

# Appendix E

## **Greenhouse Gas Worksheets**



## Santa Susana Field Laboratory Greenhouse Gas Appendix Sections & List of Tables

### Greenhouse Gas Appendix Sections

1. Factors Consistent with All sections
2. Existing Conditions
3. Unmitigated Initial Clean-up Programs
4. Unmitigated Overall Cleanup Emissions
5. Mitigated Emission Factors
6. Mitigated Initial Clean-up Programs
7. Mitigated Overall Cleanup Emissions

### List of Tables

Table	Title
1-1	Emission Factors for Commuter Trips
1-2	Emission factors for Offroad Equipment (Unadjusted Fleet)
1-3	Emission Factors for Offroad Equipment (Adjusted to Tier 3 Compliance)
1-4	Emission Factors for Onroad Vehicles (Onsite)
1-5	Emissions Per Offroad Vehicle Type per 8 Hour Work Day
1-6	Initial Clean Up Program Equipment Assumptions
1-7	Scaling for Truck Trips
1-8	Emission Factors for Fugitive Dust Emissions
1-9	Emission Factors for Haul Trucks (Offsite)
1-10	Weighted Emission Factors and Trucks per day for Initial Clean-up
1-11	Overall Cleanup Equipment Assumptions
1-12	Weighted Emission Factors and Trucks per day for Overall Cleanup
1-13	Landfill Distance by Air District
1-14	Landfill Distance by Air Basin
2-1	Existing Conditions - Boeing Commuter Emissions
2-2	Existing Conditions - DOE Commuter Emissions
2-3	Existing Conditions - NASA Commuter Emissions
2-4	Existing Conditions - Total Daily Mobile Emissions
2-5	Existing Conditions - Total Annual GHG Emissions
3-1	Summary of Initial Clean-up Emissions
3-2	Onsite Initial Clean-up Emissions
3-3	Offsite Demolition - DOE Commuter Emissions
3-4	Offsite Demolition - DOE Haul Emissions
3-5	Area IV Offsite - DOE Commuter Emissions
3-6	Area IV Offsite - DOE Haul Emissions
3-7	Liquid Oxygen Plant Offsite - NASA Commuter Emissions
3-8	Liquid Oxygen Plant Offsite - NASA Haul Truck Emissions
3-9	TTF Offsite - Boeing Commuter Emissions
3-10	TTF Offsite - Boeing Haul Emissions
3-11	RMHF/HWMF Offsite - DOE Commuter Emissions
3-12	RMHF/HWMF Offsite - DOE Haul Emissions

## List of Tables (Continued)

Table	Title
4-1	Summary of Overall Site Cleanup Emissions
4-2	Onsite Overall Cleanup Emissions
4-3	Offsite Overall - Boeing Commuter Emissions
4-4	Offsite Overall - Boeing Haul Emissions
4-5	Offsite Overall - DOE Commuter Emissions
4-6	Offsite Overall - DOE Haul Emissions
4-7	Offsite Overall - NASA Commuter Emissions
4-8	Offsite Overall - NASA Haul Emissions
4-9	Offsite Overall - Monitoring & Maintenance Commuter Emissions
5-1	Emission Factors for Offroad Equipment (Adjusted to Tier 4 Compliance)
5-2	Emission Factors for Onroad Vehicles (Onsite)
5-3	Mitigated Emissions Per Offroad Vehicle Type per 8 Hour Work Day
5-4	Mitigated Mileage and Emission Factors for Haul Trucks (offsite)
5-5	Mitigated Weighted Emission Factors and Trucks per day for Initial Clean-up
5-6	Mitigated Weighted Emission Factors and Trucks per day for Overall Clean-up
6-1	Summary of Initial Clean-up Emissions
	Offsite Demolition - Boeing Haul Emissions
6-3	Offsite Demolition - DOE Commuter Emissions
6-4	Offsite Demolition - DOE Haul Emissions
6-5	Area IV Offsite - DOE Commuter Emissions
6-6	Area IV Offsite - DOE Haul Emissions
6-7	Liquid Oxygen Plant Offsite - NASA Commuter Emissions
6-8	Liquid Oxygen Plant Offsite - NASA Haul Truck Emissions
6-9	TTF Offsite - Boeing Commuter Emissions
6-10	TTF Offsite - Boeing Haul Emissions
6-11	RMHF/HWMF Offsite - DOE Commuter Emissions
6-12	RMHF/HWMF Offsite - DOE Haul Emissions
7-1	Summary of Overall Site Cleanup Emissions
	Offsite Overall - Boeing Haul Emissions
7-3	Offsite Overall - DOE Commuter Emissions
7-4	Offsite Overall - DOE Haul Emissions
7-5	Offsite Overall - NASA Commuter Emissions
7-6	Offsite Overall - NASA Haul Emissions
7-7	Offsite Overall - Monitoring & Maintenance Commuter Emissions

## Santa Susana Field Laboratory Acronyms

<u>Acronym</u>	<u>Definition</u>
CH <sub>4</sub>	Methane
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	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 <sub>2</sub> O	Nitrogen dioxide
NEPAB	Northeast Plateau Air Basin
Non-Haz	Non-Hazardous Waste Disposal Location
NOP	Notice of Preparation
NOx	Nitrogen oxides
PM <sub>10</sub>	Particulate matter with a diameter of 10 microns or smaller
PM <sub>2.5</sub>	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 Control 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**  
**Greenhouse Gas 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	NO <sub>x</sub>	CO	SO <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	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 factors 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):**

$$E = k(sL)^{0.91}w^{1.02}$$

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

$$= 0.0022 * 0.123 * 2.936$$

$$= 7.95E-04 \text{ PM10}$$
  

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

$$= 1.95E-04 \text{ PM2.5}$$

k 0.0022 PM10 - particle size multiplier (lbs/VMT)  
k 0.00054 PM2.5 - particle size multiplier (lbs/VMT)  
sL 0.1 road surface silt loading grams per square meter (g/m<sup>2</sup>)  
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 listed 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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>
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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>		
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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub> /N <sub>2</sub> O
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 "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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>
<b>(lbs/day) per Excavation Site</b>								
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 emissions = (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 <sub>2</sub> Plant	DOE Demo	Boeing	DOE
				TTF	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
O2 Plant	3	3695	5	0.085882	9
DOE - Demo	2	788	2	0.027473	3
Boeing - Demo	1	752	0	0	0
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

69% of the trips are hazardous, the remainder are radiological.

80% of the trips are hazardous the remainder are non-hazardous.

No longer part of Initial Clean-up. Truck trips zeroed out to maintain 96 trucks per day over the whole site

- 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

	<b>PM10</b>	<b>PM2.5</b>	<b>Units</b>
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:

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

S = mean vehicle speed (mph) Default = 7.1

$F_{PM10}$  = PM<sub>10</sub> scaling factor default of 0.6

$F_{PM2.5}$  = PM<sub>2.5</sub> scaling factor default of 0.031

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

Fugitive emissions from Dozers and Excavators:

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

$C_{PM10}$  = arbitrary coefficient used by AP-42 = 1

s = material silt content = 6.9 %

M = material moisture content = 7.9%

$F_{PM10}$  = PM<sub>10</sub> scaling factor default of 0.75

$F_{PM2.5}$  = PM<sub>2.5</sub> scaling factor default of 0.105

Fugitive emissions from truck loading

$$\begin{aligned}
 PM_{10} &= k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4}) \\
 &= 0.35 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4}) \\
 &= 1.11E-04 \text{ lbs/ton} \\
 PM_{2.5} &= k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4}) \\
 &= 0.053 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4}) \\
 &= 1.68E-05 \text{ lbs/ton}
 \end{aligned}$$

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

$$\begin{aligned}
 PM_{10} &= k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4}) \\
 &= 0.35 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4}) \\
 &= 1.11E-04 \text{ lbs/ton} \\
 PM_{2.5} &= k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4}) \\
 &= 0.053 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4}) \\
 &= 1.68E-05 \text{ lbs/ton}
 \end{aligned}$$

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

$$\begin{aligned}
 PM_{10} &= k \times EF_{L,TSP} \\
 &= 0.35 \times 0.058 \\
 &= 0.020 \text{ lbs/ton}
 \end{aligned}$$

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

$EF_{L,TSP}$  = default value = 0.058 lbs/ton

$$\begin{aligned}
 PM_{2.5} &= k \times EF_{L,TSP} \\
 &= 0.053 \times 0.058 \\
 &= 0.003 \text{ lbs/ton}
 \end{aligned}$$

**Santa Susana Field Laboratory**  
**Initial Clean-up - Unmitigated**

**Onsite Fugitive Emissions**

Equations

- Emissions for graders and scrapers = Emission factor  $\times$  ((Acres / blade width of 12 ft)  $\times$  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  $\times$  hours of operation  $\times$  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  $\times$  tons of material
  - Emission factor taken from Table 1-8.
- Emissions for Excavation truck loading = EF  $\times$  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)  $\times$  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  $\times$  Number of Trucks  $\times$  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**

**Offsite Exhaust Emission Factors**

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

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

Haul Truck Emission Factors	Exhaust								Fugitive	
	ROC/VOC	NOx	CO	SO <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	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:**

$$E = k(sL)^{0.91}w^{1.02}$$

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

$$= 0.0022 * 0.123 * 26.662$$

$$= 0.007 \text{ PM10}$$
  

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

$$= 0.002 \text{ PM2.5}$$

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 surface silt loading grams per square meter (g/m<sup>2</sup>)  
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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	#/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	3	780	TTF
	Haz	2.11E-04	0.011	8.86E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.48E-05			
	Rad	2.07E-04	0.010	8.66E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.46E-05			
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	55	14,934	Area IV & HWMF
	Haz	2.13E-04	0.011	8.95E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.49E-05			
	Rad	2.10E-04	0.010	8.81E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.48E-05			
	Rad	2.10E-04	0.011	9.51E-04	3.53E-05	1.15E-04	1.10E-04	0.002	7.56E-05			
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			
	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.
- <sup>1</sup> - 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 provides 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 miles 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 day 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 Trucks	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 equipment 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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	Max Trucks	
										/day	/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 miles 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					Antelope 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**  
**Greenhouse Gas Appendix**  
**Section 2**  
**Existing Conditions**

## Santa Susana Field Laboratory Existing Conditions

**Table 2-1: Existing Conditions - Boeing Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day							CO <sub>2</sub>	CH <sub>4</sub>
				ROC/VOC	NO <sub>x</sub>	CO	SO <sub>x</sub>	PM10	PM2.5			
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 <sup>1</sup>	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 <sup>1</sup>	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	NO <sub>x</sub>	CO	SO <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	
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 <sup>1</sup>	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 <sup>1</sup>	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 provides 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 calculations

**Table 2-2: Existing Conditions - DOE Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day								
				ROC/VOC	NOx	CO	SO <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	
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 <sup>1</sup>	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 <sup>1</sup>	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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>
	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 <sup>1</sup>	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 <sup>1</sup>	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.

<sup>1</sup> 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 provides 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**

NASA

	Miles/trip	# trips	Miles	ROC/VOC	NOx	CO	SO <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>		
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 <sup>1</sup>	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 <sup>1</sup>	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 <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>	CH <sub>4</sub>		
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 <sup>1</sup>	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 <sup>1</sup>	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.

<sup>1</sup> 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 provides 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	NO <sub>x</sub>	CO	SO <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>
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 Existing Conditions

### Electrical Consumption

117,602	kWh per month		
1,411,224	kWh per year		
1,411	MWh per year		
702.43634	CO <sub>2</sub> intensity Factor	991,295 lbs/MWh CO <sub>2</sub>	991,295 lbs/MWh CO <sub>2</sub> e
0.029	CH <sub>4</sub> Intensity Factor	41 lbs/MWh CH <sub>4</sub>	1,023 lbs/MWh CO <sub>2</sub> e
0.00617	N <sub>2</sub> O Intensity Factor	9 lbs/MWh N <sub>2</sub> O	2,595 lbs/MWh CO <sub>2</sub> e
			994,913 Total Lbs/MWh CO <sub>2</sub> e
			451 Total MT CO <sub>2</sub> e

Sources: Intensity Factors: Taken from the CalEEMod model version 2016.3.1 for SCE.  
kWh per month: Taken from the Energy Section of the EIR.

Equations: (For Electrical consumptions)

kWh per year = kWh per month multiplied by 12 months per year.

MWh per year = kWh per year divided by 1,000 kilowatts per megawatt.

lbs/MWhr (per pollutant) = MWh per year multiplied by the pollutant specific carbon intensity factor.

lbs/MWhr (CO<sub>2</sub>e) = lbs/MWh multiplied by the global warming potential for each pollutant (CO = 1; CH<sub>4</sub> = 25; N<sub>2</sub>O = 298).

MT CO<sub>2</sub>e = Total lbs/MWh CO<sub>2</sub>e divided by 2004.62 metric tons per pound.

\*Note: All total values may not add directly due to rounding.

## Santa Susana Field Laboratory Existing Conditions

*Annual GHG Emissions Summary for Existing Conditions*

**Table 2-5: Existing Conditions - Total Annual GHG Emissions**

	<i>MT/year</i>			
	<b>CO<sub>2</sub></b>	<b>CH<sub>4</sub></b>	<b>N<sub>2</sub>O</b>	<b>CO<sub>2</sub>e</b>
Electrical	449.648	0.464	1.177	451.290
Boeing WC	205.794	0.008	-	205.802
DOE WC	13.191	0.001	-	13.192
NASA WC	39.573	0.002	-	39.575
<b>Total Existing</b>				<b>709.858</b>

\*WC = worker commute for this table.

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory**  
**Greenhouse Gas Appendix**  
**Section 3**  
**Unmitigated Initial Clean-up Programs**

**Santa Susana Field Laboratory  
Unmitigated GHG Emissions Summary**

Table 4-1: Summary of Overall Cleanup Emissions				
Unmitigated Overall Cleanup GHG Emissions MT/yr <sup>1</sup>				
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Overall Cleanup				
Onsite	2,236	34		2,270
Offsite	13,151	579		13,730
Overall Cleanup Per Year	15,387	613		16,000
Monitoring and Maintenance				
Mobile	711	0.028	0.000	711
Energy	450	0.464	1.177	451
Total	1,160	0.492	1.177	1,162
Maximum Project Total <sup>2</sup>				17,162
Threshold (2020)				10,000
Exceeds Threshold				Yes
*Totals may not add exactly due to rounding.				
<sup>1</sup> Assumes 96 trucks per day				
<sup>2</sup> Maximum Project Total is the sum of the monitoring and maintenance emissions plus the Overall Sources: Tables 2-5, 4-2 through 4-9. Sum of Onsite emissions plus offsite commuter and haul emissions for all activities.				

Table 3-1: Summary of Initial Clean-up Emissions				
Unmitigated Initial Project GHG Emissions MT/yr <sup>1</sup>				
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Area IV	10,596	506		11,103
Liquid Oxygen Plant	2,476	100		2,576
Demolition - DOE	1,167	38		1,205
TTF - Boeing	737	18		755
RMHF/HWMF - DOE	1,305	27		1,332
Initial Projects Total	16,280	690		<b>16,970</b>
Threshold (2020)				10,000
Exceeds Threshold				Yes
*Totals may not add exactly due to rounding.				
<sup>1</sup> Assumes 73 trucks per day				
Sources: Tables 3-2 through 3-12. Sum of Onsite emissions plus offsite commuter and haul emissions for all activities.				

\*Note Offsite emissions for the RCRA and Post Closure are included in the other activities for that RP

**Santa Susana Field Laboratory**  
**Unmitigated - Onsite Initial Clean-up - Emissions**  
**Initial Clean Up Emissions**

**Table 3-2: Onsite Initial Clean-up Emissions**

	(Lbs/day)		(MT/year)		
	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub> /N <sub>2</sub> O	CO <sub>2</sub> e
Area IV - DOE					
Exhaust	4,107	32.06	484.351	3.781	488.132
Crew	7	0.33	0.771	0.039	0.810
Haul	NC	NC	1.079	0.054	1.133
Total	4,114	32.39	485.122	3.820	488.942
Liquid Oxygen Plant - NASA					
Exhaust	4,107	32.06	484.351	3.781	488.132
Crew	7	0.33	0.771	0.039	0.810
Haul	NC	NC	0.128	0.006	0.134
Total	4,114	32.39	485.122	3.820	488.942
Demolition - DOE					
Exhaust	2,876	31.68	339.201	3.736	342.937
Crew	15	0.75	1.774	0.089	1.862
Haul	NC	NC	0.043	0.002	0.045
Total	2,891	32.43	340.975	3.825	344.800
TTF - Boeing					
Exhaust	3,339	31.83	393.832	3.754	397.585
Crew	5	0.26	0.617	0.031	0.648
Haul	NC	NC	0.043	0.002	0.045
Total	3,345	32.09	394.448	3.785	398.233
RMHF/HWMF - DOE					
Exhaust	6,679	63.66	787.663	7.508	795.171
Crew	13	0.65	1.542	0.077	1.619
Haul	NC	NC	0.071	0.004	0.075
Total	6,692	64.32	789.205	7.585	796.790

\*NC = Not Calculated

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory**  
**Unmitigated - Onsite Initial Clean-up - Emissions**  
**Initial Clean Up Emissions**

Equations

- Daily emissions (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 activity from Table 1-6.
- Daily emissions (crew (onsite worker transport)) = ((Number of Employees/15) times Emission Factor times 4 ) / 453.6
  - Number of employees per phase taken from Table 3-1.
  - **15** workers/onsite van
  - Emission Factor taken from Table 1-5
  - **4** miles/ round trip
  - 453.6 grams per pound
  - **2** trips/day
- Total Daily Emissions for each GHG is the sum of the daily exhaust, haul truck, and crew emissions.
- Annual emissions (MT/year) = (Daily Emissions \* Number of Days)/2204.623 - Exhaust and Crew
  - Daily Emissions from Table 3-3.
  - 2,204.62 lbs per Metric Ton
  - 260 days per year
- Annual emissions (haul trucks) (MT/year)
  - = (Emission Factorexhaust X number of trips X Miles ) + (Emission Factoridle \* Number of trucks \* Minutes) /1,000,000
  - 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)
  - 1,000,000 g/MT

**Santa Susana Field Laboratory  
Unmitigated - Offsite Initial Clean-up Emissions**

**Demolition Offsite Emissions - DOE**

**Table 3-3 Offsite Demolition - DOE Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	46	1,441	959	0	113.123	0.004	113.127
SCAQMD	8.68	46	399	266	0	31.351	0.001	31.352
total <sup>1</sup>	40	46	1,840	1,225	0	144.474	0.006	144.479
VCAPCD	0.42	46	19	13	0	1.517	0.000	1.517
SCAQMD	39.58	46	1,821	1,212	0	142.957	0.006	142.962
total <sup>1</sup>	40	46	1,840	1,225	0	144.474	0.006	144.479

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**Table 3-4 Offsite Demolition - DOE Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Radiological Disposal Site						
VCAPCD	0.42	1,560	655	0.991	0.050	1.041
SCAQMD	45.78	1,560	71,417	108.021	5.401	113.423
Other CA	242.6	1,560	378,456	572.433	28.622	601.055
Non-CA	48.2	1,560	75,192	113.732	5.687	119.418
Total	288.8	1,560	450,528	681.446	34.072	715.518
Maximum Emissions by Air Basin						
SCCAB	0.42	1,560	655	0.991	0.050	1.041
SCAB	45.78	1,560	71,417	108.021	5.401	113.423
SSAB	0.00	1,560	0	0.000	0.000	0.000
MDAB	198.21	1,560	309,208	467.692	23.385	491.076
SJVAB	0.00	1,560	0	0.000	0.000	0.000
GBVAB	142.64	1,560	222,518	336.570	16.829	353.399
SACVAB	0.00	1,560	0	0.000	0.000	0.000
NEPAB	0.00	1,560	0	0.000	0.000	0.000
Outside CA	670.88	1,560	1,046,573	1,582.993	79.150	1,662.143

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Unmitigated - Offsite Initial Clean-up Emissions**

**Area IV Offsite Emissions**

**Table 3-5 Area IV Offsite - DOE Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	20	626	417.05	0.02	49.184	0.002	49.186
SCAQMD	8.68	20	174	115.58	0.00	13.631	0.001	13.631
total <sup>1</sup>	40	20	800	532.63	0.02	62.815	0.002	62.817
VCAPCD	0.42	20	8	5.59	0.00	0.660	0.000	0.660
SCAQMD	39.58	20	792	527.03	0.02	62.155	0.002	62.158
total <sup>1</sup>	40	20	800	532.63	0.02	62.815	0.002	62.817

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**Table 3-6 Area IV Offsite - DOE Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Radiological Disposal Site						
VCAPCD	0.42	11,211	4,709	7.042	0.352	7.394
SCAQMD	45.78	11,211	513,249	767.567	38.378	805.946
Other CA	242.6	11,211	2,719,837	4,067.537	203.377	4,270.913
Other Non-CA	48.2	11,211	540,380	808.142	40.407	848.549
Total	288.8	11,211	3,237,795	4,842.146	242.107	5,084.253
Hazardous Waste Disposal Site						
VCAPCD	0.42	27,789	11,671	17.494	0.875	18.368
SCAQMD	124.58	27,789	3,461,929	5,188.905	259.445	5,448.351
Other CA	0	27,789	0	0.000	0.000	0.000
Other Non-CA	0	27,789	0	0.000	0.000	0.000
Total	125	27,789	3,473,600	5,206.399	260.320	5,466.719
Maximum Emissions by Air Basin						
SCCAB	0.42	39,000	16,380	24.551	1.228	25.779
SCAB	124.58	39,000	4,858,620	7,282.333	364.117	7,646.450
SSAB	103	39,000	4,017,000	6,020.873	301.044	6,321.917
MDAB	198.21	39,000	7,730,190	11,586.381	579.319	12,165.700
SJVAB	57	39,000	2,223,000	3,331.939	166.597	3,498.536
GBVAB	142.64	39,000	5,562,960	8,338.032	416.902	8,754.934
SACVAB	0	39,000	0	0.000	0.000	0.000
NEPAB	0	39,000	0	0.000	0.000	0.000
Outside CA	670.88	39,000	26,164,320	39,216.342	1,960.817	41,177.159

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory**  
**Unmitigated - Offsite Initial Clean-up Emissions**

**Liquid Oxygen Plant Offsite Emissions**

**Table 3-7 Liquid Oxygen Plant Offsite - NASA Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	20	626	417.05	0.02	49.184	0.002	49.186
SCAQMD	8.68	20	174	115.58	0.00	13.631	0.001	13.631
total <sup>1</sup>	40	20	800	532.63	0.02	62.815	0.002	62.817
VCAPCD	0.42	20	8	5.59	0.00	0.660	0.000	0.660
SCAQMD	39.58	20	792	527.03	0.02	62.155	0.002	62.158
total <sup>1</sup>	40	20	800	532.63	0.02	62.815	0.002	62.817

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**Table 3-8 Liquid Oxygen Plant Offsite - NASA Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Non-hazardous Waste Disposal Site						
VCAPCD	10.29	520	5,351	8.093	0.405	8.498
SCAQMD	53.58	520	27,862	42.142	2.107	44.249
Other CA	34.13	520	17,748	26.844	1.342	28.186
Other Non-CA	0	520	0	0.000	0.000	0.000
Total	98	520	50,960	77.080	3.854	80.933
Hazardous Waste Disposal Site						
VCAPCD	0.42	4,160	1,747	2.613	0.131	2.744
SCAQMD	124.58	4,160	518,253	775.196	38.760	813.956
Other CA	172.39	4,160	717,142	1,072.693	53.635	1,126.328
Other Non-CA	26.61	4,160	110,698	165.580	8.279	173.859
Total	297.39	4,160	1,237,142	1,850.503	92.525	1,943.028
Maximum Emissions by Air Basin						
SCCAB	0.42	4,680	1,966	2.973	0.149	3.122
SCAB	124.58	4,680	583,034	881.868	44.093	925.962
SSAB	48.4	4,680	226,512	342.611	17.131	359.741
MDAB	123.99	4,680	580,273	877.692	43.885	921.576
SJVAB	0	4,680	0	0.000	0.000	0.000
GBVAB	131.4	4,680	614,952	930.145	46.507	976.652
SACVAB	0	4,680	0	0.000	0.000	0.000
NEPAB	0	4,680	0	0.000	0.000	0.000
Outside CA	26.61	4,680	124,535	188.365	9.418	197.783

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory**  
**Unmitigated - Offsite Initial Clean-up Emissions**

**TTF Offsite -Boeing**

**Table 3-9 TTF Offsite - Boeing Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	16	501	333.64	0.01	39.347	0.002	39.349
SCAQMD	8.68	16	139	92.46	0.00	10.905	0.000	10.905
total <sup>1</sup>	40	16	640	426.10	0.02	50.252	0.002	50.254
VCAPCD	0.42	16	7	4.47	0.00	0.528	0.000	0.528
SCAQMD	39.58	16	633	421.63	0.02	49.724	0.002	49.726
total <sup>1</sup>	40	16	640	426.10	0.02	50.252	0.002	50.254

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**Table 3-10 TTF Offsite - Boeing Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Hazardous Waste Disposal Site						
VCAPCD	0.42	1,560	655	0.981	0.049	1.030
SCAQMD	124.58	1,560	194,345	290.859	14.543	305.402
Other CA	0	1,560	0	0.000	0.000	0.000
Other Non-CA	0	1,560	0	0.000	0.000	0.000
Total	125	1,560	195,000	291.839	14.592	306.431
Radiological Disposal Site						
VCAPCD	0.42	0	0	0.000	0.000	0.000
SCAQMD	45.78	0	0	0.000	0.000	0.000
Other CA	242.6	0	0	0.000	0.000	0.000
Other Non-CA	48.2	0	0	0.000	0.000	0.000
Total	288.8	0	0	0.000	0.000	0.000
Maximum Emissions by Air Basin						
SCCAB	0.42	1,560	655	0.981	0.049	1.030
SCAB	92.52	1,560	144,331	216.008	10.800	226.808
SSAB	0.00	1,560	0	0.000	0.000	0.000
MDAB	198.21	1,560	309,208	462.764	23.138	485.902
SJVAB	297.36	1,560	463,882	694.251	34.713	728.963
GBVAB	156.57	1,560	244,249	365.546	18.277	383.824
SACVAB	227.09	1,560	354,260	530.190	26.510	556.700
NEPAB	65.74	1,560	102,554	153.484	7.674	161.158
Outside CA	862.88	1,560	1,346,093	2,014.579	100.729	2,115.308

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory**  
**Unmitigated - Offsite Initial Clean-up Emissions**

**RMHF/HWMF - DOE**

**Table 3-11 RMHF/HWMF - DOE Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	40	1,253	834.09	0.03	98.37	0.00	98.37
SCAQMD	8.68	40	347	231.16	0.01	27.26	0.00	27.26
total <sup>1</sup>	40	40	1,600	1065.25	0.04	125.63	0.00	125.63
VCAPCD	0.42	40	17	11.19	0.00	1.32	0.00	1.32
SCAQMD	39.58	40	1,583	1054.07	0.04	124.31	0.00	124.32
total <sup>1</sup>	40	40	1,600	1065.25	0.04	125.63	0.00	125.63

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**RMHF/HWMF - DOE**

**Table 3-12 RMHF/HWMF - DOE Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Hazardous Waste Disposal Site						
VCAPCD	0.42	2,080	874	1.309	0.065	1.375
SCAQMD	124.58	2,080	259,126	388.391	19.420	407.811
Other CA	0	2,080	0	0.000	0.000	0.000
Other Non-CA	0	2,080	0	0.000	0.000	0.000
Total	125	2,080	260,000	389.701	19.485	409.186
Radiological Disposal Site						
VCAPCD	0.42	0	0	0.000	0.000	0.000
SCAQMD	45.78	0	0	0.000	0.000	0.000
Other CA	242.6	0	0	0.000	0.000	0.000
Other Non-CA	48.2	0	0	0.000	0.000	0.000
Total	288.8	0	0	0.000	0.000	0.000
Maximum Emissions by Air Basin						
SCCAB	0.42	2,080	874	1.309	0.065	1.375
SCAB	124.58	2,080	259,126	388.391	19.420	407.811
SSAB	103.00	2,080	214,240	321.113	16.056	337.169
MDAB	198.21	2,080	412,277	617.940	30.897	648.837
SJVAB	57.00	2,080	118,560	177.703	8.885	186.589
GBVAB	142.64	2,080	296,691	444.695	22.235	466.930
SACVAB	0.00	2,080	0	0.000	0.000	0.000
NEPAB	0.00	2,080	0	0.000	0.000	0.000
Outside CA	670.88	2,080	1,395,430	2,091.538	104.577	2,196.115

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory**  
**Greenhouse Gas Appendix**  
**Section 4**  
**Unmitigated Overall Cleanup Emissions**

**Santa Susana Field Laboratory  
Unmitigated GHG Emissions Summary**

<b>Table 4-1: Summary of Overall Cleanup Emissions</b>				
<b>Unmitigated Overall Cleanup GHG Emissions MT/yr<sup>1</sup></b>				
	<b>CO<sub>2</sub></b>	<b>CH<sub>4</sub></b>	<b>N<sub>2</sub>O</b>	<b>CO<sub>2</sub>e</b>
<b>Overall Cleanup</b>				
Onsite	2,236	34		2,270
Offsite	13,151	579		13,730
<b>Overall Cleanup Per Year</b>	<b>15,387</b>	<b>613</b>		<b>16,000</b>
<b>Monitoring and Maintenance</b>				
Mobile	711	0.028	0.000	711
Energy	450	0.464	1.177	451
<b>Total</b>	<b>1,160</b>	<b>0.492</b>	<b>1.177</b>	<b>1,162</b>
<b>Maximum Project Total<sup>2</sup></b>				<b>17,162</b>
<b>Threshold (2020)</b>				<b>10,000</b>
<b>Exceeds Threshold</b>				<b>Yes</b>
*Totals may not add exactly due to rounding.				
<sup>1</sup> Assumes 96 trucks per day				
<sup>2</sup> Maximum Project Total is the sum of the monitoring and maintenance emissions plus the Overall Sources: Tables 2-5, 4-2 through 4-9. Sum of Onsite emissions plus offsite commuter and haul emissions for all activities.				

<b>Table 3-1: Summary of Initial Clean-up Emissions</b>				
<b>Unmitigated Initial Project GHG Emissions MT/yr<sup>1</sup></b>				
	<b>CO<sub>2</sub></b>	<b>CH<sub>4</sub></b>	<b>N<sub>2</sub>O</b>	<b>CO<sub>2</sub>e</b>
Area IV	10,596	506		11,103
Liquid Oxygen Plant	2,476	100		2,576
Demolition - DOE	1,167	38		1,205
TTF - Boeing	737	18		755
RMHF/HWMF - DOE	1,305	27		1,332
<b>Initial Projects Total</b>	<b>16,280</b>	<b>690</b>		<b>16,970</b>
<b>Threshold (2020)</b>				<b>10,000</b>
<b>Exceeds Threshold</b>				<b>Yes</b>
*Totals may not add exactly due to rounding.				
<sup>1</sup> Assumes 73 trucks per day				
Sources: Tables 3-2 through 3-12. Sum of Onsite emissions plus offsite commuter and haul emissions for all activities.				

\*Note Offsite emissions for the RCRA and Post Closure are included in the other activities for that RP

**Santa Susana Field Laboratory**  
**Unmitigated - Onsite Overall Cleanup Emissions**

**Overall Cleanup Emissions**

**Table 4-2: Onsite Overall Cleanup Emissions**

	(Lbs/day)		(MT/year)		
	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub> /N <sub>2</sub> O	CO <sub>2</sub> e
Boeing					
Exhaust	7,807	95	920.693	11.183	931.877
Haul Trucks	N/C	N/C	99.657	4.983	104.640
Crew	49.04	2.45	5.783	0.289	6.073
Total	7,856	97	1,026.134	16.455	1,042.589
DOE					
Exhaust	4,280	32	504.751	3.787	508.538
Haul Trucks	N/C	N/C	99.657	4.983	104.640
Crew	19.62	0.98	2.313	0.116	2.429
Total	4,300	33	606.721	8.886	615.607
NASA					
Exhaust	4,280	32	504.751	3.787	508.538
Haul Trucks	N/C	N/C	95.966	4.798	100.764
Crew	19.62	0.98	2.313	0.116	2.429
Total	4,300	33	603.030	8.701	611.731

\*Totals may not add exactly due to rounding.

- Equations
- Daily emissions (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 activity from Table 1-11.
  - Daily emissions (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 sum of the daily exhaust, haul truck, and crew emissions.
  - Annual emissions (MT/year) = (Daily Emissions \* Number of Days)/2204.623 - For Exhaust and Crew emissions
    - Daily Emissions from Table 4-6.
    - 2,204.62 lbs per Metric Ton
    - 260 days per year
  - Annual emissions (haul trucks) (MT/year)
    - = (Emission Factorexhaust X number of trips X Miles ) + (Emission Factoridle \* Number of trucks \* Minutes ) /1,000,000
    - 20,800 trucks per year per year for the site (See Table 1-11).
    - **15** minutes idling per truck (- assumes idling entering the site, at the loading location, and leaving the site)
    - 1,000,000.00 g/metric ton
    - 260 days per year
    - Emission Factors from Table 1-4.
    - **4** miles/ round trip

**Santa Susana Field Laboratory  
Unmitigated - Offsite Program Emissions**

**Boeing**

**Table 4-3: Offsite Overall - Boeing Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	300	9,396	6,256	0.25	737.758	0.029	737.787
SCAQMD	8.68	300	2,604	1,734	0.07	204.462	0.008	204.470
total <sup>1</sup>	40	300	12,000	7,989	0.32	942.220	0.037	942.257
VCAPCD	0.42	300	126	84	0.00	9.893	0.000	9.894
SCAQMD	39.58	300	11,874	7,905	0.31	932.327	0.037	932.364
total <sup>1</sup>	40	300	12,000	7,989	0.32	942.220	0.037	942.257

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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  
Unmitigated - Offsite Program Emissions**

**Table 4-4: Offsite Overall - Boeing Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Non-Hazardous						
VCAPCD	10.29	11,158	114,813	173.252	8.663	181.915
SCAQMD	67.58	11,158	754,037	1,137.840	56.892	1,194.732
Other CA	37.13	11,158	414,285	625.156	31.258	656.413
Non-CA	0	11,158	0	0.000	0.000	0.000
total1	115	11,158	1,283,136	1,936.248	96.812	2,033.060
Hazardous						
VCAPCD	0.42	2,255	947	1.417	0.071	1.488
SCAQMD	124.58	2,255	280,878	420.365	21.018	441.383
Other CA	166	2,255	374,263	560.127	28.006	588.133
Non-CA	0	2,255	0	0.000	0.000	0.000
total1	291	2,255	656,088	981.909	49.095	1,031.005
Radiological Soil						
VCAPCD	0.42	628	264	0.393	0.020	0.413
SCAQMD	92.52	628	58,075	86.642	4.332	90.974
Other CA	162.93	628	102,271	152.578	7.629	160.207
Non-CA	442.13	628	277,525	414.038	20.702	434.740
total1	698	628	160,610	239.613	11.981	251.593
Total Emissions						
VCAPCD			116,023	175.063	8.753	183.816
SCAQMD			1,092,990	1,644.847	82.242	1,727.089
Other CA			890,820	1,337.860	66.893	1,404.753
Non-CA			277,525	414.038	20.702	434.740
total1			2,099,834	3,157.770	157.888	3,315.658
Maximum Emissions By Air Basin						
SCCAB	10.29	14,040	144,472	218.007	10.900	228.908
SCAB	124.58	14,040	1,749,103	2,639.392	131.970	2,771.361
SSAB	48.40	14,040	679,536	1,025.418	51.271	1,076.689
MDAB	198.21	14,040	2,782,868	4,199.340	209.967	4,409.307
SJVAB	297.36	14,040	4,174,934	6,299.964	314.998	6,614.962
GBVAB	156.57	14,040	2,198,243	3,317.142	165.857	3,482.999
SACVAB	227.09	14,040	3,188,344	4,811.201	240.560	5,051.761
NEPAB	65.74	14,040	922,990	1,392.789	69.639	1,462.428
Outside CA	1495.00	14,040	20,989,800	31,673.547	1,583.677	33,257.224

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Unmitigated - Offsite Program Emissions**

DOE

**Table 4-5: Offsite Overall - DOE Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	100	3,132	2,085	0.08	245.919	0.010	245.929
SCAQMD	8.68	100	868	578	0.02	68.154	0.003	68.157
total <sup>1</sup>	40	100	4,000	2,663	0.11	314.073	0.012	314.086
VCAPCD	0.42	100	42	28	0.00	3.298	0.000	3.298
SCAQMD	39.58	100	3,958	2,635	0.10	310.776	0.012	310.788
total <sup>1</sup>	40	100	4,000	2,663	0.11	314.073	0.012	314.086

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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  
Unmitigated - Offsite Program Emissions**

DOE

**Table 4-6: Offsite Overall - DOE Haul Emissions**

	Miles/trip	Trips	Miles	MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Non-Hazardous						
VCAPCD	0.42	12,483	5,243	7.903	0.395	8.298
SCAQMD	67.58	12,483	843,578	1,271.574	63.579	1,335.153
Other CA	57	12,483	711,511	1,072.503	53.625	1,126.128
Non-CA	0	12,483	0	0.000	0.000	0.000
total1	125	12,483	1,560,331	2,351.979	117.599	2,469.578
Hazardous						
VCAPCD	0.42	545	229	0.343	0.017	0.360
SCAQMD	124.58	545	67,926	101.811	5.091	106.902
Other CA	103	545	56,160	84.175	4.209	88.384
Non-CA	0	545	0	0.000	0.000	0.000
total1	228	545	124,315	186.330	9.316	195.646
Radiological Soil						
VCAPCD	0.42	1,012	425	0.636	0.032	0.668
SCAQMD	45.78	1,012	46,334	69.293	3.465	72.758
Other CA	242.6	1,012	245,537	367.203	18.360	385.563
Non-CA	48.2	1,012	48,784	72.956	3.648	76.604
total1	337	1,012	292,296	437.132	21.857	458.988
Total Emissions						
VCAPCD			5,897	8.882	0.444	9.326
SCAQMD			957,838	1,442.679	72.134	1,514.812
Other CA			1,013,208	1,523.880	76.194	1,600.074
Non-CA			48,784	72.956	3.648	76.604
total1			2,025,727	2,975.441	148.772	3,124.213
Maximum Emissions By Air Basin						
SCCAB	17.84	14,040	250,474	377.554	18.878	396.431
SCAB	124.58	14,040	1,749,103	2,636.526	131.826	2,768.353
SSAB	138.00	14,040	1,937,520	2,920.538	146.027	3,066.565
MDAB	198.21	14,040	2,782,868	4,194.781	209.739	4,404.520
SJVAB	71.00	14,040	996,840	1,502.596	75.130	1,577.725
GBVAB	142.64	14,040	2,002,666	3,018.736	150.937	3,169.673
SACVAB	0.00	14,040	0	0.000	0.000	0.000
NEPAB	0.00	14,040	0	0.000	0.000	0.000
Outside CA	670.88	14,040	9,419,155	14,198.047	709.902	14,907.950

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Unmitigated - Offsite Program Emissions**

NASA

**Table 4-7: Offsite Overall - NASA Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	100	3,132	2,085	0.08	245.919	0.010	245.929
SCAQMD	8.68	100	868	578	0.02	68.154	0.003	68.157
total <sup>1</sup>	40	100	4,000	2,663	0.11	314.073	0.012	314.086
VCAPCD	0.42	100	42	28	0.00	3.298	0.000	3.298
SCAQMD	39.58	100	3,958	2,635	0.10	310.776	0.012	310.788
total <sup>1</sup>	40	100	4,000	2,663	0.11	314.073	0.012	314.086

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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  
Unmitigated - Offsite Program Emissions**

NASA

Table 4-8: Offsite Overall - NASA Haul Emissions

	Miles/trip	Trips	Miles	MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Non-Hazardous						
VCAPCD	10.29	2,299	23,657	35.782	1.789	37.571
SCAQMD	53.58	2,299	123,180	186.316	9.316	195.632
Other CA	34.13	2,299	78,465	118.682	5.934	124.616
Non-CA	0	2,299	0	0.000	0.000	0.000
total1	98	2,299	225,302	340.780	17.039	357.819
Hazardous						
VCAPCD	0.42	10,816	4,543	6.871	0.344	7.215
SCAQMD	124.58	10,816	1,347,457	2,038.096	101.905	2,140.000
Other CA	172.39	10,816	1,864,570	2,820.254	141.013	2,961.267
Non-CA	26.61	10,816	287,814	435.333	21.767	457.099
total1	324	10,816	3,216,570	4,865.221	243.261	5,108.482
Radiological Soil						
VCAPCD	0.42	405	170	0.254	0.013	0.267
SCAQMD	92.52	405	37,471	56.049	2.802	58.851
Other CA	305.57	405	123,757	185.115	9.256	194.370
Non-CA	299.49	405	121,295	181.431	9.072	190.503
total1	698	405	161,398	241.418	12.071	253.488
Total Emissions						
VCAPCD			28,369	42.907	2.145	45.053
SCAQMD			1,508,108	2,280.460	114.023	2,394.483
Other CA			2,066,792	3,124.051	156.203	3,280.253
Non-CA			409,109	616.764	30.838	647.602
total1			3,603,270	5,447.418	272.371	5,719.789
Maximum Emissions By Air Basin						
SCCAB	0.42	13,520	5,678	8.589	0.429	9.018
SCAB	124.58	13,520	1,684,322	2,547.619	127.381	2,675.000
SSAB	48.40	13,520	654,368	989.764	49.488	1,039.252
MDAB	198.21	13,520	2,679,799	4,053.328	202.666	4,255.995
SJVAB	297.36	13,520	4,020,307	6,080.913	304.046	6,384.959
GBVAB	156.57	13,520	2,116,826	3,201.804	160.090	3,361.895
SACVAB	227.09	13,520	3,070,257	4,643.915	232.196	4,876.111
NEPAB	65.74	13,520	888,805	1,344.361	67.218	1,411.579
Outside CA	862.88	13,520	11,666,138	17,645.608	882.280	18,527.889

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Unmitigated - Offsite Program Emissions**

**Monitoring & Maintenance**

**Table 4-9: Offsite Overall - Monitoring and Maintenance Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	144	4,510	3,003	0.12	354.124	0.014	354.138
SCAQMD	8.68	144	1,250	832	0.03	98.142	0.004	98.146
total <sup>1</sup>	40	144	5,760	3,835	0.15	452.266	0.018	452.284
VCAPCD	0.42	144	60	40	0.00	4.749	0.000	4.749
SCAQMD	39.58	144	5,700	3,795	0.15	447.517	0.018	447.535
total <sup>1</sup>	40	144	5,760	3,835	0.15	452.266	0.018	452.284

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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**  
**Greenhouse Gas 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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>		
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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub> /N <sub>2</sub> O
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 "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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>
	(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 emissions = (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)**

Haul Truck Emission Factors	Exhaust								Fugitive	
	ROC/VOC	NOx	CO	SO <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	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:**

$$E = k(sL)^{0.91}xW^{1.02}$$

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

$$= 0.0022 * 0.123 * 26.662$$

$$= 0.007 \text{ PM10}$$
  

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

$$= 0.002 \text{ PM2.5}$$

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 surface silt loading grams per square meter (g/m<sup>2</sup>)  
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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	#/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	3	780	TTF
	Haz	5.88E-05	0.001	3.69E-04	3.53E-05	9.04E-06	8.65E-06	0.001	6.73E-05			
	Rad	5.69E-05	0.001	3.45E-04	3.53E-05	9.01E-06	8.62E-06	0.001	6.71E-05			
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	55	14,934	Area IV & HWMF
	Haz	5.97E-05	0.001	3.80E-04	3.53E-05	9.05E-06	8.66E-06	0.001	6.74E-05			
	Rad	5.83E-05	0.001	3.63E-04	3.53E-05	9.03E-06	8.64E-06	0.001	6.73E-05			
NASA	Non-Haz	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
	Haz	6.51E-05	0.001	4.49E-04	3.53E-05	9.12E-06	8.72E-06	0.001	6.80E-05			
	Max	5.84E-05	0.001	3.65E-04	3.53E-05	9.03E-06	8.64E-06	0.001	6.73E-05			
		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
										8	2,080	Liquid O2

- 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.
- <sup>1</sup> - 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 provides 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 miles 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 day 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 <sub>x</sub>	PM10	PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	Max Trucks	
										/day	/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 miles 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**  
**Greenhouse Gas Appendix**  
**Section 6**  
**Mitigated Initial Clean-up Programs**

## Santa Susana Field Laboratory Mitigated GHG Emissions Summary

Table 7-1: Summary of Overall Cleanup Emissions				
Unmitigated Overall Cleanup GHG Emissions MT/yr <sup>1</sup>				
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Overall Cleanup				
Onsite	2,122	28		2,150
Offsite	11,980	521		12,501
Overall Cleanup Per Year	14,102	549		14,651
Monitoring and Maintenance				
Mobile	711	0.028	0.000	711
Energy	450	0.464	1.177	451
Total	1,160	0.492	1.177	1,162
Maximum Project Total <sup>2</sup>				15,813
Threshold (2020)				10,000
Exceeds Threshold				Yes
*Totals may not add exactly due to rounding.				
<sup>1</sup> Assumes 96 trucks per day				
<sup>2</sup> Maximum Project Total is the sum of the monitoring and maintenance emissions plus the Overall Sources: Tables 2-5, 7-2 through 7-9. Sum of Onsite emissions plus offsite commuter and haul emissions for all activities.				

Table 6-1: Summary of Initial Clean-up Emissions				
Unmitigated Initial Project GHG Emissions MT/yr <sup>1</sup>				
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Area IV	9,574	455		10,029
Liquid Oxygen Plant	2,269	90		2,359
Demolition - DOE	1,085	34		1,119
TTF - Boeing	695	16		711
RMHF/HWMF - DOE	1,240	24		1,264
Initial Projects Total	14,863	619		<b>15,482</b>
Threshold (2020)				10,000
Exceeds Threshold				Yes
*Totals may not add exactly due to rounding.				
<sup>1</sup> Assumes 73 trucks per day				
Sources: Tables 6-2 through 6-12. Sum of Onsite emissions plus offsite commuter and haul emissions for all activities.				

\*Note Offsite emissions for the RCRA and Post Closure are included in the other activities for that RP

**Santa Susana Field Laboratory**  
**Mitigated - Onsite Initial Clean-up - Emissions**  
**Initial Clean Up Emissions**

**Table 6-2: Onsite Initial Clean-up Emissions**

	(Lbs/day)		(MT/year)		
	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub> /N <sub>2</sub> O	CO <sub>2</sub> e
Area IV - DOE					
Exhaust	3,999	26.67	471.625	3.145	474.770
Crew	7	0.33	0.771	0.039	0.810
Haul	NC	NC	0.894	0.045	0.938
Total	4,006	26.99	472.396	3.184	475.580
Liquid Oxygen Plant - NASA					
Exhaust	3,999	26.67	471.625	3.145	474.770
Crew	7	0.33	0.771	0.039	0.810
Haul	NC	NC	0.106	0.005	0.111
Total	4,006	26.99	472.396	3.184	475.580
Demolition - DOE					
Exhaust	2,768	26.28	326.476	3.100	329.575
Crew	15	0.75	1.774	0.089	1.862
Haul	NC	NC	0.035	0.002	0.037
Total	2,783	27.04	328.249	3.188	331.438
TTF - Boeing					
Exhaust	3,232	26.44	381.106	3.118	384.224
Crew	5	0.26	0.617	0.031	0.648
Haul	NC	NC	0.035	0.002	0.037
Total	3,237	26.70	381.723	3.149	384.871
RMHF/HWMF - DOE					
Exhaust	6,463	52.87	762.212	6.235	768.447
Crew	13	0.65	1.542	0.077	1.619
Haul	NC	NC	0.059	0.003	0.062
Total	6,476	53.53	763.754	6.313	770.067

\*NC = Not Calculated

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory**  
**Mitigated - Onsite Initial Clean-up - Emissions**  
**Initial Clean Up Emissions**

Equations

- Daily emissions (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 activity from Table 1-6.
- Daily emissions (crew (onsite worker transport)) = ((Number of Employees/15) times Emission Factor times 4 ) / 453.6
  - Number of employees per phase taken from Table 3-1.
  - **15** workers/onsite van
  - Emission Factor taken from Table 1-5
  - **4** miles/ round trip
  - 453.6 grams per pound
  - **2** trips/day
- Total Daily Emissions for each GHG is the sum of the daily exhaust, haul truck, and crew emissions.
- Annual emissions (MT/year) = (Daily Emissions \* Number of Days)/2204.623 - Exhaust and Crew
  - Daily Emissions from Table 3-3.
  - 2,204.62 lbs per Metric Ton
  - 260 days per year
- Annual emissions (haul trucks) (MT/year)
  - = (Emission Factorexhaust X number of trips X Miles ) + (Emission Factoridle \* Number of trucks \* Minutes) /1,000,000
  - 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)
  - 1,000,000 g/MT

**Santa Susana Field Laboratory  
Mitigated - Offsite Initial Clean-up Emissions**

**Demolition Offsite Emissions - DOE**

**Table 6-3 Offsite Demolition - DOE Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	46	1,441	959	0	113.123	0.004	113.127
SCAQMD	8.68	46	399	266	0	31.351	0.001	31.352
total <sup>1</sup>	40	46	1,840	1,225	0	144.474	0.006	144.479
VCAPCD	0.42	46	19	13	0	1.517	0.000	1.517
SCAQMD	39.58	46	1,821	1,212	0	142.957	0.006	142.962
total <sup>1</sup>	40	46	1,840	1,225	0	144.474	0.006	144.479

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**Table 6-4 Offsite Demolition - DOE Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Radiological Disposal Site						
VCAPCD	0.42	1,560	655	0.891	0.045	0.935
SCAQMD	45.78	1,560	71,417	97.074	4.854	101.927
Other CA	242.6	1,560	378,456	514.418	25.721	540.139
Non-CA	48.2	1,560	75,192	102.205	5.110	107.315
Total	288.8	1,560	450,528	612.382	30.619	643.001
Maximum Emissions by Air Basin						
SCCAB	0.42	1,560	655	0.891	0.045	0.935
SCAB	45.78	1,560	71,417	97.074	4.854	101.927
SSAB	0.00	1,560	0	0.000	0.000	0.000
MDAB	198.21	1,560	309,208	420.292	21.015	441.307
SJVAB	0.00	1,560	0	0.000	0.000	0.000
GBVAB	142.64	1,560	222,518	302.459	15.123	317.582
SACVAB	0.00	1,560	0	0.000	0.000	0.000
NEPAB	0.00	1,560	0	0.000	0.000	0.000
Outside CA	670.88	1,560	1,046,573	1,422.559	71.128	1,493.687

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Mitigated - Offsite Initial Clean-up Emissions**

**Area IV Offsite Emissions**

**Table 6-5 Area IV Offsite - DOE Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	20	626	417.05	0.02	49.184	0.002	49.186
SCAQMD	8.68	20	174	115.58	0.00	13.631	0.001	13.631
total <sup>1</sup>	40	20	800	532.63	0.02	62.815	0.002	62.817
VCAPCD	0.42	20	8	5.59	0.00	0.660	0.000	0.660
SCAQMD	39.58	20	792	527.03	0.02	62.155	0.002	62.158
total <sup>1</sup>	40	20	800	532.63	0.02	62.815	0.002	62.817

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**Table 6-6 Area IV Offsite - DOE Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Radiological Disposal Site						
VCAPCD	0.42	11,211	4,709	6.335	0.317	6.652
SCAQMD	45.78	11,211	513,249	690.534	34.527	725.060
Other CA	242.6	11,211	2,719,837	3,659.315	182.966	3,842.281
Other Non-CA	48.2	11,211	540,380	727.036	36.352	763.388
Total	288.8	11,211	3,237,795	4,356.184	217.809	4,573.993
Hazardous Waste Disposal Site						
VCAPCD	0.42	27,789	11,671	15.734	0.787	16.521
SCAQMD	124.58	27,789	3,461,929	4,667.128	233.356	4,900.485
Other CA	0	27,789	0	0.000	0.000	0.000
Other Non-CA	0	27,789	0	0.000	0.000	0.000
Total	125	27,789	3,473,600	4,682.863	234.143	4,917.006
Maximum Emissions by Air Basin						
SCCAB	0.42	39,000	16,380	22.082	1.104	23.186
SCAB	124.58	39,000	4,858,620	6,550.049	327.502	6,877.552
SSAB	103	39,000	4,017,000	5,415.436	270.772	5,686.208
MDAB	198.21	39,000	7,730,190	10,421.297	521.065	10,942.362
SJVAB	57	39,000	2,223,000	2,996.892	149.845	3,146.737
GBVAB	142.64	39,000	5,562,960	7,499.591	374.980	7,874.570
SACVAB	0	39,000	0	0.000	0.000	0.000
NEPAB	0	39,000	0	0.000	0.000	0.000
Outside CA	670.88	39,000	26,164,320	35,272.893	1,763.645	37,036.537

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Mitigated - Offsite Initial Clean-up Emissions**

**Liquid Oxygen Plant Offsite Emissions**

**Table 6-7 Liquid Oxygen Plant Offsite - NASA Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	20	626	417.05	0.02	49.184	0.002	49.186
SCAQMD	8.68	20	174	115.58	0.00	13.631	0.001	13.631
total <sup>1</sup>	40	20	800	532.63	0.02	62.815	0.002	62.817
VCAPCD	0.42	20	8	5.59	0.00	0.660	0.000	0.660
SCAQMD	39.58	20	792	527.03	0.02	62.155	0.002	62.158
total <sup>1</sup>	40	20	800	532.63	0.02	62.815	0.002	62.817

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**Table 6-8 Liquid Oxygen Plant Offsite - NASA Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Non-hazardous Waste Disposal Site						
VCAPCD	10.29	520	5,351	7.273	0.364	7.637
SCAQMD	53.58	520	27,862	37.871	1.894	39.765
Other CA	34.13	520	17,748	24.124	1.206	25.330
Other Non-CA	0	520	0	0.000	0.000	0.000
Total	98	520	50,960	69.268	3.463	72.731
Hazardous Waste Disposal Site						
VCAPCD	0.42	4,160	1,747	2.351	0.118	2.469
SCAQMD	124.58	4,160	518,253	697.384	34.869	732.253
Other CA	172.39	4,160	717,142	965.019	48.251	1,013.270
Other Non-CA	26.61	4,160	110,698	148.960	7.448	156.408
Total	297.39	4,160	1,237,142	1,664.754	83.238	1,747.992
Maximum Emissions by Air Basin						
SCCAB	0.42	4,680	1,966	2.672	0.134	2.805
SCAB	124.58	4,680	583,034	792.492	39.625	832.117
SSAB	48.4	4,680	226,512	307.888	15.394	323.282
MDAB	123.99	4,680	580,273	788.739	39.437	828.176
SJVAB	0	4,680	0	0.000	0.000	0.000
GBVAB	131.4	4,680	614,952	835.876	41.794	877.670
SACVAB	0	4,680	0	0.000	0.000	0.000
NEPAB	0	4,680	0	0.000	0.000	0.000
Outside CA	26.61	4,680	124,535	169.275	8.464	177.738

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Mitigated - Offsite Initial Clean-up Emissions**

**TTF Offsite -Boeing**

**Table 6-9 TTF Offsite - Boeing Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	16	501	333.64	0.01	39.347	0.002	39.349
SCAQMD	8.68	16	139	92.46	0.00	10.905	0.000	10.905
total <sup>1</sup>	40	16	640	426.10	0.02	50.252	0.002	50.254
VCAPCD	0.42	16	7	4.47	0.00	0.528	0.000	0.528
SCAQMD	39.58	16	633	421.63	0.02	49.724	0.002	49.726
total <sup>1</sup>	40	16	640	426.10	0.02	50.252	0.002	50.254

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**Table 6-10 TTF Offsite - Boeing Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Hazardous Waste Disposal Site						
VCAPCD	0.42	1,560	655	0.882	0.044	0.926
SCAQMD	124.58	1,560	194,345	261.649	13.082	274.732
Other CA	0	1,560	0	0.000	0.000	0.000
Other Non-CA	0	1,560	0	0.000	0.000	0.000
Total	125	1,560	195,000	262.531	13.127	275.658
Radiological Disposal Site						
VCAPCD	0.42	0	0	0.000	0.000	0.000
SCAQMD	45.78	0	0	0.000	0.000	0.000
Other CA	242.6	0	0	0.000	0.000	0.000
Other Non-CA	48.2	0	0	0.000	0.000	0.000
Total	288.8	0	0	0.000	0.000	0.000
Maximum Emissions by Air Basin						
SCCAB	0.42	1,560	655	0.882	0.044	0.926
SCAB	92.52	1,560	144,331	194.315	9.716	204.031
SSAB	0.00	1,560	0	0.000	0.000	0.000
MDAB	198.21	1,560	309,208	416.290	20.815	437.105
SJVAB	297.36	1,560	463,882	624.530	31.227	655.757
GBVAB	156.57	1,560	244,249	328.836	16.442	345.278
SACVAB	227.09	1,560	354,260	476.946	23.847	500.793
NEPAB	65.74	1,560	102,554	138.070	6.904	144.974
Outside CA	862.88	1,560	1,346,093	1,812.263	90.613	1,902.877

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Mitigated - Offsite Initial Clean-up Emissions**

**RMHF/HWMF - DOE**

**Table 6-11 RMHF/HWMF - DOE Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	40	1,253	834.09	0.03	98.37	0.00	98.37
SCAQMD	8.68	40	347	231.16	0.01	27.26	0.00	27.26
total <sup>1</sup>	40	40	1,600	1065.25	0.04	125.63	0.00	125.63
VCAPCD	0.42	40	17	11.19	0.00	1.32	0.00	1.32
SCAQMD	39.58	40	1,583	1054.07	0.04	124.31	0.00	124.32
total <sup>1</sup>	40	40	1,600	1065.25	0.04	125.63	0.00	125.63

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.

**RMHF/HWMF - DOE**

**Table 6-12 RMHF/HWMF - DOE Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Hazardous Waste Disposal Site						
VCAPCD	0.42	2,080	874	1.178	0.059	1.237
SCAQMD	124.58	2,080	259,126	349.336	17.467	366.803
Other CA	0	2,080	0	0.000	0.000	0.000
Other Non-CA	0	2,080	0	0.000	0.000	0.000
Total	125	2,080	260,000	350.514	17.526	368.039
Radiological Disposal Site						
VCAPCD	0.42	0	0	0.000	0.000	0.000
SCAQMD	45.78	0	0	0.000	0.000	0.000
Other CA	242.6	0	0	0.000	0.000	0.000
Other Non-CA	48.2	0	0	0.000	0.000	0.000
Total	288.8	0	0	0.000	0.000	0.000
Maximum Emissions by Air Basin						
SCCAB	0.42	2,080	874	1.178	0.059	1.237
SCAB	124.58	2,080	259,126	349.336	17.467	366.803
SSAB	103.00	2,080	214,240	288.823	14.441	303.264
MDAB	198.21	2,080	412,277	555.803	27.790	583.593
SJVAB	57.00	2,080	118,560	159.834	7.992	167.826
GBVAB	142.64	2,080	296,691	399.978	19.999	419.977
SACVAB	0.00	2,080	0	0.000	0.000	0.000
NEPAB	0.00	2,080	0	0.000	0.000	0.000
Outside CA	670.88	2,080	1,395,430	1,881.221	94.061	1,975.282

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory**  
**Greenhouse Gas Appendix**  
**Section 7**  
**Mitigated Overall Cleanup Emissions**

## Santa Susana Field Laboratory Mitigated GHG Emissions Summary

Table 7-1: Summary of Overall Cleanup Emissions				
Unmitigated Overall Cleanup GHG Emissions MT/yr <sup>1</sup>				
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Overall Cleanup				
Onsite	2,122	28		2,150
Offsite	11,980	521		12,501
Overall Cleanup Per Year	14,102	549		14,651
Monitoring and Maintenance				
Mobile	711	0.028	0.000	711
Energy	450	0.464	1.177	451
Total	1,160	0.492	1.177	1,162
Maximum Project Total <sup>2</sup>				15,813
Threshold (2020)				10,000
Exceeds Threshold				Yes
*Totals may not add exactly due to rounding.				
<sup>1</sup> Assumes 96 trucks per day				
<sup>2</sup> Maximum Project Total is the sum of the monitoring and maintenance emissions plus the Overall Sources: Tables 2-5, 7-2 through 7-9. Sum of Onsite emissions plus offsite commuter and haul emissions for all activities.				

Table 6-1: Summary of Initial Clean-up Emissions				
Unmitigated Initial Project GHG Emissions MT/yr <sup>1</sup>				
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Area IV	9,574	455		10,029
Liquid Oxygen Plant	2,269	90		2,359
Demolition - DOE	1,085	34		1,119
TTF - Boeing	695	16		711
RMHF/HWMF - DOE	1,240	24		1,264
Initial Projects Total	14,863	619		<b>15,482</b>
Threshold (2020)				10,000
Exceeds Threshold				Yes
*Totals may not add exactly due to rounding.				
<sup>1</sup> Assumes 73 trucks per day				
Sources: Tables 6-2 through 6-12. Sum of Onsite emissions plus offsite commuter and haul emissions for all activities.				

\*Note Offsite emissions for the RCRA and Post Closure are included in the other activities for that RP

**Santa Susana Field Laboratory  
Mitigated - Onsite Overall Cleanup Emissions**

**Overall Cleanup Emissions**

**Table 7-2: Onsite Overall Cleanup Emissions**

	(Lbs/day)		(MT/year)		
	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub> /N <sub>2</sub> O	CO <sub>2</sub> e
Boeing					
Exhaust	7,483	79	882.517	9.274	891.791
Haul Trucks	N/C	N/C	82.555	4.128	86.683
Crew	49.04	2.45	5.783	0.289	6.073
Total	7,532	81	970.855	13.691	984.546
DOE					
Exhaust	4,172	27	492.025	3.151	495.176
Haul Trucks	N/C	N/C	82.555	4.128	86.683
Crew	19.62	0.98	2.313	0.116	2.429
Total	4,192	28	576.894	7.395	584.288
NASA					
Exhaust	4,172	27	492.025	3.151	495.176
Haul Trucks	N/C	N/C	79.498	3.975	83.473
Crew	19.62	0.98	2.313	0.116	2.429
Total	4,192	28	573.836	7.242	581.078

\*Totals may not add exactly due to rounding.

- Equations
- Daily emissions (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 activity from Table 1-11.
  - Daily emissions (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 sum of the daily exhaust, haul truck, and crew emissions.
  - Annual emissions (MT/year) = (Daily Emissions \* Number of Days)/2204.623 - For Exhaust and Crew emissions
    - Daily Emissions from Table 4-6.
    - 2,204.62 lbs per Metric Ton
    - 260 days per year
  - Annual emissions (haul trucks) (MT/year)
    - = (Emission Factorexhaust X number of trips X Miles ) + (Emission Factoridle \* Number of trucks \* Minutes ) /1,000,000
    - 20,800 trucks per year per year for the site (See Table 1-11).
    - **15** minutes idling per truck (- assumes idling entering the site, at the loading location, and leaving the site)
    - 1,000,000.00 g/metric ton
    - 260 days per year
    - Emission Factors from Table 1-4.
    - **4** miles/ round trip

**Santa Susana Field Laboratory  
Mitigated - Offsite Program Emissions**

**Boeing**

**Table 7-3: Offsite Overall - Boeing Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2e</sub>
Worker Commute								
VCAPCD	31.32	300	9,396	6,256	0.25	737.758	0.029	737.787
SCAQMD	8.68	300	2,604	1,734	0.07	204.462	0.008	204.470
total <sup>1</sup>	40	300	12,000	7,989	0.32	942.220	0.037	942.257
VCAPCD	0.42	300	126	84	0.00	9.893	0.000	9.894
SCAQMD	39.58	300	11,874	7,905	0.31	932.327	0.037	932.364
total <sup>1</sup>	40	300	12,000	7,989	0.32	942.220	0.037	942.257

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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  
Mitigated - Offsite Program Emissions**

**Table 7-4: Offsite Overall - Boeing Haul Emissions**

	Miles/trip	Trips	Miles	MT/Year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Non-Hazardous						
VCAPCD	10.29	11,158	114,813	155.729	7.786	163.515
SCAQMD	67.58	11,158	754,037	1,022.754	51.138	1,073.892
Other CA	37.13	11,158	414,285	561.924	28.096	590.021
Non-CA	0	11,158	0	0.000	0.000	0.000
total1	115	11,158	1,283,136	1,740.407	87.020	1,827.428
Hazardous						
VCAPCD	0.42	2,255	947	1.275	0.064	1.339
SCAQMD	124.58	2,255	280,878	378.150	18.907	397.057
Other CA	166	2,255	374,263	503.876	25.194	529.070
Non-CA	0	2,255	0	0.000	0.000	0.000
total1	291	2,255	656,088	883.301	44.165	927.466
Radiological Soil						
VCAPCD	0.42	628	264	0.354	0.018	0.372
SCAQMD	92.52	628	58,075	77.964	3.898	81.863
Other CA	162.93	628	102,271	137.297	6.865	144.162
Non-CA	442.13	628	277,525	372.573	18.629	391.201
total1	698	628	160,610	215.616	10.781	226.397
Total Emissions						
VCAPCD			116,023	157.357	7.868	165.225
SCAQMD			1,092,990	1,478.868	73.943	1,552.812
Other CA			890,820	1,203.098	60.155	1,263.253
Non-CA			277,525	372.573	18.629	391.201
total1			2,099,834	2,839.324	141.966	2,981.290
Maximum Emissions By Air Basin						
SCCAB	10.29	14,040	144,472	195.957	9.798	205.755
SCAB	124.58	14,040	1,749,103	2,372.432	118.622	2,491.053
SSAB	48.40	14,040	679,536	921.703	46.085	967.788
MDAB	198.21	14,040	2,782,868	3,774.600	188.730	3,963.330
SJVAB	297.36	14,040	4,174,934	5,662.758	283.138	5,945.895
GBVAB	156.57	14,040	2,198,243	2,981.632	149.082	3,130.713
SACVAB	227.09	14,040	3,188,344	4,324.575	216.229	4,540.804
NEPAB	65.74	14,040	922,990	1,251.916	62.596	1,314.512
Outside CA	1495.00	14,040	20,989,800	28,469.944	1,423.497	29,893.441

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Mitigated - Offsite Program Emissions**

DOE

Table 7-5: Offsite Overall - DOE Commuter Emissions

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	100	3,132	2,085	0.08	245.919	0.010	245.929
SCAQMD	8.68	100	868	578	0.02	68.154	0.003	68.157
total <sup>1</sup>	40	100	4,000	2,663	0.11	314.073	0.012	314.086
VCAPCD	0.42	100	42	28	0.00	3.298	0.000	3.298
SCAQMD	39.58	100	3,958	2,635	0.10	310.776	0.012	310.788
total <sup>1</sup>	40	100	4,000	2,663	0.11	314.073	0.012	314.086

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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  
Mitigated - Offsite Program Emissions**

DOE

**Table 7-6: Offsite Overall - DOE Haul Emissions**

	Miles/trip	Trips	Miles	MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Non-Hazardous						
VCAPCD	0.42	12,483	5,243	7.104	0.355	7.459
SCAQMD	67.58	12,483	843,578	1,143.081	57.154	1,200.236
Other CA	57	12,483	711,511	964.126	48.206	1,012.332
Non-CA	0	12,483	0	0.000	0.000	0.000
total1	125	12,483	1,560,331	2,114.312	105.716	2,220.027
Hazardous						
VCAPCD	0.42	545	229	0.309	0.015	0.324
SCAQMD	124.58	545	67,926	91.574	4.579	96.152
Other CA	103	545	56,160	75.711	3.786	79.497
Non-CA	0	545	0	0.000	0.000	0.000
total1	228	545	124,315	167.593	8.380	175.973
Radiological Soil						
VCAPCD	0.42	1,012	425	0.572	0.029	0.601
SCAQMD	45.78	1,012	46,334	62.339	3.117	65.456
Other CA	242.6	1,012	245,537	330.350	16.517	346.867
Non-CA	48.2	1,012	48,784	65.634	3.282	68.916
total1	337	1,012	292,296	393.261	19.663	412.924
Total Emissions						
VCAPCD			5,897	7.985	0.399	8.384
SCAQMD			957,838	1,296.994	64.850	1,361.844
Other CA			1,013,208	1,370.187	68.509	1,438.696
Non-CA			48,784	65.634	3.282	68.916
total1			2,025,727	2,675.165	133.758	2,808.924
Maximum Emissions By Air Basin						
SCCAB	17.84	14,040	250,474	339.402	16.970	356.372
SCAB	124.58	14,040	1,749,103	2,370.105	118.505	2,488.610
SSAB	138.00	14,040	1,937,520	2,625.418	131.271	2,756.688
MDAB	198.21	14,040	2,782,868	3,770.899	188.545	3,959.444
SJVAB	71.00	14,040	996,840	1,350.758	67.538	1,418.296
GBVAB	142.64	14,040	2,002,666	2,713.692	135.685	2,849.377
SACVAB	0.00	14,040	0	0.000	0.000	0.000
NEPAB	0.00	14,040	0	0.000	0.000	0.000
Outside CA	670.88	14,040	9,419,155	12,763.334	638.167	13,401.501

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Mitigated - Offsite Program Emissions**

NASA

**Table 7-7: Offsite Overall - NASA Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	100	3,132	2,085	0.08	245.919	0.010	245.929
SCAQMD	8.68	100	868	578	0.02	68.154	0.003	68.157
total <sup>1</sup>	40	100	4,000	2,663	0.11	314.073	0.012	314.086
VCAPCD	0.42	100	42	28	0.00	3.298	0.000	3.298
SCAQMD	39.58	100	3,958	2,635	0.10	310.776	0.012	310.788
total <sup>1</sup>	40	100	4,000	2,663	0.11	314.073	0.012	314.086

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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  
Mitigated - Offsite Program Emissions**

NASA

**Table 7-8: Offsite Overall - NASA Haul Emissions**

	Miles/trip	Trips	Miles	MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Non-Hazardous						
VCAPCD	10.29	2,299	23,657	32.155	1.608	33.763
SCAQMD	53.58	2,299	123,180	167.433	8.372	175.805
Other CA	34.13	2,299	78,465	106.654	5.333	111.986
Non-CA	0	2,299	0	0.000	0.000	0.000
total1	98	2,299	225,302	306.242	15.312	321.554
Hazardous						
VCAPCD	0.42	10,816	4,543	6.175	0.309	6.483
SCAQMD	124.58	10,816	1,347,457	1,831.538	91.577	1,923.115
Other CA	172.39	10,816	1,864,570	2,534.426	126.721	2,661.147
Non-CA	26.61	10,816	287,814	391.212	19.561	410.773
total1	324	10,816	3,216,570	4,372.139	218.607	4,590.745
Radiological Soil						
VCAPCD	0.42	405	170	0.229	0.011	0.240
SCAQMD	92.52	405	37,471	50.423	2.521	52.944
Other CA	305.57	405	123,757	166.533	8.327	174.860
Non-CA	299.49	405	121,295	163.220	8.161	171.381
total1	698	405	161,398	217.185	10.859	228.044
Total Emissions						
VCAPCD			28,369	38.559	1.928	40.487
SCAQMD			1,508,108	2,049.394	102.470	2,151.863
Other CA			2,066,792	2,807.613	140.381	2,947.993
Non-CA			409,109	554.432	27.722	582.153
total1			3,603,270	4,895.566	244.778	5,140.344
Maximum Emissions By Air Basin						
SCCAB	0.42	13,520	5,678	7.718	0.386	8.104
SCAB	124.58	13,520	1,684,322	2,289.422	114.471	2,403.893
SSAB	48.40	13,520	654,368	889.453	44.473	933.925
MDAB	198.21	13,520	2,679,799	3,642.530	182.126	3,824.656
SJVAB	297.36	13,520	4,020,307	5,464.622	273.231	5,737.853
GBVAB	156.57	13,520	2,116,826	2,877.306	143.865	3,021.172
SACVAB	227.09	13,520	3,070,257	4,173.261	208.663	4,381.924
NEPAB	65.74	13,520	888,805	1,208.112	60.406	1,268.518
Outside CA	862.88	13,520	11,666,138	15,857.254	792.863	16,650.116

\*Totals may not add exactly due to rounding.

**Santa Susana Field Laboratory  
Mitigated - Offsite Program Emissions**

**Monitoring & Maintenance**

**Table 7-9: Offsite Overall - Monitoring and Maintenance Commuter Emissions**

	Miles/trip	# trips	Miles	lbs/day		MT/year		
				CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Worker Commute								
VCAPCD	31.32	144	4,510	3,003	0.12	354.124	0.014	354.138
SCAQMD	8.68	144	1,250	832	0.03	98.142	0.004	98.146
total <sup>1</sup>	40	144	5,760	3,835	0.15	452.266	0.018	452.284
VCAPCD	0.42	144	60	40	0.00	4.749	0.000	4.749
SCAQMD	39.58	144	5,700	3,795	0.15	447.517	0.018	447.535
total <sup>1</sup>	40	144	5,760	3,835	0.15	452.266	0.018	452.284

\*Totals may not add exactly due to rounding.

<sup>1</sup> 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 provides 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.