Air Quality Technical Appendix
Bradley Landfill
Construction Emissions

Prepared by: Environmental Compliance Solutions, Inc.

Prepared for: Waste Management

October 23, 2005

Bradley Landfill
Construction Emissions
Table of Contents

Bradley Landfill
Construction Emissions
Summary

Maximum Daily Construction Emissions

	Unmitigated Max. Daily Emissions (lb/day)					*Mitigated Max. Daily Emissions (lb/day)*				
Construction Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Phase Ia - Greenwaste/MRF Expansion	31	155	386	0.3	213	31	155	386	0.3	213
Phase Ib - TS/MRF Soil Import and Pad Construction	8	45	69	0.9	366	8	45	59	0.9	364
Phase Ic - TS/MRF Building Construction	1	14	1	-	4	1	14	1	-	4
Phase Id - TS/MRF Paving	9	48	67	-	22	9	48	67	-	22
Phase II - Landfill Closure - Temporary Construction A	18	93	215	-	140	18	93	215	-	140
Max. Daily Total (1)	*39*	*200*	*455*	*1*	*579*	*39*	*200*	*445*	*1*	*577*
SCAQMD Significance Threshold	75	550	100	150	150	75	550	100	150	150
Significant?	*No*	*No*	*Yes*	*No*	*Yes*	*No*	*No*	*Yes*	*No*	*Yes*

Notes:

(1) Total maximum daily emissions assume worst-case construction day (ie., sum of daily maximum daily emissions for tasks that overlap)

Maximum Quarterly Construction Emissions

	Unmitigated Max. Quarterly Emissions (tons/Q)					*Mitigated Max. Quarterly Emissions (tons/Q)*				
Construction Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Phase Ia - Greenwaste/MRF Expansion	1.04	5.19	12.93	0.01	7.14	1.04	5.19	12.93	0.01	7.14
Phase Ib - TS/MRF Soil Import and Pad Construction	0.27	1.51	2.31	0.03	12.26	0.27	1.51	1.98	0.03	12.19
Phase Ic - TS/MRF Building Construction	0.03	0.35	0.03	-	0.10	0.03	0.35	0.03	-	0.10
Phase Id - TS/MRF Paving	0.07	0.36	0.50	-	0.17	0.07	0.36	0.50	-	0.17
Phase II - Landfill Closure - Temporary Construction A	0.60	3.12	7.20	-	4.69	0.60	3.12	7.20	-	4.69
Max. Quarterly Total (1)	*1.34*	*7.05*	*15.27*	*0.04*	*19.50*	*1.34*	*7.05*	*14.94*	*0.04*	*19.43*
SCAQMD Significance Threshold	2.5	24.75	2.5	6.75	6.75	2.5	24.75	2.5	6.75	6.75
Significant?	*No*	*No*	*Yes*	*No*	*Yes*	*No*	*No*	*Yes*	*No*	*Yes*

Notes:

(1) Maximum quarterly emissions assume worst-case construction quarter (sum of maximum quarterly emissions for tasks that overlap)
Quarterly emissions = worst case daily emissions x 67 workdays per quarter (or x actual number of workdays if activity is less than 67 days)
"Max. Quarterly Total" calculation assumes Phases Ia and Ib overlap, and Phases 1a and 1c overlap.

Bradley Landfill
Construction Emissions
Construction Schedule

Description	*Start Date*	*Calendar Days*	*Work Days*	*End Date*
Phase Ia - Greenwaste/MRF Expansion	1/1/2005	850	607	5/1/2007
Phase Ib - TS/MRF Soil Import and Pad Construction	9/1/2006	121	86	12/31/2006
Phase Ic - TS/MRF Building Construction	1/1/2007	67	50	3/9/2007
Phase Id - TS/MRF Paving	3/10/2007	21	15	3/31/2007
Phase II - Landfill Closure - Temporary Construction Activities	4/1/2007	366	262	4/1/2008

Bradley Landfill
Construction Emissions
Phase Ia - Greenwaste/MRF Expansion

Equipment/Activity Descriptions

Equipment/Activity	*Hp Rating*	*Load Factor*	*Number Active*	*Equip-Hrs Day*	*Miles/ Day*	*Idling Min. Day*	Equipment Type
Scraper (23 yd3)	313	0.66	2	14.5	-	-	Off-Road
Bulldozer	352	0.59	4	14.5	-	-	Off-Road
Compactor	79	0.575	3	14.5	-	-	Off-Road
Water Truck, Peterbilt (4,000 gal) [HHDT]	-	-	2	14.5	73	87	On-Road
Worker commute vehicle [LDT1-ALL]	-	-	30	-	60	-	On-Road

Notes:
Load factors and horsepower ratings based on 1993 SCAQMD CEQA Handbook (Tables A9-8-C and A9-8-D) and project team.
Work schedule: 14.5 hours/day, 5 days per week.
Number of workers per day: up to 30.

Bradley Landfill
Construction Emissions
Phase Ia - Greenwaste/MRF Expansion

Emission Factors for Off-Road Construction Equipment

	Emission Factors						
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
Scraper (23 yd3)	0.63	2.78	8.54	0.01	0.37	g/hp-hr	(1)
Bulldozer	0.63	2.78	8.54	0.01	0.37	g/hp-hr	(1)
Compactor	0.72	3.08	9.06	0.01	0.42	g/hp-hr	(1)

(1) Composite based on CARB OFFROAD Emissions Model (1999). SOx emission factor assumes fuel has maximum sulfur content of 15 ppmw (SCAQMD Rule 431.2 requirement effective as early as 1 January 2005).

Emission Factors for On-Road Heavy Duty Trucks

	Emission Factors						
Project Year/Mode	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
On-road Truck - Idle	4.41	26.30	80.70	0.34	1.84	grams/hr	(1)
On-road Truck - 5 mph	1.85	10.53	20.27	0.18	0.83	grams/mile	(1)
On-road Truck - 10 mph	1.45	7.26	16.81	0.18	0.79	grams/mile	(1)
On-road Truck - 25 mph	0.80	3.13	11.88	0.18	0.44	grams/mile	(1)
On-road Truck - 55 mph	0.44	1.98	15.47	0.18	0.24	grams/mile	(1)
On-road Trucks - Composite (Water Truck)	1.85	10.53	20.27	0.18	0.83	grams/mile	(2)
On-road Trucks - Composite (Dump Truck)	0.69	2.97	14.17	0.18	0.38	grams/mile	(3)

(1) From CARB's EMFAC2002 (v2.2). Assumes: Heavy duty diesel truck (HHDT), Location: SCAQMD, Temp.: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire wear and brake wear included with fugitive dust).
Based on EMFAC emission factors for Year 2006.

(2) Assumes water truck travel at 5 miles per hour (mph) maximum. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.

(3) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.

Emission Factors for On-Road Construction Worker Vehicles and Pickups

	Emission Factors						
Project Year/Mode	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
Worker Trips - 10 mph	0.92	11.15	0.79	0.01	0.04	grams/mile	(1)
Worker Trips - 25 mph	0.50	7.25	0.59	0.01	0.02	grams/mile	(1)
Worker Trips - 55 mph	0.40	5.71	0.59	0.00	0.01	grams/mile	(1)
Worker Trips - Composite	0.49	6.87	0.61	0.00	0.02	grams/mile	(2)

(1) From CARB's EMFAC2002 (v2.2). Units in grams/mile. Assumptions: Location: SCAQMD, Temperature: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire and brake wear included with fugitive dust). Conservatively assumes light-duty trucks, composite (LDT1-ALL).
ROG emission factors includes evaporative running loss of 0.2017 grams/mile.
Based on EMFAC emission factors for Year 2006.
Starting emisions (grams/trip, after 600 minutes): ROG (1.52), CO (17.59), NOx (0.66), SOx (0.003), PM10 (0.015).
Starting emisions (grams/trip, after 60 minutes): ROG (0.862), CO (10.647), NOx (0.726), SOx (0.001), PM10 (0.008).
Hot soak emissions (grams/trip): ROG (0.326).
Partial day diurnal emissions (grams/hr): ROG (0.013).
Resting losses (grams/hr): ROG (0.077).

(2) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Composite emission factor is used for worker commute vehicles.

DRAFT / Attorney-Client Privilege

Bradley Landfill
Construction Emissions
Phase Ia - Greenwaste/MRF Expansion

Fugitive Dust

	Emissions (lb/day) - Before Mitigation					Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Scraper (23 yd3)	-	-	-	-	70.6	-	-	-	-	70.6
Bulldozer	-	-	-	-	42.8	-	-	-	-	42.8
Compactor	-	-	-	-	32.1	-	-	-	-	32.1
Water Truck, Peterbilt (4,000 gal) [HHDT]	-	-	-	-	45.7	-	-	-	-	45.7
Worker commute vehicle [LDT1-ALL]	-	-	-	-	4.8	-	-	-	-	4.8
Total	-	-	-	-	196.0	-	-	-	-	196.0

Notes:
Fugitive PM10 emissions estimates assume watering is used to control emissions by: 50% (Table A11-9-A, CEQA Handbook)
Watering required per SCAQMD Rule 403, so watering and resulting reduction in fugitive dust is not considered mitigation.
No reduction assumed for off-site travel on paved roads (eg., worker commute vehicles) because watering only occurs on site.
Fugitive PM10 emissions for on-road vehicles also include break and tire wear.
Fugitive dust from equipment with "-" assumed to be negligible relative to other equipment.

Scraper:

Scraper emissions based on EPA's AP42, Section 13.2.3 (Heavy Construction Operations, 1/95),
Table 13.2.3-1 (Recommended Emission Factors for Construction Operations)

Description	Value		References/Notes
TSP Emission factor (assume = PM10):	0.058	lb/ton soil	AP42, Table 11.9-4 (Open Dust Sources at Western Surface Coal Mines)
PM10 fraction:	0.35		AP42, Section 13.2.4-3 (Aggregate Handling and Storage Piles)
Total soil scraped:	10,000	tons	Project description
Duration of scraping:	607	days	Project description
Soil scraping rate:	16	ton/day	
PM10 from scraping/excavating:	0.3	lb/day	Uncontrolled

Wind Erosion of Storage Piles:

PM10 Emissions (lb/day/acre) = 1.7 * (G / 1.5) * ((365 - H) / 235) * (I / 15) * 0.5

Description	Value		References/Notes
Silt Content (G):	15	% wt	Blended ore and dirt (Table A9-9-E-1, CEQA Handbook)
Days of Rain per Year >0.01 in (H):	34		Average year for South Coast Air Basin (Table A9-9-E-2, CEQA Handbook)
% of Time Wind Speed > 12 mph (I):	50	%	Assumption
Storage pile size:	0.1	acre	Assumption
PM10 from storage piles:	4.0	lb/day	Uncontrolled

References:
1993 CEQA Handbook, Table A9-9-E

Material Handling/Drop Operations:

PM10 Emissions (lb/ton) = k * (0.0032) * ((u / 5)^(1.3) / (M / 2)^(1.4))

Description	Value		References/Notes
Unitless particle size multiplier (k):	0.35		AP42
Mean wind speed (u):	7	mph	EPA Tanks v4.0 (Average wind speed for LA County = 6.2 mi/hr)
Material moisture content (M):	5	%	Table A9-9-G-1, 1993 CEQA Handbook (Dry=2.0%, Moist=15.0%, Wet=50.0%)
PM10 Emission factor:	5E-04	lb/ton	Uncontrolled
Soil handled:	16	ton/day	Assumption based on project description
PM10 emissions:	0.01	lb/day	Uncontrolled

References:
AP42, Section 13.2.4 (Aggregate Handling and Storage Piles, 1/95)
Table 9-9-G, 1993 CEQA Handbook.

Bradley Landfill
Construction Emissions
Phase Ia - Greenwaste/MRF Expansion

Grader:

PM10 Emissions (lbs/VMT) = 0.60 * 0.051 * (S)^(2.0)

Description	Value		References/Notes
Mean vehicle speed (S):	5	mph	Assumption
PM10 Emissions:	0.77	lb/VMT	AP42, Table 11.9-1
VMT/day:	30	mi/day	Assumed to travel at mean vehicle speed for 50% of work day.
PM10 Emissions:	23.0	lb/day/unit	Uncontrolled

References:

AP42, Table 11.9-1 (Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines, 7/98), Grading Operations.

Compactor and Bulldozer:

PM10 emissions (lb/hr) = 0.75 * 1.0 * ([s]^1.5) / ([M]^1.4)

Description	Value		References/Notes
Surface material silt content (s):	8	%	Table A9-9-F-1, 1993 CEQA Handbook ("Overburden" dirt type = 7.5%)
Surface material moisture content (M):	5	%	Table A9-9-F-2, 1993 CEQA Handbook (Dry = 2.0%, Moist = 15.0%, Wet = 50.0%)
PM10 Emissions:	21.4	lb/day/unit	Uncontrolled (assumes 12-hr work day)

References:

AP42, Section 13.2.3 (Heavy Construction Operations), Table 13.2.3-1 (Recommended Emission Factors for Construction Operations, 1/95) and Table 11.9-1 (Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines, 7/98, Bulldozing Operations).

(Note: PM10 equation from 1993 CEQA Handbook, Table A9-9-F [Estimating Emissions from Dirt Pushing or Bulldozing Operations] is incorrect)

Passenger vehicle travel on PAVED roads:

Description	PM10 Emissions		References/Notes
Local streets	0.018	lb/mile	Table A9-9-B, CEQA Handbook
Collector streets:	0.013	lb/mile	Table A9-9-B, CEQA Handbook
Major Streets/Highways:	0.0064	lb/mile	Table A9-9-B, CEQA Handbook
Freeways:	0.00065	lb/mile	Table A9-9-B, CEQA Handbook
PM10 Emission factor (composite)	0.005345	lb/mile	Assumption (10% Local, 10% Collector, 30% Major Street, 50% Freeway)

Truck travel on PAVED roads:

Description	PM10 Emissions		References/Notes
Construction sites w/cleaning:	0.62	lb/mile	Table A9-9-C, CEQA Handbook
Local streets:	0.62	lb/mile	Table A9-9-C, CEQA Handbook
Collector streets:	0.54	lb/mile	Table A9-9-C, CEQA Handbook
Major streets/highways:	0.43	lb/mile	Table A9-9-C, CEQA Handbook
Freeway:	0.18	lb/mile	Table A9-9-C, CEQA Handbook
Composite (dump truck):	0.28	lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (delivery-type trucks):	0.28	lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (other project trucks)	0.56	lb/mile	Assumption (50% Construction Site, 50% Local)
Composite (pickup truck):	0.62	lb/mile	Assumption (50% Construction Site, 50% Local)

Reference: Table A9-9-D, CEQA Handbook.

Vehicle travel on UNPAVED roads:

Description	PM10 Emissions		References/Notes
Dump truck:	1.55	lb/mile	Vehicle weighs 10 tons, has 10 wheels, travels at 10 mph on site.
Concrete truck/Water truck:	1.26	lb/mile	Vehicle weighs 20 tons, has 10 wheels, travels at 5 mph on site.
Tractor trailer-type truck:	1.38	lb/mile	Vehicle weighs 15 tons, has 18 wheels, travels at 5 mph on site.
Scraper:	1.62	lb/mile	Vehicle weighs 55 tons (CAT 631E), has 4 wheels, travels at 3 mph on site.
Grader:	0.80	lb/mile	Vehicle weighs 15 tons, has 6 wheels, travels at 3 mph on site.

Reference: Table A9-9-D, CEQA Handbook; Caterpillar Equipment Handbook. Assumes silt loading of 8% (Mining Haul Road, Table A9-9-D-1).

For other equipment traveling on unpaved roads, maximum speed on site assumed to be 5 mph.

Fugitive dust from other equipment (loader) travel on paved or unpaved roads assumed to be negligible relative to other equipment.

Bradley Landfill
Construction Emissions
Phase Ia - Greenwaste/MRF Expansion

Daily Emissions

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Scraper (23 yd3)	8.3	36.7	112.8	0.1	4.9	8.3	36.7	112.8	0.1	4.9
Bulldozer	16.7	73.8	226.8	0.1	9.8	16.7	73.8	226.8	0.1	9.8
Compactor	3.1	13.4	39.5	-	1.8	3.1	13.4	39.5	-	1.8
Water Truck, Peterbilt (4,000 gal) [HHDT]	0.2	1.0	4.8	0.1	0.1	0.2	1.0	4.8	0.1	0.1
Worker commute vehicle [LDT1-ALL]	2.3	29.6	2.5	-	0.1	2.3	29.6	2.5	-	0.1
Fugitive Dust	-	-	-	-	196.0	-	-	-	-	196.0
Total	*30.6*	*154.5*	*386.4*	*0.3*	*212.7*	*30.6*	*154.5*	*386.4*	*0.3*	*212.7*

Daily Emissions - Grouped by Equipment/Activity Type

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Construction Equipment	28.3	124.9	383.9	0.3	16.6	28.3	124.9	383.9	0.3	16.6
Commute Vehicles	2.3	29.6	2.5	-	0.1	2.3	29.6	2.5	-	0.1
Fugitive Dust	-	-	-	-	196.0	-	-	-	-	196.0
Total	*30.6*	*154.5*	*386.4*	*0.3*	*212.7*	*30.6*	*154.5*	*386.4*	*0.3*	*212.7*

Bradley Landfill
Construction Emissions
Phase Ib - TS/MRF Soil Import and Pad Construction

Equipment/Activity Descriptions

Equipment/Activity	*Hp Rating*	*Load Factor*	*Number Active*	*Equip-Hrs Day*	*Miles/ Day*	*Idling Min. Day*	Equipment Type
Backhoe	79	0.465	1	8	-	-	Off-Road
Forklift	94	0.465	1	8	-	-	Off-Road
Grader	179	0.575	1	8	-	-	Off-Road
Heavy Duty Haul Trucks	-	-	40	8	30	48	On-Road
Worker commute vehicle [LDT1-ALL]	-	-	30	-	50	-	On-Road

Notes:
Load factors and horsepower ratings based on 1993 SCAQMD CEQA Handbook (Tables A9-8-C and A9-8-D) and project team.
Work schedule: 8 hours/day, 5 days per week.
Number of workers per day: up to 30.

Bradley Landfill
Construction Emissions
Phase Ib - TS/MRF Soil Import and Pad Construction

Emission Factors for Off-Road Construction Equipment

	Emission Factors						
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
Backhoe	1.22	4.17	10.88	0.01	0.77	g/hp-hr	(1)
Forklift	1.81	4.97	6.85	0.01	0.75	g/hp-hr	(1)
Grader	0.72	3.08	9.06	0.01	0.42	g/hp-hr	(1)

(1) Composite based on CARB OFFROAD Emissions Model (1999). SOx emission factor assumes fuel has maximum sulfur content of 15 ppmw (SCAQMD Rule 431.2 requirement effective 1 January 2005).

Emission Factors for On-Road Heavy Duty Trucks

	Emission Factors						
Project Year/Mode	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
On-road Truck - Idle	4.41	26.30	80.70	0.34	1.84	grams/hr	(1)
On-road Truck - 5 mph	1.85	10.53	20.27	0.18	0.83	grams/mile	(1)
On-road Truck - 10 mph	1.45	7.26	16.81	0.18	0.79	grams/mile	(1)
On-road Truck - 25 mph	0.80	3.13	11.88	0.18	0.44	grams/mile	(1)
On-road Truck - 55 mph	0.44	1.98	15.47	0.18	0.24	grams/mile	(1)
On-road Trucks - Composite (Water Truck)	1.85	10.53	20.27	0.18	0.83	grams/mile	(2)
On-road Trucks - Composite (Other Trucks)	0.69	2.97	14.17	0.18	0.38	grams/mile	(3)

(1) From CARB's EMFAC2002 (v2.2). Assumes: Heavy duty diesel truck (HHDT), Location: SCAQMD, Temp.: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire wear and brake wear included with fugitive dust).
Based on EMFAC emission factors for Year 2006.

(2) Assumes water truck travel at 5 miles per hour (mph) maximum. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.

(3) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.

Emission Factors for On-Road Construction Worker Vehicles

	Emission Factors						
Project Year/Mode	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
Worker Trips - 10 mph	0.92	11.15	0.79	0.01	0.04	grams/mile	(1)
Worker Trips - 25 mph	0.50	7.25	0.59	0.01	0.02	grams/mile	(1)
Worker Trips - 55 mph	0.40	5.71	0.59	0.00	0.01	grams/mile	(1)
Worker Trips - Composite	0.49	6.87	0.61	0.00	0.02	grams/mile	(2)

(1) From CARB's EMFAC2002 (v2.2). Units in grams/mile. Assumptions: Location: SCAQMD, Temperature: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire and brake wear included with fugitive dust). Conservatively assumes light-duty trucks, composite (LDT1-ALL).
ROG emission factors includes evaporative running loss of 0.2017 grams/mile.
Based on EMFAC emission factors for Year 2006.
Starting emisions (grams/trip, after 600 minutes): ROG (1.52), CO (17.59), NOx (0.66), SOx (0.003), PM10 (0.015).
Hot soak emissions (grams/trip): ROG (0.326).
Partial day diurnal emissions (grams/hr): ROG (0.013).
Resting losses (grams/hr): ROG (0.077).

(2) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Composite emission factor is used for worker commute vehicles.

Bradley Landfill
Construction Emissions
Phase Ib - TS/MRF Soil Import and Pad Construction

Fugitive Dust

	Emissions (lb/day) - Before Mitigation					Emissions (lb/day) - After Mitigation				
Equipment/Activity	ROG	CO	NOx	SOx	PM10	ROG	CO	NOx	SOx	PM10
Backhoe	-	-	-	-	4.0	-	-	-	-	4.0
Forklift	-	-	-	-	0.4	-	-	-	-	0.4
Grader	-	-	-	-	10.4	-	-	-	-	10.4
Heavy Duty Haul Trucks	-	-	-	-	338.4	-	-	-	-	338.4
Worker commute vehicle [LDT1-ALL]	-	-	-	-	8.0	-	-	-	-	8.0
Material transfer operations	-	-	-	-	0.4	-	-	-	-	0.4
Wind Erosion of Stockpiles	-	-	-	-	1.0	-	-	-	-	1.0
Total	-	-	-	-	362.6	-	-	-	-	362.6

Notes:

Fugitive PM10 emissions estimates assume watering is used to control emissions by: 50% (Table A11-9-A, CEQA Handbook)

Watering required per SCAQMD Rule 403, so watering and resulting reduction in fugitive dust is not considered mitigation.

No reduction assumed for off-site travel on paved roads (eg., worker commute vehicles) because watering only occurs on site.

Fugitive PM10 emissions for on-road vehicles also include break and tire wear.

Fugitive dust from power shovel, crane, tractor, vibratory roller travel on paved/unpaved roads assumed to be negligible relative to other equipment.

Wind Erosion of Storage Piles:

PM10 Emissions (lb/day/acre) = 1.7 * (G / 1.5) * ((365 - H) / 235) * (I / 15) * 0.5

Description	Value		References/Notes
Silt Content (G):	15	% wt	Blended ore and dirt (Table A9-9-E-1, CEQA Handbook)
Days of Rain per Year >0.01 in (H):	34		Average year for South Coast Air Basin (Table A9-9-E-2, CEQA Handbook)
% of Time Wind Speed > 12 mph (I):	50	%	Assumption
Storage pile size:	0.05	acre	Assumption
PM10 from storage piles:	2.0	lb/day	Uncontrolled

References:

1993 CEQA Handbook, Table A9-9-E

Material Handling/Drop Operations:

PM10 Emissions (lb/ton) = k * (0.0032) * ((u / 5)^(1.3) / (M / 2)^(1.4))

Description	Value		References/Notes
Unitless particle size multiplier (k):	0.35		AP42
Mean wind speed (u):	6.2	mph	EPA Tanks v4.0 (Average wind speed for LA County = 6.2 mi/hr)
Material moisture content (M):	5	%	Table A9-9-G-1, 1993 CEQA Handbook (Dry=2.0%, Moist=15.0%, Wet=50.0%)
PM10 Emission factor:	4E-04	lb/ton	Uncontrolled
Soil handled:	1,970	ton/day	Assumption
PM10 emissions:	0.81	lb/day	Uncontrolled

References:

AP42, Section 13.2.4 (Aggregate Handling and Storage Piles, 1/95)

Table 9-9-G, 1993 CEQA Handbook.

Grader:

PM10 Emissions (lbs/VMT) = 0.60 * 0.051 * (S)^(2.0)

Description	Value		References/Notes
Mean vehicle speed (S):	3	mph	Assumption
PM10 Emissions:	0.28	lb/VMT	AP42, Table 11.9-1
VMT/day:	12	mi/day	Assumed to travel at mean vehicle speed for 50% of work day.
PM10 Emissions:	3.3	lb/day/unit	Uncontrolled

References:

AP42, Table 11.9-1 (Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines, 7/98), Grading Operations.

Passenger vehicle travel on PAVED roads:

Description	PM10 Emissions		References/Notes
Local streets	0.018	lb/mile	Table A9-9-B, CEQA Handbook
Collector streets:	0.013	lb/mile	Table A9-9-B, CEQA Handbook
Major Streets/Highways:	0.0064	lb/mile	Table A9-9-B, CEQA Handbook
Freeways:	0.00065	lb/mile	Table A9-9-B, CEQA Handbook

Bradley Landfill
Construction Emissions
Phase Ib - TS/MRF Soil Import and Pad Construction

PM10 Emission factor (composite)	0.005345 lb/mile	Assumption (10% Local, 10% Collector, 30% Major Street, 50% Freeway)

Truck travel on PAVED roads:

Description	PM10 Emissions	References/Notes
Construction sites w/cleaning:	0.62 lb/mile	Table A9-9-C, CEQA Handbook
Local streets:	0.62 lb/mile	Table A9-9-C, CEQA Handbook
Collector streets:	0.54 lb/mile	Table A9-9-C, CEQA Handbook
Major streets/highways:	0.43 lb/mile	Table A9-9-C, CEQA Handbook
Freeway:	0.18 lb/mile	Table A9-9-C, CEQA Handbook
Composite (dump truck):	0.28 lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (delivery-type trucks):	0.28 lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (other project trucks)	0.56 lb/mile	Assumption (50% Construction Site, 50% Local)
Composite (pickup truck):	0.62 lb/mile	Assumption (50% Construction Site, 50% Local)

Reference: Table A9-9-D, CEQA Handbook.

Vehicle travel on UNPAVED roads:

Description	PM10 Emissions	References/Notes
Dump truck:	1.55 lb/mile	Vehicle weighs 10 tons, has 10 wheels, travels at 10 mph on site.
Concrete truck/Water truck:	1.26 lb/mile	Vehicle weighs 20 tons, has 10 wheels, travels at 5 mph on site.
Tractor trailer-type truck:	1.38 lb/mile	Vehicle weighs 15 tons, has 18 wheels, travels at 5 mph on site.
Grader:	0.80 lb/mile	Vehicle weighs 15 tons, has 6 wheels, travels at 3 mph on site.

Reference: Table A9-9-D, CEQA Handbook; Caterpillar Performance Handbook. Assumes silt loading of 8% (Mining Haul Road, Table A9-9-D-1).
For other equipment traveling on unpaved roads, maximum speed on site assumed to be 5 mph.
Fugitive dust from other equipment (loader) travel on paved or unpaved roads assumed to be negligible relative to other equipment.

Bradley Landfill
Construction Emissions
Phase Ib - TS/MRF Soil Import and Pad Construction

Daily Emissions

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Backhoe	0.8	2.7	7.0	-	0.5	0.8	2.7	6.0	-	0.2
Forklift	1.4	3.8	5.3	-	0.6	1.4	3.8	4.6	-	0.2
Grader	1.3	5.6	16.4	-	0.8	1.3	5.6	14.1	-	0.3
HHD	2.2	8.3	37.9	0.9	1.4	2.2	8.3	32.6	0.9	0.5
Worker commute vehicle [LDT1-ALL]	1.9	25.0	2.1	-	0.1	1.9	25.0	2.1	-	0.1
Fugitive Dust	-	-	-	-	362.6	-	-	-	-	362.6
Total	*7.6*	*45.4*	*68.7*	*0.9*	*366.0*	*7.6*	*45.4*	*59.4*	*0.9*	*363.9*

Notes:
Mitigation assumes use of PuriNOx fuel for off-road diesel construction equipment:

NOx reduction: 14.0%
PM10 reduction: 63.0%

Daily Emissions - Grouped by Equipment/Activity Type

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Construction Equipment	5.7	20.4	66.6	0.9	3.3	5.7	20.4	57.3	0.9	1.2
Commute Vehicles	1.9	25.0	2.1	-	0.1	1.9	25.0	2.1	-	0.1
Fugitive Dust	-	-	-	-	362.6	-	-	-	-	362.6
Total	*7.6*	*45.4*	*68.7*	*0.9*	*366.0*	*7.6*	*45.4*	*59.4*	*0.9*	*363.9*

Bradley Landfill
Construction Emissions
Phase Ic - TS/MRF Building Construction

Equipment/Activity Descriptions

Equipment/Activity	Hp Rating	Load Factor	Number Active	Equip-Hrs Day	Miles/ Day	Idling Min. Day	Equipment Type
Worker commute vehicle [LDT1-ALL]	-	-	30	-	25	-	On-Road

Notes:
Number of workers per day: up to 30.

Emission Factors for On-Road Heavy Duty Trucks

Project Year/Mode	Emission Factors ROG	CO	NOx	SOx	PM10	Units	Reference
On-road Truck - Idle	4.41	26.30	80.70	0.34	1.84	grams/hr	(1)
On-road Truck - 5 mph	1.85	10.53	20.27	0.18	0.83	grams/mile	(1)
On-road Truck - 10 mph	1.45	7.26	16.81	0.18	0.79	grams/mile	(1)
On-road Truck - 25 mph	0.80	3.13	11.88	0.18	0.44	grams/mile	(1)
On-road Truck - 55 mph	0.44	1.98	15.47	0.18	0.24	grams/mile	(1)
On-road Trucks - Composite (Water Truck)	1.85	10.53	20.27	0.18	0.83	grams/mile	(2)
On-road Trucks - Composite (Other Trucks)	0.69	2.97	14.17	0.18	0.38	grams/mile	(3)

(1) From CARB's EMFAC2002 (v2.2). Assumes: Heavy duty diesel truck (HHDT), Location: SCAQMD, Temp.: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire wear and brake wear included with fugitive dust).
Based on EMFAC emission factors for Year 2006.
(2) Assumes water truck travel at 5 miles per hour (mph) maximum. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.
(3) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.

Emission Factors for On-Road Construction Worker Vehicles

Project Year/Mode	Emission Factors ROG	CO	NOx	SOx	PM10	Units	Reference
Worker Trips - 10 mph	0.92	11.15	0.79	0.01	0.04	grams/mile	(1)
Worker Trips - 25 mph	0.50	7.25	0.59	0.01	0.02	grams/mile	(1)
Worker Trips - 55 mph	0.40	5.71	0.59	0.00	0.01	grams/mile	(1)
Worker Trips - Composite	0.49	6.87	0.61	0.00	0.02	grams/mile	(2)

(1) From CARB's EMFAC2002 (v2.2). Units in grams/mile. Assumptions: Location: SCAQMD, Temperature: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire and brake wear included with fugitive dust). Conservatively assumes light-duty trucks, composite (LDT1-ALL).
ROG emission factors includes evaporative running loss of 0.2017 grams/mile.
Based on EMFAC emission factors for Year 2006.
Starting emisions (grams/trip, after 600 minutes): ROG (1.52), CO (17.59), NOx (0.66), SOx (0.003), PM10 (0.015).
Hot soak emissions (grams/trip): ROG (0.326).
Partial day diurnal emissions (grams/hr): ROG (0.013).
Resting losses (grams/hr): ROG (0.077).
(2) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Composite emission factor is used for worker commute vehicles.

Bradley Landfill
Construction Emissions
Phase Ic - TS/MRF Building Construction

Fugitive Dust

	Emissions (lb/day) - Before Mitigation					Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Worker commute vehicle [LDT1-ALL]	-	-	-	-	4.0	-	-	-	-	4.0
Total	-	-	-	-	4.0	-	-	-	-	4.0

Notes:

Fugitive PM10 emissions estimates assume watering is used to control emissions by: 50% (Table A11-9-A, CEQA Handbook)

Watering required per SCAQMD Rule 403, so watering and resulting reduction in fugitive dust is not considered mitigation.

No reduction assumed for off-site travel on paved roads (eg., worker commute vehicles) because watering only occurs on site.

Fugitive PM10 emissions for on-road vehicles also include break and tire wear.

Fugitive dust from power shovel, crane, tractor, vibratory roller travel on paved/unpaved roads assumed to be negligible relative to other equipment.

Passenger vehicle travel on PAVED roads:

Description	PM10 Emissions	References/Notes
Local streets	0.018 lb/mile	Table A9-9-B, CEQA Handbook
Collector streets:	0.013 lb/mile	Table A9-9-B, CEQA Handbook
Major Streets/Highways:	0.0064 lb/mile	Table A9-9-B, CEQA Handbook
Freeways:	0.00065 lb/mile	Table A9-9-B, CEQA Handbook
PM10 Emission factor (composite)	0.005345 lb/mile	Assumption (10% Local, 10% Collector, 30% Major Street, 50% Freeway)

Truck travel on PAVED roads:

Description	PM10 Emissions	References/Notes
Construction sites w/cleaning:	0.62 lb/mile	Table A9-9-C, CEQA Handbook
Local streets:	0.62 lb/mile	Table A9-9-C, CEQA Handbook
Collector streets:	0.54 lb/mile	Table A9-9-C, CEQA Handbook
Major streets/highways:	0.43 lb/mile	Table A9-9-C, CEQA Handbook
Freeway:	0.18 lb/mile	Table A9-9-C, CEQA Handbook
Composite (dump truck):	0.28 lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (delivery-type trucks):	0.28 lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (other project trucks)	0.56 lb/mile	Assumption (50% Construction Site, 50% Local)
Composite (pickup truck):	0.62 lb/mile	Assumption (50% Construction Site, 50% Local)

Reference: Table A9-9-D, CEQA Handbook.

Vehicle travel on UNPAVED roads:

Description	PM10 Emissions	References/Notes
Dump truck:	1.55 lb/mile	Vehicle weighs 10 tons, has 10 wheels, travels at 10 mph on site.
Concrete truck/Water truck:	1.26 lb/mile	Vehicle weighs 20 tons, has 10 wheels, travels at 5 mph on site.
Tractor trailer-type truck:	1.38 lb/mile	Vehicle weighs 15 tons, has 18 wheels, travels at 5 mph on site.
Grader:	0.80 lb/mile	Vehicle weighs 15 tons, has 6 wheels, travels at 3 mph on site.

Reference: Table A9-9-D, CEQA Handbook; Caterpillar Performance Handbook. Assumes silt loading of 8% (Mining Haul Road, Table A9-9-D-1).

For other equipment traveling on unpaved roads, maximum speed on site assumed to be 5 mph.

Fugitive dust from other equipment (loader) travel on paved or unpaved roads assumed to be negligible relative to other equipment.

Bradley Landfill
Construction Emissions
Phase Ic - TS/MRF Building Construction

Daily Emissions

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Worker commute vehicle {LDT1-ALL}	1.1	13.7	1.1	-	-	1.1	13.7	1.1	-	-
Fugitive Dust	-	-	-	-	4.0	-	-	-	-	4.0
Total	*1.1*	*13.7*	*1.1*	-	*4.0*	*1.1*	*13.7*	*1.1*	-	*4.0*

Notes:

Daily Emissions - Grouped by Equipment/Activity Type

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Commute Vehicles	1.1	13.7	1.1	-	-	1.1	13.7	1.1	-	-
Fugitive Dust	-	-	-	-	4.0	-	-	-	-	4.0
Total	*1.1*	*13.7*	*1.1*	-	*4.0*	*1.1*	*13.7*	*1.1*	-	*4.0*

Bradley Landfill
Construction Emissions
Phase Id - TS/MRF Paving

Equipment/Activity Descriptions

Equipment/Activity	*Hp Rating*	*Load Factor*	*Number Active*	*Equip-Hrs Day*	*Miles/ Day*	*Idling Min. Day*	Equipment Type
Paver	111	0.590	1	8	-	-	Off-Road
Roller	437	0.575	1	8	-	-	Off-Road
Grader	179	0.575	1	8	-	-	Off-Road
Worker commute vehicle [LDT1-ALL]	-	-	50	-	25	-	On-Road

Notes:
Load factors and horsepower ratings from 1993 SCAQMD CEQA Handbook (Tables A9-8-C and A9-8-D) and project team.
Work schedule: 8 hours/day
Number of workers per day: up to 50.

Bradley Landfill
Construction Emissions
Phase Id - TS/MRF Paving

Emission Factors for Off-Road Construction Equipment

	Emission Factors						
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
Paver	1.81	4.97	6.85	0.01	0.75	g/hp-hr	(1)
Roller	0.72	3.08	9.06	0.01	0.42	g/hp-hr	(1)
Grader	0.77	3.39	9.33	0.01	0.45	g/hp-hr	(1)

(1) Composite based on CARB OFFROAD Emissions Model (1999). SOx emission factor assumes fuel has maximum sulfur content of 15 ppmw (SCAQMD Rule 431.2 requirement effective 1 January 2005).

Emission Factors for On-Road Heavy Duty Trucks

	Emission Factors						
Project Year/Mode	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
On-road Truck - Idle	4.41	26.30	80.70	0.34	1.84	grams/hr	(1)
On-road Truck - 5 mph	1.85	10.53	20.27	0.18	0.83	grams/mile	(1)
On-road Truck - 10 mph	1.45	7.26	16.81	0.18	0.79	grams/mile	(1)
On-road Truck - 25 mph	0.80	3.13	11.88	0.18	0.44	grams/mile	(1)
On-road Truck - 55 mph	0.44	1.98	15.47	0.18	0.24	grams/mile	(1)
On-road Trucks - Composite (Water Truck)	1.85	10.53	20.27	0.18	0.83	grams/mile	(2)
On-road Trucks - Composite (Other Trucks)	0.69	2.97	14.17	0.18	0.38	grams/mile	(3)

(1) From CARB's EMFAC2002 (v2.2). Assumes: Heavy duty diesel truck (HHDT), Location: SCAQMD, Temp.: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire wear and brake wear included with fugitive dust).
Based on EMFAC emission factors for Year 2006.

(2) Assumes water truck travel at 5 miles per hour (mph) maximum. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.

(3) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.

Emission Factors for On-Road Construction Worker Vehicles

	Emission Factors						
Project Year/Mode	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
Worker Trips - 10 mph	0.92	11.15	0.79	0.01	0.04	grams/mile	(1)
Worker Trips - 25 mph	0.50	7.25	0.59	0.01	0.02	grams/mile	(1)
Worker Trips - 55 mph	0.40	5.71	0.59	0.00	0.01	grams/mile	(1)
Worker Trips - Composite	0.49	6.87	0.61	0.00	0.02	grams/mile	(2)

(1) From CARB's EMFAC2002 (v2.2). Units in grams/mile. Assumptions: Location: SCAQMD, Temperature: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire and brake wear included with fugitive dust). Conservatively assumes light-duty trucks, composite (LDT1-ALL).
ROG emission factors includes evaporative running loss of 0.2017 grams/mile.
Based on EMFAC emission factors for Year 2006.
Starting emisions (grams/trip, after 600 minutes): ROG (1.52), CO (17.59), NOx (0.66), SOx (0.003), PM10 (0.015).
Hot soak emissions (grams/trip): ROG (0.326).
Partial day diurnal emissions (grams/hr): ROG (0.013).
Resting losses (grams/hr): ROG (0.077).

(2) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Composite emission factor is used for worker commute vehicles.

Bradley Landfill
Construction Emissions
Phase Id - TS/MRF Paving

Fugitive Dust

	Emissions (lb/day) - Before Mitigation					*Emissions (lb/day) - After Mitigation*				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Paver	-	-	-	-	-	-	-	-	-	-
Roller	-	-	-	-	-	-	-	-	-	-
Grader	-	-	-	-	11.3	-	-	-	-	11.3
Worker commute vehicle [LDT1-ALL]	-	-	-	-	6.7	-	-	-	-	6.7
Material transfer operations	-	-	-	-	-	-	-	-	-	-
Wind Erosion of Stockpiles	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	18.0	-	-	-	-	18.0

Notes:
Fugitive PM10 emissions estimates assume watering is used to control emissions by: 50% (Table A11-9-A, CEQA Handbook)
Watering required per SCAQMD Rule 403, so watering and resulting reduction in fugitive dust is not considered mitigation.
No reduction assumed for off-site travel on paved roads (eg., worker commute vehicles) because watering only occurs on site.
Fugitive PM10 emissions for on-road vehicles also include break and tire wear.
Fugitive dust from equipment with "-" assumed to be negligible relative to other equipment.

Wind Erosion of Storage Piles:

PM10 Emissions (lb/day/acre) = 1.7 * (G / 1.5) * ((365 - H) / 235) * (I / 15) * 0.5

Description	Value	References/Notes
Silt Content (G):	15 % wt	Blended ore and dirt (Table A9-9-E-1, CEQA Handbook)
Days of Rain per Year >0.01 in (H):	34	Average year for South Coast Air Basin (Table A9-9-E-2, CEQA Handbook)
% of Time Wind Speed > 12 mph (I):	50 %	Assumption
Storage pile size:	0 acre	Assumption
PM10 from storage piles:	0.0 lb/day	Uncontrolled

References:
1993 CEQA Handbook, Table A9-9-E

Material Handling/Drop Operations:

PM10 Emissions (lb/ton) = k * (0.0032) * ((u / 5)^(1.3) / (M / 2)^(1.4))

Description	Value	References/Notes
Unitless particle size multiplier (k):	0.35	AP42
Mean wind speed (u):	6.2 mph	EPA Tanks v4.0 (Average wind speed for LA County = 6.2 mi/hr)
Material moisture content (M):	5 %	Table A9-9-G-1, 1993 CEQA Handbook (Dry=2.0%, Moist=15.0%, Wet=50.0%)
PM10 Emission factor:	4E-04 lb/ton	Uncontrolled
Soil handled:	0 ton/day	Assumption
PM10 emissions:	0.0 lb/day	Uncontrolled

References:
AP42, Section 13.2.4 (Aggregate Handling and Storage Piles, 1/95)
Table 9-9-G, 1993 CEQA Handbook.

Bradley Landfill
Construction Emissions
Phase Id - TS/MRF Paving

Grader:

PM10 Emissions (lbs/VMT) = 0.60 * 0.051 * (S)^(2.0)

Description	Value	References/Notes
Mean vehicle speed (S):	3 mph	Assumption
PM10 Emissions:	0.28 lb/VMT	AP42, Table 11.9-1
VMT/day:	12.0 mi/day	Assumed to travel at mean vehicle speed for 50% of work day.
PM10 Emissions:	3.3 lb/day/unit	Uncontrolled

References:

AP42, Table 11.9-1 (Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines, 7/98), Grading Operations.

Passenger vehicle travel on PAVED roads:

Description	PM10 Emissions	References/Notes
Local streets	0.018 lb/mile	Table A9-9-B, CEQA Handbook
Collector streets:	0.013 lb/mile	Table A9-9-B, CEQA Handbook
Major Streets/Highways:	0.0064 lb/mile	Table A9-9-B, CEQA Handbook
Freeways:	0.00065 lb/mile	Table A9-9-B, CEQA Handbook
PM10 Emission factor (composite)	0.005345 lb/mile	Assumption (10% Local, 10% Collector, 30% Major Street, 50% Freeway)

Truck travel on PAVED roads:

Description	PM10 Emissions	References/Notes
Construction sites w/cleaning:	0.62 lb/mile	Table A9-9-C, CEQA Handbook
Local streets:	0.62 lb/mile	Table A9-9-C, CEQA Handbook
Collector streets:	0.54 lb/mile	Table A9-9-C, CEQA Handbook
Major streets/highways:	0.43 lb/mile	Table A9-9-C, CEQA Handbook
Freeway:	0.18 lb/mile	Table A9-9-C, CEQA Handbook
Composite (dump truck):	0.28 lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (delivery-type trucks):	0.28 lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (other project trucks)	0.56 lb/mile	Assumption (50% Construction Site, 50% Local)
Composite (pickup truck):	0.62 lb/mile	Assumption (50% Construction Site, 50% Local)

Reference: Table A9-9-D, CEQA Handbook.

Vehicle travel on UNPAVED roads:

Description	PM10 Emissions	References/Notes
Dump truck:	1.55 lb/mile	Vehicle weighs 10 tons, has 10 wheels, travels at 10 mph on site.
Concrete truck/Water truck:	1.26 lb/mile	Vehicle weighs 20 tons, has 10 wheels, travels at 5 mph on site.
Tractor trailer truck:	1.38 lb/mile	Vehicle weighs 15 tons, has 18 wheels, travels at 5 mph on site.
Grader:	0.80 lb/mile	Vehicle weighs 15 tons, has 6 wheels, travels at 3 mph on site.

Reference: Table A9-9-D, CEQA Handbook; Caterpillar Performance Handbook. Assumes silt loading of 8% (Mining Haul Road, Table A9-9-D-1).

For other equipment traveling on unpaved roads, maximum speed on site assumed to be 5 mph.

Fugitive dust from other equipment (loader) travel on paved or unpaved roads assumed to be negligible relative to other equipment.

DRAFT / Attorney-Client Privilege

Bradley Landfill
Construction Emissions
Phase Id - TS/MRF Paving

Daily Emissions

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Paver	2.1	5.7	7.9	-	0.9	2.1	5.7	7.9	-	0.9
Roller	3.2	13.6	40.2	-	1.9	3.2	13.6	40.2	-	1.9
Grader	1.4	6.2	16.9	-	0.8	1.4	6.2	16.9	-	0.8
Worker commute vehicle [LDT1-ALL]	1.9	22.8	1.8	-	-	1.9	22.8	1.8	-	-
Fugitive Dust	-	-	-	-	18.0	-	-	-	-	18.0
Total	*8.6*	*48.3*	*66.8*	-	*21.6*	*8.6*	*48.3*	*66.8*	-	*21.6*

Daily Emissions - Grouped by Equipment/Activity Type

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Construction Equipment	6.7	25.5	65.0	-	3.6	6.7	25.5	65.0	-	3.6
Commute Vehicles	1.9	22.8	1.8	-	-	1.9	22.8	1.8	-	-
Fugitive Dust	-	-	-	-	18.0	-	-	-	-	18.0
Total	*8.6*	*48.3*	*66.8*	-	*21.6*	*8.6*	*48.3*	*66.8*	-	*21.6*

Bradley Landfill
Construction Emissions
Phase II - Landfill Closure - Temporary Construction Activities

Equipment/Activity Descriptions

Equipment/Activity	*Hp Rating*	*Load Factor*	*Number Active*	*Equip-Hrs Day*	*Miles/ Day*	*Idling Min. Day*	Equipment Type
Scraper (23 yd3)	313	0.66	2	8	-	-	Off-Road
Bulldozer	352	0.59	4	8	-	-	Off-Road
Compactor	79	0.575	3	8	-	-	Off-Road
Grader	179	0.575	1	8	-	-	Off-Road
Water Truck, Peterbilt (4,000 gal) [HHDT]	-	-	2	8	40	48	On-Road
Worker commute vehicle [LDT1-ALL]	-	-	50	-	25	-	On-Road

Notes:
Load factors and horsepower ratings based on 1993 SCAQMD CEQA Handbook (Tables A9-8-C and A9-8-D) and project team.
Work schedule: 8 hours/day, 5 days per week.
Number of workers per day: up to 50.

Bradley Landfill
Construction Emissions
Phase II - Landfill Closure - Temporary Construction Activities

Emission Factors for Off-Road Construction Equipment

	Emission Factors						
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
Scraper (23 yd3)	0.63	2.78	8.54	0.01	0.37	g/hp-hr	(1)
Bulldozer	0.63	2.78	8.54	0.01	0.37	g/hp-hr	(1)
Compactor	0.72	3.08	9.06	0.01	0.42	g/hp-hr	(1)

(1) Composite based on CARB OFFROAD Emissions Model (1999). SOx emission factor assumes fuel has maximum sulfur content of 15 ppmw (SCAQMD Rule 431.2 requirement effective as early as 1 January 2005).

Emission Factors for On-Road Heavy Duty Trucks

	Emission Factors						
Project Year/Mode	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
On-road Truck - Idle	4.41	26.30	80.70	0.34	1.84	grams/hr	(1)
On-road Truck - 5 mph	1.85	10.53	20.27	0.18	0.83	grams/mile	(1)
On-road Truck - 10 mph	1.45	7.26	16.81	0.18	0.79	grams/mile	(1)
On-road Truck - 25 mph	0.80	3.13	11.88	0.18	0.44	grams/mile	(1)
On-road Truck - 55 mph	0.44	1.98	15.47	0.18	0.24	grams/mile	(1)
On-road Trucks - Composite (Water Truck)	1.85	10.53	20.27	0.18	0.83	grams/mile	(2)
On-road Trucks - Composite (Dump Truck)	0.69	2.97	14.17	0.18	0.38	grams/mile	(3)

(1) From CARB's EMFAC2002 (v2.2). Assumes: Heavy duty diesel truck (HHDT), Location: SCAQMD, Temp.: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire wear and brake wear included with fugitive dust).
Based on EMFAC emission factors for Year 2006.
(2) Assumes water truck travel at 5 miles per hour (mph) maximum. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.
(3) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Although not included in this composite emission factor, daily emissions estimates (see below) include idling emissions.

Emission Factors for On-Road Construction Worker Vehicles and Pickups

	Emission Factors						
Project Year/Mode	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*Units*	*Reference*
Worker Trips - 10 mph	0.92	11.15	0.79	0.01	0.04	grams/mile	(1)
Worker Trips - 25 mph	0.50	7.25	0.59	0.01	0.02	grams/mile	(1)
Worker Trips - 55 mph	0.40	5.71	0.59	0.00	0.01	grams/mile	(1)
Worker Trips - Composite	0.49	6.87	0.61	0.00	0.02	grams/mile	(2)

(1) From CARB's EMFAC2002 (v2.2). Units in grams/mile. Assumptions: Location: SCAQMD, Temperature: 70 F, Relative Humidity: 60%.
PM10 factors include PM10 from combustion only (tire and brake wear included with fugitive dust). Conservatively assumes light-duty trucks, composite (LDT1-ALL).
ROG emission factors includes evaporative running loss of 0.2017 grams/mile.
Based on EMFAC emission factors for Year 2006.
Starting emisions (grams/trip, after 600 minutes): ROG (1.52), CO (17.59), NOx (0.66), SOx (0.003), PM10 (0.015).
Starting emisions (grams/trip, after 60 minutes): ROG (0.862), CO (10.647), NOx (0.726), SOx (0.001), PM10 (0.008).
Hot soak emissions (grams/trip): ROG (0.326).
Partial day diurnal emissions (grams/hr): ROG (0.013).
Resting losses (grams/hr): ROG (0.077).
(2) Based on 10% at 10 miles per hour (mph), 40% at 25 mph, and 50% at 55 mph. Composite emission factor is used for worker commute vehicles.

Bradley Landfill
Construction Emissions
Phase II - Landfill Closure - Temporary Construction Activities

Fugitive Dust

	Emissions (lb/day) - Before Mitigation					Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Scraper (23 yd3)	-	-	-	-	26.2	-	-	-	-	26.2
Bulldozer	-	-	-	-	28.5	-	-	-	-	28.5
Compactor	-	-	-	-	21.4	-	-	-	-	21.4
Water Truck, Peterbilt (4,000 gal) [HHDT]	-	-	-	-	44.0	-	-	-	-	44.0
Worker commute vehicle [LDT1-ALL]	-	-	-	-	6.7	-	-	-	-	6.7
Soil transfer operations	-	-	-	-	-	-	-	-	-	-
Wind Erosion of Stockpiles	-	-	-	-	4.0	-	-	-	-	4.0
Total	-	-	-	-	130.8	-	-	-	-	130.8

Notes:
Fugitive PM10 emissions estimates assume watering is used to control emissions by: 50% (Table A11-9-A, CEQA Handbook)
Watering required per SCAQMD Rule 403, so watering and resulting reduction in fugitive dust is not considered mitigation.
No reduction assumed for off-site travel on paved roads (eg., worker commute vehicles) because watering only occurs on site.
Fugitive PM10 emissions for on-road vehicles also include break and tire wear.
Fugitive dust from equipment with "-" assumed to be negligible relative to other equipment.

Scraper:

Scraper emissions based on EPA's AP42, Section 13.2.3 (Heavy Construction Operations, 1/95),
Table 13.2.3-1 (Recommended Emission Factors for Construction Operations)

Description	Value		References/Notes
TSP Emission factor (assume = PM10):	0.058	lb/ton soil	AP42, Table 11.9-4 (Open Dust Sources at Western Surface Coal Mines)
PM10 fraction:	0.35		AP42, Section 13.2.4-3 (Aggregate Handling and Storage Piles)
Total soil scraped:	15,000	tons	Assumption
Duration of scraping:	607	days	Project description
Soil scraping rate:	25	ton/day	
PM10 from scraping/excavating:	0.5	lb/day	Uncontrolled

Wind Erosion of Storage Piles:

PM10 Emissions (lb/day/acre) = 1.7 * (G / 1.5) * ((365 - H) / 235) * (I / 15) * 0.5

Description	Value		References/Notes
Silt Content (G):	15	% wt	Blended ore and dirt (Table A9-9-E-1, CEQA Handbook)
Days of Rain per Year >0.01 in (H):	34		Average year for South Coast Air Basin (Table A9-9-E-2, CEQA Handbook)
% of Time Wind Speed > 12 mph (I):	50	%	Assumption
Storage pile size:	0.2	acre	Assumption
PM10 from storage piles:	8.0	lb/day	Uncontrolled

References:
1993 CEQA Handbook, Table A9-9-E

Material Handling/Drop Operations:

PM10 Emissions (lb/ton) = k * (0.0032) * ((u / 5)^(1.3) / (M / 2)^(1.4))

Description	Value		References/Notes
Unitless particle size multiplier (k):	0.35		AP42
Mean wind speed (u):	7	mph	EPA Tanks v4.0 (Average wind speed for LA County = 6.2 mi/hr)
Material moisture content (M):	5	%	Table A9-9-G-1, 1993 CEQA Handbook (Dry=2.0%, Moist=15.0%, Wet=50.0%)
PM10 Emission factor:	5E-04	lb/ton	Uncontrolled
Soil handled:	25	ton/day	Assumption
PM10 emissions:	0.01	lb/day	Uncontrolled

References:
AP42, Section 13.2.4 (Aggregate Handling and Storage Piles, 1/95)
Table 9-9-G, 1993 CEQA Handbook.

Bradley Landfill
Construction Emissions
Phase II - Landfill Closure - Temporary Construction Activities

Grader:

PM10 Emissions (lbs/VMT) = 0.60 * 0.051 * (S)^(2.0)

Description	Value	References/Notes
Mean vehicle speed (S):	5 mph	Assumption
PM10 Emissions:	0.77 lb/VMT	AP42, Table 11.9-1
VMT/day:	30 mi/day	Assumed to travel at mean vehicle speed for 50% of work day.
PM10 Emissions:	23.0 lb/day/unit	Uncontrolled

References:

AP42, Table 11.9-1 (Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines, 7/98), Grading Operations.

Compactor and Bulldozer:

PM10 emissions (lb/hr) = 0.75 * 1.0 * ([s]^1.5) / ([M]^1.4)

Description	Value	References/Notes
Surface material silt content (s):	8 %	Table A9-9-F-1, 1993 CEQA Handbook ("Overburden" dirt type = 7.5%)
Surface material moisture content (M):	5 %	Table A9-9-F-2, 1993 CEQA Handbook (Dry = 2.0%, Moist = 15.0%, Wet = 50.0%)
PM10 Emissions:	14.3 lb/day/unit	Uncontrolled (assumes 8-hr work day)

References:

AP42, Section 13.2.3 (Heavy Construction Operations), Table 13.2.3-1 (Recommended Emission Factors for Construction Operations, 1/95) and Table 11.9-1 (Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines, 7/98, Bulldozing Operations).

(Note: PM10 equation from 1993 CEQA Handbook, Table A9-9-F [Estimating Emissions from Dirt Pushing or Bulldozing Operations] is incorrect)

Passenger vehicle travel on PAVED roads:

Description	PM10 Emissions	References/Notes
Local streets	0.018 lb/mile	Table A9-9-B, CEQA Handbook
Collector streets:	0.013 lb/mile	Table A9-9-B, CEQA Handbook
Major Streets/Highways:	0.0064 lb/mile	Table A9-9-B, CEQA Handbook
Freeways:	0.00065 lb/mile	Table A9-9-B, CEQA Handbook
PM10 Emission factor (composite)	0.005345 lb/mile	Assumption (10% Local, 10% Collector, 30% Major Street, 50% Freeway)

Truck travel on PAVED roads:

Description	PM10 Emissions	References/Notes
Construction sites w/cleaning:	0.62 lb/mile	Table A9-9-C, CEQA Handbook
Local streets:	0.62 lb/mile	Table A9-9-C, CEQA Handbook
Collector streets:	0.54 lb/mile	Table A9-9-C, CEQA Handbook
Major streets/highways:	0.43 lb/mile	Table A9-9-C, CEQA Handbook
Freeway:	0.18 lb/mile	Table A9-9-C, CEQA Handbook
Composite (dump truck):	0.28 lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (delivery-type trucks):	0.28 lb/mile	Assumption (5% Construction Site, 10% Local, 10% Collector, 75% Major Street/highway)
Composite (other project trucks)	0.56 lb/mile	Assumption (50% Construction Site, 50% Local)
Composite (pickup truck):	0.62 lb/mile	Assumption (50% Construction Site, 50% Local)

Reference: Table A9-9-D, CEQA Handbook.

Vehicle travel on UNPAVED roads:

Description	PM10 Emissions	References/Notes
Dump truck:	1.55 lb/mile	Vehicle weighs 10 tons, has 10 wheels, travels at 10 mph on site.
Concrete truck/Water truck:	1.26 lb/mile	Vehicle weighs 20 tons, has 10 wheels, travels at 5 mph on site.
Tractor trailer-type truck:	1.38 lb/mile	Vehicle weighs 15 tons, has 18 wheels, travels at 5 mph on site.
Scraper:	1.62 lb/mile	Vehicle weighs 55 tons (CAT 631E), has 4 wheels, travels at 2 mph on site.
Grader:	0.80 lb/mile	Vehicle weighs 15 tons, has 6 wheels, travels at 3 mph on site.

Reference: Table A9-9-D, CEQA Handbook; Caterpillar Equipment Handbook. Assumes silt loading of 8% (Mining Haul Road, Table A9-9-D-1).

For other equipment traveling on unpaved roads, maximum speed on site assumed to be 5 mph.

Fugitive dust from other equipment (loader) travel on paved or unpaved roads assumed to be negligible relative to other equipment.

Bradley Landfill
Construction Emissions
Phase II - Landfill Closure - Temporary Construction Activities

Daily Emissions

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Scraper (23 yd3)	4.6	20.3	62.2	-	2.7	4.6	20.3	62.2	-	2.7
Bulldozer	9.2	40.7	125.1	0.1	5.4	9.2	40.7	125.1	0.1	5.4
Compactor	1.7	7.4	21.8	-	1.0	1.7	7.4	21.8	-	1.0
Water Truck, Peterbilt (4,000 gal) [HHDT]	0.3	1.9	3.7	-	0.1	0.3	1.9	3.7	-	0.1
Worker commute vehicle [LDT1-ALL]	1.9	22.8	1.8	-	-	1.9	22.8	1.8	-	-
Fugitive Dust	-	-	-	-	130.8	-	-	-	-	130.8
Total	*17.7*	*93.1*	*214.6*	*0.1*	*140.0*	*17.7*	*93.1*	*214.6*	*0.1*	*140.0*

Daily Emissions - Grouped by Equipment/Activity Type

	Daily Emissions (lb/day) - Before Mitigation					Daily Emissions (lb/day) - After Mitigation				
Equipment/Activity	*ROG*	*CO*	*NOx*	*SOx*	*PM10*	*ROG*	*CO*	*NOx*	*SOx*	*PM10*
Construction Equipment	15.8	70.3	212.8	0.1	9.2	15.8	70.3	212.8	0.1	9.2
Commute Vehicles	1.9	22.8	1.8	-	-	1.9	22.8	1.8	-	-
Fugitive Dust	-	-	-	-	130.8	-	-	-	-	130.8
Total	*17.7*	*93.1*	*214.6*	*0.1*	*140.0*	*17.7*	*93.1*	*214.6*	*0.1*	*140.0*