DOWNEY | BRAND
ATTORNEYS LLP

Sophia J. Rowlands
srowlands@downeybrand.com
916/520-5524 Direct
916/520-5924 Fax

621 Capitol Mall, 18th Floor
Sacramento, CA 95814
916/444-1000 Main
916/444-2100 Fax
downeybrand.com

DOCKET
08-AFC-2
DATE June 25 2009
RECD. June 25 2009

DATE: June 25, 2009

TO: California Energy Commission
Attn: Dockets

FROM: Sophia J. Rowlands

SUBJECT: **Project Beacon – Docket No. 08-AFC-2**

ENCLOSED PLEASE FIND: Attached for docketing in matter 08-AFC-2, please find **revised versions of Attachments 7a and 7b** to the BSEP Project Design Refinements document that was filed last Friday. Due to a glitch in the conversion process to PDF, only the first page of each of these attachments was included in the original filing. The complete Attachments, 33 and 20 pages respectively (inclusive of cover page) are attached to this email. All members on the proof of service list who received a hard copy of the original filing will receive a hard copy to replace the incomplete versions in their binders.

We apologize for the inadvertent error in the original filing. Should you have any questions regarding the above, please contact me immediately.

- [x] FOR YOUR INFORMATION
- [ ] PLEASE FILE AND RETURN ENDORSED COPIES IN THE ENCLOSED SELF-ADDRESSED, STAMPED ENVELOPE
- [ ] PLEASE TELEPHONE
- [ ] PER OUR TELEPHONE CONVERSATION
- [ ] IN ACCORDANCE WITH YOUR REQUEST
- [ ] PLEASE REVIEW

Prentiss, Shawn

From: Rowlands, Sophia
Sent: Thursday, June 25, 2009 9:29 AM
To: 'Bill Narvaez'; 'Bill Pietrucha'; 'CA Independent System Operator'; 'California Energy Commission, Attn: Docket No. 08-AFC-2'; 'Diane Fellman'; 'Duane McCloud'; 'Eric K. Solorio'; Luckhardt, Jane; 'Jared Babula'; 'Jared Foster'; 'Jeffrey D. Byron'; 'Jenn Guigliano'; 'Josh Escoto'; 'Karen Douglas'; 'Kenneth Celli'; 'Kenneth Stein, J.D.'; 'Kim McCormick'; 'Maxwell Woods'; 'Meg Russell'; Navarrot, Lois; Prentiss, Shawn; 'Public Advisor'; 'rbooth@waterboards.ca.gov'; 'Sara Head'; 'Scott Busa'; 'Sophie Rowland'; 'Tanya A. Gulesserian/Marc D. Joseph'; 'Will Walters'
Subject: BSEP Project Design Refinements, Revised Attachments 7a & 7b, 08-AFC-2

Attachments: ATTACHMENT 7a Construction Emissions Revised.pdf; ATTACHMENT 7b Operating Emissions Revised (2).pdf

Dear Dockets Clerk:

Attached for docketing in matter 08-AFC-2, please find **revised versions of Attachments 7a and 7b** to the BSEP Project Design Refinements document that was filed last Friday. Due to a glitch in the conversion process to PDF, only the first page of each of these attachments was included in the original filing. The complete Attachments, 33 and 20 pages respectively (inclusive of cover page) are attached to this email.

Originals of the complete attachments will be sent to the docketing office via regular mail or hand delivery, and all members on the proof of service list who received a hard copy of the original filing will receive a hard copy to replace the incomplete versions in their binders.

We apologize for the inadvertent error in the original filing. Should you have any questions regarding the above, please contact me immediately.


ATTACHMENT 7a Construction Emi... ATTACHMENT 7b Operating Emissi...

Sincerely,

Sophie Rowlands
DOWNEY BRAND
621 Capitol Mall, 18th Floor
Sacramento, CA 95814
916/520-5524 Direct
916/520-5924 Fax
srowlands@downeybrand.com
http://www.downeybrand.com

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

APPLICATION FOR CERTIFICATION FOR THE BEACON SOLAR ENERGY PROJECT	DOCKET NO. 08-AFC-2

PROOF OF SERVICE
(Revised 4/28/09)

APPLICANT	**COUNSEL FOR APPLICANT**	**ENERGY COMMISSION**
Scott Busa Kenneth Stein, J.D. Meg Russell Duane McCloud Guillermo Narvaez, P.E. NextEra Energy Resources 700 Universe Blvd. Juno Beach, FL 33408 Scott.busa@nexteraenergy.com Kenneth.stein@nexteraenergy.com Meg.Russell@nexteraenergy.com Duane.mccloud@nexteraenergy.com Guillermo.narvaez@nexteraenergy.com Diane Fellman, Director West Region NextEra Energy Resources 234 Van Ness Avenue San Francisco, CA 94102 Diane.fellman@nexteraenergy.com	Jane Luckhardt, Esq. Downey Brand, LLP 621 Capitol Mall, 18th Floor Sacramento, CA 95814 jluckhardt@downeybrand.com	Karen Douglas Commissioner and Presiding Member kldougla@energy.state.ca.us Jeffrey D. Byron Commissioner & Associate Member jbyron@energy.state.ca.us Kenneth Celli Hearing Officer kcelli@energy.state.ca.us
APPLICANT CONSULTANT Sara Head, Vice President AECOM Environment 1220 Avenida Acaso Camarillo, CA 93012 Sara.head@aecom.com	**INTERESTED AGENCIES** California ISO 151 Blue Ravine Road Folsom, CA 95630 e-recipient@caiso.com	Eric K. Solorio Project Manager esolorio@energy.state.ca.us Jared Babula Staff Counsel jbabula@energy.state.ca.us
Bill Pietrucha, Project Manager Jared Foster, P.E. Worley Parsons 2330 E. Bidwell, Suite 150 Folsom, CA 95630 Bill.Pietrucha@worleyparsons.com Jared.Foster@worleyparsons.com	**INTERVENORS** Tanya A. Gulesserian Marc D. Jacobs Adams Broadwell Joseph & Cardozo 601 Gateway Boulevard, Suite 1000 South San Francisco, CA 94080 **E-MAIL PREFERRED** tgulesserian@adamsbroadwell.com	Public Adviser's Office publicadviser@energy.state.ca.us

Declaration of Service

I, Sophia Rowlands, declare that on June 25, 2009, I served and filed copies of the **Revised Attachments 7a and 7a to the BSEP Project Design Refinements**. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: www.energy.ca.gov/sitingcases/beacon. The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service List) and to the Commission's Docket Unit, in the following manner:

(check all that apply)

For Service to All Other Parties

__X__ sent electronically to all email addresses on the Proof of Service list;

__X__ by personal delivery or by depositing in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service List above.

For Filing with the Energy Commission

__X__ sending an original paper copy mailed, to the address below;

OR

____ depositing in the mail an original and 12 paper copies as follow:

California Energy Commission
Attn: Docket No. 08-AFC-2
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

Sophia Rowlands

Attachment 7a
Construction Emissions Related to Emergency Access Road

Table 1.1
Diesel Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
A/C Tug Narrow Body	0	250	0.72	0.25	2.34	0.00	0.10
A/C Tug Wide Body	0	500	2.14	0.42	4.01	0.00	0.17
Aerial Lifts	0	15	0.05	0.01	0.07	0.00	0.00
Aerial Lifts	16	25	0.06	0.02	0.10	0.00	0.01
Aerial Lifts	26	50	0.20	0.08	0.20	0.00	0.02
Aerial Lifts	51	120	0.25	0.07	0.46	0.00	0.04
Aerial Lifts	121	500	0.59	0.16	1.98	0.00	0.06
Aerial Lifts	501	750	1.07	0.29	3.68	0.00	0.11
Agricultural Mowers	0	120	0.23	0.06	0.42	0.00	0.03
Agricultural Tractors	0	15	0.06	0.01	0.08	0.00	0.00
Agricultural Tractors	16	25	0.08	0.02	0.16	0.00	0.01
Agricultural Tractors	26	50	0.37	0.15	0.36	0.00	0.04
Agricultural Tractors	51	120	0.49	0.14	0.90	0.00	0.07
Agricultural Tractors	121	175	0.68	0.16	1.37	0.00	0.07
Agricultural Tractors	176	250	0.46	0.15	1.83	0.00	0.06
Agricultural Tractors	251	500	0.87	0.23	2.72	0.00	0.09
Air Compressors	0	15	0.05	0.01	0.09	0.00	0.01
Air Compressors	16	25	0.09	0.03	0.14	0.00	0.01
Air Compressors	26	50	0.29	0.12	0.24	0.00	0.03
Air Compressors	51	120	0.34	0.11	0.62	0.00	0.06
Air Compressors	121	175	0.52	0.13	1.04	0.00	0.06
Air Compressors	176	250	0.35	0.13	1.45	0.00	0.05
Air Compressors	251	500	0.70	0.20	2.29	0.00	0.08
Air Compressors	501	750	1.08	0.32	3.63	0.00	0.12
Air Compressors	751	1000	1.93	0.54	6.17	0.00	0.19
Air Conditioner	0	175	0.77	0.12	1.11	0.00	0.06
Air Conditioner	176	250	0.38	0.11	1.52	0.00	0.04
Air Conditioner	251	500	0.74	0.20	2.59	0.00	0.08
Air Start Unit	0	175	0.78	0.16	1.46	0.00	0.07
Air Start Unit	176	250	0.49	0.15	1.96	0.00	0.06
Air Start Unit	251	500	1.04	0.27	3.54	0.00	0.11
Air Start Unit	501	750	1.56	0.41	5.46	0.01	0.17
Baggage Tug	0	120	0.38	0.13	0.72	0.00	0.07
Balers	0	50	0.28	0.10	0.35	0.00	0.03
Balers	51	120	0.33	0.09	0.61	0.00	0.04
Belt Loader	0	120	0.25	0.08	0.47	0.00	0.04
Bobtail	0	120	0.56	0.17	1.04	0.00	0.09
Bore/Drill Rigs	0	15	0.06	0.01	0.08	0.00	0.00
Bore/Drill Rigs	16	25	0.07	0.02	0.13	0.00	0.01
Bore/Drill Rigs	26	50	0.25	0.05	0.28	0.00	0.02
Bore/Drill Rigs	51	120	0.48	0.07	0.61	0.00	0.05
Bore/Drill Rigs	121	175	0.75	0.09	0.91	0.00	0.05
Bore/Drill Rigs	176	250	0.35	0.10	1.18	0.00	0.04
Bore/Drill Rigs	251	500	0.56	0.15	1.70	0.00	0.06
Bore/Drill Rigs	501	750	1.10	0.30	3.47	0.01	0.12
Bore/Drill Rigs	751	1000	1.71	0.54	8.30	0.01	0.21

Table 1.1
Diesel Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Cargo Loader	0	120	0.45	0.13	0.80	0.00	0.07
Cargo Tractor	0	120	0.43	0.13	0.75	0.00	0.07
Catering Truck	0	250	0.30	0.08	1.25	0.00	0.03
Cement and Mortar Mixers	0	15	0.04	0.01	0.05	0.00	0.00
Cement and Mortar Mixers	16	25	0.09	0.03	0.16	0.00	0.01
Chippers/Stump Grinders	0	25	0.08	0.02	0.16	0.00	0.01
Chippers/Stump Grinders	26	120	0.50	0.13	0.87	0.00	0.07
Chippers/Stump Grinders	121	175	0.71	0.15	1.34	0.00	0.07
Chippers/Stump Grinders	176	250	0.54	0.17	2.13	0.00	0.07
Chippers/Stump Grinders	251	500	0.66	0.17	2.13	0.00	0.07
Chippers/Stump Grinders	501	750	1.59	0.43	5.27	0.01	0.17
Chippers/Stump Grinders	751	1000	2.86	0.80	9.76	0.01	0.28
Combines	0	120	0.59	0.16	1.08	0.00	0.08
Combines	121	175	0.63	0.13	1.26	0.00	0.06
Combines	176	250	0.41	0.12	1.66	0.00	0.05
Combines	251	500	0.59	0.16	2.12	0.00	0.06
Commercial Turf Equipment	0	15	0.06	0.01	0.07	0.00	0.00
Commercial Turf Equipment	16	25	0.06	0.02	0.11	0.00	0.01
Compressor (Entertainment)	0	120	0.25	0.07	0.44	0.00	0.04
Compressor (GSE)	0	120	0.40	0.11	0.67	0.00	0.06
Compressor (GSE)	121	250	0.29	0.10	1.15	0.00	0.04
Compressor (GSE)	251	500	0.64	0.18	2.10	0.00	0.07
Compressor (GSE)	501	750	0.94	0.28	3.19	0.00	0.11
Compressor (Railyard)	0	120	0.23	0.07	0.41	0.00	0.04
Concrete/Industrial Saws	0	25	0.07	0.02	0.13	0.00	0.01
Concrete/Industrial Saws	26	50	0.32	0.12	0.31	0.00	0.03
Concrete/Industrial Saws	51	120	0.50	0.13	0.86	0.00	0.07
Concrete/Industrial Saws	121	175	0.88	0.19	1.64	0.00	0.09
Crane (Rail-CHE)	0	120	0.38	0.11	0.68	0.00	0.06
Crane (Rail-CHE)	121	175	0.36	0.08	0.70	0.00	0.03
Cranes	0	50	0.32	0.13	0.25	0.00	0.03
Cranes	51	120	0.37	0.11	0.65	0.00	0.06
Cranes	121	175	0.49	0.12	0.93	0.00	0.05
Cranes	176	250	0.35	0.12	1.24	0.00	0.05
Cranes	251	500	0.66	0.18	1.77	0.00	0.07
Cranes	501	750	1.12	0.31	3.05	0.00	0.12
Cranes	751	9999	4.15	1.09	12.18	0.01	0.38
Crawler Tractors	0	50	0.35	0.14	0.28	0.00	0.03
Crawler Tractors	51	120	0.50	0.15	0.90	0.00	0.08
Crawler Tractors	121	175	0.76	0.19	1.48	0.00	0.09
Crawler Tractors	176	250	0.57	0.21	1.94	0.00	0.08
Crawler Tractors	251	500	1.20	0.29	2.72	0.00	0.11
Crawler Tractors	501	750	2.14	0.52	4.98	0.00	0.20
Crawler Tractors	751	1000	3.40	0.80	8.60	0.01	0.28

Table 1.1
Diesel Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Crushing/Proc. Equipment	0	50	0.56	0.23	0.47	0.00	0.05
Crushing/Proc. Equipment	51	120	0.59	0.18	1.04	0.00	0.10
Crushing/Proc. Equipment	121	175	0.97	0.24	1.86	0.00	0.11
Crushing/Proc. Equipment	176	250	0.62	0.22	2.54	0.00	0.08
Crushing/Proc. Equipment	251	500	1.05	0.31	3.45	0.00	0.12
Crushing/Proc. Equipment	501	750	1.63	0.50	5.64	0.01	0.19
Crushing/Proc. Equipment	751	9999	4.82	1.38	16.07	0.01	0.48
Dumpers/Tenders	0	25	0.03	0.01	0.06	0.00	0.00
Excavators	0	25	0.07	0.02	0.13	0.00	0.01
Excavators	26	50	0.31	0.11	0.26	0.00	0.03
Excavators	51	120	0.53	0.14	0.84	0.00	0.08
Excavators	121	175	0.67	0.15	1.11	0.00	0.07
Excavators	176	250	0.39	0.14	1.49	0.00	0.05
Excavators	251	500	0.62	0.20	1.93	0.00	0.07
Excavators	501	750	1.02	0.33	3.29	0.00	0.12
Forklift	0	175	0.33	0.07	0.61	0.00	0.03
Forklifts	0	50	0.19	0.07	0.15	0.00	0.02
Forklifts	51	120	0.23	0.06	0.36	0.00	0.04
Forklifts	121	175	0.33	0.08	0.57	0.00	0.03
Forklifts	176	250	0.17	0.07	0.73	0.00	0.02
Forklifts	251	500	0.24	0.09	0.91	0.00	0.03
Fuel Truck	0	250	0.14	0.05	0.57	0.00	0.02
Generator	0	120	0.60	0.17	1.01	0.00	0.10
Generator	121	175	0.93	0.22	1.69	0.00	0.10
Generator	176	250	0.58	0.22	2.30	0.00	0.08
Generator	251	500	0.97	0.32	3.19	0.00	0.11
Generator	501	750	1.56	0.52	5.30	0.01	0.19
Generator (Entertainment)	0	50	0.41	0.16	0.44	0.00	0.04
Generator (Entertainment)	51	120	0.58	0.15	1.03	0.00	0.08
Generator (Entertainment)	121	175	0.79	0.17	1.53	0.00	0.07
Generator (Entertainment)	176	250	0.49	0.15	1.91	0.00	0.06
Generator (Entertainment)	251	500	0.77	0.20	2.44	0.00	0.08
Generator (Entertainment)	501	750	1.52	0.39	4.92	0.01	0.16
Generator (Entertainment)	751	9999	3.33	0.91	11.04	0.01	0.33
Generator (Railyard)	0	175	0.73	0.16	1.43	0.00	0.07
Generator (Railyard)	176	9999	3.04	0.83	10.05	0.01	0.30
Generator Sets	0	15	0.07	0.02	0.12	0.00	0.01
Generator Sets	16	25	0.11	0.03	0.17	0.00	0.01
Generator Sets	26	50	0.30	0.12	0.31	0.00	0.03
Generator Sets	51	120	0.51	0.15	0.93	0.00	0.07
Generator Sets	121	175	0.75	0.18	1.53	0.00	0.07
Generator Sets	176	250	0.51	0.17	2.14	0.00	0.06
Generator Sets	251	500	0.91	0.24	3.10	0.00	0.09
Generator Sets	501	750	1.47	0.40	5.14	0.01	0.15
Generator Sets	751	9999	3.73	1.05	12.41	0.01	0.37

Table 1.1
Diesel Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Graders	0	50	0.36	0.14	0.30	0.00	0.03
Graders	51	120	0.55	0.15	0.93	0.00	0.08
Graders	121	175	0.74	0.17	1.35	0.00	0.08
Graders	176	250	0.49	0.18	1.79	0.00	0.07
Graders	251	500	0.75	0.21	2.12	0.00	0.08
Graders	501	750	1.59	0.46	4.59	0.00	0.17
Ground Power Unit	0	175	0.87	0.20	1.57	0.00	0.09
Hydrant Truck	0	175	0.85	0.19	1.62	0.00	0.09
Hydro Power Units	0	15	0.04	0.01	0.04	0.00	0.00
Hydro Power Units	16	25	0.05	0.01	0.09	0.00	0.00
Hydro Power Units	26	50	0.27	0.11	0.23	0.00	0.03
Hydro Power Units	51	120	0.30	0.09	0.55	0.00	0.05
Lav Truck	0	175	0.31	0.07	0.57	0.00	0.03
Lawn & Garden Tractors	0	15	0.06	0.01	0.07	0.00	0.00
Lawn & Garden Tractors	16	25	0.06	0.02	0.12	0.00	0.01
Leaf Blowers/Vacuums	0	15	0.02	0.00	0.02	0.00	0.00
Leaf Blowers/Vacuums	16	120	0.29	0.07	0.51	0.00	0.04
Leaf Blowers/Vacuums	121	250	0.22	0.06	0.89	0.00	0.02
Lift	0	120	0.50	0.14	0.85	0.00	0.07
Materials Handling (Rail-CHE)	0	120	0.42	0.12	0.74	0.00	0.07
Off-Highway Tractors	0	120	0.74	0.25	1.42	0.00	0.13
Off-Highway Tractors	121	175	0.86	0.23	1.76	0.00	0.10
Off-Highway Tractors	176	250	0.54	0.19	1.70	0.00	0.07
Off-Highway Tractors	251	750	3.58	0.74	6.84	0.01	0.29
Off-Highway Tractors	751	1000	5.56	1.12	11.47	0.01	0.40
Off-Highway Trucks	0	175	0.76	0.17	1.28	0.00	0.08
Off-Highway Trucks	176	250	0.43	0.16	1.61	0.00	0.06
Off-Highway Trucks	251	500	0.75	0.25	2.32	0.00	0.09
Off-Highway Trucks	501	750	1.22	0.41	3.87	0.00	0.14
Off-Highway Trucks	751	1000	2.07	0.64	7.32	0.01	0.22
Other Agricultural Equipment	0	15	0.05	0.01	0.06	0.00	0.00
Other Agricultural Equipment	16	25	0.07	0.02	0.12	0.00	0.01
Other Agricultural Equipment	26	50	0.26	0.10	0.26	0.00	0.03
Other Agricultural Equipment	51	120	0.34	0.10	0.62	0.00	0.05
Other Agricultural Equipment	121	175	0.50	0.11	1.00	0.00	0.05
Other Agricultural Equipment	176	250	0.34	0.11	1.35	0.00	0.04
Other Agricultural Equipment	251	500	0.55	0.14	1.77	0.00	0.06
Other Construction Equipment	0	15	0.06	0.01	0.07	0.00	0.00
Other Construction Equipment	16	25	0.05	0.02	0.10	0.00	0.01
Other Construction Equipment	26	50	0.29	0.10	0.28	0.00	0.03
Other Construction Equipment	51	120	0.54	0.13	0.86	0.00	0.07
Other Construction Equipment	121	175	0.59	0.12	0.99	0.00	0.05
Other Construction Equipment	176	500	0.61	0.17	1.98	0.00	0.07

Table 1.1
Diesel Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Other General Industrial Equipmen	0	15	0.04	0.01	0.05	0.00	0.00
Other General Industrial Equipmen	16	25	0.06	0.02	0.12	0.00	0.01
Other General Industrial Equipmen	26	50	0.32	0.13	0.24	0.00	0.03
Other General Industrial Equipmen	51	120	0.47	0.15	0.85	0.00	0.08
Other General Industrial Equipmen	121	175	0.59	0.16	1.17	0.00	0.07
Other General Industrial Equipmen	176	250	0.37	0.14	1.55	0.00	0.05
Other General Industrial Equipmen	251	500	0.82	0.26	2.69	0.00	0.09
Other General Industrial Equipmen	501	750	1.36	0.43	4.56	0.00	0.16
Other General Industrial Equipmen	751	1000	2.28	0.66	7.31	0.01	0.23
Other GSE	0	175	0.53	0.14	1.09	0.00	0.06
Other Lawn & Garden Equipment	0	15	0.07	0.01	0.09	0.00	0.00
Other Lawn & Garden Equipment	16	25	0.07	0.02	0.13	0.00	0.01
Other Material Handling Equipment	0	50	0.44	0.19	0.34	0.00	0.04
Other Material Handling Equipment	51	120	0.46	0.15	0.82	0.00	0.08
Other Material Handling Equipment	121	175	0.74	0.20	1.49	0.00	0.09
Other Material Handling Equipment	176	250	0.40	0.15	1.65	0.00	0.06
Other Material Handling Equipment	251	500	0.59	0.18	1.94	0.00	0.07
Other Material Handling Equipment	501	9999	3.01	0.87	9.66	0.01	0.30
Passenger Stand	0	120	0.44	0.10	0.76	0.00	0.05
Pavers	0	25	0.08	0.03	0.16	0.00	0.01
Pavers	26	50	0.39	0.16	0.31	0.00	0.04
Pavers	51	120	0.52	0.16	0.97	0.00	0.09
Pavers	121	175	0.80	0.20	1.60	0.00	0.09
Pavers	176	250	0.70	0.24	2.33	0.00	0.10
Pavers	251	500	1.17	0.26	2.53	0.00	0.10
Paving Equipment	0	25	0.05	0.02	0.10	0.00	0.01
Paving Equipment	26	50	0.33	0.14	0.27	0.00	0.03
Paving Equipment	51	120	0.41	0.13	0.76	0.00	0.07
Paving Equipment	121	175	0.62	0.16	1.26	0.00	0.07
Paving Equipment	176	250	0.44	0.15	1.46	0.00	0.06
Plate Compactors	0	15	0.03	0.01	0.03	0.00	0.00
Pressure Washers	0	15	0.04	0.01	0.06	0.00	0.00
Pressure Washers	16	25	0.04	0.01	0.07	0.00	0.00
Pressure Washers	26	50	0.12	0.04	0.14	0.00	0.01
Pressure Washers	51	120	0.15	0.04	0.27	0.00	0.02
Pumps	0	15	0.05	0.02	0.09	0.00	0.01
Pumps	16	25	0.12	0.05	0.19	0.00	0.01
Pumps	26	50	0.35	0.14	0.35	0.00	0.03
Pumps	51	120	0.52	0.15	0.95	0.00	0.08
Pumps	121	175	0.75	0.18	1.53	0.00	0.08
Pumps	176	250	0.49	0.17	2.06	0.00	0.06
Pumps	251	500	0.97	0.26	3.22	0.00	0.10
Pumps	501	750	1.60	0.43	5.46	0.01	0.17
Pumps	751	9999	4.98	1.38	16.22	0.01	0.49

Table 1.1
Diesel Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Rollers	0	15	0.04	0.01	0.05	0.00	0.00
Rollers	16	25	0.06	0.02	0.10	0.00	0.01
Rollers	26	50	0.32	0.13	0.28	0.00	0.03
Rollers	51	120	0.42	0.12	0.74	0.00	0.06
Rollers	121	175	0.63	0.15	1.20	0.00	0.07
Rollers	176	250	0.45	0.15	1.62	0.00	0.06
Rollers	251	500	0.78	0.20	2.09	0.00	0.08
Rough Terrain Forklifts	0	50	0.42	0.16	0.36	0.00	0.04
Rough Terrain Forklifts	51	120	0.44	0.12	0.73	0.00	0.07
Rough Terrain Forklifts	121	175	0.73	0.16	1.28	0.00	0.07
Rough Terrain Forklifts	176	250	0.43	0.15	1.66	0.00	0.06
Rough Terrain Forklifts	251	500	0.69	0.21	2.20	0.00	0.08
Rubber Tired Dozers	0	175	0.87	0.24	1.79	0.00	0.10
Rubber Tired Dozers	176	250	0.78	0.28	2.45	0.00	0.11
Rubber Tired Dozers	251	500	1.74	0.36	3.21	0.00	0.14
Rubber Tired Dozers	501	750	2.63	0.55	4.90	0.00	0.21
Rubber Tired Dozers	751	1000	4.21	0.85	8.49	0.01	0.30
Rubber Tired Loaders	0	25	0.07	0.02	0.13	0.00	0.01
Rubber Tired Loaders	26	50	0.40	0.16	0.33	0.00	0.04
Rubber Tired Loaders	51	120	0.43	0.12	0.72	0.00	0.07
Rubber Tired Loaders	121	175	0.63	0.15	1.15	0.00	0.07
Rubber Tired Loaders	176	250	0.42	0.15	1.53	0.00	0.06
Rubber Tired Loaders	251	500	0.77	0.22	2.17	0.00	0.08
Rubber Tired Loaders	501	750	1.57	0.45	4.55	0.00	0.17
Rubber Tired Loaders	751	1000	2.24	0.62	7.13	0.01	0.22
Sailboat Auxiliary Inboard Engine	0	50	0.10	0.07	0.22	0.00	0.01
Scrapers	0	120	0.72	0.22	1.30	0.00	0.12
Scrapers	121	175	0.93	0.24	1.83	0.00	0.11
Scrapers	176	250	0.74	0.26	2.48	0.00	0.10
Scrapers	251	500	1.52	0.37	3.42	0.00	0.14
Scrapers	501	750	2.63	0.63	6.02	0.01	0.24
Service Truck	0	175	0.23	0.05	0.43	0.00	0.02
Signal Boards	0	15	0.04	0.01	0.04	0.00	0.00
Signal Boards	16	50	0.38	0.15	0.37	0.00	0.04
Signal Boards	51	120	0.54	0.15	0.94	0.00	0.08
Signal Boards	121	175	0.84	0.19	1.62	0.00	0.08
Signal Boards	176	250	0.61	0.20	2.51	0.00	0.08
Skid Steer Loaders	0	25	0.07	0.02	0.13	0.00	0.01
Skid Steer Loaders	26	50	0.25	0.08	0.25	0.00	0.02
Skid Steer Loaders	51	120	0.28	0.06	0.41	0.00	0.04
Snowblowers	0	175	0.70	0.15	1.33	0.00	0.07
Snowblowers	176	250	0.48	0.15	1.91	0.00	0.06
Snowblowers	251	500	0.74	0.20	2.57	0.00	0.08
Sprayers	0	25	0.07	0.03	0.12	0.00	0.01
Sprayers	26	50	0.17	0.06	0.22	0.00	0.02
Sprayers	51	120	0.35	0.09	0.64	0.00	0.04
Sprayers	121	175	0.47	0.10	0.94	0.00	0.04
Sprayers	176	250	0.35	0.11	1.45	0.00	0.04
Sprayers	251	500	0.40	0.10	1.47	0.00	0.04

Table 1.1
Diesel Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Surfacing Equipment	0	50	0.15	0.06	0.14	0.00	0.01
Surfacing Equipment	51	120	0.43	0.12	0.77	0.00	0.06
Surfacing Equipment	121	175	0.48	0.11	0.92	0.00	0.05
Surfacing Equipment	176	250	0.39	0.13	1.38	0.00	0.05
Surfacing Equipment	251	500	0.78	0.19	2.05	0.00	0.07
Surfacing Equipment	501	750	1.22	0.30	3.28	0.00	0.12
Swathers	0	120	0.33	0.09	0.61	0.00	0.04
Swathers	121	175	0.52	0.11	1.04	0.00	0.05
Sweeper	0	120	0.20	0.04	0.31	0.00	0.02
Sweepers/Scrubbers	0	15	0.07	0.01	0.09	0.00	0.00
Sweepers/Scrubbers	16	25	0.08	0.02	0.15	0.00	0.01
Sweepers/Scrubbers	26	50	0.40	0.16	0.33	0.00	0.04
Sweepers/Scrubbers	51	120	0.54	0.16	0.89	0.00	0.09
Sweepers/Scrubbers	121	175	0.81	0.19	1.47	0.00	0.09
Sweepers/Scrubbers	176	250	0.37	0.14	1.60	0.00	0.05
Tillers	0	15	0.04	0.01	0.05	0.00	0.00
Tillers	16	250	0.56	0.17	2.28	0.00	0.07
Tillers	251	500	1.07	0.28	3.77	0.00	0.11
Tractors/Loaders/Backhoes	0	25	0.07	0.02	0.13	0.00	0.01
Tractors/Loaders/Backhoes	26	50	0.35	0.13	0.31	0.00	0.03
Tractors/Loaders/Backhoes	51	120	0.36	0.09	0.57	0.00	0.05
Tractors/Loaders/Backhoes	121	175	0.59	0.12	0.96	0.00	0.06
Tractors/Loaders/Backhoes	176	250	0.40	0.14	1.55	0.00	0.05
Tractors/Loaders/Backhoes	251	500	0.85	0.26	2.72	0.00	0.10
Tractors/Loaders/Backhoes	501	750	1.27	0.40	4.21	0.01	0.15
Transport Refrigeration Units	0	15	0.05	0.01	0.07	0.00	0.00
Transport Refrigeration Units	16	25	0.06	0.02	0.11	0.00	0.01
Transport Refrigeration Units	26	50	0.24	0.06	0.24	0.00	0.02
Trenchers	0	15	0.05	0.01	0.06	0.00	0.00
Trenchers	16	25	0.14	0.04	0.26	0.00	0.01
Trenchers	26	50	0.44	0.18	0.36	0.00	0.04
Trenchers	51	120	0.48	0.15	0.91	0.00	0.08
Trenchers	121	175	0.88	0.23	1.80	0.00	0.10
Trenchers	176	250	0.82	0.28	2.68	0.00	0.11
Trenchers	251	500	1.64	0.35	3.40	0.00	0.14
Trenchers	501	750	3.09	0.66	6.51	0.01	0.26
Vessels w/Inboard Engines	0	250	0.88	0.59	2.01	0.00	0.05
Welders	0	15	0.04	0.01	0.07	0.00	0.01
Welders	16	25	0.07	0.03	0.11	0.00	0.01
Welders	26	50	0.31	0.13	0.28	0.00	0.03
Welders	51	120	0.28	0.08	0.50	0.00	0.04
Welders	121	175	0.56	0.14	1.13	0.00	0.06
Welders	176	250	0.31	0.11	1.28	0.00	0.04
Welders	251	500	0.50	0.14	1.62	0.00	0.05

[a] These are composite horsepower-based off-road emission factors for 2010 developed by running CARB's OFFROAD2007 Model (December 15, 2006 version). Total daily emissions from the model for each type of equipment within each horsepower range were divided by the total daily operating hours for the equipment within each horsepower range to calculate hourly emissions from individual pieces of equipment.

Table 1.2
Four-stroke Gasoline Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
2-Wheel Tractors	0	5	0.89	0.06	0.03	0.00	0.00
2-Wheel Tractors	6	15	2.74	0.07	0.05	0.00	0.04
2-Wheel Tractors	16	25	5.81	0.15	0.10	0.00	0.08
A/C Tug Narrow Body	0	175	6.32	0.27	1.86	0.00	0.01
A/C Tug Wide Body	0	500	22.29	0.41	2.99	0.01	0.05
Aerial Lifts	0	15	3.30	0.09	0.07	0.00	0.05
Aerial Lifts	16	25	5.12	0.14	0.09	0.00	0.07
Aerial Lifts	26	50	2.79	0.07	0.12	0.00	0.00
Aerial Lifts	51	120	1.89	0.08	0.28	0.00	0.00
Agricultural Mowers	0	15	2.23	0.07	0.04	0.00	0.03
Agricultural Mowers	16	25	5.23	0.15	0.08	0.00	0.07
Agricultural Tractors	0	120	5.73	0.35	0.98	0.00	0.01
Agricultural Tractors	121	175	4.64	0.24	1.69	0.00	0.01
Air Compressors	0	5	0.83	0.07	0.03	0.00	0.00
Air Compressors	0	5	0.83	0.07	0.03	0.00	0.00
Air Compressors	6	15	2.17	0.06	0.04	0.00	0.03
Air Compressors	6	15	2.17	0.06	0.04	0.00	0.03
Air Compressors	16	25	5.60	0.15	0.10	0.00	0.08
Air Compressors	16	25	5.61	0.15	0.10	0.00	0.08
Air Compressors	26	50	4.88	0.20	0.28	0.00	0.00
Air Compressors	51	120	4.26	0.27	0.78	0.00	0.01
Air Compressors	121	175	4.30	0.23	1.69	0.00	0.01
Air Conditioner	0	175	4.82	0.17	1.47	0.00	0.01
Air Start Unit	0	175	5.89	0.22	1.79	0.00	0.02
All Terrain Vehicles (ATVs) Active	0	15	0.06	0.00	0.00	0.00	0.00
All Terrain Vehicles (ATVs) Active	16	25	0.06	0.00	0.00	0.00	0.00
All Terrain Vehicles (ATVs) Active	26	50	0.06	0.00	0.00	0.00	0.00
All Terrain Vehicles (ATVs) Inactive	0	15	0.00	0.00	0.00	0.00	0.00
All Terrain Vehicles (ATVs) Inactive	16	25	0.00	0.00	0.00	0.00	0.00
All Terrain Vehicles (ATVs) Inactive	26	50	0.00	0.00	0.00	0.00	0.00
Asphalt Pavers	0	15	3.28	0.09	0.07	0.00	0.05
Asphalt Pavers	16	25	8.52	0.22	0.15	0.00	0.12
Asphalt Pavers	26	50	4.95	0.19	0.29	0.00	0.00
Asphalt Pavers	51	120	4.04	0.24	0.78	0.00	0.01
Baggage Tug	0	120	3.95	0.09	0.38	0.00	0.01
Balers	0	50	3.39	0.12	0.25	0.00	0.00
Balers	51	120	2.64	0.15	0.64	0.00	0.00
Belt Loader	0	120	2.30	0.06	0.23	0.00	0.00
Bobtail	0	120	3.95	0.09	0.38	0.00	0.01
Bore/Drill Rigs	0	15	4.52	0.12	0.08	0.00	0.06
Bore/Drill Rigs	16	25	8.52	0.23	0.13	0.00	0.11
Bore/Drill Rigs	26	50	4.63	0.17	0.33	0.00	0.00
Bore/Drill Rigs	51	120	5.43	0.31	1.28	0.00	0.01
Bore/Drill Rigs	121	175	5.14	0.25	2.01	0.00	0.01
Cargo Loader	0	120	2.80	0.08	0.31	0.00	0.00
Cargo Tractor	0	120	7.46	0.30	0.74	0.00	0.01
Cart	0	15	3.31	0.07	0.05	0.00	0.00

Table 1.2
Four-stroke Gasoline Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Catering Truck	0	250	6.97	0.30	1.97	0.00	0.01
Cement and Mortar Mixers	0	5	1.17	0.06	0.03	0.00	0.00
Cement and Mortar Mixers	6	15	3.17	0.12	0.04	0.00	0.04
Cement and Mortar Mixers	16	25	9.87	0.34	0.11	0.00	0.11
Chippers/Stump Grinders	0	15	4.85	0.13	0.10	0.00	0.07
Chippers/Stump Grinders	0	15	5.55	0.14	0.07	0.00	0.06
Chippers/Stump Grinders	16	25	8.43	0.23	0.15	0.00	0.11
Chippers/Stump Grinders	16	25	9.32	0.22	0.10	0.00	0.09
Combines	0	120	4.01	0.19	0.78	0.00	0.01
Combines	121	175	6.34	0.18	1.36	0.00	0.02
Combines	176	250	7.50	0.17	1.43	0.00	0.02
Commercial Turf Equipment	0	15	3.07	0.07	0.05	0.00	0.00
Commercial Turf Equipment	16	25	5.62	0.12	0.09	0.00	0.01
Commercial Turf Equipment	26	50	4.38	0.12	0.17	0.00	0.00
Commercial Turf Equipment	51	120	1.17	0.02	0.13	0.00	0.00
Concrete/Industrial Saws	0	5	1.21	0.07	0.03	0.00	0.00
Concrete/Industrial Saws	6	15	3.87	0.10	0.08	0.00	0.06
Concrete/Industrial Saws	16	25	7.77	0.20	0.13	0.00	0.11
Concrete/Industrial Saws	26	50	3.86	0.06	0.09	0.00	0.00
Concrete/Industrial Saws	51	120	1.84	0.04	0.10	0.00	0.01
Cranes	0	50	4.18	0.16	0.24	0.00	0.00
Cranes	51	120	3.55	0.21	0.66	0.00	0.00
Cranes	121	175	3.37	0.17	1.25	0.00	0.01
Crushing/Proc. Equipment	0	15	4.22	0.11	0.08	0.00	0.06
Crushing/Proc. Equipment	16	25	7.97	0.21	0.14	0.00	0.11
Crushing/Proc. Equipment	26	120	7.22	0.43	1.52	0.00	0.01
Deicer	0	120	5.37	0.26	1.27	0.00	0.01
Dumpers/Tenders	0	5	0.56	0.04	0.02	0.00	0.00
Dumpers/Tenders	6	15	2.44	0.09	0.03	0.00	0.03
Dumpers/Tenders	16	25	5.15	0.17	0.06	0.00	0.06
Dumpers/Tenders	26	120	2.15	0.12	0.50	0.00	0.00
Forklift	0	50	3.43	0.05	0.10	0.00	0.00
Forklifts	0	25	4.07	0.07	0.06	0.00	0.00
Forklifts	26	50	5.96	0.08	0.15	0.00	0.00
Forklifts	51	120	2.97	0.07	0.22	0.00	0.00
Forklifts	121	175	3.05	0.09	0.46	0.00	0.01
Front Mowers	0	15	3.01	0.05	0.04	0.00	0.00
Front Mowers	0	15	3.12	0.06	0.04	0.00	0.00
Front Mowers	16	25	4.18	0.06	0.05	0.00	0.00
Front Mowers	16	25	4.28	0.08	0.05	0.00	0.00
Fuel Truck	0	175	1.60	0.06	0.51	0.00	0.00
Generator	0	120	10.78	0.58	1.41	0.00	0.01
Generator Sets	0	5	1.46	0.11	0.02	0.00	0.01
Generator Sets	0	5	1.59	0.13	0.02	0.00	0.01
Generator Sets	6	15	3.65	0.11	0.06	0.00	0.00
Generator Sets	6	15	4.04	0.15	0.05	0.00	0.00
Generator Sets	16	25	7.95	0.22	0.11	0.00	0.01
Generator Sets	16	25	8.52	0.28	0.10	0.00	0.01
Generator Sets	26	50	4.02	0.14	0.28	0.00	0.00
Generator Sets	51	120	4.45	0.24	1.01	0.00	0.01
Generator Sets	121	175	5.00	0.24	1.92	0.00	0.01
Ground Power Unit	0	175	6.37	0.09	0.68	0.00	0.01
Hydrant truck	0	175	6.36	0.29	1.71	0.00	0.01
Hydro Power Units	0	5	0.99	0.06	0.03	0.00	0.00
Hydro Power Units	6	15	2.48	0.07	0.05	0.00	0.04
Hydro Power Units	16	25	5.59	0.15	0.10	0.00	0.08
Hydro Power Units	26	50	3.51	0.06	0.10	0.00	0.00
Hydro Power Units	51	120	1.31	0.03	0.07	0.00	0.00

Table 1.2
Four-stroke Gasoline Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Lav Cart	0	15	3.31	0.07	0.05	0.00	0.00
Lav Truck	0	175	2.11	0.06	0.38	0.00	0.00
Lawn & Garden Tractors	0	15	3.64	0.05	0.04	0.00	0.00
Lawn & Garden Tractors	0	15	3.75	0.07	0.05	0.00	0.00
Lawn & Garden Tractors	16	25	5.97	0.08	0.05	0.00	0.00
Lawn & Garden Tractors	16	25	6.11	0.11	0.06	0.00	0.00
Lawn & Garden Tractors	26	50	2.51	0.08	0.15	0.00	0.00
Lawn Mowers	0	5	0.52	0.03	0.01	0.00	0.00
Lawn Mowers	0	5	0.83	0.03	0.01	0.00	0.00
Leaf Blowers/Vacuums	0	5	0.35	0.01	0.00	0.00	0.00
Leaf Blowers/Vacuums	0	5	0.48	0.02	0.00	0.00	0.00
Lift	0	120	4.41	0.23	0.78	0.00	0.01
Maint. Truck	0	175	3.67	0.13	0.95	0.00	0.01
Minibikes	0	5	1.89	0.30	0.01	0.00	0.01
Off-Road Motorcycles Active	0	15	0.06	0.00	0.00	0.00	0.00
Off-Road Motorcycles Active	16	25	0.06	0.00	0.00	0.00	0.00
Off-Road Motorcycles Active	26	50	0.06	0.00	0.00	0.00	0.00
Off-Road Motorcycles Inactive	0	15	0.00	0.00	0.00	0.00	0.00
Off-Road Motorcycles Inactive	16	25	0.00	0.00	0.00	0.00	0.00
Off-Road Motorcycles Inactive	26	50	0.00	0.00	0.00	0.00	0.00
Other Agricultural Equipment	0	5	0.81	0.05	0.02	0.00	0.00
Other Agricultural Equipment	6	15	3.29	0.10	0.05	0.00	0.04
Other Agricultural Equipment	16	25	8.48	0.25	0.12	0.00	0.11
Other Agricultural Equipment	26	50	2.98	0.11	0.21	0.00	0.00
Other Agricultural Equipment	51	120	2.95	0.17	0.68	0.00	0.00
Other Agricultural Equipment	121	175	3.91	0.19	1.52	0.00	0.01
Other Agricultural Equipment	176	250	7.08	0.30	2.37	0.00	0.02
Other Construction Equipment	0	175	3.27	0.06	0.34	0.00	0.01
Other General Industrial Equipmen	0	15	2.39	0.04	0.03	0.00	0.00
Other General Industrial Equipmen	16	25	5.70	0.11	0.08	0.00	0.01
Other General Industrial Equipmen	26	50	4.09	0.06	0.12	0.00	0.00
Other General Industrial Equipmen	51	120	3.15	0.09	0.34	0.00	0.01
Other General Industrial Equipmen	121	175	5.44	0.11	0.77	0.00	0.01
Other GSE	0	50	4.66	0.15	0.27	0.00	0.00
Other Lawn & Garden Equipment	0	5	1.02	0.04	0.01	0.00	0.01
Other Lawn & Garden Equipment	0	5	1.56	0.05	0.01	0.00	0.00
Other Lawn & Garden Equipment	6	15	2.56	0.04	0.03	0.00	0.00
Other Lawn & Garden Equipment	6	15	2.83	0.05	0.03	0.00	0.00
Other Lawn & Garden Equipment	16	25	5.78	0.08	0.06	0.00	0.00
Other Lawn & Garden Equipment	16	25	6.25	0.11	0.06	0.00	0.00
Other Lawn & Garden Equipment	26	50	3.37	0.11	0.23	0.00	0.00
Other Lawn & Garden Equipment	51	120	3.94	0.20	0.91	0.00	0.01
Other Material Handling Equipment	0	50	5.40	0.19	0.30	0.00	0.00
Other Material Handling Equipment	51	120	2.91	0.16	0.53	0.00	0.00
Passenger Stand	0	175	3.83	0.15	1.19	0.00	0.01
Paving Equipment	0	5	0.83	0.05	0.02	0.00	0.00
Paving Equipment	6	15	3.32	0.09	0.06	0.00	0.05
Paving Equipment	16	25	7.70	0.21	0.13	0.00	0.10
Paving Equipment	26	50	3.83	0.13	0.23	0.00	0.00
Paving Equipment	51	120	2.70	0.15	0.56	0.00	0.01
Plate Compactors	0	5	0.77	0.05	0.02	0.00	0.00
Plate Compactors	6	15	2.48	0.07	0.05	0.00	0.03
Pressure Washers	0	5	1.73	0.13	0.04	0.00	0.01
Pressure Washers	0	5	2.41	0.19	0.03	0.00	0.01
Pressure Washers	6	15	3.55	0.10	0.05	0.00	0.00
Pressure Washers	6	15	3.92	0.14	0.05	0.00	0.00
Pressure Washers	16	25	9.25	0.24	0.13	0.00	0.01
Pressure Washers	16	25	10.00	0.32	0.12	0.00	0.01
Pressure Washers	26	50	4.33	0.16	0.30	0.00	0.00

Table 1.2
Four-stroke Gasoline Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Pumps	0	5	0.76	0.06	0.02	0.00	0.00
Pumps	0	5	1.10	0.09	0.02	0.00	0.01
Pumps	6	15	3.15	0.09	0.06	0.00	0.04
Pumps	6	15	3.41	0.11	0.05	0.00	0.04
Pumps	16	25	6.90	0.18	0.12	0.00	0.09
Pumps	16	25	7.11	0.20	0.11	0.00	0.09
Pumps	26	50	4.13	0.15	0.26	0.00	0.00
Pumps	51	120	5.15	0.30	1.09	0.00	0.01
Pumps	121	175	5.29	0.24	1.86	0.00	0.01
Rear Engine Riding Mowers	0	15	1.89	0.03	0.02	0.00	0.00
Rear Engine Riding Mowers	0	15	1.96	0.04	0.02	0.00	0.00
Rear Engine Riding Mowers	16	25	3.78	0.06	0.04	0.00	0.00
Rear Engine Riding Mowers	16	25	3.88	0.08	0.04	0.00	0.00
Rollers	0	5	1.27	0.06	0.03	0.00	0.00
Rollers	6	15	3.08	0.08	0.06	0.00	0.04
Rollers	16	25	6.90	0.18	0.12	0.00	0.09
Rollers	26	50	6.39	0.25	0.33	0.00	0.00
Rollers	51	120	5.50	0.34	0.90	0.00	0.01
Rough Terrain Forklifts	0	50	7.10	0.27	0.41	0.00	0.00
Rough Terrain Forklifts	51	120	5.46	0.33	1.02	0.00	0.01
Rough Terrain Forklifts	121	175	5.12	0.26	1.91	0.00	0.01
Rubber Tired Loaders	0	50	5.57	0.22	0.31	0.00	0.00
Rubber Tired Loaders	51	120	4.28	0.26	0.76	0.00	0.01
Sailboat Auxiliary Inboard Engine	0	15	1.28	0.05	0.04	0.00	0.00
Service Truck	0	250	2.26	0.10	0.66	0.00	0.00
Shredders	0	5	1.22	0.07	0.03	0.00	0.00
Shredders	0	5	2.26	0.08	0.02	0.00	0.01
Signal Boards	0	5	1.47	0.08	0.04	0.00	0.00
Signal Boards	6	15	3.36	0.09	0.07	0.00	0.05
Skid Steer Loaders	0	15	4.48	0.12	0.09	0.00	0.06
Skid Steer Loaders	16	25	6.45	0.17	0.11	0.00	0.09
Skid Steer Loaders	26	50	3.02	0.06	0.11	0.00	0.00
Skid Steer Loaders	51	120	2.28	0.08	0.30	0.00	0.01
Snowblowers	0	5	0.75	0.02	0.00	0.00	0.00
Snowblowers	0	5	0.95	0.03	0.01	0.00	0.00
Snowblowers	6	15	1.74	0.02	0.02	0.00	0.00
Snowblowers	6	15	1.92	0.03	0.02	0.00	0.00
Snowblowers	16	25	3.28	0.04	0.03	0.00	0.00
Snowblowers	16	25	3.56	0.06	0.03	0.00	0.00
Specialty Vehicles Carts	0	5	1.39	0.04	0.01	0.00	0.01
Specialty Vehicles Carts	6	15	2.24	0.03	0.02	0.00	0.00
Specialty Vehicles Carts	16	25	6.45	0.08	0.06	0.00	0.00
Sprayers	0	5	0.74	0.04	0.02	0.00	0.00
Sprayers	6	15	2.33	0.09	0.03	0.00	0.03
Sprayers	16	25	5.67	0.19	0.07	0.00	0.06
Sprayers	26	50	2.94	0.11	0.21	0.00	0.00
Sprayers	51	120	2.58	0.15	0.62	0.00	0.00
Sprayers	121	175	3.58	0.17	1.41	0.00	0.01
Surfacing Equipment	0	5	0.83	0.06	0.03	0.00	0.00
Surfacing Equipment	6	15	2.17	0.06	0.04	0.00	0.03
Surfacing Equipment	16	25	5.47	0.15	0.10	0.00	0.07
Swathers	0	120	3.53	0.20	0.84	0.00	0.01
Swathers	121	175	3.45	0.17	1.35	0.00	0.01
Sweeper	0	120	2.37	0.12	0.42	0.00	0.00
Sweepers/Scrubbers	0	15	3.13	0.06	0.04	0.00	0.00
Sweepers/Scrubbers	16	25	7.49	0.13	0.10	0.00	0.01
Sweepers/Scrubbers	26	50	4.89	0.07	0.15	0.00	0.00
Sweepers/Scrubbers	51	120	2.67	0.07	0.31	0.00	0.01
Sweepers/Scrubbers	121	175	5.50	0.09	0.67	0.00	0.01
Tampers/Rammers	0	15	2.83	0.08	0.05	0.00	0.04

Table 1.2
Four-stroke Gasoline Off-road Equipment Emission Factors for 2010 in MDAB and KCAPCD Jurisdiction by Equipment Catgeory and Horsepower Range[a]

Equipment Type	HP Range		Emission Factor (lb/hr)				
	From	To	CO	VOC	NOx	SOx	PM10
Tillers	0	5	0.70	0.03	0.01	0.00	0.00
Tillers	0	5	0.93	0.04	0.01	0.00	0.00
Tillers	6	15	3.20	0.11	0.04	0.00	0.00
Tractors/Loaders/Backhoes	0	120	3.12	0.16	0.40	0.00	0.00
Transport Refrigeration Units	0	15	3.33	0.07	0.05	0.00	0.00
Trenchers	0	15	3.65	0.10	0.07	0.00	0.05
Trenchers	16	25	8.13	0.22	0.14	0.00	0.11
Trenchers	26	50	4.71	0.18	0.27	0.00	0.00
Trenchers	51	120	4.40	0.27	0.83	0.00	0.01
Trimmers/Edgers/Brush Cutters	0	5	0.14	0.01	0.00	0.00	0.00
Trimmers/Edgers/Brush Cutters	0	5	0.22	0.01	0.00	0.00	0.00
Vessels w/Inboard Engines	0	250	13.47	0.47	0.62	0.00	0.01
Vessels w/Inboard Jet Engines	0	500	16.18	0.57	0.73	0.00	0.01
Vessels w/Outboard Engines	0	50	4.09	0.16	0.13	0.00	0.00
Vessels w/Sterndrive Engines	0	250	10.00	0.35	0.45	0.00	0.01
Water Truck	0	175	1.62	0.06	0.50	0.00	0.00
Welders	0	15	3.56	0.12	0.05	0.00	0.04
Welders	16	25	5.36	0.16	0.08	0.00	0.07
Welders	26	50	4.60	0.18	0.31	0.00	0.00
Welders	51	120	3.11	0.19	0.69	0.00	0.00
Welders	121	175	3.46	0.18	1.43	0.00	0.01
Wood Splitters	0	5	1.34	0.06	0.02	0.00	0.01
Wood Splitters	0	5	2.33	0.07	0.02	0.00	0.01

[a] These are composite horsepower-based off-road emission factors for 2010 developed by running CARB's OFFROAD2007 Model (December 15, 2006 version). Total daily emissions from the model for each type of equipment within each horsepower range were divided by the total daily operating hours for the equipment within each horsepower range to calculate hourly emissions from individual

Table 1.3
KCAPCD and MDAB Jurisdiction 2010 On-Road Motor Vehicle Emission Factors

Vehicle Class	Emission Factors[a]											
	CO (lb/mi)	VOC (lb/mi)	NO_x (lb/mi)	SO_x (lb/mi)	PM10 Exh (lb/mi)	PM10 Tire (lb/mi)	PM10 Brake (lb/mi)	PM10 Tire + Brake (lb/mi)	PM2.5 Exh (lb/mi)	PM2.5 Tire (lb/mi)	PM2.5 Brake (lb/mi)	PM2.5 Tire + Brake (lb/mi)
LDA-NCAT	2.1E-01	2.7E-02	1.2E-02	0.0E+00	1.4E-04	0.0E+00	0.0E+00	0.0E+00	1.1E-04	0.0E+00	0.0E+00	0.0E+00
LDA-CAT	7.1E-03	5.7E-04	7.0E-04	8.0E-06	2.5E-05	1.8E-05	2.8E-05	4.6E-05	2.3E-05	4.5E-06	1.2E-05	1.6E-05
LDA-DSL	1.2E-03	4.0E-04	3.6E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
LDT1-NCAT	2.0E-01	2.3E-02	1.1E-02	0.0E+00	1.1E-04	0.0E+00	0.0E+00	0.0E+00	8.0E-05	0.0E+00	0.0E+00	0.0E+00
LDT1-CAT	1.6E-02	1.2E-03	1.5E-03	1.1E-05	3.4E-05	1.8E-05	2.6E-05	4.5E-05	3.2E-05	4.6E-06	1.1E-05	1.6E-05
LDT1-DSL	1.1E-03	1.3E-04	3.7E-03	0.0E+00	9.5E-05	3.2E-05	3.2E-05	6.3E-05	8.8E-05	7.9E-06	1.4E-05	2.2E-05
LDT2-NCAT	2.1E-01	2.4E-02	1.2E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
LDT2-CAT	1.1E-02	8.2E-04	1.5E-03	1.0E-05	6.1E-05	1.8E-05	2.9E-05	4.7E-05	5.7E-05	4.6E-06	1.2E-05	1.7E-05
LDT2-DSL	1.0E-03	0.0E+00	3.0E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MDV-NCAT	3.8E-01	2.3E-02	1.9E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MDV-CAT	1.1E-02	8.2E-04	1.8E-03	1.3E-05	6.1E-05	1.7E-05	2.6E-05	4.3E-05	5.6E-05	4.3E-06	1.1E-05	1.6E-05
MDV-DSL	6.7E-04	0.0E+00	3.3E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
LHD1-CAT	1.9E-02	2.2E-03	3.7E-03	1.9E-05	3.8E-05	1.9E-05	1.9E-05	3.8E-05	3.6E-05	4.8E-06	8.3E-06	1.3E-05
LHD1-DSL	2.7E-03	4.9E-04	9.9E-03	0.0E+00	1.2E-04	4.1E-05	4.1E-05	8.2E-05	1.1E-04	1.0E-05	1.8E-05	2.8E-05
LHD2-CAT	3.0E-02	3.6E-03	4.7E-03	0.0E+00	6.9E-05	0.0E+00	0.0E+00	0.0E+00	6.4E-05	0.0E+00	0.0E+00	0.0E+00
LHD2-DSL	3.1E-03	6.8E-04	1.2E-02	0.0E+00	1.6E-04	5.3E-05	5.3E-05	1.1E-04	1.5E-04	1.3E-05	2.3E-05	3.6E-05
MHD-NCAT	5.6E-01	8.6E-02	1.0E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MHD-CAT	9.2E-02	8.0E-03	1.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MHD-DSL	8.2E-03	8.9E-04	2.1E-02	3.3E-05	9.2E-04	3.3E-05	3.3E-05	6.6E-05	8.4E-04	8.2E-06	1.4E-05	2.2E-05
HHD-CAT	1.6E-01	9.5E-03	3.2E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
HHD-DSL	1.1E-02	2.7E-03	3.5E-02	3.9E-05	1.4E-03	7.9E-05	6.2E-05	1.4E-04	1.3E-03	2.0E-05	2.7E-05	4.6E-05
OBUS-CAT	6.3E-02	4.0E-03	1.5E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
OBUS-DSL	6.0E-03	5.0E-04	1.5E-02	0.0E+00	5.0E-04	0.0E+00	0.0E+00	0.0E+00	4.6E-04	0.0E+00	0.0E+00	0.0E+00
SBUS-CAT	3.6E-02	4.0E-03	2.0E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SBUS-DSL	1.5E-02	1.6E-03	3.1E-02	0.0E+00	2.0E-03	0.0E+00	0.0E+00	0.0E+00	1.8E-03	0.0E+00	0.0E+00	0.0E+00
UBUS-CAT	3.0E-03	0.0E+00	4.0E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
UBUS-DSL	4.0E-03	0.0E+00	2.0E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MH-NCAT	4.9E-01	2.0E-02	1.0E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MH-CAT	2.7E-02	1.2E-03	3.9E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MH-DSL	2.5E-03	0.0E+00	2.0E-02	0.0E+00	5.0E-04	0.0E+00	0.0E+00	0.0E+00	4.6E-04	0.0E+00	0.0E+00	0.0E+00
MCY-NCAT	1.7E-01	1.2E-02	3.4E-03	0.0E+00	1.3E-04	0.0E+00	2.2E-05	2.2E-05	1.0E-04	0.0E+00	9.6E-06	9.6E-06
MCY-CAT	4.0E-02	6.9E-03	2.6E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

[a] Emission factors, except PM2.5, calculated by dividing total emissions [lb/day] from BURDEN output of EMFAC2007, version 2.3, by total VMT [mi/day] from BURDEN output. PM2.5 emission factors by mass fractions in table on the next page.

Table 1.3
KCAPCD and MDAB Jurisdiction 2010 On-Road Motor Vehicle Emission Factors

PM2.5 Mass Fractions of PM10

PM10 Category	Tech.	PM2.5 Fraction[a]
Exhaust	CAT	0.928
Exhaust	NCAT	0.756
Exhaust	DSL	0.920
Tire Wear	N/A	0.250
Brake Wear	N/A	0.429

[a] From Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006, http://www.aqmd.gov/ceqa/handbook/PM2_5/PM2_5.html

Table 1.4
Construction Equipment Emission Factors

Equipment Type	Fuel	Engine Rating (HP)	ARB Off-Road Model Category	CO (lb/hr)[a]	VOC (lb/hr)[a]	NOx (lb/hr)[a]	SOx (lb/hr)[a]	PM10 (lb/hr)[a]	PM2.5 (lb/hr)[b]
Dozer, 300 HP	Diesel	300	Rubber Tired Dozers	1.74	0.36	3.21	0.00	0.14	0.13
Motor Grader	Diesel	213	Graders	0.49	0.18	1.79	0.00	0.07	0.06
Tandem Roller	Diesel	100	Rollers	0.42	0.12	0.74	0.00	0.06	0.06
Vibratory Roller, 825H	Diesel	354	Rollers	0.78	0.20	2.09	0.00	0.08	0.07
Truck Tractor	Diesel	450	Tractors/Loaders/Backhoes	0.85	0.26	2.72	0.00	0.10	0.09
Asphalt Paver	Diesel	130	Pavers	0.80	0.20	1.60	0.00	0.09	0.08
Pneumatic Roller, 12 ton	Diesel	80	Rollers	0.42	0.12	0.74	0.00	0.06	0.06
Dozer, 200 HP	Diesel	200	Rubber Tired Dozers	0.78	0.28	2.45	0.00	0.11	0.10

[a] From Table 1.1 for diesel and Table 1.2 for gasoline.

[b] Diesel PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10

PM2.5 Fraction of PM10 in Diesel Engine Exhaust = 0.920 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5

PM2.5 Fraction of PM10 in Gasoline Engine Exhaust = 0.756 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Emissions [pounds per day] = Emission factor [pounds per hour] x Number pieces of equipment x Operating time for each piece [hours per day]

Table 1.5
2010 Motor Vehicle Emission Factors

Table 1.5-A

Vehicle Type	Vehicle Class	Emission Factors								
		CO (lb/mi)	VOC (lb/mi)	NOx (lb/mi)	SOx (lb/mi)	Exh. PM10 (lb/mi)	Fug. PM10 (lb/mi)	Diesel PM (lb/mi)	Exh. PM2.5 (lb/mi)	Fug. PM2.5 (lb/mi)
On-Site Asphalt Trucks	HHD-DSL	1.13E-02	2.73E-03	3.55E-02	3.93E-05	1.39E-03	7.39E-01	1.39E-03	1.28E-03	1.57E-01
On-Site Watering Truck	HHD-DSL	1.13E-02	2.73E-03	3.55E-02	3.93E-05	1.39E-03	7.39E-01	1.39E-03	1.28E-03	1.57E-01
On-Site Aggregate Truck	HHD-DSL	1.13E-02	2.73E-03	3.55E-02	3.93E-05	1.39E-03	7.39E-01	1.39E-03	1.28E-03	1.57E-01
On-Site Material truck	HHD-DSL	1.13E-02	2.73E-03	3.55E-02	3.93E-05	1.39E-03	7.39E-01	1.39E-03	1.28E-03	1.57E-01
Off-Site Asphalt Trucks	HHD-DSL	1.13E-02	2.73E-03	3.55E-02	3.93E-05	1.39E-03	9.66E-04	1.39E-03	1.28E-03	1.86E-04
Off-Site Aggregate Truck	HHD-DSL	1.13E-02	2.73E-03	3.55E-02	3.93E-05	1.39E-03	9.66E-04	1.39E-03	1.28E-03	1.86E-04
Off-Site Watering Trucks	HHD-DSL	1.13E-02	2.73E-03	3.55E-02	3.93E-05	1.39E-03	9.66E-04	1.39E-03	1.28E-03	1.86E-04
Off-Site Construction Worker Commute	LDT1-CAT	1.59E-02	1.18E-03	1.53E-03	1.06E-05	3.43E-05	8.70E-04	0.00E+00	3.19E-05	1.55E-04
Off-Site Material Delivery Truck	HHD-DSL	1.13E-02	2.73E-03	3.55E-02	3.93E-05	1.39E-03	9.66E-04	1.39E-03	1.28E-03	1.86E-04

Note: The emission factors, except fugitive emissions from entrained road dust, were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and dividing calculated daily emissions by daily vehicle-miles-traveled.
All the emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions, and fugitive PM10 and PM2.5 emission factors take into account tire and brake wear and entrained paved or unpaved road dust.
Emissions [pounds/day] = Emission factor [pounds/mile] x Vehicle miles traveled [miles/day]

Table 1.5-B
Motor Vehicle Entrained Paved Road PM10 Emission Factors

Vehicle Type	On-Road Average Vehicle Weight (tons)[a]	Road Type	Silt Loading (g/m^2)[b]	PM10 Emission Factor (lb/mi)[c]	PM2.5 Emission Factor (lb/mi)[d]
Off-Site Aggregate Truck	2.4	Collector	0.035	0.0008	0.0001
Off-Site Asphalt Trucks	2.4	Collector	0.035	0.0008	0.0001
Off-Site Watering Trucks	2.4	Collector	0.035	0.0008	0.0001
Off-Site Material Delivery Truck	2.4	Collector	0.035	0.0008	0.0001
Off-Site Construction Worker Commute	2.4	Collector	0.035	0.0008	0.0001

[a] Average on-road vehicle weight in Kern County portion of Mojave Desert Air Basin from ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)
[b] From ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)
[c] Emission factor [lb/mi] = 0.016 (Silt Loading/2)$^{0.65}$ (Weight/3)$^{1.5}$, from ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)
[d] PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10
PM2.5 Fraction of PM10 in Paved Road Dust = 0.169 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Emissions [pounds/day] = Emission factor [pounds/mile] x Vehicle miles traveled [miles/day]

Table 1.5
2010 Motor Vehicle Emission Factors

Vehicles on Unpaved Surfaces

Emission Factor [lb/mi] = 1.5 x (silt content [%] / 12)$^{0.9}$ x (vehicle weight [tons] / 3)$^{0.45}$
Reference: AP-42, Section 13.2.2, November 2006 for industrial unpaved roads

Parameter	Value	Basis
Silt Content	7.5	SCAQMD 1993 CEQA Air Quality Handbook, Overburden
Vehicle Weight	20	Average of 30 tons loaded and 10 tons empty weights

PM10 Emission Factor (Uncontrolled)	2.308	lb/mi	
Reduction from watering twice a day for industrial unpaved road.	68%		from SCAQMD 1993 CEQA Air Quality Handbook, Table 11-4
Controlled PM10 Emission Factor	0.7384	lb/mi	
Controlled PM2.5 Emission Factor[a]	0.157	lb/mi	

[a] PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10

PM2.5 Fraction of PM10 in Unpaved Road Dust = 0.212 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Emissions [pounds per day] = Controlled emission factor [pounds per mile] x Miles traveled [miles/day]

Table 1.6
Emission Factors for Fugitive PM Emissions During Earthwork

Soil handling

Emission Factor [lb/cu. yd] = 0.00112 x (mean wind speed [mi/hr] / 5)$^{1.3}$ / (moisture [%] / 2)$^{1.4}$ x (number drops per ton) x (density [ton/cu. yd])
Reference: AP-42, Equation (1), Section 13.2.4, January 1995

Parameter	Value	Basis
Mean Wind Speed	12	SCAQMD 1993 CEQA Air Quality Handbook, Default
Moisture	15	"Open Fugitive Dust PM10 Control Strategies Study," Midwest Research Institute, October 12, 1990, moist soil.
Number Drops	4	Assumption
Soil Density	1.215	Table 2.46, Handbook of Solid Waste Management

PM10 Emission Factor (Uncontrolled)	1.01E-03	lb/cu. yd
Reduction from watering four times a day	0%	
Controlled PM10 Emission Factor	1.01E-03	lb/cu. yd
Controlled PM2.5 Emission Factor[a]	2.10E-04	lb/cu. yd

[a] PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10

PM2.5 Fraction of PM10 in Construction Dust = 0.208 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Emissions [pounds per day] = Controlled emission factor [pounds per cubic yard] x Volume soil handled [cubic yards per day]

Table 1.6
Emission Factors for Fugitive PM Emissions During Earthwork

Storage Pile Wind Erosion

Emission Factor [lb/day-acre] = 0.85 x (silt content [%] / 1.5) x (365 / 235) x (percentage of time unobstructed wind exceeds 12 mph / 15)
Reference: Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, EPA, September 1992

Parameter	Value	Basis
Silt Content	7.5	SCAQMD 1993 CEQA Air Quality Handbook, Overburden
Pct. time wind > 12 mph	13.3	"Emissions Inventory Guidance, Mineral Handling and Processing Industries," MDAQMD, April 10, 2000, p. 17.

PM10 Emission Factor (Uncontrolled)	5.9 lb/day-acre	
Reduction from Watering Twice/Day	50%	SCAQMD 1993 CEQA Air Quality Handbook, Table 11-4
Controlled PM10 Emission Factor	2.9 lb/day-acre	
Controlled PM2.5 Emission Factor[a]	0.6 lb/day-acre	

[a] PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10

PM2.5 Fraction of PM10 in Construction Dust = 0.208 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Emissions [pounds per day] = Controlled emission factor [pounds per acre-day] x Storage pile surface area [acres]

Bulldozing, Scraping and Grading

Emission Factor [lb/hr] = 0.75 x (silt content [%])$^{1.5}$ / (moisture)$^{1.4}$
Reference: AP-42, Table 11.9-1, October 1998

Parameter	Value	Basis
Silt Content	7.5	SCAQMD 1993 CEQA Air Quality Handbook, Overburden
Moisture	15	SCAQMD 1993 CEQA Air Quality Handbook, Moist Soil

PM10 Emission Factor (Uncontrolled)	0.348 lb/hr	
Reduction from watering four times a day	0%	
Controlled PM10 Emission Factor	0.348 lb/hr	
Controlled PM2.5 Emission Factor[a]	0.072 lb/hr	

[a] PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10

PM2.5 Fraction of PM10 in Construction Dust = 0.208 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Emissions [pounds per day] = Controlled emission factor [pounds per hour] x Bulldozing or grading time [hours/day]

Table 1.7: Equipment and Vehicle Projection for Offsite Access Road Construction

Road length	6500	feet
Road width	36	feet
Paved road width	24	feet
Top soil depth	1	feet
Volume of topsoil stripped	234000	cu.feet
Volume of topsoil stripped	8667	cu. yd
Surface Area of road	156000	sq. ft
Surface Area of road	17333	sq. yd
Aggregate required	156000	cu.feet
Aggregate required	5778	cu. yd
Asphalt concrete required	93600	cu.feet
	3467	cu. yd

Activity	Description	Equipment	HP	Daily Output	Unit	Labor hr/day for daily output	# of Labors	Working Days	# of equipment used daily in each month	
									Month 1	Month 2
Site Clearing	Topsoil stripping, ideal condition (B10M)	Dozer	300	3000	cu. yd	12	2	3	1	
Site Grading	Grade subgrade for base course, roadways (B11L)	Grader	213	3500	sq. yd	16	2	5	1	
		Grader	213						1	
	Finish grading granular subbase for highway paving	Tandem Roller	100						1	
Aggregate sub-base course	(B32C)	Dozer	200	8000	sq. yd	48	6	3	1	
		Grader	213						1	
		Dozer	300						1	
	Base course drainage layers, aggregate base course for	Vibratory Roller	354						1	
	roadways and large paved areas, stone base,	Truck Tractor	450						1	
Aggregate base course	compacted, 3/4" stone base, to 6" deep (B36C)	Water tanker, 5000 gal		5000	sq. yd	40	5	4	1	
	Asphalt Paving, plant mixed asphaltic base courses for	Asphalt Paver	130						1	
	roadways and large paved areas, bituminous concrete,	Tandem Roller, 10 ton	100						1	
Asphaltic concrete course	6" thick (B25)	Pneumatic Roller, 12 ton	80	3700	sq. yd	88	11	5	1	
		Asphalt Paver	130							1
	Plant-mix asphalt paving, for highways and large paved	Tandem Roller, 10 ton	100							1
Binder course	areas, binder course, 2" thick (B25)	Pneumatic Roller, 12 ton	80	6345	sq. yd	88	11	3		1
		Asphalt Paver	130							1
	Plant-mix asphalt paving, for highways and large paved	Tandem Roller, 10 ton	100							2
Wearing Course	areas, wearing course, 2" thick (B25B)	Pneumatic Roller, 12 ton	80	6345	sq. yd	96	12	3		1

Vehicle	Tech.	Fuel	Capacity	Unit	Total Trucks	Trucks/day	
						Month 1	Month 2
Dump Truck	HHDT	Diesel	20	cu. yd	289	42	
Asphalt concrete trucks	HHDT	Diesel	20	cu. yd	173	35	
Water Truck	HHDT	Diesel	5000	gal		1	
Binding Material truck	HHDT	Diesel	20	cu. yd	48		17
Wearing course material	HHDT	Diesel	20	cu. yd	48		17
construction worker	LDTI-CAT	Gasoline				11	12

* Assumption - activities do not occur concurrently

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-A
Off-Site Access Road Construction Equipment and Motor Vehicle Numbers

Equipment/Vehicle Type	Fuel	Hours or Miles/Day	Daily Number	
			Month 1	Month 2
			1	**2**
Construction Equipment				
Dozer, 300 HP	Diesel	8	1	
Motor Grader	Diesel	8	1	
Tandem Roller	Diesel	8	1	2
Vibratory Roller, 825H	Diesel	8	1	
Truck Tractor	Diesel	8	1	
Asphalt Paver	Diesel	8	1	1
Pneumatic Roller, 12 ton	Diesel	8	1	1
Dozer, 200 HP	Diesel	8	1	
Motor Vehicles				
Off-Site Vehicles				
Off-Site Asphalt Trucks	Diesel	20	35	0
Off-Site Aggregate Truck	Diesel	40	42	0
Off-Site Watering Trucks	Diesel	5	1	0
Off-Site Construction Worker Commute	Gasoline	60	11	12
Off-Site Material Delivery Truck	Diesel	20	0	17

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-B
Off-Site Access Road Daily Construction Equipment and Motor Vehicle Use

Equipment/Vehicle Type	Fuel	Daily Operating Hours or Miles	
		Month 1	Month 2
Construction Equipment			
Dozer, 300 HP	Diesel	8	0
Motor Grader	Diesel	8	0
Tandem Roller	Diesel	8	16
Vibratory Roller, 825H	Diesel	8	0
Truck Tractor	Diesel	8	0
Asphalt Paver	Diesel	8	8
Pneumatic Roller, 12 ton	Diesel	8	8
Dozer, 200 HP	Diesel	8	0
Motor Vehicles			
Off-Site Vehicles			
Off-Site Asphalt Trucks	Diesel	700	0
Off-Site Aggregate Truck	Diesel	1,680	0
Off-Site Watering Trucks	Diesel	5	0
Off-Site Construction Worker Commute	Gasoline	660	720
Off-Site Material Delivery Truck	Diesel	0	340

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-C
Off-Site Access Road Daily Construction Equipment and Motor Vehicle CO Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Daily Emissions (lb/day)	
		Month 1	Month 2
Construction Equipment			
Dozer, 300 HP	1.7448	14.0	0.0
Motor Grader	0.4935	3.9	0.0
Tandem Roller	0.4172	3.3	6.7
Vibratory Roller, 825H	0.7792	6.2	0.0
Truck Tractor	0.8494	6.8	0.0
Asphalt Paver	0.7954	6.4	6.4
Pneumatic Roller, 12 ton	0.4172	3.3	3.3
Dozer, 200 HP	0.7768	6.2	0.0
Construction Equipment Total		**50.2**	**16.4**
Motor Vehicles			
Off-Site Vehicles			
Off-Site Asphalt Trucks	0.0113	7.9	0.0
Off-Site Aggregate Truck	0.0113	18.9	0.0
Off-Site Watering Trucks	0.0113	0.1	0.0
Off-Site Construction Worker Commute	0.0159	10.5	11.4
Off-Site Material Delivery Truck	0.0113	0.0	3.8
Off-Site Motor Vehicle Total		**37.3**	**15.3**

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-D
Off-Site Access Road Daily Construction Equipment and Motor Vehicle VOC Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Daily Emissions (lb/day)	
		Month 1	Month 2
Construction Equipment			
Dozer, 300 HP	0.3623	2.9	0.0
Motor Grader	0.1759	1.4	0.0
Tandem Roller	0.1199	1.0	1.9
Vibratory Roller, 825H	0.1987	1.6	0.0
Truck Tractor	0.2626	2.1	0.0
Asphalt Paver	0.2045	1.6	1.6
Pneumatic Roller, 12 ton	0.1199	1.0	1.0
Dozer, 200 HP	0.2777	2.2	0.0
Construction Equipment Total		**13.8**	**4.5**
Motor Vehicles			
Off-Site Vehicles			
Off-Site Asphalt Trucks	0.0027	1.9	0.0
Off-Site Aggregate Truck	0.0027	4.6	0.0
Off-Site Watering Trucks	0.0027	0.0	0.0
Off-Site Construction Worker Commute	0.0012	0.8	0.9
Off-Site Material Delivery Truck	0.0027	0.0	0.9
Off-Site Motor Vehicle Total		**7.3**	**1.8**

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-E
Off-Site Access Road Daily Construction Equipment and Motor Vehicle NOx Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Daily Emissions (lb/day)	
		Month 1	Month 2
Construction Equipment			
Dozer, 300 HP	3.2072	25.7	0.0
Motor Grader	1.7872	14.3	0.0
Tandem Roller	0.7375	5.9	11.8
Vibratory Roller, 825H	2.0870	16.7	0.0
Truck Tractor	2.7203	21.8	0.0
Asphalt Paver	1.6007	12.8	12.8
Pneumatic Roller, 12 ton	0.7375	5.9	5.9
Dozer, 200 HP	2.4463	19.6	0.0
Construction Equipment Total		**122.6**	**30.5**
Motor Vehicles			
Off-Site Vehicles			
Off-Site Asphalt Trucks	0.0355	24.8	0.0
Off-Site Aggregate Truck	0.0355	59.6	0.0
Off-Site Watering Trucks	0.0355	0.2	0.0
Off-Site Construction Worker Commute	0.0015	1.0	1.1
Off-Site Material Delivery Truck	0.0355	0.0	12.1
Off-Site Motor Vehicle Total		**85.6**	**13.2**

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-F
Off-Site Access Road Daily Construction Equipment and Motor Vehicle SOx Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Daily Emissions (lb/day)	
		Month 1	Month 2
Construction Equipment			
Dozer, 300 HP	0.0026	0.02	0.00
Motor Grader	0.0019	0.02	0.00
Tandem Roller	0.0007	0.01	0.01
Vibratory Roller, 825H	0.0021	0.02	0.00
Truck Tractor	0.0039	0.03	0.00
Asphalt Paver	0.0014	0.01	0.01
Pneumatic Roller, 12 ton	0.0007	0.01	0.01
Dozer, 200 HP	0.0021	0.02	0.00
Construction Equipment Total		**0.12**	**0.03**
Motor Vehicles			
Off-Site Vehicles			
Off-Site Asphalt Trucks	0.00004	0.03	0.00
Off-Site Aggregate Truck	0.00004	0.07	0.00
Off-Site Watering Trucks	0.00004	0.00	0.00
Off-Site Construction Worker Commute	0.00001	0.01	0.01
Off-Site Material Delivery Truck	0.00004	0.00	0.01
Off-Site Motor Vehicle Total		**0.10**	**0.02**

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-G
Off-Site Access Road Daily Construction Equipment and Motor Vehicle Exhaust PM10 Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Daily Emissions (lb/day)	
		Month 1	Month 2
Construction Equipment			
Dozer, 300 HP	0.1371	1.1	0.0
Motor Grader	0.0662	0.5	0.0
Tandem Roller	0.0640	0.5	1.0
Vibratory Roller, 825H	0.0784	0.6	0.0
Truck Tractor	0.0979	0.8	0.0
Asphalt Paver	0.0902	0.7	0.7
Pneumatic Roller, 12 ton	0.0640	0.5	0.5
Dozer, 200 HP	0.1072	0.9	0.0
Construction Equipment Total		**5.6**	**2.3**
Motor Vehicles			
Off-Site Vehicles			
Off-Site Asphalt Trucks	0.0014	1.0	0.0
Off-Site Aggregate Truck	0.0014	2.3	0.0
Off-Site Watering Trucks	0.0014	0.0	0.0
Off-Site Construction Worker Commute	0.0000	0.0	0.0
Off-Site Material Delivery Truck	0.0014	0.0	0.5
Off-Site Motor Vehicle Total		**3.3**	**0.5**

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-H
Off-Site Access Road Daily Construction Equipment and Motor Vehicle Exhaust PM2.5 Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Daily Emissions (lb/day)	
		Month 1	Month 2
Construction Equipment			
Dozer, 300 HP	0.1261	1.0	0.0
Motor Grader	0.0609	0.5	0.0
Tandem Roller	0.0589	0.5	0.9
Vibratory Roller, 825H	0.0721	0.6	0.0
Truck Tractor	0.0901	0.7	0.0
Asphalt Paver	0.0829	0.7	0.7
Pneumatic Roller, 12 ton	0.0589	0.5	0.5
Dozer, 200 HP	0.0987	0.8	0.0
Construction Equipment Total		**5.2**	**2.1**
Motor Vehicles			
Off-Site Vehicles			
Off-Site Asphalt Trucks	0.0013	0.9	0.0
Off-Site Aggregate Truck	0.0013	2.2	0.0
Off-Site Watering Trucks	0.0013	0.0	0.0
Off-Site Construction Worker Commute	0.00003	0.0	0.0
Off-Site Material Delivery Truck	0.0013	0.0	0.4
Off-Site Motor Vehicle Total		**3.1**	**0.5**

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-I
Off-Site Access Road Daily Motor Vehicle Fugitive PM10 Emissions

Vehicle Type	Emission Factor (lb/mile)	Daily Emissions (lb/day)	
		Month 1	Month 2
Off-Site Vehicles			
Off-Site Asphalt Trucks	0.0010	0.7	0.0
Off-Site Aggregate Truck	0.0010	1.6	0.0
Off-Site Watering Trucks	0.0010	0.0	0.0
Off-Site Construction Worker Commute	0.0009	0.6	0.6
Off-Site Material Delivery Truck	0.0010	0.0	0.3
Off-Site Motor Vehicle Total		**2.9**	**1.0**

Table 1.8-J
Off-Site Access Road Daily Motor Vehicle Fugitive PM2.5 Emissions

Vehicle Type	Emission Factor (lb/mile)	Daily Emissions (lb/day)	
		Month 1	Month 2
Off-Site Vehicles			
Off-Site Asphalt Trucks	0.0002	0.1	0.0
Off-Site Aggregate Truck	0.0002	0.3	0.0
Off-Site Watering Trucks	0.0002	0.0	0.0
Off-Site Construction Worker Commute	0.0002	0.1	0.1
Off-Site Material Delivery Truck	0.0002	0.0	0.1
Off-Site Motor Vehicle Total		**0.5**	**0.2**

Table 1.8-K
Off-Site Access Road Daily Fugitive VOC Emissions from Asphalt Paving

Item	Units	Quantity per Day	
		Month 1	Month 2
Area Paved	Acres	0.7	0.0
Emission Factor	lb/acre[a]	2.6	2.6
Emissions	lb/day	1.9	0.0

Note: Totals may not match sum of individual values because of rounding.

[a] Source: URBEMIS2007 for Windows Users' Guide, Version 9.2, November 2007

Table 1.8: Offsite Access Road Construction Emissions

Table 1.8-L
Off-Site Access Road Daily Fugitive PM10 and PM2.5 Activities

Activity	Units	Quantity per day	
		Month 1	Month 2
Excavation[a]	Cu. Yd.	2,889	0
Bulldozing, Scraping and Grading	Hours	24	0

Table 1.8-M
Off-Site Access Road Daily Fugitive PM10 Emissions

Activity	Emission Factor (lb/activity)	Emissions (lb/day)	
		Month 1	Month 2
Excavation/Soil Handling	1.01E-03	2.9	0.0
Bulldozing, Scraping and Grading	0.348	8.3	0.0
Total		**11.3**	**0.0**

Table 1.8-N
Off-Site Access Road Daily Fugitive PM2.5 Emissions

Activity	Emission Factor (lb/activity)	Emissions (lb/day)	
		Month 1	Month 2
Excavation/Soil Handling	2.10E-04	0.6	0.0
Bulldozing and Grading	0.072	1.7	0.0
Total		**2.3**	**0.0**

Table 1.9: Offsite Access Road Construction Emissions Summary

Table 1.9-A
Offsite Roadway Construction Daily CO Emissions Summary

	Month 1	Month 2
	1	2
Off-Site		
Equipment	50.2	16.4
Motor Vehicles	37.3	15.3
Off-site Daily Total	**87.5**	**31.6**
Maximum Daily Total (lb/day)	**87.5**	

Table 1.9-B
Offsite Roadway Construction Daily VOC Emissions Summary

	Month 1	Month 2
	1	2
Off-Site		
Equipment	13.8	4.5
Motor Vehicles	7.3	1.8
Asphalt Paving	1.9	0.0
Off-site Daily Total	**22.9**	**6.3**
Maximum Daily Total (lb/day)	**22.9**	

Table 1.9-C
Offsite Roadway Construction Daily NOx Emissions Summary

	Month 1	Month 2
	1	2
Off-Site		
Equipment	122.6	30.5
Motor Vehicles	85.6	13.2
Off-site Daily Total	**208.2**	**43.7**
Maximum Daily Total (lb/day)	**208.2**	

Table 1.9: Offsite Access Road Construction Emissions Summary

Table 1.9-D
Offsite Roadway Construction Daily SOx Emissions Summary

	Month 1	Month 2
	1	2
Off-Site		
Equipment	0.12	0.03
Motor Vehicles	0.10	0.02
Off-site Daily Total	**0.2**	**0.0**
Maximum Daily Total (lb/day)	**0.2**	

Table 1.9-E
Offsite Roadway Construction Daily PM10 Emissions Summary

	Month 1	Month 2
	1	2
Off-Site		
Equipment	5.6	2.3
Motor Vehicles	3.3	0.5
Fugitive	14.1	1.0
Off-site Daily Total	**23.1**	**3.7**
Maximum Daily Total (lb/day)	**23.1**	

Table 1.9-F
Offsite Roadway Construction Daily PM2.5 Emissions Summary

	Month 1	Month 2
	1	2
Off-Site		
Equipment	5.2	2.1
Motor Vehicles	3.1	0.5
Fugitive	2.9	0.2
Off-site Daily Total	**11.2**	**2.7**
Maximum Daily Total (lb/day)	**11.2**	

Attachment 7b
Operational Emissions Related to Propane Deliveries and Use

Boiler Criteria Pollutant Emission Calculations

Table 15-A Natural Gas Boiler Reference Data

Parameter	Value	Units
Heater Capacity	30	MMBtu/hr
Daily Operating Hours	14	hrs/day
Annual Operating Hours	1,000	hrs/yr
Conversion lb to tons	2,000	lbs/ton
Conversion lb to metric tons	2,205	lbs/ metric ton
Heating Value N.G.	1,050	Btu/scf
F-factor	8,710	scf/MMBtu
Conversion grains to lbs	7,000	gr/lb
Molecular Weight NOx	46	lbs/mol
Molecular Weight CO	28	lbs/mol
Molecular Volume	379	scf/mol

Table 15-B Emissions for the One Natural Gas Fired Boiler

Pollutant	Emission Factor	Units	Emission Factor (lb/MMBtu)	Emissions		
				lbs/hr	lbs/day	tons/yr
NOx	9.0	ppm @ 3% O_2	1.11E-02	0.33	4.67	0.17
VOC	5.5	lbs/MMscf	5.24E-03	0.16	2.20	0.08
CO	50	ppm @ 3% O_2	3.76E-02	1.13	15.78	0.56
SOx	0.2	gr/100 scf	2.72E-04	0.01	0.11	0.004
PM10	0.005	lbs/MMBtu	5.00E-03	0.15	2.10	0.08

Notes:

For NOx and CO, EF = (ppm/10^6) * f-factor * MW/ MV

VOC and PM10 emission factors from AP42 - Table 1.4-1 and Table 1.4-2

Sulfur emissions assume 0.2 grains Sulfur/100 scf natural gas

Table 15-C LPG Boiler Reference Data

Parameter	Value	Units
Heater Capacity	30	MMBtu/hr
Daily Operating Hours	14	hrs/day
Annual Operating Hours	1,000	hrs/yr
Conversion lb to tons	2,000	lbs/ton
Conversion lb to metric tons	2,205	lbs/ metric ton
Heating Value LPG	2,522	Btu/scf
	91.5	MMBtu/1000 gal
F-factor	8,710	scf/MMBtu
Molecular Weight NOx	46	lbs/mol
Molecular Weight CO	28	lbs/mol
Molecular Volume	379	scf/mol

Table 15-D Emissions for the One Propane Fired Boiler

Pollutant	Emission Factor	Units	Emission Factor (lb/MMBtu)	Emissions		
				lbs/hr	lbs/day	tons/yr
NOx	9.0	ppm @ 3% O_2	1.11E-02	0.33	4.67	0.17
VOC	5.5	lbs/MMscf	5.24E-03	0.16	2.20	0.08
CO	50	ppm @ 3% O_2	3.76E-02	1.13	15.78	0.56
SOx	0.0113	lb/MMBtu	1.13E-02	0.34	4.75	0.17
PM10	0.005	lbs/MMBtu	5.00E-03	0.15	2.10	0.08

Notes:

For NOx and CO, EF = (ppm/10^6) * f-factor * MW/ MV

VOC and PM10 emission factors are vendor guarantees

Sulfur emission factor taken from SBAPCD Techical Information and References
http://www.sbcapcd.org/eng/tech/sulfur01.htm

Emergency Engine Criteria Pollutant Emission Calculations

Table 16-A Diesel ICE Emission Factors

Pollutant	Emission Factors (gm/bhp-hr)
	John Deere Model 6125H
	EPA Tier 3[1]
NOx[2]	2.85
NMHC (VOC)[2]	0.15
CO	2.6
PM10	0.15

Table 16-B Engine Data

Source	Horsepower	Daily Hours	Annual Hours
Emergency Fire Pump Engine	300	1	50

Table 16-C Reference Data

Parameter	Value	Units
Fuel Consumption	7,000	Btu/hp-hr
Sulfur Content	15	ppm
Heating Value Diesel	137,000	Btu/gal
Density Diesel	7.2	lbs/gal
Conversion kg to lbs	0.454	kg/lb
Conversion gr to lbs	454	gr/lb
Conversion lb to tons	2,000	lbs/ton
Conversion lb to metric tons	2,205	lbs/metric ton
Molecular Weight S	32	lbs/mol
Molecular Weight SO2	64	lbs/mol
Fuel Use (hourly)	15.33	gal/hr
Fuel Use (annual)	766.42	gal/yr

Table 16-D Emergency Fire Pump Engine Emissions

Pollutant	Emission Factor g/bhp-hr	lbs/hr	lbs/day	tons/yr
NOx	2.85	1.88	1.88	0.05
VOC	0.15	0.10	0.10	0.002
CO	2.6	1.72	1.72	0.04
PM10	0.15	0.10	0.10	0.002
SOx	---	0.0033	0.0033	0.0001

Notes:

[1]Table 4 to Subpart III of 40 CFR Part 60 - Certification Requirements for Stationary Fire Pump Engines for model year 2009 and later

[2]Emission limit for NMHC+NOx assuming 95% NOx

Cooling Tower Particulate Emission Calculations

Table 17-A Reference Data

Parameter	Value	Units
Daily Operating Hours	16	hrs/day
Annual Operating Hours	3,300	hrs/yr
Conversion lb to tons	2,000	lbs/ton
Density Water	8.3453	lbs/gal
Conversion min to hours	60	min/hr
PM10 Fraction of TSP	100	%
PM2.5 Fraction of PM10	100	%

Table 17-C Reference Data

Parameter	Value	Units
Daily Operating Hours	16	hrs/day
Annual Operating Hours	3,300	hrs/yr
Conversion lb to tons	2,000	lbs/ton
Density Water	8.3453	lbs/gal
Conversion min to hours	60	min/hr
PM10 Fraction of TSP	100	%
PM2.5 Fraction of PM10	100	%

Table 17-B Cooling Tower Emissions - 16,600 TDS

Parameter	Units	Value
Water Circulation Rate	gpm	149,000
Total Liquid Drift	(%)	0.00050
Maximum TDS of Circulated Water	(ppmw)	16,600
Cooling Tower Emissions		
TSP	lb/hr	6.19
	lb/day	99.08
	ton/yr	10.22
PM10	lb/hr	6.19
	lb/day	99.08
	ton/yr	10.22
PM2.5	lb/hr	6.19
	lb/day	99.08
	ton/yr	10.22

Table 17-D Cooling Tower Emissions - 1,600 TDS

Parameter	Units	Value
Water Circulation Rate	gpm	149,000
Total Liquid Drift	(%)	0.00050
Maximum TDS of Circulated Water	(ppmw)	1,600
Cooling Tower Emissions		
TSP	lb/hr	0.60
	lb/day	9.55
	ton/yr	0.98
PM10	lb/hr	0.60
	lb/day	9.55
	ton/yr	0.98
PM2.5	lb/hr	0.60
	lb/day	9.55
	ton/yr	0.98

Notes:

TSP Emission Rate = based on USEPA AP-42, Section 13.4 Wet Cooling Towers, Table 13.4-1, modified to design
Rates calculated as follows:
E lb/hr = Water Circulation Rate gpm * 60 min/hr * (Drift % / 100) * 8.3453 lb/gal * TDS lb PM / 1,000,000 lb water
E lb/day = E lb/hr * hrs/day
E ton/yr = E lb/hr * hr/yr * ton/2,000 lb
PM10 calculated from TSP, assumes 100% of TSP

HTF Tank Vent Emissions

Table 18-A Reference Data

Parameter	Value	Units	Reference
Annual Operating Hours	730	hrs/yr	Assumed
Daily Operating Hours	2.00	hrs/day	Assumed
Conversion lbs to tons	2,000	lbs/ton	Constant
HTF Vent Uncontrolled Emissions	17	tons/yr	WorleyParsons
Control Efficiency Air Pollution Control Device	99.50%	%	Assumed
Waste Loadout Emissions	169.74	lb/yr	Tanks 4.09
Duration of Pump Out	2	hours/even	Assumed
Number of Wate Hauls	12	per year	Assumed

Table 18-B HTF Vent VOC Emissions

Source	Emissions		
	Lbs/hr	Lbs/day	Tons/yr
HTF Vent	0.23	0.47	0.09
Waste Load Out	7.07	14.15	0.08

Table 19-A Motor Vehicle Combustion Criteria Pollutant Emissions

Vehicle	Distance		Speed	CO	VOC	NOx	SOx	Exh. PM10	Fug. PM10	Diesel PM	Exh. PM2.5	Fug. PM2.5
	Miles/yr	Miles/day	Miles/hr	lb/hr								
Mirror Wash Truck	3000	24	5	0.06	0.01	0.19	2.08E-04	0.008	0.74	0.008	0.007	0.16
Maintenance Vehicles	96000	384	20	0.23	0.02	0.03	0.000	0.001	2.95	0.000	0.001	0.63
Weed Abatement	340	40	5	0.06	0.01	0.19	2.08E-04	0.008	0.74	0.008	0.007	0.16
Soil Stabilizer Application	340	40	5	0.06	0.01	0.19	2.08E-04	0.008	0.74	0.008	0.007	0.16
Total				0.42	0.06	0.62	6.24E-04	0.024	5.17	0.023	0.022	1.10
	Distance		Speed	CO	VOC	NOx	SOx	Exh. PM10	Fug. PM10	Diesel PM	Exh. PM2.5	Fug. PM2.5
Vehicle	Miles/yr	Miles/day	Miles/hr	lb/day								
Mirror Wash Truck	3000	24	5	0.29	0.07	0.93	9.98E-04	0.037	3.55	0.037	0.034	0.75
Maintenance Vehicles	96000	384	20	4.51	0.33	0.66	0.000	0.024	56.71	0.000	0.023	12.02
Weed Abatement	340	40	5	0.49	0.12	1.56	1.66E-03	0.062	5.91	0.062	0.057	1.25
Soil Stabilizer Application	340	40	5	0.49	0.12	1.56	1.66E-03	0.062	5.91	0.062	0.057	1.25
Total				5.77	0.64	4.70	4.32E-03	0.18	72.07	0.16	0.17	15.28
	Distance		Speed	CO	VOC	NOx	SOx	Exh. PM10	Fug. PM10	Diesel PM	Exh. PM2.5	Fug. PM2.5
Vehicle	Miles/yr	Miles/day	Miles/hr	lb/yr								
Mirror Wash Truck	3000	24	5	0.0182	0.0044	0.0583	0.0001	0.0023	0.2216	0.0023	0.0021	0.0470
Maintenance Vehicles	96000	384	20	0.5828	0.1417	1.8671	0.0020	0.0738	7.0900	0.0738	0.0679	1.5032
Weed Abatement	340	40	5	0.0021	0.0005	0.0066	0.0000	0.0003	0.0251	0.0003	0.0002	0.0053
Soil Stabilizer Application	340	40	5	0.0021	0.0005	0.0066	0.0000	0.0003	0.1256	0.0003	0.0002	0.0266
Total				0.6051	0.1471	1.9387	0.0021	0.0767	7.4623	0.0767	0.0705	1.5822

Table 19-B 2009 Motor Vehicle Emission Factors

Vehicle Use	Vehicle Type	Vehicle Class	Emission Factors								
			CO (lb/mi)	VOC (lb/mi)	NOx (lb/mi)	SOx (lb/mi)	Exh. PM10 (lb/mi)	Fug. PM10 (lb/mi)	Diesel PM (lb/mi)	Exh. PM2.5 (lb/mi)	Fug. PM2.5 (lb/mi)
Mirror Wash Truck	Water Trucks, Freightliner 4000 gallon	HHDT-DSL	1.21E-02	2.95E-03	3.89E-02	4.16E-05	1.54E-03	1.48E-01	1.54E-03	1.42E-03	3.13E-02
Weed Abatement	Water Trucks, Freightliner 4000 gallon	HHDT-DSL	1.21E-02	2.95E-03	3.89E-02	4.16E-05	1.54E-03	1.48E-01	1.54E-03	1.42E-03	3.13E-02
Soil Stabilizer Application	Water Trucks, Freightliner 4000 gallon	HHDT-DSL	1.21E-02	2.95E-03	3.89E-02	4.16E-05	1.54E-03	1.48E-01	1.54E-03	1.42E-03	3.13E-02
Maintenance Vehicles	On-Site 3/4 Ton Pick-Up, Ford	LDT2-CAT	1.17E-02	8.68E-04	1.71E-03	0.00E+00	6.35E-05	1.48E-01	0.00E+00	5.89E-05	3.13E-02

Notes:

The emission factors, except fugitive emissions from entrained road dust, were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and dividing calculated daily emissions by daily vehicle-miles-traveled.
Welding trucks, fuel/lube trucks and flatbed trucks are assumed to be Medium-Duty Catalyst Equipped Vehicles.
Pickup trucks and construction worker commuting vehicles are assumed to be Light-Duty Trucks 1.
All other vehicles are assumed to be heavy heavy-duty diesel vehicles.
All the emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions, and fugitive PM10 and PM2.5 emission factors take into account tire and brake wear and entrained paved or unpaved road dust.

Emissions [pounds/day] = Emission factor [pounds/mile] x Vehicle miles traveled [miles/day]
Control Efficiency of Dust Suppressant = 80.00%

Summary of Criteria Pollutant Emissions

Table 20-A Summary of Hourly Emissions (Lbs/Hr)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	0.33	0.01	1.13	0.16	0.15	0.15
Boiler No. 2	0.33	0.01	1.13	0.16	0.15	0.15
Cooling Tower	0.00	0.00	0.00	0.00	0.60	0.60
Emergency Fire Pump Engine	1.88	0.00	1.72	0.10	0.10	0.10
HTF Vent	0.00	0.00	0.00	0.23	0.00	0.00
Waste Loadout	0.00	0.00	0.00	7.07	0.00	0.00
Maintenance Vehicles	0.62	0.00	0.42	0.06	5.19	1.12
Total	**3.17**	**0.02**	**4.39**	**7.78**	**6.19**	**2.11**

Table 20-B Summary of Daily Emissions (Lbs/Day)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	4.67	0.11	15.78	2.20	2.10	2.10
Boiler No. 2	4.67	0.11	15.78	2.20	2.10	2.10
Cooling Tower	0.00	0.00	0.00	0.00	9.55	9.55
Emergency Fire Pump Engine	1.88	0.00	1.72	0.10	0.10	0.10
HTF Vent	0.00	0.00	0.00	0.47	0.00	0.00
Waste Loadout	0.00	0.00	0.00	14.15	0.00	0.00
Maintenance Vehicles	4.70	0.00	5.77	0.64	72.26	15.45
Total	**15.92**	**0.24**	**39.05**	**19.75**	**86.11**	**29.30**

Table 20-C Summary of Annual Emissions (Tons/Yr)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	0.17	0.004	0.56	0.08	0.08	0.08
Boiler No. 2	0.17	0.004	0.56	0.08	0.08	0.08
Cooling Tower	0.00	0.00	0.00	0.00	0.98	0.98
Emergency Fire Pump Engine	0.05	0.00	0.04	0.00	0.00	0.00
HTF Vent	0.00	0.00	0.00	0.09	0.00	0.00
Waste Loadout	0.00	0.00	0.00	0.08	0.00	0.00
Maintenance Vehicles	1.94	0.00	0.61	0.15	7.54	1.65
Total	**2.32**	**0.01**	**1.78**	**0.48**	**8.68**	**2.79**

Table 20-D Summary of Project Criteria Pollutant Emissions

Period	NOx	SOx	CO	VOC	PM10	PM2.5
Hourly Emissions (Lbs/Hr)	3.17	0.02	4.39	7.78	6.19	2.11
Daily Emissions (Lbs/Day)	15.92	0.24	39.05	19.75	86.11	29.30
Annual Emissions (Tons/Yr)	2.32	0.01	1.78	0.48	8.68	2.79

Notes:

Summary of emissions with natural gas fired boilers, 1,600 ppm TDS in the cooling water, and 3,000 hours of operation per year for the cooling tower

Summary of Criteria Pollutant Emissions

Table 20-E Summary of Hourly Emissions (Lbs/Hr)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	0.33	0.34	1.13	0.16	0.15	0.15
Boiler No. 2	0.33	0.34	1.13	0.16	0.15	0.15
Cooling Tower	0.00	0.00	0.00	0.00	0.60	0.60
Emergency Fire Pump Engine	1.88	0.00	1.72	0.10	0.10	0.10
HTF Vent	0.00	0.00	0.00	0.23	0.00	0.00
Waste Loadout	0.00	0.00	0.00	7.07	0.00	0.00
Maintenance Vehicles	0.62	0.00	0.42	0.06	5.19	1.12
Total	**3.17**	**0.68**	**4.39**	**7.78**	**6.19**	**2.11**

Table 20-F Summary of Daily Emissions (Lbs/Day)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	4.67	4.75	15.78	2.20	2.10	2.10
Boiler No. 2	4.67	4.75	15.78	2.20	2.10	2.10
Cooling Tower	0.00	0.00	0.00	0.00	9.55	9.55
Emergency Fire Pump Engine	1.88	0.00	1.72	0.10	0.10	0.10
HTF Vent	0.00	0.00	0.00	0.47	0.00	0.00
Waste Loadout	0.00	0.00	0.00	14.15	0.00	0.00
Maintenance Vehicles	4.70	0.00	5.77	0.64	72.26	15.45
Total	**15.92**	**9.50**	**39.05**	**19.75**	**86.11**	**29.30**

Table 20-G Summary of Annual Emissions (Tons/Yr)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	0.17	0.17	0.56	0.08	0.08	0.08
Boiler No. 2	0.17	0.17	0.56	0.08	0.08	0.08
Cooling Tower	0.00	0.00	0.00	0.00	0.98	0.98
Emergency Fire Pump Engine	0.05	0.00	0.04	0.00	0.00	0.00
HTF Vent	0.00	0.00	0.00	0.09	0.00	0.00
Waste Loadout	0.00	0.00	0.00	0.08	0.00	0.00
Maintenance Vehicles	1.94	0.00	0.61	0.15	7.54	1.65
Total	**2.32**	**0.34**	**1.78**	**0.48**	**8.68**	**2.79**

Table 20-H Summary of Project Criteria Pollutant Emissions

Period	NOx	SOx	CO	VOC	PM10	PM2.5
Hourly Emissions (Lbs/Hr)	3.17	0.68	4.39	7.78	6.19	2.11
Daily Emissions (Lbs/Day)	15.92	9.50	39.05	19.75	86.11	29.30
Annual Emissions (Tons/Yr)	2.32	0.34	1.78	0.48	8.68	2.79

Notes:
Summary of emissions with LPG fired boilers, 1,600 ppm TDS in the cooling water, and 3,000 hours of operation per year for the cooling tower

Summary of Criteria Pollutant Emissions

Table 20-I Summary of Hourly Emissions (Lbs/Hr)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	0.33	0.01	1.13	0.16	0.15	0.15
Boiler No. 2	0.33	0.01	1.13	0.16	0.15	0.15
Cooling Tower	0.00	0.00	0.00	0.00	6.19	6.19
Emergency Fire Pump Engine	1.88	0.00	1.72	0.10	0.10	0.10
HTF Vent	0.00	0.00	0.00	0.23	0.00	0.00
Waste Loadout	0.00	0.00	0.00	7.07	0.00	0.00
Maintenance Vehicles	0.62	0.00	0.42	0.06	5.19	1.12
Total	**3.17**	**0.02**	**4.39**	**7.78**	**11.79**	**7.71**

Table 20-J Summary of Daily Emissions (Lbs/Day)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	4.67	0.11	15.78	2.20	2.10	2.10
Boiler No. 2	4.67	0.11	15.78	2.20	2.10	2.10
Cooling Tower	0.00	0.00	0.00	0.00	99.08	99.08
Emergency Fire Pump Engine	1.88	0.00	1.72	0.10	0.10	0.10
HTF Vent	0.00	0.00	0.00	0.47	0.00	0.00
Waste Loadout	0.00	0.00	0.00	14.15	0.00	0.00
Maintenance Vehicles	4.70	0.00	5.77	0.64	72.26	15.45
Total	**15.92**	**0.24**	**39.05**	**19.75**	**175.64**	**118.83**

Table 20-K Summary of Annual Emissions (Tons/Yr)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	0.17	0.00	0.56	0.08	0.08	0.08
Boiler No. 2	0.17	0.00	0.56	0.08	0.08	0.08
Cooling Tower	0.00	0.00	0.00	0.00	10.22	10.22
Emergency Fire Pump Engine	0.05	0.00	0.04	0.00	0.00	0.00
HTF Vent	0.00	0.00	0.00	0.09	0.00	0.00
Waste Loadout	0.00	0.00	0.00	0.08	0.00	0.00
Maintenance Vehicles	1.94	0.00	0.61	0.15	7.54	1.65
Total	**2.32**	**0.01**	**1.78**	**0.48**	**17.91**	**12.02**

Table 20-L Summary of Project Criteria Pollutant Emissions

Period	NOx	SOx	CO	VOC	PM10	PM2.5
Hourly Emissions (Lbs/Hr)	3.17	0.02	4.39	7.78	11.79	7.71
Daily Emissions (Lbs/Day)	15.92	0.24	39.05	19.75	175.64	118.83
Annual Emissions (Tons/Yr)	2.32	0.01	1.78	0.48	17.91	12.02

Notes:

Summary of emissions with natural gas fired boilers, 166,000 ppm TDS in the cooling water, and 3,000 hours of operation per year for the cooling tower

Summary of Criteria Pollutant Emissions

Table 20-M Summary of Hourly Emissions (Lbs/Hr)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	0.33	0.34	1.13	0.16	0.15	0.15
Boiler No. 2	0.33	0.34	1.13	0.16	0.15	0.15
Cooling Tower	0.00	0.00	0.00	0.00	6.19	6.19
Emergency Fire Pump Engine	1.88	0.00	1.72	0.10	0.10	0.10
HTF Vent	0.00	0.00	0.00	0.23	0.00	0.00
Waste Loadout	0.00	0.00	0.00	7.07	0.00	0.00
Maintenance Vehicles	0.62	0.00	0.42	0.06	5.19	1.12
Total	**3.17**	**0.68**	**4.39**	**7.78**	**11.79**	**7.71**

Table 20-N Summary of Daily Emissions (Lbs/Day)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	4.67	4.75	15.78	2.20	2.10	2.10
Boiler No. 2	4.67	4.75	15.78	2.20	2.10	2.10
Cooling Tower	0.00	0.00	0.00	0.00	99.08	99.08
Emergency Fire Pump Engine	1.88	0.00	1.72	0.10	0.10	0.10
HTF Vent	0.00	0.00	0.00	0.47	0.00	0.00
Waste Loadout	0.00	0.00	0.00	14.15	0.00	0.00
Maintenance Vehicles	4.70	0.00	5.77	0.64	72.26	15.45
Total	**15.92**	**9.50**	**39.05**	**19.75**	**175.64**	**118.83**

Table 20-O Summary of Annual Emissions (Tons/Yr)

Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boiler No. 1	0.17	0.17	0.56	0.08	0.08	0.08
Boiler No. 2	0.17	0.17	0.56	0.08	0.08	0.08
Cooling Tower	0.00	0.00	0.00	0.00	10.22	10.22
Emergency Fire Pump Engine	0.05	0.00	0.04	0.00	0.00	0.00
HTF Vent	0.00	0.00	0.00	0.09	0.00	0.00
Waste Loadout	0.00	0.00	0.00	0.08	0.00	0.00
Maintenance Vehicles	1.94	0.00	0.61	0.15	7.54	1.65
Total	**2.32**	**0.34**	**1.78**	**0.48**	**17.91**	**12.02**

Table 20-P Summary of Project Criteria Pollutant Emissions

Period	NOx	SOx	CO	VOC	PM10	PM2.5
Hourly Emissions (Lbs/Hr)	3.17	0.68	4.39	7.78	11.79	7.71
Daily Emissions (Lbs/Day)	15.92	9.50	39.05	19.75	175.64	118.83
Annual Emissions (Tons/Yr)	2.32	0.34	1.78	0.48	17.91	12.02

Notes:

Summary of emissions with LPG fired boilers, 166,000 ppm TDS in the cooling water, and 3,000 hours of operation per year for the cooling tower

Table 21 Boiler HAP Emission Calculations

Pollutant	Emission Factor		Boiler No. 1		Boiler No. 2	
	lbs/MMscf	lb/MMBtu	lbs/hr	lbs/yr	lbs/hr	lbs/yr
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-08	4.71E-07	4.71E-04	4.71E-07	4.71E-04
Acenaphthene	1.80E-06	1.76E-09	5.29E-08	5.29E-05	5.29E-08	5.29E-05
Acenaphthylene	1.80E-06	1.76E-09	5.29E-08	5.29E-05	5.29E-08	5.29E-05
Anthracene	2.40E-06	2.35E-09	7.06E-08	7.06E-05	7.06E-08	7.06E-05
Benz(a)anthracene	1.80E-06	1.76E-09	5.29E-08	5.29E-05	5.29E-08	5.29E-05
Benzene	2.10E-03	2.06E-06	6.18E-05	6.18E-02	6.18E-05	6.18E-02
Benzo(a)pyrene	1.20E-06	1.18E-09	3.53E-08	3.53E-05	3.53E-08	3.53E-05
Benzo(b)fluoranthene	1.80E-06	1.76E-09	5.29E-08	5.29E-05	5.29E-08	5.29E-05
Benzo(g,h,i)perylene	1.20E-06	1.18E-09	3.53E-08	3.53E-05	3.53E-08	3.53E-05
Benzo(k)fluoranthene	1.80E-06	1.76E-09	5.29E-08	5.29E-05	5.29E-08	5.29E-05
Chrysene	1.80E-06	1.76E-09	5.29E-08	5.29E-05	5.29E-08	5.29E-05
Dibenz(a,h)anthracene	1.20E-06	1.18E-09	3.53E-08	3.53E-05	3.53E-08	3.53E-05
Dichlorobenzene	1.20E-03	1.18E-06	3.53E-05	3.53E-02	3.53E-05	3.53E-02
Fluoranthene	3.00E-06	2.94E-09	8.82E-08	8.82E-05	8.82E-08	8.82E-05
Formaldehyde	7.50E-02	7.35E-05	2.21E-03	2.21E+00	2.21E-03	2.21E+00
Hexane	1.80E+00	1.76E-03	5.29E-02	5.29E+01	5.29E-02	5.29E+01
Indeno(1,2,3-cd)pyrene	1.80E-06	1.76E-09	5.29E-08	5.29E-05	5.29E-08	5.29E-05
Naphthalene	6.10E-04	5.98E-07	1.79E-05	1.79E-02	1.79E-05	1.79E-02
Phenanthrene	1.70E-05	1.67E-08	5.00E-07	5.00E-04	5.00E-07	5.00E-04
Pyrene	5.00E-06	4.90E-09	1.47E-07	1.47E-04	1.47E-07	1.47E-04
Toluene	3.40E-03	3.33E-06	1.00E-04	1.00E-01	1.00E-04	1.00E-01
Total			**5.54E-02**	**5.54E+01**	**5.54E-02**	**5.54E+01**

Chloroform Annual Total Emissions Calculation

Table 22 Cooling Tower TAC Emissions

Item	Value
Emission Factor (lb chloroform/lb chlorine added)[a]	0.0034
Sodium Hypochlorite Solution Use (gal/month)	2,865
Sodium Hypochlorite Density (lb/gal)	10
Sodium Hypochlorite Solution Concentration (%)	12.5%
lb Chlorine Equivalent/lb Sodium Hypochlorite	0.95
Chloroform Emissions (lb/yr)	138.8
Operating Hours (hrs/yr)	3,300
Chloroform Emissions (lbs/hr)	0.042

Notes:

[a] From: Michael B. Rogozen, Harvey E. Ritch, Michael A. Guttman, Daniel Grosjean and Edwin L. Williams II

Sources and Concentrations of Chloroform Emissions in the South Coast Air Basin, Final Report, prepared by Science Applications International Corporation, Manhattan Beach, CA, for the California Air Resources Board, Sacramento, CA, April 8, 1988. Downloaded from http://www.arb.ca.gov/research/apr/past/statnry.htm#Toxic%20Air%20Contaminants.

Emissions [lb/yr] = Emission factor [lb chloroform/lb chlorine] x
Sodium hypochlorite use [gal/month] x Sodium hypochlorite density [lb/gal] x
Sodium hypochlorite concentration [percent] / 100 x lb Chlorine equivalent/lb Sodium hypochlorite x 12 [months/yr]

Table 23 HTF Vent HAP Emissions

Pollutant	HTF Vent	
	lbs/hr	lbs/yr
Benzene	2.33E-01	169.983
Phenol	0.00	0.00
Biphenyl	2.33E-05	0.017
Notes:		
Benzene is 99.99% of total emissions, biphenyl makes up 0.01% and phenol is negligable.		

Table 24
Summary of TAC Emissions

Pollutant	Boiler No. 1		Boiler No. 2		Fire Pump Engine		HTF Vent		Waste Loadout		Cooling Tower		Total	
	Lbs/Hr	Lbs/Yr	Lbs/Hr	Lbs/Yr	Lbs/Hr	Lbs/Yr	Lbs/Hr	Lbs/Yr	Lbs/Hr	Lbs/Yr	Lbs/Hr	Lbs/Yr	Lbs/Hr	Lbs/Yr
7,12-Dimethylbenz(a)anthracene	1.57E-08	4.71E-07	4.71E-04	4.71E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.71E-04	9.41E-07
Acenaphthene	1.76E-09	5.29E-08	5.29E-05	5.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	1.06E-07
Acenaphthylene	1.76E-09	5.29E-08	5.29E-05	5.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	1.06E-07
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrolein	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Anthracene	2.35E-09	7.06E-08	7.06E-05	7.06E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.06E-05	1.41E-07
Benz(a)anthracene	1.76E-09	5.29E-08	5.29E-05	5.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	1.06E-07
Benzene	2.06E-06	6.18E-05	6.18E-02	6.18E-05	0.00E+00	0.00E+00	2.33E-01	1.70E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-01	1.70E+02
Benzo(a)pyrene	1.18E-09	3.53E-08	3.53E-05	3.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E-05	7.06E-08
Benzo(b)fluoranthene	1.76E-09	5.29E-08	5.29E-05	5.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	1.06E-07
Benzo(g,h,i)perylene	1.18E-09	3.53E-08	3.53E-05	3.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E-05	7.06E-08
Benzo(k)fluoranthene	1.76E-09	5.29E-08	5.29E-05	5.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	1.06E-07
Biphenyl	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-05	1.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-05	1.70E-02
Chrysene	1.76E-09	5.29E-08	5.29E-05	5.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	1.06E-07
Chloroform	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-02	1.39E+02	4.21E-02	1.39E+02
Dibenz(a,h)anthracene	1.18E-09	3.53E-08	3.53E-05	3.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E-05	7.06E-08
Dichlorobenzene	1.18E-06	3.53E-05	3.53E-02	3.53E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E-02	7.06E-05
Fluoranthene	2.94E-09	8.82E-08	8.82E-05	8.82E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-05	1.76E-07
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Formaldehyde	7.35E-05	2.21E-03	2.21E+00	2.21E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.21E+00	4.41E-03
Hexane	1.76E-03	5.29E-02	5.29E+01	5.29E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E+01	1.06E-01
Indeno(1,2,3-cd)pyrene	1.76E-09	5.29E-08	5.29E-05	5.29E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	1.06E-07
Naphthalene	5.98E-07	1.79E-05	1.79E-02	1.79E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-02	3.59E-05
Phenanthrene	1.67E-08	5.00E-07	5.00E-04	5.00E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-04	1.00E-06
Phenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	4.90E-09	1.47E-07	1.47E-04	1.47E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-04	2.94E-07
Toluene	3.33E-06	1.00E-04	1.00E-01	1.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-01	2.00E-04
Total PAH	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Diesel Particulate Matter	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.91E-02	4.96E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.91E-02	4.96E+00
Total													**5.57E+01**	**3.14E+02**

Boiler GHG Pollutant Emission Calculations

Table 25-A Natural Gas Reference Data

Parameter	Value	Units
Heater Capacity	30	MMBtu/hr
Annual Operating Hours	1,000	hrs/yr
Conversion kg to metric tons	1,000	kg/metric ton

Table 25-C LPG

Parameter	Value	Units
Heater Capacity	30	MMBtu/hr
Annual Operating Hours	1,000	hrs/yr
Conversion lb to metric tons	2,205	lbs/ metric ton
Heating Value N.G.	91.5	MMBtu/1000 gal

Table 25-B GHG Emissions for the One Natural Gas Fired Boiler

Pollutant	Emission Factor Kg/MMBtu	Emissions metric tons/yr
CO_2	5.28E+01	1,583
CH_4	5.90E-03	0.177
N_20	1.00E-04	0.003
CO_2e		1,588

Notes:

$CO_2e = CO_2$ emisions + 21 x CH_4 emissions + 310 x N_20 emissions

Table 25-D GHG Emissions for the One LPG Fired Boiler

Pollutant	Emission Factor Kg/gal	Emission Factor Lb/MMBtu	Emissions metric tons/yr
CO_2	5.74E+00	1.38E+02	1,882
CH_4	2.00E-04	4.82E-03	0.07
N_20	1.00E-04	2.41E-03	0.033
CO_2e			1,894

Emergency Engine GHG Emission Calculations

Table 26-A Engine Data

Source	Horsepower	Daily Hours	Annual Hours
Emergency Fire Pump Engine	300	1	50

Table 26-B Reference Data

Parameter	Value	Units
Fuel Consumption	7,000	Btu/hp-hr
Heating Value Diesel	137,000	Btu/gal
Density Diesel	7.2	lbs/gal
Conversion kg to metric tons	1,000	kg/metric ton
Fuel Use (hourly)	15.33	gal/hr
Fuel Use (annual)	766.42	gal/yr

Table 26-C Emergency Fire Pump Engine GHG Emissions

Pollutant	Emission Factor kg/gallon	Emissions metric tons/yr
CO_2	10.15	7.78
CH_4 (Industrial)	0.0003	2.30E-04
N_20	0.0001	7.66E-05
CO_2e		7.81

Notes:

$CO_2e = CO_2$ emisions + 21 x CH_4 emissions + 310 x N_20 emissions

GHG Emission Summary

Table 27-A GHG Summary

Source	GHG Emissions MT CO2e
Boiler 1 Natural Gas	1588.00
Boiler 2 Natural Gas	1588.00
Fire Pump Engine	7.81
Project Total	3,184

Table 27-B GHG Summary

Source	GHG Emissions MT CO2e
Boiler 1 LPG	1,894
Boiler 2 LPG	1,894
Fire Pump Engine	7.81
Project Total	3,795

Propane Delivery Truck Trip Criteria Pollutant Emission Calculations

Delivery Truck Reference Data

Vehicle Use		Propane Delivery	Chemical Delivery	Evaporation Pond Cleanout
Vehicle Type		Water Pull (8000 gallon) CAT	Off-Site Low Boy Trucks	Off-Site Pipe Hauling Trucks
Vehicle Class	---	HHDT-DSL	HHDT-DSL	HHDT-DSL
Fuel Type	---	Diesel	Diesel	Diesel
Fuel Consumption	gal/mile	0.1864	0.1864	0.1864
Number of Refill Trips	---	82 per year	30 per month	700 every 3.5 years
Destination		Bakersfield	Bakersfield	Buttonwillow
Round Trip Distance	miles/trip	160	160	212
Maximum Monthly fuel Use				
Maximum Annual Fuel Use	gal/year	2,445	10,735	27,658
Total Maximum VMT	miles/day	160	320	4,240
	miles/month	1,120	4,800	133,560
	miles/year	13,120	57,600	148,400

Delivery Truck Criteria Pollutant Emissions

Trip Type	2009 Motor Vehicl Emission Factors								
	CO	VOC	Nox	SOx	Exh. PM10	Fug PM10	Diesel PM	Exh. PM2.5	Fug PM2.5
	lb/mi	lb/mi	lb/mi	lb/mi	lb/mi	lb/mi	lb/mi	lb/mi	lb/mi
Propane Delivery	0.01214	0.00295	0.03890	0.00004	0.00154	0.73855	0.00154	0.00142	0.15659
Chemical Delivery	0.01214	0.00295	0.03890	0.00004	0.00154	0.00097	0.00154	0.00142	0.00019
Evaporation Pond Cleanout	0.01214	0.00295	0.03890	0.00004	0.00154	0.00097	0.00154	0.00142	0.00019
Trip Type	**Daily Emissions**								
	CO	VOC	Nox	SOx	Exh. PM10	Fug PM10	Diesel PM	Exh. PM2.5	Fug PM2.5
	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
Propane Delivery	1.94	0.47	6.22	0.01	0.25	118.17	0.25	0.23	25.05
Chemical Delivery	7.77	1.89	24.89	0.03	0.98	0.62	0.98	0.91	0.12
Evaporation Pond Cleanout	51.48	12.52	164.93	0.18	6.52	4.12	6.52	6.00	0.79
Total	**61.19**	**14.88**	**196.05**	**0.21**	**7.75**	**122.91**	**7.75**	**7.13**	**25.97**
Trip Type	**Monthly Emissions**								
	CO	VOC	Nox	SOx	Exh. PM10	Fug PM10	Diesel PM	Exh. PM2.5	Fug PM2.5
	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month
Propane Delivery	13.60	3.31	43.57	0.05	1.72	827.17	1.72	1.59	175.38
Chemical Delivery	116.56	28.34	373.42	0.40	14.77	9.32	14.77	13.59	1.80
Evaporation Pond Cleanout	1621.60	394.29	5195.23	5.55	205.48	129.73	205.48	189.04	24.99
Total	**1,751.8**	**425.9**	**5,612.2**	**6.0**	**222.0**	**966.2**	**222.0**	**204.2**	**202.2**
Trip Type	**Annual Emissions**								
	CO	VOC	Nox	SOx	Exh. PM10	Fug PM10	Diesel PM	Exh. PM2.5	Fug PM2.5
	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr
Propane Delivery	159.29	38.73	510.34	0.55	20.18	9689.73	20.18	18.57	2054.44
Chemical Delivery	1398.69	340.09	4481.06	4.79	177.23	111.90	177.23	163.05	21.55
Evaporation Pond Cleanout	1801.78	438.10	5772.48	6.17	228.31	144.14	228.31	210.04	27.77
Total	**3359.76**	**816.93**	**10763.89**	**11.51**	**425.72**	**9945.77**	**425.72**	**391.67**	**2103.76**

Notes:

Assumes a maximum of one propane delivery tuck, two chemical delivery trucks, and 20 evaporation pond cleanout trucks in one day

Assumes a maximum of seven propane deliveries in one month

Monthly evporation pond delivery truck emissions assumes clean out occurs at the maximum daily rate everyday for one month; and there are 31 days in month

Propane Truck Trips GHG Emission Calculations

Delivery Truck Reference Data

Vehicle Use		Propane Delivery	Chemical Delivery	Evaporation Pond Cleanout
Vehicle Type		Water Pull (8000 gallon) CAT	Off-Site Low Boy Trucks	Off-Site Pipe Hauling Trucks
Vehicle Class	---	HHDT-DSL	HHDT-DSL	HHDT-DSL
Fuel Type	---	Diesel	Diesel	Diesel
Fuel Consumption	gal/mile	0.1864	0.1864	0.1864
Number of Refill Trips	---	82 per year	30 per month	700 every 3.5 years
Destination		Bakersfield	Bakersfield	Buttonwillow
Round Trip Distance	miles/trip	160	160	212
Maximum Monthly fuel Use				
Maximum Annual Fuel Use	gal/year	2,445	10,735	27,658
Total Maximum VMT	miles/day	160	320	4,240
	miles/month	1,120	4,800	133,560
	miles/year	13,120	57,600	148,400

Delivery Truck GHG Emissions

Pollutant	Emission Factor	Units	Emissions metric ton/yr			
			Propane Delivery	Chemical Delivery	Evaporation Pond	Delivery Total
CO_2	9.96000	kg/gallon	24.35	106.92	275.47	**406.75**
CH_4	0.00510	g/mi	6.69E-05	2.94E-04	7.57E-04	**1.12E-03**
N_20	0.00480	g/mi	6.30E-05	2.76E-04	7.12E-04	**1.05E-03**
CO_2e	---	---	24.38	107.01	275.71	**407.09**