APPENDIX 5.1E

Construction Data

APPENDIX 5.1E

Construction Emissions and Impact Analysis

Construction Phases

Construction of CCGS is expected to last approximately 33 months. The construction will occur in the following four main phases:

- Site preparation;
- Foundation work;
- Construction/installation of major structures; and,
- Installation of major equipment.

The main site is approximately 20 acres in size and is essentially flat. A laydown yard sized at 20 acres lies immediately adjacent to the main site. The total acreage for purposes of calculating on-site emissions will be approximately 20 acres. Offsite linear acreage will be approximately 5.27 acres. The site is currently part of the existing DuPont facility (see Project Description section). As such, the site will require only minimum grading and leveling prior to construction of the power block and cooling tower cell additions. Site preparation includes finish grading, excavation of footings and foundations, and backfilling operations. After site preparation is finished, the construction of the foundations and structures is expected to begin. Once the foundations and structures are finished, installation and assembly of the mechanical and electrical equipment are scheduled to commence.

Fugitive dust emissions from the construction of CCGS will result from:

- Dust entrained during site preparation and finish grading/excavation at the construction site;
- Dust entrained during onsite travel on paved and unpaved surfaces;
- Dust entrained during aggregate and soil loading and unloading operations; and
- Wind erosion of areas disturbed during construction activities.

Combustion emissions during construction will result from:

- Exhaust from the Diesel construction equipment used for site preparation, grading, excavation, and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from Diesel-powered welding machines, electric generators, air compressors, and water pumps;
- Exhaust from pickup trucks and Diesel trucks used to transport workers and materials around the construction site;
- Exhaust from Diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site; and,

- Exhaust from automobiles used by workers to commute to the construction site.

To determine the potential worst-case daily construction impacts, exhaust and dust emission rates have been evaluated for each source of emissions. Worst-case daily dust emissions are expected to occur during the first 2-6 months of construction when site preparation occurs. The worst-case daily exhaust emissions are expected to occur during the middle of the construction schedule during the installation of the major mechanical equipment. Annual emissions are based on the average equipment mix during the 20 month construction period.

Available Mitigation Measures

The following mitigation measures are proposed to control fugitive dust and exhaust emissions from the Diesel heavy equipment used during construction of CCGS:

- The applicant will have an on-site construction mitigation manager who will be responsible for the implementation and compliance of the construction mitigation program. The documentation of the ongoing implementation and compliance with the proposed construction mitigations will be provided on a periodic basis.

- All unpaved roads and disturbed areas in the project and laydown construction sites will be watered as frequently as necessary to control fugitive dust. The frequency of watering will be on a minimum schedule of four (4) times during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.

- Onsite vehicle speeds will be limited to 5 miles per hour on unpaved areas within the project construction site.

- The construction site entrance(s) will be posted with visible speed limit signs.

- All construction equipment vehicle tires will be inspected and cleaned as necessary to be free of dirt prior to leaving the construction site via paved roadways.

- Gravel ramps will be provided at the tire cleaning area.

- All unpaved exits from the construction site will be graveled or treated to reduce track-out to public roadways.

- All construction vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been provided.

- Construction areas adjacent to any paved roadway will be provided with sandbags or other similar measures as specified in the construction Storm Water Pollution Prevention Plan (SWPPP) to prevent runoff to roadways.

- All paved roads within the construction site will be cleaned on a periodic basis (or less during periods of precipitation), to prevent the accumulation of dirt and debris.

- The first 300 feet of any public roadway exiting the construction site will be cleaned on a periodic basis (or less during periods of precipitation), using wet sweepers or air filtered dry vacuum sweepers, when construction activity occurs or on any day when dirt or runoff from the construction site is visible on the public roadways.

- Any soil storage piles and/or disturbed areas that remain inactive for longer than 10 days will be covered, or shall be treated with appropriate dust suppressant compounds.

- All vehicles that are used to transport solid bulk material on public roadways and that have the potential to cause visible emissions will be covered, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to minimize fugitive dust emissions. A minimum freeboard height of two (2) feet will be required on all bulk materials transport.

- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition will remain in place until the soil is stabilized or permanently covered with vegetation.

- Disturbed areas will be re-vegetated as soon as practical.

To mitigate exhaust emissions from construction equipment, the applicant is proposing the following:

- The applicant will work with the construction contractor to utilize to the extent feasible, EPA-ARB Tier 2/Tier 3 engine compliant equipment for equipment over 100 horsepower.

- Insure periodic maintenance and inspections per the manufacturers specifications.

- Reduce idling time through equipment and construction scheduling.

- Use California low sulfur diesel fuels (<=15 ppmw S).

Estimation of Emissions with Mitigation Measures

Tables 5.1E-1 through 5.1E-3 show the estimated maximum daily and annual heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures. Detailed emission calculations are included in Table 5.1E-5, including estimates of PM2.5 and CO2e.

Table 5.2E-1 Average Daily Onsite Emissions During Construction, pounds per day

	NO_x	CO	VOC	SO_x	$PM_{10}/PM_{2.5}$
Construction Fugitive Dust	0	0	0	0	12.7/2.7
Equipment and Vehicle Exhaust	106.3	54.1	16	0.1	6.1/6.1
Total =	**106.3**	**54.1**	**16.0**	**0.1**	**18.8/8.8**

Table 5.2E-2 Average Annual Onsite Emissions During Construction, tons per year

	NO_x	CO	VOC	SO_x	$PM_{10}/PM_{2.5}$
Construction Fugitive Dust	0	0	0	0	0.40/0.07
Equipment and Vehicle Exhaust	14.0	7.1	2.1	0.01	0.81/0.80
Total =	**14.0**	**7.1**	**2.1**	**0.01**	**1.21/0.87**

Table 5.2E-3 Annual Onsite Emissions During Construction, tons per construction period (33 months)

	NO_x	CO	VOC	SO_x	$PM_{10}/PM_{2.5}$
Construction Fugitive Dust	0	0	0	0	1.1/0.2
Equipment and Vehicle Exhaust	38.6	19.6	5.8	0.01	2.23/2.21
Total =	**38.6**	**19.6**	**5.8**	**0.01**	**3.3/2.41**

Analysis of Ambient Impacts from Facility Construction

Ambient air quality impacts from emissions during the construction of CCGS were estimated using an air quality dispersion modeling analysis. The modeling analysis considers the construction site location, the surrounding topography, and the sources of

emissions during construction, including vehicle and equipment exhaust emissions and fugitive dust.

Existing Ambient Levels

As with the modeling analysis of project operating impacts (Section 5.1), monitoring stations delineated in Section 5.1 were used to establish the ambient background levels for the construction impact modeling analysis. Table 5.1-17 showed the maximum concentrations of NO_x, SO_2, CO, $PM_{2.5}$, and PM_{10} recorded for 2006 through 2008 at those monitoring stations.

Dispersion Model

As in the analysis of project operating impacts, the USEPA-approved model AERMOD (version 07026) was used to estimate ambient impacts from construction activities. A detailed discussion of the AERMOD dispersion model and the associated processing programs AERSURFACE, AERMET, and AERMAP is included in Section 5.1.6. As with the operational impact analysis, the CCP meteorology reprocessed for the surface characteristics of the proposed project site was used in the construction impact analysis.

The emission sources for the construction site were grouped into two categories: exhaust emissions and dust emissions. Combustion equipment exhaust emissions were modeled as twenty-nine (29) 3.048 meter high point sources (exhaust parameters of 750 Kelvins, 64.681 m/s exit velocity, and 0.1524 meter stack diameter) placed at regular 50-meter intervals around the construction area. Construction fugitive dust emissions were modeled as an area source covering the construction area with an effective plume height of 0.5 meters. Combustion and fugitive emissions were assumed to occur for 10 hours/day (8 AM to 6 PM) consistent with the expected period of onsite construction activities generating both exhaust emissions and fugitive dust. The construction impacts modeling analysis used the same receptor locations and meteorological data as used for the project operating impact analysis. A detailed discussion of the receptor locations and meteorological data is included in Section 5.1.6. For the construction impacts modeling involving area sources, the TOXICS keyword was used to minimize execution times.

To determine the construction impacts on short-term ambient standards (24 hours and less), the average daily onsite construction emission levels shown in Table 5.1E-1 were used. For pollutants with annual average ambient standards, the annual onsite emission levels as shown in Table 5.1E-2 were used.

Modeling Results

Based on the emission rates of NO_x, SO_2, CO, $PM_{2.5}$, and PM_{10}, the modeling options, receptor grids, and meteorological data, AERMOD calculates short-term and annual ambient impacts for each pollutant. As mentioned above, the modeled 1-hour, 3-hour 8-hour, and 24-hour ambient impacts are based on the worst-case daily emission rates of NO_x, SO_2, CO, $PM_{2.5}$, and PM_{10} spread over the estimated daily hours of operation. The annual impacts are based on the annual emission rates of these pollutants.

The annual average concentrations of NO_2 were computed following the revised USEPA guidance for computing these concentrations (August 9, 1995 Federal Register, 60 FR 40465). The annual average was calculated using the ambient ratio method (ARM) with the national default value of 0.75 for the annual average NO_2/NO_x ratio.

The modeling analysis results are shown in Table 5.1E-4. Also included in the table are the maximum background levels that have occurred in the last three years and the resulting total ambient impacts. As shown in Table 5.1E-4, modeled construction impacts for all pollutants are expected to be below the most stringent state and Federal standards. However, the state annual NO_2 standard, the state 24-hour and annual PM_{10} standards, and the state and Federal $PM_{2.5}$ standards are exceeded by maximum background concentrations even in the absence of the modeled impacts due to construction emissions for CCGS.

TABLE 5.1E-4 MODELED MAXIMUM CONSTRUCTION IMPACTS

Pollutant	Averaging Time	Maximum Construction Impacts (µg/m³)	Background (µg/m³)	Total Impact (µg/m³)	State Standards (µg/m³)	Federal Standards (µg/m³)
NO_2[a]	1-hour	91.5	98.1	189.6	339	-
	Annual	3.8	20.8	24.6	57	100
SO_2	1-hour	0.10	122.2	122.3	655	-
	3-hour	0.07	65.0	65.07	-	1300
	24-hour	0.02	23.4	23.42	105	365
	Annual	0.001	7.8	7.8	-	80
CO	1-hour	46.6	3771	3818	23,000	40,000
	8-hour	17.0	2171	2188	10,000	10,000
PM_{10}	24-hour	114.4	82	196.4	50	150
	Annual[b]	2.50	24	26.5	20	-
$PM_{2.5}$	24-hour	24.4	35	59.4	-	35
	Annual	0.58	9	9.6	12	15.0

Notes:
[a]ARM applied for annual average, using national default 0.75 ratio.
[b]Annual Arithmetic Mean.

For maximum modeled ambient concentrations due to construction emissions only, standards are only exceeded for the state 24-hour PM_{10} standard. All other maximum modeled construction impacts are less than the applicable state or Federal standards. Total concentrations (maximum modeled impacts plus maximum background concentrations) only exceed standards for those pollutants and averaging times where background concentrations are close to or already exceed the standards (i.e., the 24-hour and annual PM_{10} standards and 24-hour Federal $PM_{2.5}$ standard). Maximum total concentrations (modeled+background) for all other pollutants and averaging times are less than the applicable standards - i.e., the state 1-hour and the state and Federal annual NO_2 standards, the state and Federal SO_2 standards, the state and Federal CO standards, and the annual $PM_{2.5}$ standards. Modeled CCGS construction particulate impacts are not unusual in comparison to the modeling results for most construction projects; construction sites that use good dust suppression techniques and low-emitting vehicles typically would not be expected to cause exceedances of air quality particulate standards. The input and output modeling files are being provided electronically to the appropriate agencies.

Attachment - Detailed Emission Calculations

Table 5.1E-5	Construction Emissions Calculations
Table 5.1E-6	EMFAC Burden Output for SFAB – 2011
Table 5.1E-7	EMFAC Composites for Emissions Calculations

Table 5.2E-5 Construction Emission Totals

Construction Activity		lbs/day NOx	CO	VOC	SOx	PM10	PM2.5		tons per const period NOx	CO	VOC	SOx	PM10	PM2.5		tons per year NOx	CO	VOC	SOx	PM10	PM2.5
Main Site																					
Construction Equipment-Exhaust		106.3	54.1	16.0	0.1	6.14	6.10		38.6	19.6	5.80	0.01	2.23	2.21		14.04	7.13	2.11	0.00	0.81	0.80
Construction Site-Fugitive Dust		0.000	0.000	0.000	0.000	15.60	3.30		0.000	0.000	0.000	0.000	1.10	0.20		0.00	0.00	0.00	0.00	0.40	0.07
Construction Dust-Other		0.000	0.000	0.000	0.000	0.90	0.19		0.000	0.000	0.000	0.000	0.27	0.06		0.00	0.00	0.00	0.00	0.10	0.02
Site Delivery-Vehicle Exhaust		7.52	2.10	0.43	0.011	0.29	0.28		2.73	0.76	0.15	0.004	0.100	0.100		0.99	0.28	0.05	0.00	0.04	0.04
Site Support-Vehicle Exhaust		1.200	11.600	1.200	0.002	0.110	0.110		0.440	4.200	0.430	0.001	0.040	0.040		0.16	1.53	0.16	0.00	0.01	0.01
Worker Travel-Vehicle Exhaust		2.45	26.2	2.76	0.003	0.24	0.24		0.90	9.50	1.00	0.001	0.090	0.088		0.33	3.45	0.36	0.00	0.03	0.03
Track Out-Fugitive Dust		0.000	0.000	0.000	0.000	0.94	0.160		0.000	0.000	0.000	0.000	0.28	0.05		0.00	0.00	0.00	0.00	0.10	0.02
Unpaved Roads-Fugitive Dust		0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000		0.00	0.00	0.00	0.00	0.00	0.00
Paved Roads-Fugitive Dust		0.000	0.000	0.000	0.000	0.460	0.050		0.000	0.000	0.000	0.000	0.140	0.010		0.00	0.00	0.00	0.00	0.05	0.00
Offsite Linear Emissions are included in the above sector calculations, i.e., acreages, equipment types and use rates, schedules, etc.																					
TOTALS		**117.5**	**94.0**	**20.4**	**0.1**	**24.7**	**10.4**		**42.7**	**34.1**	**7.38**	**0.02**	**4.25**	**2.76**		**15.5**	**12.4**	**2.68**	**0.01**	**1.55**	**1.00**
Onsite Emissions for Modeling		*106.3*	*54.1*	*16.0*	*0.1*	*18.84*	*8.80*		*38.6*	*19.6*	*5.8*	*0.0*	*3.60*	*2.47*		*14.0*	*7.1*	*2.1*	*0.0*	*1.31*	*0.90*

Total Const Months: 33
Total Const Years: 2.75

CONSTRUCTION EQUIPMENT EXHAUST EMISSIONS

Project: CCGS

Assumptions:

1. The average diesel engine employed in construction equipment use consumes fuel at a rate of: 0.06 gal/hp-hr

Ref: EPA, NR-009b Publication, November 2002.
Ref: Sacramento County APCD Const. Program Data, V. 6.0.3, 3/2007.
Ref: EPA, NR-009c Publication, EPA 420-P-04-009, April 2004.
Ref: Niland Energy Project, IID, AFC Vol 2, App A.
Ref: South Coast AQMD PR XXI, Draft Staff Report, 3-15-95, and SCAQMD CEQA Manual, 11/03.
The above noted references present fuel consumption values which range from 0.050 to 0.064 gal/hp-hr for diesel engines used in construction related equipment. The value of 0.060 gal/hp-hr was chosen as a reasonable upper mid-range value for construction emissions calculations.

2. Construction equipment exhaust emissions will be calculated on an annual basis using the site specific equipment list, HP ratings, hours of use, days of use, etc. Annual emissions will be apportioned to daily values based on the estimated construction period time on site.

3. The equipment list derived from the South Coast AQMD (12/2006) will be used to establish the various equipment categories. Data produced by the Sacramento APCD was used to establish the average HP ratings for each equipment category. HP rating data was supplemented by data from SCAQMD CEQA Handbook (Table A9-8-C) if not available from Sacramento APCD.

4. Construction Schedule:

10	hrs/day	Construction Totals:	220	hrs/month
5	days/week		7260	hrs/const period
22	days/month		726	days/const period
33	months			

5. Anticipated Construction Start Year: Late 2010 or early 2011

Equipment Category	Avg HP	# of Units Used for Project	Avg Use Rate Hrs/day	# of Days On Site (each)	Total Hrs/Day	Total Hp-Hrs per Day	Total Hrs per Const Period	Total Hp-Hrs per Const Period
Bore/Drill Rigs/Pile Drivers	217.7	2	10	30	20	4354	600	130620
Cement Mixers	11	1	10	10	10	110	100	1100
Industrial/Concrete Saws	83.7	1	10	10	10	837	100	8370
Cranes	190.4	4	10	500	40	7616	20000	3808000
Crawler Tractors/Dozers	143.4	2	10	60	20	2868	1200	172080
Crushing/Processing Eq.	154.3	0	0	0	0	0	0	0
Dump and Tender Trucks	223	5	10	180	50	11150	9000	2007000
Excavators	180	6	10	170	60	10800	10200	1836000
Forklifts/Aerial Lifts/Booms	83	5	10	400	50	4150	20000	1660000
Generators/Compressors	37	10	10	250	100	3700	25000	925000
Graders	174	2	10	120	20	3480	2400	417600
Off Highway Tractors	255.1	0	0	0	0	0	0	0
Off Highway Trucks	417.2	0	0	0	0	0	0	0
Other Const. Eq.-Diesel	240.3	0	0	0	0	0	0	0
Pavers	131.5	1	10	10	10	1315	100	13150
Paving Eq./Surfacing Eq.	110.9	0	0	0	0	0	0	0
Plate Compactors	8	4	10	450	40	320	18000	144000
Rollers/Compactors	113.9	2	10	100	20	2278	2000	227800
Rough Terrain Forklifts	94.2	0	0	0	0	0	0	0
Rubber Tired Dozers	352.5	0	0	0	0	0	0	0
Rubber Tired Loaders	165.3	0	0	0	0	0	0	0
Scrapers	313.2	4	10	60	40	12528	2400	751680
Signal Boards/Light Sets	118.8	5	10	180	50	5940	9000	1069200
Skid Steer Loaders	62	2	10	450	20	1240	9000	558000
Tractors/Loaders/Backhoes	79.5	0	0	0	0	0	0	0
Trenchers	28	0	0	0	0	0	0	0
Welders	35	10	10	250	100	3500	25000	875000
Other Const. Eq.-Gasoline	0	0	0	0	0	0	0	0

*includes equipment and use rates for proposed offsite linears.

Estimated Const Period Hp-Hrs = 14604600

Estimated Const Period Fuel Use = 876276 gals

2010 Equipment Emissions Factors

Equip. Type	HP	lbs/hp-hr CO	lbs/hp-hr VOC	lbs/hp-hr NOx	lbs/hp-hr SOx	lbs/hp-hr PM10
Bore/Drill Rigs/Pile Drivers	217.7	0.001400	0.000400	0.004700	0.000008	0.000200
Cement Mixers	11	0.003800	0.001400	0.006500	0.000009	0.000400
Industrial/Concrete Saws	83.7	0.006400	0.002500	0.006100	0.000008	0.000600
Cranes	190.4	0.001400	0.000500	0.004900	0.000005	0.000200
Crawler Tractors/Dozers	143.4	0.004300	0.001100	0.008500	0.000008	0.000500
Crushing/Processing Eq.	154.3	0.002500	0.000900	0.010200	0.000011	0.000300
Dump and Tender Trucks	223	0.001300	0.000400	0.002600	0.000004	0.000100
Excavators	180	0.003800	0.000800	0.006400	0.000007	0.000400
Forklifts/Aerial Lifts/Booms	83	0.002100	0.000600	0.003800	0.000004	0.000300
Generators/Compressors	37	0.005800	0.002200	0.006100	0.000008	0.000600
Graders	174	0.002000	0.000700	0.007200	0.000008	0.000300
Off Highway Tractors	255.1	0.004900	0.001300	0.010100	0.000008	0.000600
Off Highway Trucks	417.2	0.001500	0.000500	0.004600	0.000005	0.000200
Other Const. Eq.-Diesel	240.3	0.005900	0.002100	0.005600	0.000007	0.000500
Pavers	131.5	0.004400	0.001400	0.008100	0.000007	0.000700
Paving Eq./Surfacing Eq.	110.9	0.006600	0.002800	0.005300	0.000006	0.000600
Plate Compactors	8	0.001800	0.000300	0.002100	0.000004	0.000100
Rollers/Compactors	113.9	0.003500	0.001000	0.006200	0.000006	0.000500
Rough Terrain Forklifts	94.2	0.004200	0.000900	0.007400	0.000008	0.000400
Rubber Tired Dozers	352.5	0.003500	0.000700	0.006400	0.000005	0.000300
Rubber Tired Loaders	165.3	0.003600	0.000800	0.006600	0.000007	0.000400
Scrapers	313.2	0.002900	0.001000	0.009900	0.000009	0.000400
Signal Boards/Light Sets	118.8	0.002500	0.000500	0.003000	0.000006	0.000100
Skid Steer Loaders	62	0.005000	0.001600	0.004900	0.000007	0.000400
Tractors/Loaders/Backhoes	79.5	0.003000	0.000800	0.004700	0.000005	0.000400
Trenchers	28	0.004000	0.001300	0.007600	0.000006	0.000600
Welders	35	0.002300	0.000700	0.004100	0.000004	0.000400
Other Const. Eq.-Gasoline	0.0	0.003300	0.000900	0.006500	0.000006	0.000400

SCAQMD off-road emissions factor database, website, 12/2006. Load factor adjustments incorporated.
EFs are for equipment inventory year 2010.

Construction Period Emissions, lbs

Equip. Type	CO	VOC	NOx	SOx	PM10
Bore/Drill Rigs/Pile Drivers	183	52	614	1	26
Cement Mixers	4	2	7	0	0
Industrial/Concrete Saws	54	21	51	0	5
Cranes	5331	1904	18659	19	762
Crawler Tractors/Dozers	740	189	1463	1	86
Crushing/Processing Eq.	0	0	0	0	0
Dump and Tender Trucks	2609	803	5218	8	201
Excavators	6977	1469	11750	13	734
Forklifts/Aerial Lifts/Booms	3486	996	6308	7	498
Generators/Compressors	5365	2035	5643	7	555

Graders	835	292	3007	3	125	
Off Highway Tractors	0	0	0	0	0	
Off Highway Trucks	0	0	0	0	0	
Other Const. Eq.-Diesel	0	0	0	0	0	
Pavers	58	18	107	0	9	
Paving Eq./Surfacing Eq.	0	0	0	0	0	
Plate Compactors	259	43	302	1	14	
Rollers/Compactors	797	228	1412	1	114	
Rough Terrain Forklifts	0	0	0	0	0	
Rubber Tired Dozers	0	0	0	0	0	
Rubber Tired Loaders	0	0	0	0	0	
Scrapers	2180	752	7442	7	301	
Signal Boards/Light Sets	2673	535	3208	7	107	
Skid Steer Loaders	2790	893	2734	4	223	
Tractors/Loaders/Backhoes	0	0	0	0	0	
Trenchers	0	0	0	0	0	
Welders	2013	613	3588	4	350	
Other Const. Eq.-Gasoline	2888	788	5688	5	350	

Totals	**CO**	**VOC**	**NOx**	**SOx**	**PM10**	**PM2.5**	
lbs per const. period	39241	11631	77200	88	4461	4420.75	
tons per const. period	19.6	5.8	38.6	0.0	2.23	2.21	
Average lbs/day =	54.1	16.0	106.3	0.12	6.14	6.09	
Estimated Maximum lbs/day =	*83.8*	*24.8*	*164.8*	*0.2*	*9.5*	*9.4*	*note 3*
Average lbs/month =	1189.1	352.5	2339.4	2.7	135.18	133.96	
Average tons/year =	7.13	2.11	14.04	0.02	0.81	0.80	

CARB-CEIDARS, Updated Size Fractions for PM Profiles: PM2.5 = 0.991 of PM10 : Diesel Vehicle Exhaust
CO2 EF: CCAR General Protocol, June 2006, for CA-Low Sulfur Diesel combustion.

	CO2
lbs per const period	19243021
tons per const period	9622

Other Assumptions and References:

1. Trench construction times per: Southern Regional Water Pipeline Alliance, 3/08.
   Optimum trench construction progress rate is 80m (260ft) per day.
   Non-optimum trench construction progress rate is 30m (100 ft) per day.
   An average progress of 180 ft/day is used where applicable.
2. Paving speeds can range from 3 to 15 m/min depending on asphalt delivery rates and required compaction thickness.
   A minium paving speed of 3 m/min (10 ft/min or 600 ft/hr) I used where applicable.
   The minimum speed is based upon a 3" compacted layer, 12 ft lane width, with an asphalt delivery rate of ~ 140 tons/hr.
   Ref: Asphalt Paving Speed, Pavement Worktip No. 31, AAPA, 11/2001.
3. Estimation of maximum daily emissions is extremely variable. Some projects provide estimated manpower and equipment use schedules, but even this data usually leads to a wide range of assumptions being made in order to estimate equipment exhaust emissions for a maximum work day. The methodology used in this analysis assumes that the estimated maximum day represents the ratio of the number of pieces of equipment on site on any day during the maximum month as compared to the number of pieces of equipment on site on any day during an average month.

CONSTRUCTION PHASE-Main Project Site Fugitive Dust Emissions
MRI Level 2 Analysis

Acres Subject to Construction Disturbance Activites:		20	
Max Acres Subject to Construction Disturbance Activites on any day:		20	
Emissions Factor for PM10 Uncontrolled, tons/acre/month:		0.0144	
PM2.5 fraction of PM10 (per CARB CEIDARS Profiles):		0.21	
Activity Levels: Hrs/Day:		10	
Days/Wk:		5	
Days/Month:		22	
Const Period, Months:		33	2.8 years
Const Period, Days:		726	
Wet Season Adjustment: (Per AP-42, Section 13.2.2, Figure 13.2.2-1, 12/03)			
Mean # days/year with rain >= 0.01 inch:		70	
Mean # months/yr with rain >= 0.01 inch:		2.33	
Adjusted Const Period, Months:		26.58	
Adjusted Const Period, Days:		533.5	
Controls for Fugitive Dust:			
Proposed watering schedule is every:		2.5	Hours

SCAQMD Mitigation Measures, Table XI-A, 4/07
2.5 hour watering interval yields ~80% control of PM10/PM2.5
Speed control of onsite const traffic to <=15 mph = 44% control

Calculated % control based on mitigations proposed:		89	% control
Conservative control % used for emissions estimates:		89	% control
		0.11	release fraction

Emissions: Controlled	PM10	PM2.5
tons/month	0.032	0.007
tons/period	0.842	0.177
Max lbs/day	2.9	0.605

Cut and Fill Data:

Total cu/yds:		43000
10^3 cu/yds:		43
MRI PM10 emissions factor, tons/1000 cu.yds:		0.059
PM10 uncontrolled emissions, tons/period:		2.54
Cut and Fill Activity Period, months:		2.0
Cut and Fill Activity Period, days:		44.0
PM10 Controlled Emissions:	tons/period	0.28
PM2.5 Controlled Emisisons:	tons/period	0.06
PM10 Controlled Emissions:	tons/month	0.14
PM2.5 Controlled Emisisons:	tons/month	0.03
PM10 Controlled Emissions:	max lbs/day	12.7
PM2.5 Controlled Emisisons:	max lbs/day	2.7

Emissions Totals:	**PM10**	**PM2.5**
tons/period	**1.1**	**0.2**
tons/month	**0.2**	**0.0**
max lbs/day	**15.6**	**3.3**

Ref: MRI Report, South Coast AQMD Project No. 95040, March 1996, Level 2 Analysis Procedure.
MRI Report factor of 0.011 tons/acre/month is based on 168 hours per month of const activity.
For an activity rate of 220 hrs/month, the adjusted EF would be 0.0144 tons/acre/month.

CONSTRUCTION PHASE- Laydown Yard plus Offsite Linears
MRI Level 2 Analysis

Acres Subject to Construction Disturbance Activites:		25.3	
Emissions Factor for PM10 Uncontrolled, tons/acre/month:		0.0036	
PM2.5 fraction of PM10 (per CARB CEIDARS Profiles):		0.21	
Activity Levels:	Hrs/Day:	10	
	Days/Wk:	5	
	Days/Month:	22	
	Const Period, Months:	33	2.8 years
	Const Period, Days:	726	
Wet Season Adjustment:	(Per AP-42, Section 13.2.2, Figure 13.2.2-1, 12/03)		
	Mean # days/year with rain >= 0.01 inch:	70	
	Mean # months/yr with rain >= 0.01 inch:	2.33	
	Adjusted Const Period, Months:	26.58	
	Adjusted Const Period, Days:	533.5	
Controls for Fugitive Dust:			
	Proposed watering schedule is every:	2.5	Hours

SCAQMD Mitigation Measures, Table XI-A, 4/07
2.5 hour watering interval yields ~80% control of PM10/PM2.5
Speed control of onsite const traffic to <=15 mph = 44% control

Calculated % control based on watering interval ratio:	89	% control
Conservative control % used for emissions estimates:	89	% control
	0.11	release fraction

Emissions: Controlled	PM10	PM2.5
tons/month	0.010	0.002
tons/period	0.266	0.056
Max lbs/day	0.9	0.191

Cut and Fill Data:

Total cu/yds:		0
10^3 cu/yds:		0
MRI PM10 emissions factor, tons/1000 cu.yds:		0.059
PM10 uncontrolled emissions, tons/period:		0.00
Cut and Fill Activity Period, months:		0.0
Cut and Fill Activity Period, days:		0.0
PM10 Controlled Emissions:	tons/period	0.00
PM2.5 Controlled Emisisons:	tons/period	0.00
PM10 Controlled Emissions:	tons/month	0.00
PM2.5 Controlled Emisisons:	tons/month	0.00
PM10 Controlled Emissions:	max lbs/day	0.0
PM2.5 Controlled Emisisons:	max lbs/day	0.0

Emissions Totals:	**PM10**	**PM2.5**
tons/period	**0.266333**	**0.06**
tons/month	**0.010019**	**0.00**
max lbs/day	**0.9**	**0.19**

Ref: MRI Report, South Coast AQMD Project No. 95040, March 1996, Level 2 Analysis Procedure.
MRI Report factor of 0.011 tons/acre/month is based on 168 hours per month of const activity.
For an activity rate of 220 hrs/month, the adjusted EF would be 0.0144 tons/acre/month.
EF of 0.0144 tons/acre/month reduced by 75% to account for emissions from laydown yard surface use

PAVED ROAD FUGITIVE DUST EMISSIONS
(associated with construction traffic)

Length of Paved Road used for/by Construction Access:		0.3	miles, roundtrip distance***
Avg weight of vehicular equipment on road:		4.3	tons (range 2 - 42 tons)
Road surface silt loading factor:		0.28	g/m2 (range 0.03 - 400 g/m2)
Particle size multiplier factors:	PM10	0.023	lb/VMT
	PM2.5	0.0034	lb/VMT
C factors (brake and tire wear):	PM10	0.00047	lb/VMT
	PM2.5	0.00036	lb/VMT
Avg vehicle speed on road:		25	mph (range 10-55 mph)
Number of vehicles per day:		262	
Number of construction work days per month:		22	
Total vehicles per month:		5764	
Number of construction work months:		26.58	after wet season adjustment*
Total vehicles per const period:		153207.1	

	VMT/day:	78.6
	VMT/month:	1729.2
	VMT/period:	45962.14

	PM10	PM2.5	
Calc 1	0.207	0.207	
Calc 2	1.334	1.334	
Calc 3	0.006	0.0006	lb/VMT

Emissions	PM10	PM2.5
lbs/day	0.46	0.05
lbs/month	10.19	1.00
lbs/period	270.89	26.69
tons/period	0.14	0.01

Default Silt Load Values for Paved Road Types

Freeway	0.02 g/m2
Arterial	0.036 g/m2
Collector	0.036 g/m2
Local	0.28 g/m2
Rural	1.6 g/m2

* see main const dust site page for this value
EPA, AP-42, Section 13.2.1, March 2006, updated 9/2008.
Allocation of emissions from the project traffic will be based on a 0.3 mile roundtrip adjacent to the project site, with trackout emissions allocated to the remaining 0.11 miles.

CO2e Emissions Estimates

Total CO2 emisisons from diesel combustion:	10034.6	tons/period
Total CO2 emissions from gasoline combustion:	1489.4	tons/period

Approximate methane fraction of CO2 for diesel combustion:	0.000051
Approximate N2O fraction of CO2 for diesel combustion:	0.000032
Approximate methane fraction of CO2 for gasoline combustion:	0.000213
Approximate N2O fraction of CO2 for gasoline combustion:	0.000113

Estimated methane from diesel combustion:	0.511765	tons/period
Estimated N2O from diesel combustion:	0.321107	tons/period
Estimated methane from gasoline combustion:	0.317242	tons/period
Estimated N2O from diesel combustion:	0.168302	tons/period

Estimated methane CO2e from diesel combustion:	10.74706	tons/period
Estimated N2O CO2e from diesel combustion:	99.54323	tons/period
Estimated methane CO2e from gasoline combustion:	6.662086	tons/period
Estimated N2O CO2e from gasoline combustion:	52.17368	tons/period

Total CO2e emissions from construction:	11693	**tons/period**
	10524	*metric tons/period*

CCAR General Protocol, June 2006, Version 2.1.
IPCC SAR values for methane and N2O.

Average Vehicle Weight Estimate for Construction Period

Vehicle Type	Weight tons	# Vehicles per day	Frac. of total vehicles
Passenger Cars	2	202	0.771
LD Pickups	3	40	0.153
MD Pickups	4	0	0.000
HD Loaded*	40	10	0.038
HD Unloaded*	20	10	0.038
Buses	0	0	0.000
		262	1.000

Weighted Avg Vehicle Weight, tons : **4.3**

* Ref: Liberty Energy XXIII DEIR, City of Banning, CA., Aspen Environmental Group, June 2008.

CONSTRUCTION PHASE - Trackout Emissions

Paved Road Length (miles):	0.11	estimated roundtrip trackout distance				
Daily # of Vehicles:	262					
Avg Vehicle Weight (tons):	4.3			PM10	PM2.5*	
Total Unadjusted VMT/day	28.8			0.207		
Particle Size Multipliers	PM10			1.334		
lb/VMT	0.023			0.001	0.0001	lb/VMT
C factor, lb/VMT	0.00047			**0.943**	0.1594	**lbs/day**
Road Sfc Silt Loading (g/m^2):	0.28			**0.010**	0.0018	**tons/month**
# of Active Trackout Points:	1			**0.28**	0.0466	**tons/period**
Added Trackout Miles:	PM10					
Trackout VMT/day:	1572		*Default Silt Load Values for Paved Road Types*			
Final Adjusted VMT/day	1601			Freeway	0.02 g/m2	
Final Adjusted VMT/month	35218			Arterial	0.036 g/m2	
Final Adjusted VMT/period	936096			Collector	0.036 g/m2	
Construction days/month:	22.0			Local	0.28 g/m2	
Construction months/period:	26.6			Rural	1.6 g/m2	
Control Applied to Trackout:	Sweeping and Cleaning (Water washing)					
Control Efficiency, %	90	0.9	Release Factor =		0.1	

* PM2.5 fraction of PM10 assumed to be 0.169 (CARB CEIDARS updated fraction values) for paved roads.

EPA, AP-42, Section 13.2.1, Proposed revisions dated 9/2008.
Use silt loading factor from default values for road type if no site specific data is available.
Trackout effects approximately 300 ft of roadway arriving and departing from the site access point.

CONSTRUCTION PHASE - Worker Travel - Emissions

Ref: SFAB, Emfac 2007, V2.3, Nov 2006
On Road Vehicles (1967-2011)
LDP/LDT Weighted Avg Efs

Max # of Workers/Day:	729	
Avg # of Workers/Day:	303	
Avg Occupancy/Vehicle:	1.5	
Round Trips/Day:	202	
Avg Roundtrip Distance:	15	miles
VMT/Day:	3030	
VMT/Const Period:	2199780	
Total Const Days:	726	

Emissions Factors (lbs/VMT)

NOx	CO	VOC	SOx	PM10	CO2
0.00081	0.00864	0.00091	0.000001	0.00008	0.96325

Avg. Daily Emissions (lbs)

NOx	CO	VOC	SOx	PM10		PM2.5
2.454	**26.179**	**2.757**	**0.003**	**0.242**	**2918.648**	**0.242**

Tons per Const Period

0.8909	**9.5030**	**1.0009**	**0.0011**	**0.0880**	**1059.4690**	**0.0878**

It should be noted that these emissions are not necessarily new emissions to the regional air shed. A significant portion of the workers will be derived from the existing work force pool in the urban regional area, and as such these workers would most likely be involved in projects in the area regardless of whether or not the proposed facility is constructed. As such, a major portion of the above estimated emissions would not be considered as additions to the air shed.

CONSTRUCTION PHASE - Truck Delivery and Site Support Vehicle Emissions

Ref: SFAB, Emfac 2007, V2.3, Nov 2006
On-Road Heavy Duty Diesels (1967-2011)

Avg # deliveries/day:	10.0										
Avg Haul Distance (miles)	30	see note below		Emissions Factors (lbs/vmt)							
VMT/Day:	300.0		NOx	CO	VOC	SOx	PM10	CO2			
Work days/yr:	264		0.025066	0.007002	0.001418	0.000036	0.000955	3.785			
Total Const Work Days:	726				Daily Emissions (lbs)						
Total # of Deliveries:	7260		**NOx**	**CO**	**VOC**	**SOx**	**PM10**	**CO2**	**PM2.5**		
			7.520	**2.101**	**0.425**	**0.011**	**0.287**	**1135.500**	**0.284**		
					Tons per Const Period						
			2.730	0.763	0.154	0.004	0.104	412.187	0.103		

Site Support Vehicle Emissions

Total # of vehicles:	40		**NOx**	**CO**	**VOC**	**SOx**	**PM10**	**CO2**			**PM2.5**
# of Pickups (gas):	36		0.001108	0.010723	0.001096	0.000001	0.000098	1.096509	lbs/vmt*	gasoline	
# of Pickups (diesel):	4		0.000039	0.000016	0.000002	0.000011	0.000002	0.008964	lbs/vmt*	diesel	
Avg. pickup daily vmt:	30		**1.1966**	**11.5808**	**1.1837**	**0.0011**	**0.1058**	**1184.2297**	**lbs/day**	**gasoline**	**0.1056283**
Total Gas VMT:	1080		**0.0047**	**0.0019**	**0.0002**	**0.0013**	**0.0002**	**1.0757**	**lbs/day**	**diesel**	**0.0002**
Total Diesel VMT:	120										
			0.4344	4.2038	0.4297	0.0004	0.0384	429.8754	**tons/period**	**gasoline**	0.0383
			0.0017	0.0007	0.0001	0.0005	0.0001	0.3905	**tons/period**	**diesel**	0.0001

Ref: SFAB, Emfac 2007, V2.3, Nov 2006
LDTs (gas and diesel), 1967-2011

Avg haul distance: one way distance from site to either Concord or Oakland.
These trucks will not be dedicated to the site, so backhaul distances are not included.

CARB-CEIDARS, Updated Fractions for PM Profiles: PM2.5 = 0.991 of PM10 for Diesel Exhaust, and 0.998 for Gasoline Vehicles.

It should be noted that these emissions are not necessarily new emissions to the regional air shed. A significant portion of the truck services will be derived from the existing regional truck services vehicle pool, and as such these truck emissions would most likely be involved in deliveries in the area regardless of whether or not the proposed facility is constructed. As such, a major portion of the above estimated emissions would not be considered as additions to the air shed.

Table 5.1E-7

EMFAC Composite Emissions Factor Conversion — EMFAC 2007, V2.3, Nov 2006

County: SFAB (BAAQMD)
Year: 2011
Model Years: 1967-2011

EMFAC Burden Output

	LDP(gas)	LDP(diesel)	LDT(gas)	LDT(diesel)	MDT(gas)	MDT(diesel)	HDT(gas)	HDT(diesel)	Buses	Motorcycles
Daily VMT/1000	91371	183	55777	651	14393	1047	1005	5570	614	1347
Daily VMT	91371000	183000	55777000	651000	14393000	1047000	1005000	5570000	614000	1347000
ROG, tpd	36.5	0.04	30.57	0.06	8.1	0.25	3.69	3.95	0.68	7.16
CO, tpd	335.27	0.16	299.05	0.45	77.88	1.27	45.73	19.5	4.37	69.48
NOx, tpd	28.49	0.3	30.89	1.09	11.95	4.98	6.31	69.81	11.78	1.98
CO2, tpd (x 1000) >	40290	70	30580	250	11500	600	790	10540	1640	240
PM10, tpd	3.6	0.03	2.72	0.05	0.75	0.08	0.04	2.66	0.21	0.07
SOx, tpd	0.001	0.39	0.001	0.3	0.001	0.12	0.01	0.1	0.02	0.001

Composite Efs

	LDP(gas) g/VMT	LDP(diesel) g/VMT	LDT(gas) g/VMT	LDT(diesel) g/VMT	MDT(gas) g/VMT	MDT(diesel) g/VMT	HDT(gas) g/VMT	HDT(diesel) g/VMT	Buses g/VMT	Motorcycles g/VMT
ROG	0.36	0.00	0.50	0.0010	0.51	0.00	3.33	0.64	1.00	4.82
CO	3.34	0.00	4.86	0.0073	4.91	0.01	41.28	3.18	6.46	40.06
NOx	0.28	0.00	0.50	0.0177	0.75	0.05	5.70	11.37	17.40	1.33
CO2	400.02	0.69	497.37	4.0661	724.84	5.96	713.11	1716.64	2423.09	161.64
PM10	0.03	0.00	0.04	0.0008	0.05	0.00	0.04	0.43	0.31	0.05
SOx	0.0000	0.0039	0.0000	0.0049	0.0001	0.0012	0.0090	0.0163	0.0295	0.0007

Composite Efs

	LDP(gas) lb/VMT	LDP(diesel) lb/VMT	LDT(gas) lb/VMT	LDT(diesel) lb/VMT	MDT(gas) lb/VMT	MDT(diesel) lb/VMT	HDT(gas) lb/VMT	HDT(diesel) lb/VMT	Buses lb/VMT	Motorcycles lb/VMT
ROG	0.000799	0.000001	0.001096	0.000002	0.001126	0.000005	0.007343	0.001418	0.002215	0.010616
CO	0.007361	0.000004	0.010723	0.000016	0.010822	0.000028	0.091005	0.007002	0.014235	0.088315
NOx	0.000623	0.000007	0.001108	0.000039	0.001662	0.000109	0.012557	0.025066	0.038371	0.002940
CO2	0.881899	0.001532	1.096509	0.008964	1.597999	0.013133	1.572139	3.784560	5.342020	0.356347
PM10	0.000072	0.000001	0.000098	0.000002	0.000104	0.000002	0.000080	0.000955	0.000684	0.000104
SOx	0.000000	0.000009	0.000000	0.000011	0.000000	0.000003	0.000020	0.000036	0.000065	0.000001

Weighted Avg LDP/LDT Gasoline

	g/VMT	lb/VMT		
			Calc 1	0.379
ROG	0.413	0.00091	Calc 2	0.621
CO	3.917	0.00864		
NOx	0.366	0.00081		
CO2	436.9	0.96325		
PM10	0.037	0.00008		
SOx	0.000	0.00000		

	LDP(gas)	LDP(diesel)	LDT(gas)	LDT(diesel)	MDT(gas)	MDT(diesel)	HDT(gas)	HDT(diesel)	Buses	Motorcycles
Annual VMT	3.34E+10	6.68E+07	2.04E+10	2.38E+08	5.25E+09	3.82E+08	3.67E+08	2.03E+09	2.24E+08	4.92E+08
Daily Fuel Use, 10^3 gal	4164.69	6.51	3183.39	22.46	1190.83	54.19	89.21	948.85	149.14	35.91
Daily Fuel Use, gals	4164690	6510	3183390	22460	1190830	54190	89210	948850	149140	35910
Annual Fuel Use, gals	1.527E+09	2376150	1.162E+09	8197900	434652950	19779350	32561650	346330250	54436100	13107150
Average Miles/gallon	21.8	28.1	17.5	29.0	12.1	19.3	11.3	5.9	4.1	37.5

Table 5.1E-6

le : SFAB-2011
sion : Emfac2007 V2.3 Nov 1 2006
Date : 2009/06/11 18:56:46
n Year: 2011 -- All model years in the range 1967 to 2011 selected
son : Annual
a : San Francisco Air Basin Average
Stat : Enhanced Interim (2005) -- Using I/M schedule for area 43 San Francisco (SF)
ssions: Tons Per Day

	Light Duty Passenger Cars				Light Duty Trucks				Medium Duty Trucks				Heavy Duty Trucks - Gasoline Trucks			Diesel	Total HD	Urban	Motor-	All
	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Diesel	Total	Non-cat	Cat	Total	Trucks	Trucks	Buses	cycles	Vehicles
hicles	26455.	2928470.	8330.	2963250.	17192.	1674200.	22426.	1713820.	1679.	388205.	27192.	417076.	2527.	42454.	44981.	69449.	114430.	5034.	166772.	5380380.
T/1000	440.	91371.	183.	91994.	366.	55777.	651.	56795.	34.	14393.	1047.	15475.	24.	981.	1005.	5570.	6574.	614.	1347.	172799.
ips	104043.	18413600.	45008.	18562700.	68871.	10484300.	135670.	10688800.	17539.	3867310.	331753.	4216610.	55913.	626140.	682053.	1314440.	1996490.	20138.	333510.	35818300.
Reactive Organic Gas Emissions																				
n Exh	3.08	5.06	0.03	8.17	2.61	4.76	0.06	7.43	0.30	1.64	0.25	2.19	0.18	0.84	1.03	3.52	4.54	0.66	4.89	27.88
le Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.08	0.00	0.03	0.04	0.43	0.47	0.00	0.00	0.55
art Ex	0.63	8.87	0.00	9.49	0.41	6.22	0.00	6.62	0.13	2.44	0.00	2.57	0.69	1.19	1.88	0.00	1.88	0.01	0.91	21.49
tal Ex	3.71	13.92	0.03	17.67	3.02	10.97	0.06	14.05	0.43	4.15	0.25	4.83	0.88	2.07	2.95	3.95	6.90	0.67	5.79	49.92
urnal	0.14	1.86	0.00	1.99	0.09	1.18	0.00	1.26	0.00	0.15	0.00	0.15	0.00	0.01	0.01	0.00	0.01	0.00	0.26	3.69
t Soak	0.35	3.69	0.00	4.04	0.23	2.21	0.00	2.44	0.02	0.39	0.00	0.41	0.03	0.03	0.06	0.00	0.06	0.00	0.15	7.10
nning	2.05	9.59	0.00	11.65	0.77	11.33	0.00	12.10	0.08	2.77	0.00	2.85	0.26	0.42	0.68	0.00	0.68	0.01	0.81	28.10
sting	0.08	1.10	0.00	1.19	0.06	0.71	0.00	0.77	0.00	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.13	2.18
tal	6.33	30.17	0.03	36.54	4.17	26.40	0.06	30.63	0.53	7.56	0.25	8.35	1.17	2.53	3.69	3.95	7.65	0.68	7.15	90.99
Carbon Monoxide Emissions																				
n Exh	38.69	189.74	0.16	228.59	31.93	182.72	0.45	215.09	5.15	41.76	1.25	48.15	4.80	15.00	19.80	17.60	37.40	4.19	55.68	589.10
le Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.03	0.47	0.02	0.20	0.22	1.91	2.13	0.00	0.00	2.60
art Ex	3.46	104.38	0.00	107.84	2.30	82.11	0.00	84.41	0.86	29.67	0.00	30.53	5.20	20.52	25.71	0.00	25.71	0.18	3.80	252.48
tal Ex	42.16	294.11	0.16	336.43	34.23	264.83	0.45	299.51	6.01	71.87	1.27	79.15	10.02	35.72	45.73	19.50	65.24	4.37	59.48	844.18
Oxides of Nitrogen Emissions																				
n Exh	2.23	19.32	0.30	21.86	1.81	22.85	1.09	25.74	0.22	6.88	4.91	12.02	0.12	3.75	3.87	65.45	69.32	11.76	1.87	142.57
le Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.08	0.00	0.00	0.00	4.36	4.36	0.00	0.00	4.44
art Ex	0.17	6.72	0.00	6.89	0.11	6.13	0.00	6.24	0.02	4.82	0.00	4.84	0.08	2.35	2.43	0.00	2.43	0.02	0.12	20.53
tal Ex	2.40	26.04	0.30	28.74	1.92	28.98	1.09	31.98	0.25	11.71	4.98	16.94	0.21	6.10	6.31	69.81	76.11	11.78	1.98	167.53
Carbon Dioxide Emissions (000)																				
n Exh	0.25	38.54	0.07	38.87	0.21	29.31	0.25	29.77	0.03	11.08	0.60	11.71	0.02	0.73	0.74	10.29	11.03	1.64	0.22	93.24
le Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.01	0.25	0.26	0.00	0.00	0.28
art Ex	0.02	1.47	0.00	1.49	0.02	1.04	0.00	1.06	0.00	0.37	0.00	0.37	0.01	0.03	0.04	0.00	0.04	0.00	0.02	2.97
tal Ex	0.28	40.01	0.07	40.36	0.23	30.35	0.25	30.83	0.03	11.46	0.60	12.10	0.03	0.76	0.79	10.54	11.33	1.64	0.24	96.49
PM10 Emissions																				
n Exh	0.02	1.09	0.02	1.13	0.01	1.30	0.04	1.35	0.00	0.38	0.06	0.44	0.00	0.01	0.01	2.32	2.33	0.19	0.05	5.49
le Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.06
art Ex	0.00	0.12	0.00	0.12	0.00	0.13	0.00	0.13	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.29
tal Ex	0.02	1.20	0.02	1.24	0.01	1.43	0.04	1.48	0.00	0.41	0.06	0.48	0.00	0.01	0.01	2.38	2.40	0.19	0.05	5.85
reWear	0.00	0.81	0.00	0.81	0.00	0.49	0.01	0.50	0.00	0.14	0.01	0.15	0.00	0.01	0.01	0.15	0.16	0.01	0.01	1.64
akeWr	0.01	1.26	0.00	1.27	0.01	0.77	0.01	0.79	0.00	0.20	0.01	0.21	0.00	0.02	0.02	0.13	0.14	0.01	0.01	2.43
tal	0.03	3.27	0.03	3.33	0.02	2.69	0.05	2.77	0.00	0.75	0.09	0.84	0.00	0.04	0.04	2.66	2.70	0.21	0.07	9.92
ad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
x	0.00	0.39	0.00	0.39	0.00	0.30	0.00	0.30	0.00	0.11	0.01	0.12	0.00	0.01	0.01	0.10	0.11	0.02	0.00	0.94
Fuel Consumption (000 gallons)																				
soline	36.35	4148.34	0.00	4184.69	29.67	3153.72	0.00	3183.39	4.26	1186.57	0.00	1190.83	5.10	84.12	89.21	0.00	89.21	7.03	35.91	8691.07
esel	0.00	0.00	6.51	6.51	0.00	0.00	22.46	22.46	0.00	0.00	54.19	54.19	0.00	0.00	0.00	948.85	948.85	142.11	0.00	1174.12