

APPENDIX B

REVISED AIR EMISSIONS CALCULATIONS

Paramount Refinery Clean Fuels Project Construction Emission Summary

Emissions from Equipment	2007
CO (lb/day)	22.57
NOx (lb/day)	34.73
VOC (lb/day)	8.64
SOx (lb/day)	0.04
PM10 (lb/day)	2.55

Emission from Trips	2007
CO (lb/day)	3.74
NOx (lb/day)	0.39
VOC (lb/day)	0.38
SOx (lb/day)	0.00
PM10 (lb/day)	0.15
Exhaust PM (lb/day)	0.03
Fugitive PM (lb/day)	0.13

Paint	2007
VOC (lb/day) ⁽¹⁾	20.75

Total Emissions	Thresholds	2007
CO (lb/day)	550	26.31
NOx (lb/day)	100	35.13
VOC (lb/day)	75	29.77
SOx (lb/day)	150	0.04
PM10 (lb/day) ⁽¹⁾	150	2.71
PM2.5 (lb/day) ⁽²⁾	55	1.57

(1) Mitigated PM.

(2) https://www.aqmd.gov/ceqa/handbook/PM2_5/pm2_5ratio.xls ; Profile ID #391.

**Paramount Refinery
Clean Fuels Project
Construction Equipment Emission Rates**

Equipment Type	Hp	2007 Emission Factors lb/hr ⁽¹⁾				
		VOC	CO	NOx	SOx	PM10
Welders	Composite	0.0917	0.2336	0.3191	0.0003	0.0297
Cranes	Composite	0.1882	0.6365	1.6948	0.0014	0.0755
Forklifts	Composite	0.0861	0.2495	0.6430	0.0006	0.0346

(1) SCAQMD, 2006 : http://www.aqmd.gov/ceqa/handbook/offroad/offroadEF05_20.xls

**Paramount Refinery
Clean Fuels Project
Construction Equipment Emissions**

Equipment	Hours (hr/day)	2007
Welders	10	4
Cranes	10	1
Forklifts	10	1

CO	Emission Rate (lb/hr)	2007
Welders	0.383	15.32
Cranes	0.339	3.39
Forklifts	0.385	3.85
Total		22.57

NOX	Emission Rate (lb/hr)	2007
Welders	0.322	12.89
Cranes	0.651	6.51
Forklifts	1.534	15.34
Total		34.73

VOC	Emission Rate (lb/hr)	2007
Welders	0.154	6.15
Cranes	0.111	1.11
Forklifts	0.138	1.38
Total		8.64

SOx	Emission Rate (lb/hr)	2007
Welders	0.000	0.02
Cranes	0.001	0.01
Forklifts	0.001	0.01
Total		0.04

PM10	Emission Rate (lb/hr)	2007
Welders	0.036	1.45
Cranes	0.058	0.58
Forklifts	0.053	0.53
Total		2.55

**Paramount Refinery
Clean Fuels Project
Construction Vehicle Trip Emissions**

Vehicle	Miles per Day	2007
Commuters	32.4	10
Pickup Trucks	10	0
Total Light Vehicle Miles		324

	Emission Rate (lb/mi) ⁽¹⁾	2007
CO		
Light Duty	0.0115516	3.74
Total		3.74

	Emission Rate (lb/mi) ⁽¹⁾	2007
NOx		
Light Duty	0.0012133	0.39
Total		0.39

	Emission Rate (lb/mi) ⁽¹⁾	2007
VOC		
Light Duty	0.0011823	0.38
Total		0.38

	Emission Rate (lb/mi) ⁽¹⁾	2007
SOx		
Light Duty	0.0000108	0.00
Total		0.00

	Emission Rate (lb/mi) ⁽¹⁾	2007
PM10		
Light Duty Exhaust	0.0000845	0.03
Total Exhaust PM		0.03
Light Duty Fugitive ⁽²⁾	0.00038589	0.13
Total Fugitive PM		0.13
Total		0.15

(1) Based on 2007 SCAQMD on-road emission rates.

(<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>)

(2) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, December 2003

$$E = k(sL/2)^{0.65} \times (W/3)^{1.5} - C$$

Where: k = 0.016 lb/VMT for PM10, sL = road silt loading (gms/m²) from CARB Methodology 7.9 for paved roads. (0.240 for local roads and 0.037 for major/collector roads), W = weight of vehicles (2.4 tons for light; 5 for medium trucks, and 20 for heavy trucks), and C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lbs/VMT).

Activity	2007
Volume paint applied per day	25.0
VOC content (lb/gal)	0.83
VOC Emissions (lb/day)	20.8

(1) SCAQMD Rule 1113 VOC limit of 100 grams per liter.

FUGITIVE COMPONENT COUNTS AND EMISSIONS

COMPONENTS	QUANTITY	EMISSION FACTOR (lbs/yr)	SAFETY FACTOR (100%)	EMISSIONS (lbs/yr)
Gasoline Filter				
Valves Bellow seals (light liquid)	12	0	3	0
Fittings (flanges, etc.)	10	1.5	3	45
Total Emissions from Gasoline Filter				45
Ethanol Filter				
Valves Bellow seals (light liquid)	12	0	3	0
Fittings (flanges, etc.)	10	1.5	3	45
Total Emissions from Ethanol Filter				45
Total Fugitive Emissions				90

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification				
User Identification:	Tank T-5006 (Post-Mod)			
City:	Paramount			
State:	California			
Company:	Paramount Petroleum Corp			
Type of Tank:	Internal Floating Roof Tank			
Description:	Ethanol tank			
Tank Dimensions				
Diameter (ft):	40.00			
Volume (gallons):	211,520.00			
Turnovers:	146.00			
Self Supp. Roof? (y/n):	N			
No. of Columns:	1.00			
Eff. Col. Diam. (ft):	1.00			
Paint Characteristics				
Internal Shell Condition:	Light Rust			
Shell Color/Shade:	White/White			
Shell Condition:	Good			
Roof Color/Shade:	White/White			
Roof Condition:	Good			
Rim-Seal System				
Primary Seal:	Mechanical Shoe			
Secondary Seal:	Rim-mounted			
Deck Characteristics				
Deck Fitting Category:	Detail			
Deck Type:	Welded			
Deck Fitting/Status				Quantity
Access Hatch (24-in. Diam./Bolted Cover, Gasketed				1
Gauge-Hatch/Sample Well (8-in. Diam./Weighted Mech. Actuation, Gask.				1
Ladder Well (36-in. Diam./Sliding Cover, Gasketed				1
Roof Drain (3-in. Diameter)/90% Closed				1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float				1
Vacuum Breaker (10-in. Diam./Weighted Mech. Actuation, Gask.				1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock				12
Meteorological Data used in Emissions Calculations: Long Beach, California (Avg Atmospheric Pressure = 14.7 psia)				

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Tank T-5006 (Post-Mod) - Internal Floating Roof Tank
Paramount, California

Mixture/Component	Month			Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
	Avg.	Min.	Max.	Avg.	Min.	Max.		Avg.	Min.	Max.					
Paramount Spec. Ethanol	All	66.43	60.99	71.87	64.33	64.33	2.5000	N/A	N/A	N/A	54.5000			47.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Tank T-5006 (Post-Mod) - Internal Floating Roof Tank
Paramount, California

Annual Emission Calculations

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Rim Seal Losses (lb): 60.8988
Seal Factor A (lb-mole/ft-yr): 0.6000
Seal Factor B (lb-mole/ft-yr (mph)0.75): 0.4000
Value of Vapor Pressure Function: 0.0466
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 2.5000
Tank Diameter (ft): 40.0000
Vapor Molecular Weight (lb/lb-mole): 54.5000
Product Factor: 1.0000

Withdrawal Losses (lb): 175.9000
Number of Columns: 1.0000
Effective Column Diameter (ft): 1.0000
Annual Net Throughput (gal/yr): 30,881,920.0000
Shell Churnage Factor (lb/1000 soft): 0.0015
Average Organic Liquid Density (lb/gal): 6.6000
Tank Diameter (ft): 40.0000

Deck Fitting Losses (lb): 282.8497
Value of Vapor Pressure Function: 0.0466
Vapor Molecular Weight (lb/lb-mole): 54.5000
Product Factor: 1.0000
Tot. Roof Fitting Loss Fact. (lb-mole/yr): 111.4700

Deck Seam Losses (lb): 0.0000
Deck Seam Length (ft): 0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr): 0.0000
Deck Seam Length Factor (ft/sqft): 0.0000
Tank Diameter (ft): 40.0000
Vapor Molecular Weight (lb/lb-mole): 54.5000
Product Factor: 1.0000
  
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Total Losses (lb): 519.6486

Roof Fitting/Status	Quantity	KF*(lb-mole/yr)	Roof Fitting Loss Factors KF*(lb-mole/yr m ³ /m ³)	m	Losses (lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	4.0589
Gauge Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	1.1926
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	142.0973
Roof Drain (3-in. Diameter)/90% Closure	1	1.80	0.14	1.10	4.5674
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	78.6610
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	15.7322
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Sock	12	1.20	0.14	0.65	36.5393

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Tank T-5006 (Post-Mod) - Internal Floating Roof Tank
Paramount, California

Components	Losses(lbs)				Total Emissions
	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	
Paramount Spec. Ethanol	60.90	175.90	282.85	0.00	519.65

Paramount Refinery Clean Fuels Project Emissions Calculations

Tank 5006 Emissions

Contents: Emulsion Blend Stock

Total Asphalt VOC Emissions 573.16 lb/yr

	Vapor Weight Fraction	Emissions (lb/yr)	Emissions (lb/hr)
TAC			
Acetaldehyde	6.70E-08	3.84E-07	4.38E-11
Acrolein + Acetone	1.96E-08	1.13E-07	1.28E-11
Benzene	1.09E-04	6.24E-04	7.12E-08
Ethyl Benzene	1.73E-04	9.93E-04	1.13E-07
Formaldehyde	1.42E-09	8.15E-09	9.31E-13
Naphthalene	5.87E-05	3.36E-04	3.84E-08
PAHs	1.54E-06	8.81E-06	1.01E-09
Toluene	8.14E-05	4.66E-04	5.32E-08
Total Xylenes	1.87E-04	1.07E-03	1.22E-07

Contents: Ethanol

Total Ethanol VOC Emissions 519.65 lb/yr

	Vapor Weight Fraction	Emissions (lb/yr)	Emissions (lb/hr)
TAC			
Benzene	2.41E-01	7.53E-02	8.59E-06
Ethyl Benzene	1.67E-01	5.21E-02	5.95E-06
Hexane	3.13E+00	9.76E-01	1.11E-04
Toluene	3.86E+00	1.20E+00	1.37E-04
Total Xylenes	5.68E-01	1.77E-01	2.02E-05

**Paramount Refinery
Clean Fuels Project
Toxic Air Contaminant Screening Analysis**

Tank 5006 TAC Screening Analysis

Contents: Emulsion Blend Stock

Chemical	Emissions ⁽¹⁾		Screening Threshold ⁽³⁾		PSI	
	lb/hr	lb/yr	Cancer/ Chronic (lbs/yr)	Acute (lbs/hr)	Cancer/ Chronic	Acute
Acetaldehyde	4.351E-11	3.811E-07	8.920E+01		4.27E-09	NA
Acrolein	1.275E-11	1.117E-07	1.550E+01	5.090E-04	7.21E-09	2.50E-08
Benzene	7.068E-08	6.192E-04	8.920E+00	3.960E+00	6.94E-05	1.78E-08
Ethyl Benzene	1.124E-07	9.851E-04	5.170E+05		1.91E-09	NA
Formaldehyde	9.236E-13	8.090E-09	5.250E+01	2.520E-01	1.54E-10	3.66E-12
Naphthalene	3.809E-08	3.337E-04	7.440E+00		4.48E-05	NA
PAH	9.979E-10	8.742E-06	7.690E-03		1.14E-03	NA
Toluene	5.283E-08	4.628E-04	7.750E+04	9.910E+01	5.97E-09	5.33E-10
Xylene (mixed)	1.211E-07	1.061E-03	1.810E+05	5.890E+01	5.86E-09	2.06E-09
Total Pollutant Screening Index (PSI)					1.25E-03	4.55E-08
Significance Threshold					1	1
Above Significance?					NO	NO

Contents: Ethanol denatured with 6% gasoline

Chemical	Emissions ⁽²⁾		Screening Threshold ⁽³⁾		PSI	
	lb/hr	lb/yr	Cancer/ Chronic (lbs/yr)	Acute (lbs/hr)	Cancer/ Chronic	Acute
Benzene	8.278E-06	7.252E-02	8.920E+00	3.960E+00	8.13E-03	2.09E-06
Ethylbenzene	5.732E-06	5.021E-02	5.170E+05		9.71E-08	NA
n-Hexane	1.074E-04	9.404E-01	1.810E+06		5.20E-07	NA
Toluene	1.322E-04	1.158E+00	7.750E+04	9.910E+01	1.49E-05	1.33E-06
Xylenes	1.947E-05	1.705E-01	1.810E+05	5.890E+01	9.42E-07	3.30E-07
Total Pollutant Screening Index (PSI)					8.15E-03	3.76E-06
Significance Threshold					1	1
Above Significance?					NO	NO

(1) Based on 568.78 lb/yr of VOC.

(2) Based on 500.66 lb/yr of VOC.

(3) SCAQMD, 2005. Risk Assessment Procedures for Rules 1401 and 212, Version 7.0.