APPENDIX D

Project Emission Calculations

Construction Equipment Emissions for the Industrial Services Oil Company, Inc.

Construction Equipment

Equipment Type	Hp[1]	Load[2]	Emission Factors lb/hp-hr[3]					Emission Factors lb/hr				
			CO	VOC	NOx	SOx	PM10	CO	VOC	NOx	SOx	PM10
Air Compressor 130 CFM	37	0.48	0.011	0.002	0.018	0.002	0.001	0.195	0.036	0.320	0.036	0.018
Backhoe	79	0.465	0.015	0.003	0.022	0.002	0.001	0.551	0.110	0.808	0.073	0.037
Dozer[4]	--	--	--	--	--	0.350	0.165	--	--	--	0.350	0.165
Plate Compactor (Gasoline)	8	0.43	0.830	0.043	0.004	0.001	0.000	2.855	0.148	0.014	0.002	0.001
Cranes	194	0.43	0.009	0.003	0.023	0.002	0.002	0.751	0.250	1.919	0.167	0.125
Front End Loader[4]	--	--	0.572	0.230	1.900	0.182	0.170	0.572	0.230	1.900	0.182	0.170
Manlifts (Boom and Scissor)	43	0.505	0.013	0.003	0.031	0.002	0.002	0.282	0.065	0.673	0.043	0.033
Motor Grader[4]	--	--	0.151	0.039	0.713	0.086	0.061	0.151	0.039	0.713	0.086	0.061
Paver	99	0.53	0.010	0.002	0.024	0.002	0.001	0.525	0.105	1.259	0.105	0.052
Pile Driver[4 - misc]	0	8	0.675	0.150	1.700	0.450	0.140	0.675	0.150	1.700	0.450	0.140
Trench Machine	60	0.695	0.020	0.003	0.022	0.002	0.002	0.834	0.125	0.917	0.083	0.063
Forklift 4000 lb.[4]	--	--	0.520	0.170	1.540	0.143	0.093	0.520	0.170	1.540	0.143	0.093
Generators (Gasoline)	12.9	0.68	1.479	0.054	0.002	0.001	0.000	12.974	0.474	0.018	0.005	0.002
Generators (Diesel)	22	0.74	0.011	0.002	0.018	0.002	0.001	0.179	0.033	0.293	0.033	0.016
Weld Machine (gasoline)	35	0.45	0.011	0.002	0.018	0.002	0.001	0.173	0.032	0.284	0.032	0.016
Drum Roller[4]	--	--	0.300	0.065	0.870	0.067	0.050	0.300	0.065	0.870	0.067	0.050
Demolition Hammer[4-misc]	--	--	0.675	0.150	1.700	0.143	0.140	0.675	0.150	1.700	0.143	0.140
Track Boring Mach.[4-misc]	--	--	0.675	0.150	1.700	0.143	0.140	0.675	0.150	1.700	0.143	0.140

(1) Default Horsepower from SCAQMD CEQA Air Quality Handbook, Table A9-8-C.

(2) Default load factors from SCAQMD CEQA Air Quality Handbook, Table A9-8-D.

(3) Emission factors from SCAQMD CEQA Air Quality Handbook, Table A9-8-B, unless otherwise noted.

(4) Emissions factors from SCAQMD CEQA Air Quality Handbook, Table A9-8-A. Units are in lbs/hr.

Construction Equipment Emissions for Industrial Services Oil Company, Inc.

Peak Daily Construction Emissions

Equipment Type	Number	Hours Per Day	Emission Factors lb/hr					Daily Emissions (lbs/day)				
			CO	VOC	NOx	SOx	PM10	CO	VOC	NOx	SOx	PM10
Air Compressor 130 CFM	2	8	0.195	0.036	0.320	0.036	0.018	3.13	0.57	5.11	0.57	0.28
Backhoe	1	4	0.551	0.110	0.808	0.073	0.037	2.20	0.44	3.23	0.29	0.15
Dozer	0	8	--	--	--	0.350	0.165	0.00	0.00	0.00	0.00	0.00
Plate Compactor (Gasoline)	2	4	2.855	0.148	0.014	0.002	0.001	22.84	1.18	0.11	0.01	0.01
Cranes	4	2	0.751	0.250	1.919	0.167	0.125	6.01	2.00	15.35	1.33	1.00
Front End Loader	1	4	0.572	0.230	1.900	0.182	0.170	2.29	0.92	7.60	0.73	0.68
Manlifts (Boom and Scissor)	3	2	0.282	0.065	0.673	0.043	0.033	1.69	0.39	4.04	0.26	0.20
Motor Grader	0	8	0.151	0.039	0.713	0.086	0.061	0.00	0.00	0.00	0.00	0.00
Paver	0	8	0.525	0.105	1.259	0.105	0.052	0.00	0.00	0.00	0.00	0.00
Pile Driver	0	8	0.675	0.150	1.700	0.450	0.140	0.00	0.00	0.00	0.00	0.00
Trench Machine	0	8	0.834	0.125	0.917	0.083	0.063	0.00	0.00	0.00	0.00	0.00
Forklift 4000 lb.	2	3	0.520	0.170	1.540	0.143	0.093	3.12	1.02	9.24	0.86	0.56
Generators (Gasoline)	2	8	12.974	0.474	0.018	0.005	0.002	207.58	7.58	0.28	0.08	0.04
Generators (Diesel)	0	0	0.179	0.033	0.293	0.033	0.016	0.00	0.00	0.00	0.00	0.00
Weld Machine	6	4	0.173	0.032	0.284	0.032	0.016	4.16	0.76	6.80	0.76	0.38
Drum Roller	0	8	0.300	0.065	0.870	0.067	0.050	0.00	0.00	0.00	0.00	0.00
Demolition Hammer	0	8	0.675	0.150	1.700	0.143	0.140	0.00	0.00	0.00	0.00	0.00
Track Boring Mach.	0	8	0.675	0.150	1.700	0.143	0.140	0.00	0.00	0.00	0.00	0.00
Total Emission Totals								253.02	14.86	51.77	4.90	3.29

* Emissions factors from SCAQMD CEQA Air Quality Handbook, Table A9-8-A.

* Emissions factors from SCAQMD CEQA Air Quality Handbook, Table A9-8-C. Table 9-8-C, *Pounds/hour calculated from load factor and hp rating.*

* Trucks Emissions factors from SCAQMD CEQA Air Quality Handbook Table A9-8-A, *Trucks:off highway diesel used for truck:pickup/stake bed.*

* Emissions factors from SCAQMD CEQA Air Quality Handbook, Table A9-8-A, *Emissions for equipment not specifically listed can be found under miscellaneous.*

Construction Vehicle Emissions

On Road Mobile Emission Factors from California ARB EMFAC2002 Scenario Year 2005 (Model Years 1965 to 2005)

Vehicle Type	CO Emissions Factor (lb/mile)	VOC Emission Factor (lb/mile)	NOx Emissions Factor (lb/mile)	SOx Emissions Factor (lb/mile)	PM10 Emissions Factor (lb/mile)
Construction Workers Commuting	0.015165	0.001626	0.001634	0.00001	0.000079
Light Duty Trucks	0.015165	0.001626	0.001634	0.00001	0.000079
Heavy Diesel Trucks	0.020984	0.002955	0.028142	0.000246	0.0005

Source	Parameters			Peak Day Emissions, lbs/day				
	Number of Vehicles	Total Number of Trips	Distance Traveled per Trip	CO Emissions	VOC Emissions	NOx Emissions	SOx Emissions	PM10 Emissions
Construction Workers Commuting	12	24	16.2	5.90	0.63	0.64	0.00	0.03
Light Duty Trucks	2	4	16.2	0.98	0.11	0.11	0.00	0.01
Daily Delivery Trucks	3	6	50	6.30	0.89	8.44	0.07	0.15
Dump and Flatbed Trucks	2	4	50	4.20	0.59	5.63	0.05	0.10
Water Truck	1	1	1	0.02	0.00	0.03	0.00	0.00

Source	Parameters		CO	VOC	NOx	SOx	PM10
Total Emissions for Construction Workers	12	24	5.90	0.63	0.64	0.00	0.03
Total Emissions for Light Duty Trucks	2	10	0.98	0.11	0.11	0.00	0.01
Total Emissions for Heavy Diesel Trucks	6	11	10.51	1.48	14.10	0.12	0.25
TOTALS			**17.39**	**2.22**	**14.84**	**0.13**	**0.29**

Fugitive Construction
Emission Estimates

PROJECT CONSTRUCTION

Grading Operations	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor	Controlled Emissions: Average PM10 Emissions (lbs/day)	Controlled Emissions: Peak PM10 Emissions (lbs/day)	Uncontrolled Emissions: Average PM10 Emissions (lbs/day)	Uncontrolled Emissions: Peak PM10 Emissions (lbs/day)	SCAQMD Emission Factor Source
Construction Activities[1]	1	1	8	7.7	0.5	30.80	30.80	61.6	61.6	Table A9-9-F

TRENCHING OPERATIONS (Backhoe) TEMPORARY STOCKPILES	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions: Average PM10 Emissions Pounds/day	Controlled Emissions: Peak PM10 Emissions Pounds/day	Uncontrolled Emissions: Average PM10 Emissions Pounds/day	Uncontrolled Emissions: Peak PM10 Emissions Pounds/day	SCAQMD Emission Factor Source
Construction Activities[2]	0.25	0.5	0.0035	0.5	0.0004375	0.000595	0.000875	0.00175	Table A9-9-G

Assumptions:
1cubic yard trench spoils = 1 ton

WIND EROSION Disturbed Area and Temporary Stockpiles	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Tons/Year	Peak PM10 Emissions Tons/Year	SCAQMD Emission Factor Source
Construction Activities	90	0.25	0.5	19.800	4.950	9.900	0.223	0.446	Table A9-9-E

TRUCK FILLING/DUMPING	Estimated Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions: Average PM10 Emissions Pounds/day	Controlled Emissions: Peak PM10 Emissions Pounds/day	Uncontrolled Emissions: Average PM10 Emissions Pounds/day	Uncontrolled Emissions: Peak PM10 Emissions Pounds/day	SCAQMD Emission Factor Source
Truck Filling[4]	0.25	0.5	0.02205	0.5	0.00275625	0.0055125	0.0055125	0.011025	Table A9-9
Truck Dumping	0.25	0.5	0.009075	0.5	0.00113438	0.00226875	0.00226875	0.0045375	Table A9-9

TOTAL PM10 Pounds/day		Average	Peak
(Controlled Emissions)	Construction	35.7543	40.70449
(Uncontrolled Emissions)		66.559	71.517
Mitigated Emissions (assumes water 3 times/day)		22.630	24.316

(1) Emissions (lbs/hr) = $[0.45 \times (G^{1.5})/(H^{1.4}) \times 2.2046 \times J$; where G = silt content (7.5%), H = moisture content (2.0%) and J = hrs of operation.
(2) Emissions (lbs/ton) = $0.00112 \times [(G/5)^{1.3}/(H/2)^{1.4}] \times I/J$; where G=mean wind speed (12 mph), H=moisture content of surface material (2%); I=lbs of dirt handled per day (100,000 lbs); and J=2,000 lbs/ton
(3) Emissions (lbs/day/acre) = $1.7 \times [(G/1.5)/(365-H/235)] \times I/15 \times J$; where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (50%) and J= fraction of TSP (0.5)
(4) Used SCAQMD Table 9-9 Default emission factors.

Fugitive Dust Construction Emission Estimates From Trucks and Employee Vehicles

Source Type	Number	Fuel	Peak Daily Trips	One-way Distance	Emission Factor (lb/vmt)	Peak PM-10 (lbs/day)
Passenger Vehicle/ On Paved Roadways	12	Gasoline	2	16.2	0.000856	0.33
Pickup Trucks on Paved Roadways	2	Gasoline	2	16.2	0.0026	0.17
Trucks on Paved Roadways	5	Diesel	2	50	0.0206	10.30
Trucks on Unpaved Roads	0	Diesel	1	1	1.6	0.00
Total	19					10.80

* Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1

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

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 cars; 5 for pickup trucks, and 20 for heavy trucks)

**Emission Calculations for travel on unpaved roads from EPA AP-42 Section 13.2.2

$E = 2.6(s/12)^{0.8} \times (W/3)^{0.4}/(M/0.2)^{0.3}$

Where: s = surface silt content (assumed to be 11%, AP-42 Table 13.2.2-1), W = vehicle weight (tons) same assumptions as above, and M = material moisture content (assumed to be 10 percent since these emissions would only come from a water truck watering the site).

CONSTRUCTION SUMMARY

Construction Period	Estimated Emissions				
	CO	VOC	NOx	SOx	PM10
Construction Equipment	253.02	14.86	51.77	4.90	3.29
Vehicle Emissions	17.39	2.22	14.84	0.13	0.29
Fugitive Construction	0	0	0	0	40.70
Fugitive Road Dust	0	0	0	0	10.80
TOTAL EMISSIONS	270.41	17.08	66.61	5.03	55.08
SCAQMD Thresholds	550	75	100	150	150
Significant	No	No	No	No	No

Boiler and Heater Emissions

Unit	Source ID	Fire Duty (BTUs/hr)	Heating Value (BTU/scf)	Natural Gas Usage (scf/hr)	Annual Operating Hours	Annual Fuel Usage (mmscf/yr)	VOC Emissions (lbs/yr)	Methane Emissions (lbs/yr)	NOx Emissions (lbs/yr)	SOx Emissions (lbs/yr)	CO Emissions (lbs/yr)	PM10 Emissions (lbs/yr)	VOC Emissions (lbs/day)	NOx Emissions (lbs/day)	SOx Emissions (lbs/day)	CO Emissions (lbs/day)	PM10 Emissions (lbs/day)
Boiler #1	1	1995000	1020	1956	8760	17.13	94.2	39.4	1713.4	10.3	1439.2	130.2	0.26	4.69	0.03	3.94	0.36
Boiler #2	2	1995000	1020	1956	8760	17.13	94.2	39.4	1713.4	10.3	1439.2	130.2	0.26	4.69	0.03	3.94	0.36
Heater H-1	9	1920000	1020	1882	8760	16.49	115.4	115.4	115.4	115.4	115.4	115.4	0.32	0.32	0.32	0.32	0.32
Heater H-2	10	1920000	1020	1882	8760	16.49	115.4	115.4	115.4	115.4	115.4	115.4	0.32	0.32	0.32	0.32	0.32
Oil Heater(1)	15	12600000	1020	12353	8760	108.21	757.5	248.9	5388.9	64.9	3787.4	811.6	2.08	14.76	0.18	10.38	2.22
Total Boiler and Heater Emissions							1176.8	558.6	9046.5	316.3	6896.7	1302.9	3.22	24.78	0.87	18.90	3.57

(1) Oil heater is equipped with low NOx burners.

Unit	Souce ID	Diesel Fuel Use (gal/hr)	Annual Operating Hours(2)	Annual Fuel Usage (1000 gal/yr)	VOC Emissions (lbs/yr)	NOx Emissions (lbs/yr)	SOx Emissions (lbs/yr)	CO Emissions (lbs/yr)	PM10 Emissions (lbs/yr)
Backup Generator(2)	21	7	250	1.75	65.625	820.75	12.4	178.5	58.6
Emissions (lbs/day)					0.18	2.25	0.03	0.49	0.16

(2) Annual Operating Hours are limited by SCAQMD permit conditions.

	Natural Gas Emission Factors (lb/mmcf)(3)					
	VOC	Methane	NOx	SOx	CO	PM10
Boilers	5.5	2.3	100	0.6	84	7.6
Heater with Low NOx Burners	7	2.3	49.8	0.6	35	7.5
Other	7	2.3	130	0.6	35	7.5

(3) From SCAQMD 2003-2004 Annual Emission Report Form B-1 Instructions

	Diesel Emission Factors (lb/1000)(3)					
	VOC	Methane	NOx	SOx	CO	PM10
ICE	37.5	NA	469	7.1	102	33.5

(3) From SCAQMD 2003-2004 Annual Emission Report Form B-1 Instructions

Storage Tank Emissions

Tank Number	100	200	300	400	500	600	700	800	21
Source ID	8	8	7	7	7	5	7	7	16
Tank Contents	Used / Recycled Oil	Used / Recycled Oil	Used / Recycled Oil	Used / Recycled Oil	Used / Recycled Oil	Used / Recycled Oil / RCRA Waste	Used / Recycled Oil	Spill Containment Standby	Used Oil
Speciation Profile[1]	3	3	3	3	3	6	3	1	2
Liquid Temperature, °F (as measured in ISOCI tanks)	85	85	85	85	85	75	85	75	180
Maximim Storage Capacity (in 1000 gallons)	71.025	71.025	71.025	71.025	71.025	71.025	71.025	58.748	28.064
Vented to Vapor Recovery System, (N, V or T)	V	V	V	V	V	V	V	V	V
Tank Diameter, ft. (D)	24	24	24	24	24	24	24	20	16
Tank Shell Height, ft. (H_s)	20	20	20	20	20	20	20	25	20.67
Annual Throughput, bbl, (Q)	331107	331107	331107	331107	331107	217262	331107	0	234195
Usage Factor (U) (0 <U ≤1)	1	1	1	1	1	1	1	1	1
Turnovers (N)	195.80	195.80	195.80	195.80	195.80	128.48	195.80	0.00	350.49
Vapor Space Volume, ft^3 (V_V) (=0.7854*D^2*H_{VO}; H_{VO} = 0.5*H_S or 1 ft.)	4523.90	4523.90	4523.90	4523.90	4523.90	4523.90	4523.90	3927.00	2077.98
Vapor density, lb/ft^3, (Wv = Mv*P / R*$T_{la;}$ R= 10.31 ft^3*psia/lb-mole*°R)	2.82E-08	2.82E-08	2.82E-08	2.82E-08	2.82E-08	2.75E-04	2.82E-08	0.00E+00	2.46E-04
Vapor Molecular Weight, lb/lb-mole, (M_v)	0.03	0.03	0.03	0.03	0.03	3.02	0.03	0.05	2.99
Daily avg. liq. surf. temp., °R, (T_{la}) Tla = °F + 460	545	545	545	545	545	535	545	535	640
True Vapor Pressure, psia, (P)	5.20E-03	5.20E-03	5.20E-03	5.20E-03	5.20E-03	5.03E-01	5.20E-03	8.72E-03	5.43E-01
Vapor space expansion factor, Ke = (DTv/T_{la}) + (DPv-Pb) / (Pa-P)	7.57E-02	7.57E-02	7.57E-02	7.57E-02	7.57E-02	7.98E-02	7.57E-02	7.71E-02	6.69E-02
Daily vapor temp. range, °R, DTv = 0.72DTa + 0.028al	41	41	41	41	41	41	41	41	41
Daily vapor pressure range, psia, (DPv)	3.93E-04	3.93E-04	3.93E-04	3.93E-04	3.93E-04	3.87E-02	3.93E-04	6.72E-04	3.49E-02
Daily max. liq. temperature, °R	566	566	566	566	566	556	566	556	661
Daily min. liquid temperature, °R	524	524	524	524	524	514	524	514	619
Vapor pressure at max. liq. temp., psia, (Pvx)	5.39E-03	5.39E-03	5.39E-03	5.39E-03	5.39E-03	5.22E-01	5.39E-03	9.05E-03	5.60E-01
Vapor pressure at min. liq. temp., psia, (Pvn)	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	4.83E-01	5.00E-03	8.38E-03	5.25E-01
Vented Vapor Saturation Factor (K_v)	1.00	1.00	1.00	1.00	1.00	0.79	1.00	0.99	0.77
Turnover factor, (Kn), N<=36: Kn=1; N>36: Kn=(180+N)/6N	0.3199	0.3199	0.3199	0.3199	0.3199	0.4002	0.3199	1.0000	0.2523
Product factor, (Kp), Kp=0.75 (crude oils); Kp=1 (all other org. liq.)	1	1	1	1	1	1	1	1	1
Standing Storage Loss (L_s= V_v*W_v*K_e*K_s*U), lbs/yr	0.00	0.00	0.00	0.00	0.00	28.63	0.00		9.63
Working Loss (Lw), lbs/yr	0.02	0.02	0.02	0.02	0.02	132.01	0.02		95.96
Total Loss without Control System (L_s + L_w), lbs/yr	0.02	0.02	0.02	0.02	0.02	160.64	0.02		105.58
Control System % Efficiency	0	0	0	0	0	95	0	0	0
Total Loss with Control System (L_s + L_w)[(100 - %eff) / 100], lbs/yr	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**8.03**	**0.02**		**105.58**
Total Standing Storage Uncontrolled Loss (lbs/yr)	97.42								
Total Working Uncontrolled Loss (lbs/yr)	824.92								
Total Loss (lbs/yr)	769.73								
Total Loss (lb/day)	2.11								

Storage Tank Emissions

Tank Number	22	23	24	25	26	27	40	41	42
Source ID	16	16	16	16	16	16	6	6	6
Tank Contents	Used Oil	Used Oil	Used Oil	Used Oil	Used Oil	Used Oil	Oily Wastewater / Antifreeze / Waste Glycol	Oil Treatment	Oil Treatment / Oxidation
Speciation Profile[1]	2	2	2	2	2	2	1	1	1
Liquid Temperature, °F (as measured in ISOCI tanks)	180	180	180	180	180	180	75	75	75
Maximim Storage Capacity (in 1000 gallons)	31.071	31.071	28.064	28.064	28.064	28.064	20.093	20.093	19.458
Vented to Vapor Recovery System, (N, V or T)	V	V	V	V	V	V	V	V	V
Tank Diameter, ft. (D)	16	16	16	16	16	16	12	12	12
Tank Shell Height, ft. (H_s)	22.5	22.5	20.67	20.67	20.67	20.67	22	20	24
Annual Throughput, bbl, (Q)	259288	259288	234195	234195	234195	234195	102538	147725	143057
Usage Factor (U) (0 <U ≤1)	1	1	1	1	1	1	1	1	1
Turnovers (N)	350.49	350.49	350.49	350.49	350.49	350.49	214.33	308.79	308.79
Vapor Space Volume, ft^3 (V_V) (=0.7854*D^2*H_{VO}; H_{VO} = 0.5*H_S or 1 ft.)	2261.95	2261.95	2077.98	2077.98	2077.98	2077.98	1244.07	1130.98	1357.17
Vapor density, lb/ft^3, (Wv = Mv*P / R*T_{la}; R= 10.31 ft^3*psia/lb-mole*°R)	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04	2.46E-04	7.29E-08	7.29E-08	7.29E-08
Vapor Molecular Weight, lb/lb-mole, (M_v)	2.99	2.99	2.99	2.99	2.99	2.99	0.05	0.05	0.05
Daily avg. liq. surf. temp., °R, (T_{la}) Tla = °F + 460	640	640	640	640	640	640	535	535	535
True Vapor Pressure, psia, (P)	5.43E-01	5.43E-01	5.43E-01	5.43E-01	5.43E-01	5.43E-01	8.72E-03	8.72E-03	8.72E-03
Vapor space expansion factor, Ke = (DTv/T_{la}) + (DPv-Pb) / (Pa-P)	6.69E-02	6.69E-02	6.69E-02	6.69E-02	6.69E-02	6.69E-02	7.71E-02	7.71E-02	7.71E-02
Daily vapor temp. range, °R, DTv = 0.72DTa + 0.028al	41	41	41	41	41	41	41	41	41
Daily vapor pressure range, psia, (DPv)	3.49E-02	3.49E-02	3.49E-02	3.49E-02	3.49E-02	3.49E-02	6.72E-04	6.72E-04	6.72E-04
Daily max. liq. temperature, °R	661	661	661	661	661	661	556	556	556
Daily min. liquid temperature, °R	619	619	619	619	619	619	514	514	514
Vapor pressure at max. liq. temp., psia, (Pvx)	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	9.05E-03	9.05E-03	9.05E-03
Vapor pressure at min. liq. temp., psia, (Pvn)	5.25E-01	5.25E-01	5.25E-01	5.25E-01	5.25E-01	5.25E-01	8.38E-03	8.38E-03	8.38E-03
Vented Vapor Saturation Factor (K_v)	0.76	0.76	0.77	0.77	0.77	0.77	0.99	1.00	0.99
Turnover factor, (Kn), N<=36: Kn=1; N>36: Kn=(180+N)/6N	0.2523	0.2523	0.2523	0.2523	0.2523	0.2523	0.3066	0.2638	0.2638
Product factor, (Kp), Kp=0.75 (crude oils); Kp=1 (all other org. liq.)	1	1	1	1	1	1	1	1	1
Standing Storage Loss (L_s= V_v*W_v*K_e*K_s*U), lbs/yr	10.27	10.27	9.63	9.63	9.63	9.63	0.00	0.00	0.00
Working Loss (Lw), lbs/yr	106.24	106.24	95.96	95.96	95.96	95.96	0.01	0.02	0.02
Total Loss without Control System (L_s + L_w), lbs/yr	116.51	116.51	105.58	105.58	105.58	105.58	0.02	0.02	0.02
Control System % Efficiency	0	0	0	0	0	0	0	0	0
Total Loss with Control System (L_s + L_w)[(100 - %eff) / 100], lbs/yr	**116.51**	**116.51**	**105.58**	**105.58**	**105.58**	**105.58**	**0.02**	**0.02**	**0.02**
Total Standing Storage Uncontrolled Loss (lbs/yr)									
Total Working Uncontrolled Loss (lbs/yr)									
Total Loss (lbs/yr)									
Total Loss (lb/day)									

Storage Tank Emissions

Tank Number	43	44	45	46	47	48	49	50	52
Source ID	6	6	6	6	6	6	6	6	6
Tank Contents	Used Oil	Wastewater / Antifreeze / Waste Glycol	Wastewater / Antifreeze / Waste Glycol	Oily Wastewater / Antifreeze / Waste Glycol	Antifreeze / Chemical Product	Oily Wastewater / Antifreeze / Waste Glycol	Oily Wastewater / Antifreeze / Waste Glycol	Used Oil & Water	Oily Wastewater Treatment / Oxidation
Speciation Profile[1]	1	1	1	1	1	1	1	1	1
Liquid Temperature, °F (as measured in ISOCI tanks)	75	75	75	75	75	75	75	75	75
Maximim Storage Capacity (in 1000 gallons)	19.458	20.15	20.15	20.15	6.143	20.15	20.15	6.143	20.15
Vented to Vapor Recovery System, (N, V or T)	V	V	V	V	V	V	V	V	V
Tank Diameter, ft. (D)	12	12	12	12	8	12	12	8	12
Tank Shell Height, ft. (H_s)	24	24	24	24	20	24	24	20	24
Annual Throughput, bbl, (Q)	162378	102828	102828	102828	31349	102828	102828	51264	148144
Usage Factor (U) (0 <U ≤1)	1	1	1	1	1	1	1	1	1
Turnovers (N)	350.49	214.33	214.33	214.33	214.33	214.33	214.33	350.49	308.79
Vapor Space Volume, ft^3 (V_V) (=0.7854*D^2*H_{VO}; H_{VO} = 0.5*H_S or 1 ft.)	1357.17	1357.17	1357.17	1357.17	502.66	1357.17	1357.17	502.66	1357.17
Vapor density, lb/ft^3, (Wv = Mv*P / R*T_{la}; R= 10.31 ft^3*psia/lb-mole*^{o}R)	7.29E-08	7.29E-08	7.29E-08	7.29E-08	7.29E-08	7.29E-08	7.29E-08	7.29E-08	1.58E-06
Vapor Molecular Weight, lb/lb-mole, (M_v)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Daily avg. liq. surf. temp., °R, (T_{la}) Tla = °F + 460	535	535	535	535	535	535	535	535	535
True Vapor Pressure, psia, (P)	8.72E-03	8.72E-03	8.72E-03	8.72E-03	8.72E-03	8.72E-03	8.72E-03	8.72E-03	8.72E-03
Vapor space expansion factor, Ke = (DTv/T_{la}) + (DPv-Pb) / (Pa-P)	7.71E-02	7.71E-02	7.71E-02	7.71E-02	7.71E-02	7.71E-02	7.71E-02	7.71E-02	7.71E-02
Daily vapor temp. range, °R, DTv = 0.72DTa + 0.028al	41	41	41	41	41	41	41	41	41
Daily vapor pressure range, psia, (DPv)	6.72E-04	6.72E-04	6.72E-04	6.72E-04	6.72E-04	6.72E-04	6.72E-04	6.72E-04	6.72E-04
Daily max. liq. temperature, °R	556	556	556	556	556	556	556	556	556
Daily min. liquid temperature, °R	514	514	514	514	514	514	514	514	514
Vapor pressure at max. liq. temp., psia, (Pvx)	9.05E-03	9.05E-03	9.05E-03	9.05E-03	9.05E-03	9.05E-03	9.05E-03	9.05E-03	9.05E-03
Vapor pressure at min. liq. temp., psia, (Pvn)	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03
Vented Vapor Saturation Factor (K_v)	0.99	0.99	0.99	0.99	1.00	0.99	0.99	1.00	0.99
Turnover factor, (Kn), N<=36: Kn=1; N>36: Kn=(180+N)/6N	0.2523	0.3066	0.3066	0.3066	0.3066	0.3066	0.3066	0.2523	0.2638
Product factor, (Kp), Kp=0.75 (crude oils); Kp=1 (all other org. liq.)	1	1	1	1	1	1	1	1	1
Standing Storage Loss (L_s= V_v*W_v*K_e*K_s*U), lbs/yr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Working Loss (Lw), lbs/yr	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.34
Total Loss without Control System (L_s + L_w), lbs/yr	0.02	0.02	0.02	0.02	0.00	0.02	0.02	0.01	0.40
Control System % Efficiency	0	0	0	0	0	0	0	0	0
Total Loss with Control System (L_s + L_w)[(100 - %eff) / 100], lbs/yr	**0.02**	**0.02**	**0.02**	**0.02**	**0.00**	**0.02**	**0.02**	**0.01**	**0.40**
Total Standing Storage Uncontrolled Loss (lbs/yr)									
Total Working Uncontrolled Loss (lbs/yr)									
Total Loss (lbs/yr)									
Total Loss (lb/day)									

Storage Tank Emissions

Tank Number	**53**	**54**	**55**	**56**
Source ID	6	6	6	6
Tank Contents	Oily Wastewater Treatment / Oxidation	Oily Wastewater Treatment / Oxidation	Glycol Products	Sludge Thickening
Speciation Profile[1]	1	1	1	1
Liquid Temperature, °F (as measured in ISOCI tanks)	75	75	75	75
Maximim Storage Capacity (in 1000 gallons)	20.15	20.15	10	10
Vented to Vapor Recovery System, (N, V or T)	V	V	V	V
Tank Diameter, ft. (D)	12	12	12	12
Tank Shell Height, ft. (H_s)	24	24	24	12
Annual Throughput, bbl, (Q)	148144	148144	83450	125143
Usage Factor (U) ($0 < U \leq 1$)	1	2	1	1
Turnovers (N)	308.79	308.79	350.49	525.60
Vapor Space Volume, ft^3 (V_V) ($=0.7854*D^2*H_{VO}$; $H_{VO} = 0.5*H_S$ or 1 ft.)	1357.17	1357.17	1357.17	678.59
Vapor density, lb/ft^3, ($Wv = Mv*P / R*T_{la}$; R= 10.31 ft^3*psia/lb-mole*°R)	7.29E-08	7.29E-08	7.29E-08	7.29E-08
Vapor Molecular Weight, lb/lb-mole, (M_v)	0.05	0.05	0.05	0.05
Daily avg. liq. surf. temp., °R, (T_{la}) Tla = °F + 460	535	535	535	535
True Vapor Pressure, psia, (P)	8.72E-03	8.72E-03	8.72E-03	8.72E-03
Vapor space expansion factor, Ke = (DTv/T_{la}) + (DPv-Pb) / (Pa-P)	7.71E-02	7.71E-02	7.71E-02	7.71E-02
Daily vapor temp. range, °R, DTv = 0.72DTa + 0.028al	41	41	41	41
Daily vapor pressure range, psia, (DPv)	6.72E-04	6.72E-04	6.72E-04	6.72E-04
Daily max. liq. temperature, °R	556	556	556	556
Daily min. liquid temperature, °R	514	514	514	514
Vapor pressure at max. liq. temp., psia, (Pvx)	9.05E-03	9.05E-03	9.05E-03	9.05E-03
Vapor pressure at min. liq. temp., psia, (Pvn)	8.38E-03	8.38E-03	8.38E-03	8.38E-03
Vented Vapor Saturation Factor (K_v)	0.99	0.99	0.99	1.00
Turnover factor, (Kn), N<=36: Kn=1; N>36: Kn=(180+N)/6N	0.2638	0.2638	0.2523	0.2237
Product factor, (Kp), Kp=0.75 (crude oils); Kp=1 (all other org. liq.)	1	2	1	1
Standing Storage Loss ($L_s = V_v*W_v*K_e*K_s*U$), lbs/yr	0.00	0.01	0.00	0.00
Working Loss (Lw), lbs/yr	0.02	0.03	0.01	0.01
Total Loss without Control System ($L_s + L_w$), lbs/yr	0.02	0.04	0.01	0.01
Control System % Efficiency	0	0	0	0
Total Loss with Control System ($L_s + L_w$)[(100 - %eff) / 100], lbs/yr	**0.02**	**0.04**	**0.01**	**0.01**
Total Standing Storage Uncontrolled Loss (lbs/yr)				
Total Working Uncontrolled Loss (lbs/yr)				
Total Loss (lbs/yr)				
Total Loss (lb/day)				

Oil/Water Separator Emissions

T_L = V x OT x EF					
T_L = Total Loss (lbs/year)					
V = Volume of Wastewater treated each day (84,600 gal/day)					
OT = Operating days/year (365 d/yr)					
EF = Emission Factor (0.2 lb VOC/1,000 gal)					
Emissions are:					
T_L =	**6175.8**	**lbs/year**			
T_L =	16.92	**lbs/day**			
Source: U.S. EPA, 1995 AP-42, Table 5.1-2					
Controlled Emissions are (assuming 90% control efficiency):					
T_L =	**617.58**	**lbs/year**			
T_L =	1.692	**lbs/day**			

Centrifuge Emissions
(Waste Solids Treatment Unit)

Sludge Centrifuge, Uncontrolled Emission Factor for Benzene =					2.50E-03	lb benzene/million gallons processed			
Source: U.S. EPA Locating and Estimating Air Emissions of Benzene, EPA-454/R-98-011, June 1998									
Basis:	84,600	gallons of wastewater processed/day							
Benzene Emissions =			0.077	lb/yr					
VOC Emissions =		8.45	lbs/yr =	0.02	lb/day				
Speciation using Profile #1:				**Chemical**	**Wt. Frac.**	**lbs/year**			
				Benzene	0.0091	0.08			
				Butane	0.0919	0.78			
				Butane, iso-	0.0189	0.16			
				Ethane	0.0026	0.02			
				Ethylbenzene	0.0053	0.04			
				Ethylene	0.0006	0.01			
				Heptane	0.0087	0.07			
				Heptane, iso-	0.1042	0.88			
				Hexane	0.0691	0.58			
				Hexane, iso-	0.1943	1.64			
				Methane	0.0062	0.05			
				Methyl-tert-Butylether (MTBE)	0.1406	1.19			
				Methylene Chloride	0.0120	0.10			
				Pentane	0.0688	0.58			
				Pentane, iso-	0.1486	1.26			
				Propane	0.0124	0.10			
				Propene	0.0009	0.01			
				Tetrachloroethylene	0.0115	0.10			
				Toluene	0.0653	0.55			
				Trichloroethane, 1,1,1-	0.0014	0.01			
				Trichloroethylene	0.0011	0.01			
				Xylenes (o-, m- & p-)	0.0262	0.22			
				Total	1.0000	8.45			

Plate and Frame Filter Press Emissions

Sludge Centrifuge, Uncontrolled Emission Factor for Benzene =					5.00E-02	lb benzene/million gallons processed		
Source: U.S. EPA Locating and Estimating Air Emissions of Benzene, EPA-454/R-98-011, June 1998								
Basis:	84,600	gallons of wastewater processed/day						
Benzene Emissions =			1.544	lb/yr				
VOC Emissions =		168.93	lbs/yr =	0.46	lb/day			
Speciation using Profile #1:		**Chemical**			**Wt. Frac.**	**lbs/year**		
		Benzene			0.0091	1.54		
		Butane			0.0919	15.53		
		Butane, iso-			0.0189	3.19		
		Ethane			0.0026	0.44		
		Ethylbenzene			0.0053	0.89		
		Ethylene			0.0006	0.10		
		Heptane			0.0087	1.47		
		Heptane, iso-			0.1042	17.61		
		Hexane			0.0691	11.68		
		Hexane, iso-			0.1943	32.82		
		Methane			0.0062	1.05		
		Methyl-tert-Butylether (MTBE)			0.1406	23.76		
		Methylene Chloride			0.0120	2.02		
		Pentane			0.0688	11.63		
		Pentane, iso-			0.1486	25.11		
		Propane			0.0124	2.10		
		Propene			0.0009	0.15		
		Tetrachloroethylene			0.0115	1.94		
		Toluene			0.0653	11.03		
		Trichloroethane, 1,1,1-			0.0014	0.24		
		Trichloroethylene			0.0011	0.19		
		Xylenes (o-, m- & p-)			0.0262	4.43		
		Total			1.0000	168.93		