SCAQMD
Air Permit Application
Health Risk Assessment

Mission & Jesse Air Treatment Facility

Prepared by
Black & Veatch Corporation

For

City of Los Angeles
Department of Public Works
Bureau of Engineering

July 2011

Table of Contents

List of Appendices

1.0 INTRODUCTION

To ventilate the sewer headspace and mitigate emissions, the City of Los Angeles plans to operate a permanent air treatment facility (ATF) at Mission Road and Jesse Street. Since the ATF would have the potential to emit/control air pollutants, an air permit is required by the South Coast Air Quality Management District (SCAQMD) under Rule 201- Permit to Construct and Rule 203 – Permit to Operate. The permitting process mandates compliance with stringent public health requirements set forth in SCAQMD Rule 1401 – New Source Review of Toxic Air Contaminants.

This analysis provides a Tier 4 detailed risk assessment in accordance with Version 7.0 of the "SCAQMD Risk Assessment Procedures for Rules 1401 and 212, July 1, 2005" utilizing the latest Attachment L cancer potency factors and reference exposure levels (RELs) for applications deemed complete on or after July 1, 2005, Revised September 10, 2010.

Emissions of several toxic air contaminants (TACs) were analyzed.

2.0 AIR DISPERSION MODELING

Consistent with previously accepted air dispersion modeling methodology, the Industrial Source Complex Short-Term (ISCST3 Version 02035) computer model was used to estimate the ground level concentrations of air pollutants from the PATFs. The ISCST3 model is a USEPA-approved, steady state, straight-line Gaussian plume model used to predict the impact of stack emissions on the surrounding community. While Appendix W of 40 CFR 51, Guideline on Air Quality Models, now recommends the use of AERMOD for typical air dispersion modeling applications (effective December 9, 2005), the ISCST3 air dispersion model remains an acceptable model that may be used to assess pollutant concentrations from a wide variety of sources associated with an industrial facility. In fact, the SCAQMD continues to provide ISCST3-ready meteorological datasets (available for download on their website) for modeling purposes.

Modeling data, which consisted of on-site building dimensions, emission source parameters, and property boundary locations, were configured to run with the BREEZE interface to the ISCST3 dispersion model.

2.1 Emission Source Parameters

The site contains only one emissions source, and as such was modeled as a single point source stack. Table 2-1 presents the ISCST3 source parameters used for modeling. Since model-predicted impacts are directly proportional to exhaust mass emission rates, all modeling was performed using a nominal 1 gram/second emission rate, to simplify the estimation of multiple pollutant impacts.

2.2 Air Dispersion Model Options

The following standard USEPA default regulatory modeling options were used in the ISCST3 model:

- Final plume rise.
- Stack-tip downwash.
- Buoyancy induced dispersion.
- Default vertical wind profile exponents and vertical potential temperature gradient values.
- Terrain elevations.

The processing of calm wind speeds (i.e., those less than 1 m/s) was bypassed, in accordance with South Coast Air Quality Management District (SCAQMD) modeling requirements.

2.3 Receptor Grids and Terrain Considerations

The air dispersion modeling receptor locations were established at appropriate distances from the sources and in a sufficiently dense manner to adequately characterize the pattern of pollutant impacts in the area. Specifically, a nested rectangular grid network was generated that placed receptors at 100 meter increments out to 1 kilometer (km), 250

Table 2-1
Physical Parameters Used in ISCST3 Modeling

Site	UTM Location of Stack		Site Base Elevation	Point Source Stack Parameters			
	(X) Easting (m)	(Y) Northing (m)	(m)	Stack Height (m)	Temperature (^{o}K)	Diameter (m)	Exit Velocity (m/s)
Mission & Jesse	386,867.1	3,766,618.9	73	7.62	294.26	0.76	12.42

Note:
Coordinates are in Universal Transverse Mercator (UTM), Zone 11, meters.
The emission rate at each site was a nominal 1 gram per second.

meter increments out to 2 kilometers, and 500-meter increments out to 4 km from the center of the site. The maximum interval between receptors along the fenceline was set at 5 m. According to SCAQMD guidelines, when identifying receptor locations to calculate acute hazard index, all off-site locations where there is the potential for acute exposure should be considered. As such the maximum 1-hr model-predicted concentration occurring anywhere on the grid was used in the acute hazard index calculations. In fact, where possible, the maximum model-predicted concentration occurring anywhere on the grid was used to estimate the Maximum Individual Cancer Risk (MICR), Chronic Hazard Index (CHI), and Acute Hazard Index (AHI). This conservative assumption, made to simplify the analysis, assumes that an individual residence was located at the maximally exposed receptor from the network described above. The MICR for workers continued to use the maximum model predicted concentration anywhere on the previously discussed receptor grid.

Receptor elevations were assigned using elevations from USGS 7.5-minute digital quadrangle, Digital Elevation Model (DEM), terrain data. The elevations were determined via a method that ensures the most accurate possible terrain elevation is assigned to each receptor. The receptor elevations were compared with actual USGS 7.5-minute quadrangle maps to ensure accuracy.

2.4 Meteorological Data

The ISCST3 air dispersion model requires hourly input of specific surface and upper-air meteorological data. These data include the wind flow vector, wind speed, ambient temperature, stability category, and the mixing height. Model-ready data sets, representative of each site, were downloaded from the SCAQMD website. The data was chosen by selecting the meteorological surface station nearest each of the sites. Table 2-2 lists the meteorological data sets used for each of the sites and the distances from the sites to the surface station selected for modeling.

2.5 Land Use Dispersion Coefficients

The USEPA's Auer land use method was utilized to determine whether rural or urban dispersion coefficients would be used in the ISCST3 air dispersion model. In this procedure, land circumscribed within a 3-km radius of the facility was classified as rural or urban using the Auer land use classification method. If rural land use types account for more than 50 percent of the land use area within the 3-km radius, then the rural dispersion coefficient option is used. Otherwise, the urban coefficient option is used.

Based on visual inspection of the USGS 7.5-minute topographic map of the proposed facility locations and aerial photographs, it was conservatively concluded that over 50 percent of the area surrounding the facility can be classified as urban. Accordingly, the urban dispersion modeling option was used.

Table 2-2
Meteorological Data Stations Used in ISCST3 Modeling

Site	Surface station*	Distance from site (km)	Corresponding Upper air station
Mission & Jesse	Downtown LA #52075	3.54	LAX (Loyola Marymount) #91919

Note:
* The anemometer height for modeling was set at 10 meters per SCAQMD guidelines.

3.0 Specific Methodologies for Toxics

The toxic air contaminants (TACs) of concern were modeled collectively by assuming a single, nominal 1 gram/second emission rate in the ISCST3 air dispersion model. Both short-term (1-hour) and long-term (annual) model-predicted ground-level impacts were output from the model.

With the exception of hydrogen sulfide, mass emission rates for TACs were estimated based on unmitigated, worst-case results of sampling performed in February 2005 and April 2010. To be conservative, where concentrations of the same TACs were available from 2005 and 2010, the higher concentration was used. Since ISCST3 impacts vary directly with exhaust mass emission rates, the emission rate for each TAC in grams/second was then multiplied by the maximum, model-predicted, ground-level impact resulting from the nominal 1 gram/second emission rate to arrive at ground-level, air quality impacts for each TAC.

A health risk assessment (HRA) was performed in accordance with Version 7.0 of the, "SCAQMD Risk Assessment Procedures for Rules 1401 and 212, July 1, 2005," using the latest Attachment L cancer potency factors and reference exposure levels (RELs) for applications deemed complete on or after July 1, 2005, Revised September 10, 2010.

Model-predicted, annual impacts were used with estimated average emission rates for each TAC to calculate the carcinogenic risks and non-carcinogenic chronic hazard indices (CHIs). The annual average impact for each TAC was multiplied, per SCAQMD guidance, by a cancer potency factor, an annual concentration adjustment factor, a daily breathing rate, an exposure value factor, and a multipathway factor when applicable, to determine the carcinogenic risk for each TAC. The individual carcinogenic risks were then summed to yield a total cancer risk at each receptor location from the operation of the site. To calculate individual TAC CHIs, the annual average impact for each TAC was divided by its chronic relative exposure level (REL), and multiplied by a multipathway factor when applicable. The CHIs for each TAC were summed for each target organ system to determine the maximum overall CHI.

The maximum, model-predicted, 1-hour impact at any receptor was used with the estimated peak emission rates for each TAC of concern to calculate the total non-carcinogenic acute hazard index (AHIs) at each location on the receptor grid. The maximum impact for each TAC was divided by its acute REL to calculate individual TAC AHIs. The individual AHIs were summed for each target organ system to determine the maximum overall AHI.

4.0 Health Risk Assessment Results

Table 4-1 provides the results of the HRA analyses. The results presented in the table are below the required ten in one million cancer risk threshold established in the SCAQMD guidance document as well as the 1.0 hazard index for non-carcinogenic chronic and acute impacts. However, the estimated MICR is above the one in a million Best Available Control Technology for Toxics (T-BACT) installation cancer risk threshold. Therefore, under SCAQMD regulations, the ATF would comply with MICR requirements provided T-BACT is utilized. The ATF will incorporate the use of a carbon filtration system, which represents T-BACT based on discussions with SCAQMD staff. It should also be noted that these risk estimates are based on unmitigated exhaust concentrations for all compounds except for H_2S, for which a mitigated, 1 ppmv exhaust concentration was used. The H_2S concentration is based on permitted levels for similar equipment. Appendix A presents figures showing cancer risk isopleths overlaid on aerial photographs. Spreadsheets containing the calculations of all HRA analyses are provided in Appendix B.

Since the model-predicted MICRs shown in Table 4-1 are above one in a million, cancer burden calculations, per SCAQMD guidance, must be performed. Cancer burden is a theoretical estimate of the increased number of cancer cases in a population exposed to a risk of greater than or equal to one in a million. The cancer burden for a given population is the product of the number of persons in the population and the estimated individual risk from TACs.

To calculate cancer burden, a radius surrounding the facility extending out a distance equal to the furthest location where the cancer risk falls below one in a million is determined. The population within this radius of impact is based on a worst-case estimate (7,000 persons/km^2) provided in the SCAQMD guidance document. Cancer burden is then calculated by multiplying the population residing within the determined radius by the MICR. Table 4-2 provides the results of the cancer burden calculations demonstrating that the operation of the ATF site will be below the SCAQMD cancer burden threshold of no more than a 0.5 increase in cancer cases in the given population.

Table 4-1
Unmitigated Health Risk Assessment Results

Site	Maximum Individual Cancer Risk[a] (in one million)		Maximum Chronic Hazard Index[b] (CHI)	Maximum Acute Hazard Index[b] (AHI)
	Offsite Worker[b,c]	Residential[b]		
Mission & Jesse	0.26	1.31	0.015	0.091

[a] Based on the conservative assumption that continued exposure occurs at the location of maximum impact. Cancer Burden calculations, per SCAQMD guidance, were also performed and are given in Table 4-2.

[b] The maximum impact for each toxic compound from the entire grid of receptors, including the facility's property boundary, was used to determine Residential and Offsite Worker-MICR, CHI, and AHI.

[c] SCAQMD guidelines allow for the application of a Exposure Value Factor (EVF) for workers since their lifetime in a particular location is less than that of a resident. The EVF for an offsite worker is assumed to be 240 days/yr, for 40 years (out of a life span of 70 years). This gives an EVF of 0.38, which is conservatively multiplied by the maximum 70-year residential cancer risk to yield an estimate of the maximum cancer risk to an offsite worker.

Table 4-2
Unmitigated Cancer Burden Results

Site	Maximum Downwind Distance[a] (km)	Zone of Impact[b] (km^2)	Population Density[c] (persons/km^2)	Zone of Impact Population[d] (persons)	MICR[e] (in a million)	Cancer Burden[f]
Mission & Jesse	0.34	0.36	7,000	2,542	1.31	0.003

[a] The furthest downwind distance at which a modeled receptor indicated a MICR greater than one in a million.

[b] The area of a circle surrounding the stack whose radius is the maximum downwind distance.

[c] According to the SCAQMD guidelines, where there is no census data, 7,000 persons/km2 should be used for areas with high population densities. As a conservative estimate, it was assumed that the site was located in an area with high population density.

[d] The population residing within the ZOI. Calculated by multiplying the zone of impact area by the assumed population density.

[e] The maximum MICR from Table 4-1.

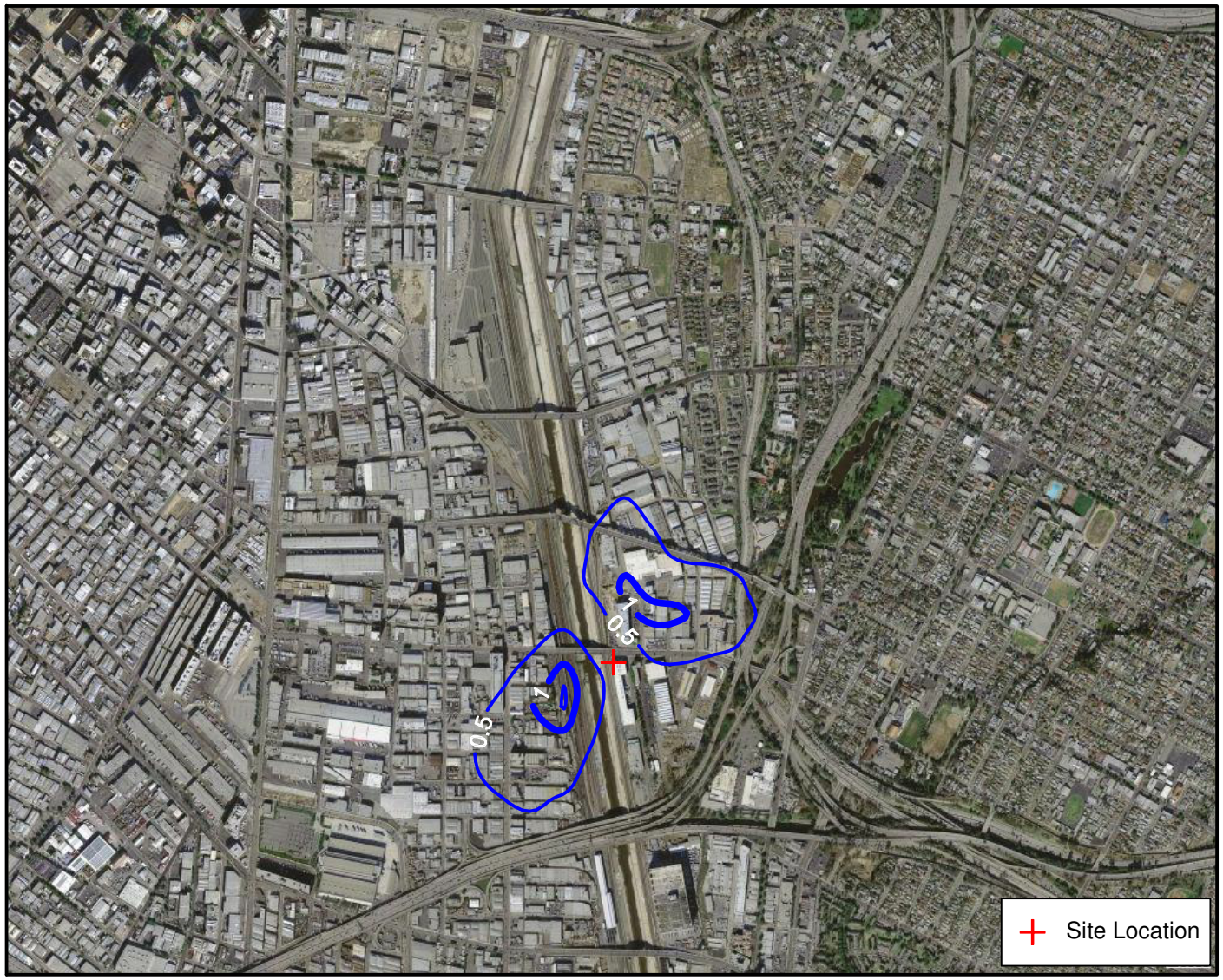
[f] Calculated by multiplying the population residing within the zone of impact by the MICR. According to SCAQMD guidelines, cancer burden calculations must be below 0.5.

5.0 Conclusions

Based on discussions with SCAQMD permitting staff indicating that carbon adsorption is considered T-BACT for this application, the project results in carcinogenic and non-carcinogenic health risk impacts that comply with SCAQMD Regulation 1401 - New Source Review of Toxic Air Contaminants.

APPENDIX A

Aerial Photographs with Maximum Individual Cancer Risk Isopleths



Mission & Jesse
Permanent Air Treatment Facility

Maximum Individual Cancer Risk Contours
(contour values represent risks in a million)

APPENDIX B

Emission Rates & Health Risk Assessment Spreadsheets

CARCINOGENIC RISK - Mission & Jesse (Sensitive and Residential)

Exhaust Flow (scfm)	12,000
Maximum Annual X/Q (ug/m3)/(g/s)	17.18

COMPOUND	CAS	MOLECULAR WEIGHT (g/gmol)	AVERAGE EXHAUST CONCENTRATION (ppbv)	AVERAGE EMISSION RATE (lb/hr)	AVERAGE EMISSION RATE (g/s)	MAXIMUM IMPACT (ug/m^3)	ANNUAL CONC. ADJUSTMENT FACTOR (unitless)	CANCER POTENCY (mg/kg-dy)-1	DAILY BREATHING RATE (Sens. & Res.) (L/kg-day)	EXPOSURE VALUE FACTOR (Sens. & Res.) (unitless)	CARCINOGENIC RISK (Inhalation)	MULTIPATHWAY FACTOR	CARCINOGENIC RISK (Total)
Vinyl chloride	75-01-4	62.50	0.40	4.66E-05	5.87E-06	1.01E-04	1.00E+00	2.70E-01	3.02E+02	9.60E-01	7.89E-09	1.0	7.89E-09
Methyl bromide (Bromomethane)	74-83-9	94.95	0.40	7.07E-05	8.91E-06	1.53E-04	1.00E+00		3.02E+02	9.60E-01			
Ethyl chloride	75-00-3	64.52	0.40	4.81E-05	6.06E-06	1.04E-04	1.00E+00		3.02E+02	9.60E-01			
1,1-dichloroethylene (Vinylidene Chloride)	75-35-4	96.95	0.40	7.22E-05	9.10E-06	1.56E-04	1.00E+00		3.02E+02	9.60E-01			
1,1-dichloroethane (Ethylidene Chloride)	75-34-3	98.96	0.40	7.37E-05	9.29E-06	1.60E-04	1.00E+00	5.70E-03	3.02E+02	9.60E-01	2.64E-10	1.0	2.64E-10
Chloroform/Trichloromethane	67-66-3	119.39	115.50	2.57E-02	3.24E-03	5.56E-02	1.00E+00	1.90E-02	3.02E+02	9.60E-01	3.06E-07	1.0	3.06E-07
1,2-dichloroethane (Ethylene Dichloride)	107-06-2	98.96	0.40	7.37E-05	9.29E-06	1.60E-04	1.00E+00	7.20E-02	3.02E+02	9.60E-01	3.33E-09	1.0	3.33E-09
1,1,1-trichloroethane (Methyl Chloroform)	71-55-6	133.42	0.40	9.94E-05	1.25E-05	2.15E-04	1.00E+00		3.02E+02	9.60E-01			
Benzene	71-43-2	78.11	2.50	3.63E-04	4.58E-05	7.86E-04	1.00E+00	1.00E-01	3.02E+02	9.60E-01	2.28E-08	1.0	2.28E-08
Carbon Tetrachloride	56-23-5	153.84	0.40	1.15E-04	1.44E-05	2.48E-04	1.00E+00	1.50E-01	3.02E+02	9.60E-01	1.08E-08	1.0	1.08E-08
Trichloroethene (Trichloroethylene)	79-01-6	131.38	14.86	3.63E-03	4.58E-04	7.87E-03	1.00E+00	7.00E-03	3.02E+02	9.60E-01	1.60E-08	1.0	1.60E-08
1,1,2-trichloroethane	79-00-5	133.42	0.40	9.94E-05	1.25E-05	2.15E-04	1.00E+00	5.70E-02	3.02E+02	9.60E-01	3.55E-09	1.0	3.55E-09
Toluene/Methyl Benzene	108-88-3	92.13	837.00	1.44E-01	1.81E-02	3.11E-01	1.00E+00		3.02E+02	9.60E-01			
Chlorobenzene	108-90-7	112.56	3.39	7.11E-04	8.96E-05	1.54E-03	1.00E+00		3.02E+02	9.60E-01			
Ethyl benzene	100-41-4	106.16	38.90	7.69E-03	9.69E-04	1.66E-02	1.00E+00	8.70E-03	3.02E+02	9.60E-01	4.20E-08	1.0	4.20E-08
m + p-xylenes	1330-20-7	106.16	159.00	3.14E-02	3.96E-03	6.80E-02	1.00E+00		3.02E+02	9.60E-01			
Styrene/Vinyl Benzene	100-42-5	104.14	5.40	1.05E-03	1.32E-04	2.27E-03	1.00E+00		3.02E+02	9.60E-01			
1,1,2,2-tetrachloroethane	79-34-5	167.86	1.04	3.24E-04	4.08E-05	7.01E-04	1.00E+00	2.00E-01	3.02E+02	9.60E-01	4.07E-08	1.0	4.07E-08
o-xylene	1330-20-7	106.16	35.60	7.04E-03	8.87E-04	1.52E-02	1.00E+00		3.02E+02	9.60E-01			
p-dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	147.01	42.04	1.15E-02	1.45E-03	2.49E-02	1.00E+00	4.00E-02	3.02E+02	9.60E-01	2.89E-07	1.0	2.89E-07
Hydrogen Sulfide	7783-06-4	34.08	1000.00	6.35E-02	8.00E-03	1.37E-01	1.00E+00		3.02E+02	9.60E-01			
Carbon Disulfide	75-15-0	76.14	30.00	4.25E-03	5.36E-04	9.21E-03	1.00E+00		3.02E+02	9.60E-01			
1,3-Butadiene	106-99-0	54.09	0.40	4.03E-05	5.08E-06	8.72E-05	1.00E+00	6.00E-01	3.02E+02	9.60E-01	1.52E-08	1.0	1.52E-08
Methylene Chloride/Dichloromethane	75-09-2	84.94	28.47	4.50E-03	5.67E-04	9.75E-03	1.00E+00	3.50E-03	3.02E+02	9.60E-01	9.89E-09	1.0	9.89E-09
1,4-Dioxan	123-91-1	88.10	0.40	6.56E-05	8.27E-06	1.42E-04	1.00E+00	2.70E-02	3.02E+02	9.60E-01	1.11E-09	1.0	1.11E-09
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	187.88	0.40	1.40E-04	1.76E-05	3.03E-04	1.00E+00	2.50E-01	3.02E+02	9.60E-01	2.20E-08	1.0	2.20E-08
Tetrachloroethylene (Perchloroethylene)	127-18-4	165.85	127.63	3.94E-02	4.97E-03	8.53E-02	1.00E+00	2.10E-02	3.02E+02	9.60E-01	5.19E-07	1.0	5.19E-07
Isoproply Alcohol	67-63-0	60.10	15.50	1.73E-03	2.19E-04	3.75E-03	1.00E+00		3.02E+02	9.60E-01			
Methyl Ethyl Keytone (MEK)/2-Butanone	78-93-3	72.11	9.30	1.25E-03	1.57E-04	2.70E-03	1.00E+00		3.02E+02	9.60E-01			
Hexane	110-54-3	86.18	4.10	6.58E-04	8.29E-05	1.42E-03	1.00E+00		3.02E+02	9.60E-01			
Total Carcinogenic Risk											**1.31E-06**		**1.31E-06**

Notes:

Exhaust Concentrations are unmitigated (i.e., a control efficiency of 0.0% is assumed for permitting) and are the higher of the average of three inlet concentration air sampling events performed on February 2, 2005 by URS or a single inlet concentration air sampling event performed by HDR i

Hydrogen Sulfide concentration is based on the outlet permit limit of 1 ppm.

Compounds shown in bold type were Non-Detected in at least one of the three sampling events. As such, 1/2 of the ND value was used as the sampled concentration per SCAQMD guidance.

Annual Concentration Adjustment, Cancer Potency, Daily Breathing, Exposure Value, and Multipathway Factors were obtained from Attachment L of SCAQMD's Risk Assessment Procedures for Rules 1401 & 212 (for applications deemed complete on or after July 1, 2005, Revised September 10, 2010).

CARCINOGENIC RISK - Mission & Jesse (Worker)

Exhaust Flow (scfm)	12,000
Maximum Annual X/Q (ug/m3)/(g/s)	17.18

COMPOUND	CAS	MOLECULAR WEIGHT (g/gmol)	AVERAGE EXHAUST CONCENTRATION (ppbv)	AVERAGE EMISSION RATE (lb/hr)	AVERAGE EMISSION RATE (g/s)	MAXIMUM IMPACT (ug/m^3)	ANNUAL CONC. ADJUSTMENT FACTOR (unitless)	CANCER POTENCY (mg/kg-dy)-1	DAILY BREATHING RATE (off-site worker) (L/kg-day)	EXPOSURE VALUE FACTOR (off-site worker) (unitless)	CARCINOGENIC RISK (Inhalation)	MULTIPATHWAY FACTOR	CARCINOGENIC RISK (Total)
Vinyl chloride	75-01-4	62.50	0.40	4.66E-05	5.87E-06	1.01E-04	1.00E+00	2.70E-01	1.49E+02	3.80E-01	1.54E-09	1.0	1.54E-09
Methyl bromide (Bromomethane)	74-83-9	94.95	0.40	7.07E-05	8.91E-06	1.53E-04	1.00E+00		1.49E+02	3.80E-01			
Ethyl chloride	75-00-3	64.52	0.40	4.81E-05	6.06E-06	1.04E-04	1.00E+00		1.49E+02	3.80E-01			
1,1-dichloroethylene (Vinylidene Chloride)	75-35-4	96.95	0.40	7.22E-05	9.10E-06	1.56E-04	1.00E+00		1.49E+02	3.80E-01			
1,1-dichloroethane (Ethylidene Chloride)	75-34-3	98.96	0.40	7.37E-05	9.29E-06	1.60E-04	1.00E+00	5.70E-03	1.49E+02	3.80E-01	5.15E-11	1.0	5.15E-11
Chloroform/Trichloromethane	67-66-3	119.39	115.50	2.57E-02	3.24E-03	5.56E-02	1.00E+00	1.90E-02	1.49E+02	3.80E-01	5.98E-08	1.0	5.98E-08
1,2-dichloroethane (Ethylene Dichloride)	107-06-2	98.96	0.40	7.37E-05	9.29E-06	1.60E-04	1.00E+00	7.20E-02	1.49E+02	3.80E-01	6.51E-10	1.0	6.51E-10
1,1,1-trichloroethane (Methyl Chloroform)	71-55-6	133.42	0.40	9.94E-05	1.25E-05	2.15E-04	1.00E+00		1.49E+02	3.80E-01			
Benzene	71-43-2	78.11	2.50	3.63E-04	4.58E-05	7.86E-04	1.00E+00	1.00E-01	1.49E+02	3.80E-01	4.45E-09	1.0	4.45E-09
Carbon Tetrachloride	56-23-5	153.84	0.40	1.15E-04	1.44E-05	2.48E-04	1.00E+00	1.50E-01	1.49E+02	3.80E-01	2.11E-09	1.0	2.11E-09
Trichloroethene (Trichloroethylene)	79-01-6	131.38	14.86	3.63E-03	4.58E-04	7.87E-03	1.00E+00	7.00E-03	1.49E+02	3.80E-01	3.12E-09	1.0	3.12E-09
1,1,2-trichloroethane	79-00-5	133.42	0.40	9.94E-05	1.25E-05	2.15E-04	1.00E+00	5.70E-02	1.49E+02	3.80E-01	6.94E-10	1.0	6.94E-10
Toluene/Methyl Benzene	108-88-3	92.13	837.00	1.44E-01	1.81E-02	3.11E-01	1.00E+00		1.49E+02	3.80E-01			
Chlorobenzene	108-90-7	112.56	3.39	7.11E-04	8.96E-05	1.54E-03	1.00E+00		1.49E+02	3.80E-01			
Ethyl benzene	100-41-4	106.16	38.90	7.69E-03	9.69E-04	1.66E-02	1.00E+00	8.70E-03	1.49E+02	3.80E-01	8.20E-09	1.0	8.20E-09
m + p-xylenes	1330-20-7	106.16	159.00	3.14E-02	3.96E-03	6.80E-02	1.00E+00		1.49E+02	3.80E-01			
Styrene/Vinyl Benzene	100-42-5	104.14	5.40	1.05E-03	1.32E-04	2.27E-03	1.00E+00		1.49E+02	3.80E-01			
1,1,2,2-tetrachloroethane	79-34-5	167.86	1.04	3.24E-04	4.08E-05	7.02E-04	1.00E+00	2.00E-01	1.49E+02	3.80E-01	7.94E-09	1.0	7.94E-09
o-xylene	1330-20-7	106.16	35.60	7.04E-03	8.87E-04	1.52E-02	1.00E+00		1.49E+02	3.80E-01			
p-dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	147.01	42.04	1.15E-02	1.45E-03	2.49E-02	1.00E+00	4.00E-02	1.49E+02	3.80E-01	5.64E-08	1.0	5.64E-08
Hydrogen Sulfide	7783-06-4	34.08	1000.00	6.35E-02	8.00E-03	1.37E-01	1.00E+00		1.49E+02	3.80E-01			
Carbon Disulfide	75-15-0	76.14	30.00	4.25E-03	5.36E-04	9.21E-03	1.00E+00		1.49E+02	3.80E-01			
1,3-Butadiene	106-99-0	54.09	0.40	4.03E-05	5.08E-06	8.72E-05	1.00E+00	6.00E-01	1.49E+02	3.80E-01	2.96E-09	1.0	2.96E-09
Methylene Chloride/Dichloromethane	75-09-2	84.94	28.47	4.50E-03	5.67E-04	9.75E-03	1.00E+00	3.50E-03	1.49E+02	3.80E-01	1.93E-09	1.0	1.93E-09
1,4-Dioxan	123-91-1	88.10	0.40	6.56E-05	8.27E-06	1.42E-04	1.00E+00	2.70E-02	1.49E+02	3.80E-01	2.17E-10	1.0	2.17E-10
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	187.88	0.40	1.40E-04	1.76E-05	3.03E-04	1.00E+00	2.50E-01	1.49E+02	3.80E-01	4.29E-09	1.0	4.29E-09
Tetrachloroethylene (Perchloroethylene)	127-18-4	165.85	127.63	3.94E-02	4.97E-03	8.53E-02	1.00E+00	2.10E-02	1.49E+02	3.80E-01	1.01E-07	1.0	1.01E-07
Isoproply Alcohol	67-63-0	60.10	15.50	1.73E-03	2.19E-04	3.76E-03	1.00E+00		1.49E+02	3.80E-01			
Methyl Ethyl Keytone (MEK)/2-Butanone	78-93-3	72.11	9.30	1.25E-03	1.57E-04	2.70E-03	1.00E+00		1.49E+02	3.80E-01			
Hexane	110-54-3	86.18	4.10	6.58E-04	8.29E-05	1.42E-03	1.00E+00		1.49E+02	3.80E-01			
Total Carcinogenic Risk											2.56E-07		**2.56E-07**

Notes:

Exhaust Concentrations are unmitigated (i.e., a control efficiency of 0.0% is assumed for permitting) and are the higher of the average of three inlet concentration air sampling events performed on February 2, 2005 by URS or a single inlet concentration air sampling event performed by HDR in 2

Hydrogen Sulfide concentration is based on the outlet permit limit of 1 ppm.

Compounds shown in bold type were Non-Detected in at least one of the three sampling events. As such, 1/2 of the ND value was used as the sampled concentration per SCAQMD guidance.

Annual Concentration Adjustment, Cancer Potency, Daily Breathing, Exposure Value, and Multipathway Factors were obtained from Attachment L of SCAQMD's Risk Assessment Procedures for Rules 1401 & 212 (for applications deemed complete on or after July 1, 2005, Revised September 10, 2010).

CHRONIC HAZARD INDEX - Mission & Jesse

Exhaust Flow (scfm)	12,000
Maximum Annual X/Q (ug/m3)/(g/s)	17.18

COMPOUND	CAS	MOLECULAR WEIGHT (g/gmol)	AVG EXHAUST CONCENTRATION (ppbv)	AVG EMISSION RATE (lb/hr)	(g/s)	MAXIMUM IMPACT (ug/m3)	CHRONIC INHALATION REL (ug/m^3)	MULTI PATHWAY ADJUSTMENT FACTOR	Maximum	Alimentary System (Gastrointestinal & Liver)	Bones & Teeth	Cardiovascular	Developmental	Endocrine	Eye	Hematopoietic (Blood)	Immune	Kidney	Nervous System	Reproductive	Respiratory	Skin
Vinyl chloride	75-01-4	62.50	0.40	4.66E-05	5.87E-06	1.01E-04																
Methyl bromide (Bromomethane)	74-83-9	94.95	0.40	7.07E-05	8.91E-06	1.53E-04	5.00E+00	1.0					3.06E-05						3.06E-05		3.06E-05	
Ethyl chloride	75-00-3	64.52	0.40	4.81E-05	6.06E-06	1.04E-04	3.00E+04	1.0		3.47E-09			3.47E-09									
1,1-dichloroethylene (Vinylidene Chloride)	75-35-4	96.95	0.40	7.22E-05	9.10E-06	1.56E-04	7.00E+01	1.0		2.23E-06												
1,1-dichloroethane (Ethylidene Chloride)	75-34-3	98.96	0.40	7.37E-05	9.29E-06	1.60E-04																
Chloroform/Trichloromethane	67-66-3	119.39	115.50	2.57E-02	3.24E-03	5.56E-02	3.00E+02	1.0		1.85E-04			1.85E-04					1.85E-04				
1,2-dichloroethane (Ethylene Dichloride)	107-06-2	98.96	0.40	7.37E-05	9.29E-06	1.60E-04	4.00E+02	1.0		3.99E-07												
1,1,1-trichloroethane (Methyl Chloroform)	71-55-6	133.42	0.40	9.94E-05	1.25E-05	2.15E-04	1.00E+03	1.0											2.15E-07			
Benzene	71-43-2	78.11	2.50	3.63E-04	4.58E-05	7.86E-04	6.00E+01	1.0					1.31E-05			1.31E-05			1.31E-05			
Carbon Tetrachloride	56-23-5	153.84	0.40	1.15E-04	1.44E-05	2.48E-04	4.00E+01	1.0		6.20E-06			6.20E-06						6.20E-06			
Trichloroethene (Trichloroethylene)	79-01-6	131.38	14.86	3.63E-03	4.58E-04	7.87E-03	6.00E+02	1.0							1.31E-05				1.31E-05			
1,1,2-trichloroethane	79-00-5	133.42	0.40	9.94E-05	1.25E-05	2.15E-04																
Toluene/Methyl Benzene	108-88-3	92.13	837.00	1.44E-01	1.81E-02	3.11E-01	3.00E+02	1.0					1.04E-03						1.04E-03		1.04E-03	
Chlorobenzene	108-90-7	112.56	3.39	7.11E-04	8.96E-05	1.54E-03	1.00E+03	1.0		1.54E-06								1.54E-06		1.54E-06		
Ethyl benzene	100-41-4	106.16	38.90	7.69E-03	9.69E-04	1.66E-02	2.00E+03	1.0		8.32E-06			8.32E-06	8.32E-06				8.32E-06				
m + p-xylenes	1330-20-7	106.16	159.00	3.14E-02	3.96E-03	6.80E-02	7.00E+02	1.0											9.72E-05		9.72E-05	
Styrene/Vinyl Benzene	100-42-5	104.14	5.40	1.05E-03	1.32E-04	2.27E-03	9.00E+02	1.0											2.52E-06			
1,1,2,2-tetrachloroethane	79-34-5	167.86	1.04	3.24E-04	4.08E-05	7.01E-04																
o-xylene	1330-20-7	106.16	35.60	7.04E-03	8.87E-04	1.52E-02	7.00E+02	1.0											2.18E-05		2.18E-05	
p-dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	147.01	42.04	1.15E-02	1.45E-03	2.49E-02	8.00E+02	1.0		3.11E-05								3.11E-05	3.11E-05		3.11E-05	
Hydrogen Sulfide	7783-06-4	34.08	1000.00	6.35E-02	8.00E-03	1.37E-01	1.00E+01	1.0													1.37E-02	
Carbon Disulfide	75-15-0	76.14	30.00	4.25E-03	5.36E-04	9.21E-03	8.00E+02	1.0											1.15E-05	1.15E-05		
1,3-Butadiene	106-99-0	54.09	0.40	4.03E-05	5.08E-06	8.72E-05	2.00E+01	1.0												4.36E-06		
Methylene Chloride/Dichloromethane	75-09-2	84.94	28.47	4.50E-03	5.67E-04	9.75E-03	4.00E+02	1.0				2.44E-05							2.44E-05			
1,4-Dioxan	123-91-1	88.10	0.40	6.56E-05	8.27E-06	1.42E-04	3.00E+03	1.0		4.73E-08		4.73E-08						4.73E-08				
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	187.88	0.40	1.40E-04	1.76E-05	3.03E-04	8.00E-01	1.0												3.79E-04		
Tetrachloroethylene (Perchloroethylene)	127-18-4	165.85	127.63	3.94E-02	4.97E-03	8.53E-02	3.50E+01	1.0		2.44E-03								2.44E-03				
Isoproply Alcohol	67-63-0	60.10	15.50	1.73E-03	2.19E-04	3.75E-03	7.00E+03	1.0					5.36E-07					5.36E-07				
Methyl Ethyl Keytone (MEK)/2-Butanone	78-93-3	72.11	9.30	1.25E-03	1.57E-04	2.70E-03																
Hexane	110-54-3	86.18	4.10	6.58E-04	8.29E-05	1.42E-03	7.00E+03	1.0										2.03E-07				
								Total	**0.015**	**2.67E-03**	**0.00E+00**	**2.44E-05**	**1.28E-03**	**8.32E-06**	**1.31E-05**	**1.31E-05**	**0.00E+00**	**2.66E-03**	**1.29E-03**	**3.96E-04**	**1.50E-02**	**0.00E+00**

Notes:

Exhaust Concentrations are unmitigated (i.e., a control efficiency of 0.0% is assumed for permitting) and are the higher of the average of three inlet concentration air sampling events performed on February 2, 2005 by URS or a single inlet concentration air sampling event performed by HDR in 2010.

Hydrogen Sulfide concentration is based on the outlet permit limit of 1 ppm.

Compounds shown in bold type were Non-Detected in at least one of the three sampling events. As such, 1/2 of the ND value was used as the sampled concentration per SCAQMD guidance.

Chronic Inhalation RELs, Mulitpathway Factors, and target specific system were obtained from Attachment L of SCAQMD's Risk Assessment Procedures for Rules 1401 & 212 (for applications deemed complete on or after July 1, 2005, Revised September 10, 2010)

ACUTE HAZARD INDEX - Mission & Jesse

Exhaust Flow (scfm)	12,000
Maximum 1-hr X/Q (ug/m^3)/(g/s)	445.9341

COMPOUND	CAS	MOLECULAR WEIGHT (g/gmol)	MAX EXHAUST CONCENTRATION (ppbv)	EMISSION RATE (lb/hr)	EMISSION RATE (g/s)	MAXIMUM IMPACT (ug/m3)	ACUTE INHALATION REL (ug/m3)	REL Averaging Time (hours)	Adjustmet Factor (Vernon Met Station)	Maximum	Alimentary System (Gastrointestinal & Liver)	Cardiovascular	Developmental	Eye	Hematopoietic (Blood)	Immune	Nervous System	Reproductive	Respiratory	Skin
Vinyl chloride	75-01-4	62.50	0.40	4.66E-05	5.87E-06	2.62E-03	1.80E+05	1	1.00					1.45E-08			1.45E-08		1.45E-08	
Methyl bromide (Bromomethane)	74-83-9	94.95	0.40	7.07E-05	8.91E-06	3.97E-03	3.90E+03	1	1.00				1.02E-06				1.02E-06	1.02E-06	1.02E-06	
Ethyl chloride	75-00-3	64.52	0.40	4.81E-05	6.06E-06	2.70E-03														
1,1-dichloroethylene (Vinylidene Chloride)	75-35-4	96.95	0.40	7.22E-05	9.10E-06	4.06E-03														
1,1-dichloroethane (Ethylidene Chloride)	75-34-3	98.96	0.40	7.37E-05	9.29E-06	4.14E-03														
Chloroform/Trichloromethane	67-66-3	119.39	119.31	2.65E-02	3.34E-03	1.49E+00	1.50E+02	7	0.61				6.06E-03				6.06E-03	6.06E-03		
1,2-dichloroethane (Ethylene Dichloride)	107-06-2	98.96	0.40	7.37E-05	9.29E-06	4.14E-03														
1,1,1-trichloroethane (Methyl Chloroform)	71-55-6	133.42	0.40	9.94E-05	1.25E-05	5.58E-03	6.80E+04	1	1.00								8.21E-08			
Benzene	71-43-2	78.11	2.57	3.74E-04	4.71E-05	2.10E-02	1.30E+03	6	0.61				9.86E-06		9.86E-06	9.86E-06		9.86E-06		
Carbon Tetrachloride	56-23-5	153.84	0.40	1.15E-04	1.44E-05	6.44E-03	1.90E+03	7	0.61		2.07E-06		2.07E-06				2.07E-06	2.07E-06		
Trichloroethene (Trichloroethylene)	79-01-6	131.38	22.10	5.41E-03	6.81E-04	3.04E-01														
1,1,2-trichloroethane	79-00-5	133.42	0.40	9.94E-05	1.25E-05	5.58E-03														
Toluene/Methyl Benzene	108-88-3	92.13	837.00	1.44E-01	1.81E-02	8.07E+00	3.70E+04	1	1.00				2.18E-04	2.18E-04			2.18E-04	2.18E-04	2.18E-04	
Chlorobenzene	108-90-7	112.56	4.10	8.59E-04	1.08E-04	4.83E-02														
Ethyl benzene	100-41-4	106.16	38.90	7.69E-03	9.69E-04	4.32E-01														
m + p-xylenes	1330-20-7	106.16	159.00	3.14E-02	3.96E-03	1.77E+00	2.20E+04	1	1.00					8.03E-05					8.03E-05	
Styrene/Vinyl Benzene	100-42-5	104.14	5.71	1.11E-03	1.40E-04	6.22E-02	2.10E+04	1	1.00					2.96E-06					2.96E-06	
1,1,2,2-tetrachloroethane	79-34-5	167.86	2.31	7.22E-04	9.10E-05	4.06E-02														
o-xylene	1330-20-7	106.16	35.60	7.04E-03	8.87E-04	3.95E-01	2.20E+04	1	1.00					1.80E-05					1.80E-05	
p-dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	147.01	51.78	1.42E-02	1.79E-03	7.96E-01														
Hydrogen Sulfide	7783-06-4	34.08	1000.00	6.35E-02	8.00E-03	3.57E+00	4.20E+01	1	1.00								8.49E-02			
Carbon Disulfide	75-15-0	76.14	30.00	4.25E-03	5.36E-04	2.39E-01	6.20E+03	6	0.61				2.35E-05				2.35E-05	2.35E-05		
1,3-Butadiene	106-99-0	54.09	0.40	4.03E-05	5.08E-06	2.26E-03														
Methylene Chloride/Dichloromethane	75-09-2	84.94	32.59	5.15E-03	6.49E-04	2.90E-01	1.40E+04	1	1.00								2.07E-05			
1,4-Dioxan	123-91-1	88.10	0.40	6.56E-05	8.27E-06	3.69E-03	3.00E+03	1	1.00					1.23E-06					1.23E-06	
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	187.88	0.40	1.40E-04	1.76E-05	7.86E-03														
Tetrachloroethylene (Perchloroethylene)	127-18-4	165.85	172.20	5.32E-02	6.70E-03	2.99E+00	2.00E+04	1	1.00					1.49E-04			1.49E-04		1.49E-04	
Isoproply Alcohol	67-63-0	60.10	15.50	1.73E-03	2.19E-04	9.75E-02	3.20E+03	1	1.00					3.05E-05					3.05E-05	
Methyl Ethyl Keytone (MEK)/2-Butanone	78-93-3	72.11	9.30	1.25E-03	1.57E-04	7.02E-02	1.30E+04	1	1.00					5.40E-06					5.40E-06	
Hexane	110-54-3	86.18	4.10	6.58E-04	8.29E-05	3.70E-02														
									Total	**0.091**	**2.07E-06**	**0.00E+00**	**6.32E-03**	**5.06E-04**	**9.86E-06**	**9.86E-06**	**9.14E-02**	**6.32E-03**	**5.07E-04**	**0.00E+00**

Notes:

Exhaust Concentrations are unmitigated (i.e., a control efficiency of 0.0% is assumed for permitting) and are the maximum of three inlet concentration air sampling events performed on February 2, 2005 by URS and a single inlet concentration air sampling event performed by HDR in 2010.

Hydrogen Sulfide concentration is based on the outlet permit limit of 1 ppm.

Compounds shown in bold type were Non-Detected in at least one of the three sampling events. As such, 1/2 of the ND value was used as the sampled concentration per SCAQMD guidance.

Acute Inhalation RELs, Mulitpathway Factors, and target specific system were obtained from Attachment L of SCAQMD's Risk Assessment Procedures for Rules 1401 & 212 (for applications deemed complete on or after July 1, 2005, Revised September 10, 2010)

Toxics Data Mission Jesse

			Sampling Event 1[a]				Sampling Event 2[b]				
Sample Location:			**Inlet**	**Inlet**	**Inlet**	**Average**	**Inlet**	**Average Inlet Concentration**		**Maximum Concentration**	
Test No.:			**1**	**2**	**3**			(highest value of 3-run average		(over all samples taken)	
Time:								of sampling event#1 and single value			
Flow Rate, dscfm:			**7516**				**5150**	from event#2)			
Species[c]	**CAS**	**Molecular Weight**	**ppb[d]**	**ppb[d]**	**ppb[d]**	**ppb[d]**	**ppb_v**	**ppb**	**lb/hr**	**ppb**	**lb/hr**
Vinyl chloride	75-01-4	62.50	**0.4**	**0.4**	**0.4**	0.40		0.40	2.97E-05	0.40	2.97E-05
Methyl bromide (Bromomethane)	74-83-9	94.95	**0.4**	**0.4**	**0.4**	0.40		0.40	4.51E-05	0.40	4.51E-05
Ethyl chloride	75-00-3	64.52	**0.4**	**0.4**	**0.4**	0.40		0.40	3.07E-05	0.40	3.07E-05
1,1-dichloroethylene (Vinylidene Chloride)	75-35-4	96.95	**0.4**	**0.4**	**0.4**	0.40		0.40	4.61E-05	0.40	4.61E-05
1,1-dichloroethane (Ethylidene Chloride)	75-34-3	98.96	**0.4**	**0.4**	**0.4**	0.40		0.40	4.70E-05	0.40	4.70E-05
Chloroform/Trichloromethane	67-66-3	119.39	119.31	115.77	111.43	115.50	80.2	115.50	1.64E-02	119.31	1.69E-02
1,2-dichloroethane (Ethylene Dichloride)	107-06-2	98.96	**0.4**	**0.4**	**0.4**	0.40		0.40	4.70E-05	0.40	4.70E-05
1,1,1-trichloroethane (Methyl Chloroform)	71-55-6	133.42	**0.4**	**0.4**	**0.4**	0.40		0.40	6.34E-05	0.40	6.34E-05
Benzene	71-43-2	78.11	2.36	2.56	2.57	2.50	1.8	2.50	2.32E-04	2.57	2.39E-04
Carbon Tetrachloride	56-23-5	153.84	**0.4**	**0.4**	**0.4**	0.40		0.40	7.31E-05	0.40	7.31E-05
Trichloroethene (Trichloroethylene)	79-01-6	131.38	22.1	17.81	4.66	14.86	8.7	14.86	2.32E-03	22.10	3.45E-03
1,1,2-trichloroethane	79-00-5	133.42	**0.4**	**0.4**	**0.4**	0.40		0.40	6.34E-05	0.40	6.34E-05
Toluene/Methyl Benzene	108-88-3	92.13	81.6	87	191.92	120.17	837	837.00	6.28E-02	837.00	6.28E-02
Chlorobenzene	108-90-7	112.56	4.1	3.68	2.4	3.39		3.39	4.54E-04	4.10	5.48E-04
Ethyl benzene	100-41-4	106.16	6.7	5.25	8.65	6.87	38.9	38.90	3.36E-03	38.90	3.36E-03
m + p-xylenes	1330-20-7	106.16	10.88	8.47	17.39	12.25	159	159.00	1.37E-02	159.00	1.37E-02
Styrene/Vinyl Benzene	100-42-5	104.14	3.25	1.92	5.71	3.63	5.4	5.40	4.58E-04	5.71	7.07E-04
1,1,2,2-tetrachloroethane	79-34-5	167.86	2.31	**0.4**	**0.4**	1.04		1.04	2.07E-04	2.31	4.61E-04
o-xylene	1330-20-7	106.16	11.82	8.37	17.96	12.72	35.6	35.60	3.08E-03	35.60	3.08E-03
p-dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	147.01	51	23.33	51.78	42.04	17	42.04	7.34E-03	51.78	9.05E-03
Hydrogen Sulfide	7783-06-4	34.08	-	-	1000	1000.00		1,000.00	4.05E-02	1,000.00	4.05E-02
Carbon Disulfide	75-15-0	76.14	-	-	**30**	30.00	14.6	30.00	2.71E-03	30.00	2.71E-03
1,3-Butadiene	106-99-0	54.09	**0.4**	**0.4**	**0.4**	0.40		0.40	2.57E-05	0.40	2.57E-05
Methylene Chloride/Dichloromethane	75-09-2	84.94	22.93	32.59	29.89	28.47	8.4	28.47	2.87E-03	32.59	3.29E-03
1,4-Dioxan	123-91-1	88.10	**0.4**	**0.4**	**0.4**	0.40		0.40	4.19E-05	0.40	4.19E-05
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	187.88	**0.4**	**0.4**	**0.4**	0.40		0.40	8.93E-05	0.40	8.93E-05
Tetrachloroethylene (Perchloroethylene)	127-18-4	165.85	119.73	90.97	172.2	127.63	68.4	127.63	2.52E-02	172.20	3.39E-02
Isoproply Alcohol	67-63-0	60.10	-	-	-	-	15.5	15.50	7.58E-04	15.50	7.58E-04
Methyl Ethyl Keytone (MEK)/2-Butanone	78-93-3	72.11	-	-	-	-	9.3	9.30	5.46E-04	9.30	5.46E-04
Hexane	110-54-3	86.18	-	-	-	-	4.1	4.10	2.88E-04	4.10	2.88E-04
Total:									0.18		0.20

Notes:

[a]This data is from the URS February 2, 2005 Sampling Event as provided by Connie Leonard (B&V) in email on June 13, 2005 from a URS report dated March 15, 2005.

[b]This data is from the HDR 2010 Sampling Event as provided by Jeffrey Mohr (B&V) in email on July 7, 2011 from an HRD report dated November 2010.

[c]These compounds are those that appear in Attachment L of SCAQMD's Risk Assessment Procedures for Rules 1401 and 212 as having some health hazard characteristics

[d]Bold values indicate that the compound was not detected in a particular sampling event and as such, half of the method detection limit value was used as the compound's concentration per SCAQMD guidelines.

Emissions Information

With the exception of hydrogen sulfide (H_2S), concentrations of the Toxic Air Contaminants (TACs) of concern were based on the unmitigated, inlet numbers obtained during sampling of air pollution control equipment ventilation at the site, performed in February 2005 and April 2010.

It was assumed that the maximum and average controlled emission rate for H_2S would be 1 ppmv, which was used in the health risk assessment and is based on similar permit limitations of the pollutant.

Emission rates were estimated for all compounds using concentrations in ppbv, the ideal gas law at 70^oF, and the stack exhaust flow rate of 12,000 scfm.