RECEIVED
By Alameda County Environmental Health at 1:43 pm, Feb 13, 2013

PERJURY STATEMENT

Subject: Fuel Lake Case No. RO0002981 and Geotracker Global ID T1000000416, Red Hanger Cleaners, 6335-6339 College Ave., Oakland, CA 94618

"I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge."

Ted Cleveland
Vice President, Operations
EFI Global, Inc.

11000 Richmond Avenue
Suite 250
Houston, TX 77042
Tel: 832.518.5145
Tf: 866.464.2127
Fax: 832.518.5157
www.efiglobal.com

January 31, 2013

Ms. Barbary Jakub, P.G.
Hazardous Materials Specialist
Alameda County Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Soil Vapor Survey and Screening-Level Risk Evaluation Report
Red Hangar Cleaners Site
6335-6339 College Avenue
Oakland, California
RO#0002981

EFI Global, Inc. (EFI) is pleased to present this Soil Vapor Survey and Screening-Level Risk Evaluation (SLRE) report to the Alameda County Environmental Health Department (ACEH). This survey was conducted in response to an ACEH request dated June 24, 2011. The purpose of the survey was to assess the concentrations of tetrachloroethene (PCE) and other volatile organic compounds (VOCs) in soil gases underlying the site. The purpose of the SLRE was to evaluate the potential health risks that could occur from worker exposure to the detected VOCs. A brief review of the site background and a description of this soil gas survey are provided in the following sections.

Site Background

The site is located in a mixed commercial and residential area of Oakland, and consists of a three-story building, a parking area, and associated landscaping. The building is currently occupied by various tenants, including a dry cleaning facility.

A Phase I environmental site assessment performed for the Site in 2005 in support of a property transfer identified the following Recognized Environmental Conditions:

- A former underground gasoline storage tank (UST) in the site's northwestern portion; and
- Historical dry cleaning activities conducted since 1987.

Based on the findings of the Phase I assessment, a Phase II subsurface investigation was performed at the site in order to assess if the UST remained, and to determine if VOCs (particularly PCE) and/or total petroleum hydrocarbons (TPH) were present in the subsurface soil and groundwater. Investigation activities included a geophysical survey in the suspected UST area, and soil and groundwater sampling. The scope and findings of this investigation are presented in the report entitled Phase II Subsurface Investigation Report – 6293[sic] College Avenue – Oakland, California (AEI Consultants, May 2005).

According to the Phase II report, a geophysical anomaly interpreted as a backfilled excavation was observed in the suspected UST vicinity. Analyses for total petroleum hydrocarbons (TPH) and/or VOCs were performed on soil samples collected from five borings (maximum soil sample depth was 4 feet below ground surface [bgs]). Four of the borings were located in the vicinity of the dry cleaning machine in the southwestern corner of the site, and one boring was located in the former UST area in the site's northwestern corner. TPH was not detected in the soil sample collected from the former UST area, and the only VOC detected in the dry cleaning machine area was PCE. The reported PCE concentrations were relatively low, with the highest concentration (0.26 milligrams per kilogram [mg/kg]) being slightly greater than the screening level of 0.25 mg/kg (Regional Water Quality Control Board's (RWQCB's) screening level for commercial/industrial land use). In addition, PCE and chloroform were detected in a groundwater sample. The PCE concentration in the groundwater sample (48 micrograms per liter [µg/L]) was higher than the Maximum Contaminant Level (MCL) of 5 µg/L.

A second sampling event was conducted at the site in June 2005 by EFI Global, Inc. (EFI) in response to a request by the City of Oakland Fire Department (OFD). The scope and findings of that sampling event are presented in their June 28, 2005 letter report. During that sampling event, a groundwater sample was collected from a location south of the dry cleaning machines. There was no evidence of PCE impacts to soils, but the presence of PCE and chloroform in groundwater was confirmed. The reported PCE concentration (15 µg/L) was lower than that previously reported. Based on the data collected from these two investigations, OFD issued a No Further Action letter and the transaction was completed.

An additional round of soil and groundwater sampling was conducted at the site in May 2008 by P&D Environmental, Inc. at two locations northeast (presumed upgradient) of the existing dry cleaning machine. PCE was detected in one of the soil samples and in both groundwater samples. In addition, chloroform was detected in both groundwater samples. The reported PCE concentrations (7 µg/L and 12 µg/L) in groundwater were higher than PCE's Maximum Contaminant Level (MCL) of 5 µg/L. The source of these upgradient detections was unknown. However, one possibility was a former dry cleaning facility previously located adjacent to and northeast of the current Red Hanger Cleaners location at 6251 College Avenue. Basics Environmental (Basics) conducted a local regulatory agency file review for the two dry cleaning facilities. According to Basics' findings, the 6251 address originally housed a dry cleaning operation called Kay's Cleaners, and that facility was apparently later adopted for use by Red Hanger Cleaners, which apparently moved their operations in 1987 to the current location.

In October 2009, ERM-West, Inc. (ERM) conducted a soil and groundwater investigation in order to assess the vertical extent of PCE impacts in soil and groundwater near the dry cleaning machines and to assess whether TPH impacts were present in soil and groundwater in the vicinity of the former UST location. The results were documented in a report entitled 2009 Site Characterization Summary Report, dated January 20, 2010. The investigation identified acetone, chloroform, PCE, and toluene in soil at concentrations exceeding the laboratory reporting limits but less than the San Francisco Regional Water Quality Control Board (SF RWQCB) environmental screening levels (ESLs). In addition, chloroform and PCE were reported in groundwater samples at concentrations above the laboratory reporting limits but less than the SF RWQCB ESLs.

In June, 2011, ACEH requested an assessment of soil vapors beneath the Red Hanger Cleaners' building and along the sanitary sewer line located adjacent to the north side of the building. This assessment of described in the following sections.

Investigative Procedures

The soil gas survey was conducted at the site on December 9, 2012. It was conducted in general accordance with the DTSC and Los Angeles Regional Water Quality Control Board's "Advisory - Active Soil Gas Investigation" dated January 28, 2003.

Sample Collection

The objective of this survey was to evaluate VOC concentrations in soil vapors beneath the current building and along an adjoining sewer pipeline. Two soil gas samples were collected beneath the building (SV-1 and SV-2; Figure 1). Sampling location SV-1 was placed approximately 1.5 feet west of the existing dry cleaning machine. Sample location SV-2 was placed in the central portions of the dry cleaning facility. Soil gas samples were collected from a depth of 5 feet at each of these locations.

Two soil gas samples were also collected along the sewer pipeline immediately north of the dry cleaning facility (SV-3 and SV-4). These sampling locations were placed within 1 foot of the sewer line. Soil gas samples were collected from a depth of approximately 4 feet at each of these locations.

The vapor probes were driven into the ground at SV-1 and SV-2 with an electric rotary hammer to the target depth. Due to the very soft soils adjacent to the sewer line, these vapor probes were driven by hand. A stainless steel vapor implant attached to new Teflon tubing was placed at the target depth. A filter pack consisting of #3 Monterey Sand (or equivalent) was placed in the annular space surrounding the entire screened interval. The sand thickness was maintained at about 0.5 feet. The sand pack was covered with 6-inches thick lifts of granular bentonite, which were each hydrated prior to the placement of a new lift. The tubing was capped with a gas-tight cap above the ground surface.

The equilibration time used, or the duration between installation and sampling, was greater than 30 minutes. The table prepared during sampling that recorded probe placement times, beginning and ending purge times, and sample collection times was inadvertently lost at the site during or following the field investigation.

Prior to sample collection, the Teflon tubing was purged seven volumes. During purging and sampling, a tracer gas (isopropyl alcohol) was introduced into ambient air at ground surface. Gas tight glass syringes were used to collect soil gas from the tubing. The soil gas samples were collected at a rate less than 200 milliliters per minute. One soil gas duplicate sample (SV-2 dup) was collected during the site investigation. One field blank consisting of ambient air collected onsite prior to the beginning of sampling, was also analyzed.

Chemical Analysis

The soil gas samples were analyzed by an onsite mobile laboratory provided by TEG Northern California (TEG). Each collected soil gas sample was analyzed for VOCs using EPA Method 8260B. Note that this laboratory's equipment ceased functioning during an initial analyses, so the collected soil samples were rushed back to TEG, where the laboratory was fixed and the samples analyzed or reanalyzed. The analytical results are summarized in Table 1 and TEG's laboratory report is included in Appendix B.

Screening-Level Risk Evaluation

The purpose of the screening-level risk evaluation (SLRE) was to evaluate the potential health risks from VOCs detected in ambient air within the dry-cleaners site. Maximum chloroform and PCE concentrations detected within the site were assumed to be representative of onsite exposure point concentrations.

The methods and assumptions developed in this risk assessment are consistent with U.S. Environmental Protection Agency (EPA, 1989) and Department of Toxic Substances Control (DTSC, 2005) risk assessment methodologies for evaluating air quality and associated human health risks. EPA and DTSC risk assessment guidelines require risk assessors to provide risk estimates for "typical", average conditions likely to be present at the site under study and risk estimates assuming "worst-case" conditions. For simplification, only the “worst-case” exposure scenario is presented in this report.

The only potential receptors likely to visit the dry-cleaners store are:

- Customers at the dry-cleaners establishment;
- Onsite workers; and,
- Maintenance workers.

Customers entering the dry-cleaners establishment are likely to be there for only a few minutes. The total exposure time for these receptors is too short to be of concern. Therefore, customers are not evaluated in this SLRE. Similarly, maintenance workers might be there only a few hours a month to do general maintenance and housekeeping activities. Exposure time for these receptors is also too short to be of concern. Therefore, maintenance workers are also not evaluated in this SLRE.

An onsite worker might be present at the site for 8 hours a day, 5 days per week for several years. Therefore, potential exposures and health risks to onsite workers was evaluated in this SLRE. Chemical intake rates were estimated using exposure parameters such as body weight, inhalation rates, and other assumptions regarding frequency and duration of exposure. The intake and exposure factors used to quantify chemical intakes are included in Table A-2 in Appendix A.

Fate and Transport Modeling

Risk characterization involves estimating the magnitude of the potential adverse health effects that could occur as a result of chronic, long-term exposure to chemicals identified in soil gas at the site. The risk characterization is based on the results of the dose-response (toxicity) and exposure assessment.

Only traces of chloroform and PCE were detected in soil gas under the exiting building. It is known that chemicals may migrate through environmental media from their source to a point where human receptors may be exposed. Therefore, it was necessary to determine if the detected VOCs – given their residual concentrations, locations, soil physical characteristics, weather conditions, etc. – could potentially migrate up to the surface (where human receptors may be exposed).

Screening-level models were used to predict indoor air concentrations that may result from the chemical vapors potentially released from soil gas under the site. The estimated vapor flux and indoor air concentrations were then used to estimate potential health risks that may result from onsite exposure. For purposes of this evaluation, it as assumed that the land use will remain commercial/industrial and that the only exposed population is made of adult onsite workers. The only exposure pathway that was considered to be complete was the volatilization of VOCs from soil gas and the subsequent emission to indoor air.

The potential migration of VOC vapors into indoor air was estimated using the Johnson and Ettinger (J&E) model (1991), modified to incorporate DTSC toxicity values (SG-SCREEN, DTSC Version 2.0-last modified 12/06/2011). A copy of the J&E model used in the evaluation is included in Appendix A. The estimated VOC flux and ambient concentrations were then used to estimate potential health risks and hazards that may result from onsite exposure to estimated VOC concentrations in indoor air. The J&E model was run using default soil physical parameters for silty clay loamy soils. This soil type was selected as soil samples collected at the site were classified as sandy, silty clays (ERM 2012).

The only site-specific parameters entered into the model were the building dimensions (2,640 square feet) and the ceiling height (18 feet). These site-specific parameters were used to calculate the floor-wall seam perimeter, the area of enclosed space, and the total volume of indoor air at the onsite building. Given that the building at the site is a commercial building, the ventilation rate of the model was set to 1.0 air exchanges per hour (Appendix A).

The J&E model contains a module for estimating potential doses as well as cancer risks and health hazards associated with a given dose. For this assessment, the J&E model was used to estimate the potential health risks and hazards associated with indoor VOC exposures.

The indoor air chemical concentrations estimated to result from the volatilization of VOCs could be considered to represent a “worst-case” estimate. In the calculations it was assumed that single chemical compounds are volatilizing, traveling alone through the vadose zone and escaping to ambient air. In reality, all chemicals detected at the site are competing with each other for available soil-pore space. It is well known that chemical volatilization and migration is limited by the vapor saturation in the vadose zone.

To estimate the chemical emissions to ambient air, the source of VOC vapors was assumed to be VOCs detected in soil gas at a depth of 5 feet below ground surface (Table 1). For the model runs, maximum detected soil gas chemical concentrations were used in the evaluation. Toxicity data used in the evaluation were taken from the most recent J&E model “VLOOKUP” table that is routinely updated by the Office of Environmental Health Hazard Analysis (OEHHA).

Potential health risks and hazards associated with the estimated indoor VOC concentrations were estimated using equations and methods established by the California DTSC and the U.S. Environmental Protection Agency (USEPA). Current regulatory guidance requires risk assessments to be conservative in nature and to overestimate any potential risks. Therefore, actual risks associated with conditions evaluated in this risk evaluation are likely to be lower than those described herein. The estimated incremental cancer risks and health hazards are summarized below.

- Using the maximum detected chloroform and PCE concentrations, the cancer risk for occupational receptors exposed to indoor air was estimated to be 7.8E-07 (Appendix A).

- Using the maximum detected chloroform and PCE concentrations, the hazard quotient for occupational receptors exposed to indoor air was estimated to be 0.01 (Appendix A).

The excess cancer risk was compared to the risk level considered acceptable by federal and state regulatory agencies. The target cancer risk level identified by the DTSC in the Preliminary Endangerment Assessment (PEA) Guidance Manual is 1 in one million (1.0E-06). However, the USEPA has established acceptable incremental cancer risk levels to be within the risk range of 1 in 10,000 (1.0E-04) and 1.0E-06; risks greater than 1.0E-04 are generally considered unacceptable. Cal-EPA has defined a risk of 1 in 100,000 (1.0E-05) as the "no significant level" for carcinogens under California's Safe Drinking Water and Toxic Enforcement Act (Proposition 65). Further, most California air districts use the 1.0E-05 risk level as the notification trigger level under California's AB2588 Toxic Hot Spots Program. Thus, although agencies will exercise caution in determining whether risks within the range of 1.0E-04 and 1.0E-06 require additional investigation or some form of risk management, there is a general precedent that predicted cancer risks below 1.0E-05 are considered acceptable and not warrant further evaluation. The estimated cancer risk is lower than the maximum acceptable risk level of one-in-a-hundred-thousand (1E-05) mandated by California's Safe Drinking Water and Toxics Enforcement Act of 1986 (Proposition 65).

The potential for noncancer effects due to exposure to a particular chemical is expressed as the hazard quotient (HQ). A HQ is the ratio of the estimated intake or average daily dose (ADD) of a chemical to the corresponding chemical-specific toxicity value. The HQs are compared to an acceptable hazard level. Implicit in the HQ is the assumption of a threshold level of exposure below which no adverse effects are expected to occur. For example, if the HQ exceeds unity (i.e., is greater than 1.0), site-specific exposure exceeds the reference toxicity value, then the potential for noncancer adverse effects may exist. In general, the greater the value above 1.0, the greater the potential hazard. In contrast, HQs less than 1.0 indicate that no adverse health effects are expected to occur from exposure to chemicals at the site. The estimated HQ is below 1.0, the benchmark level for non-cancer effects and therefore acceptable to the DTSC.

Findings and Conclusions

The following findings and conclusions are based on the data collected during this investigation.

- As noted in the attached laboratory report, PCE was reported in each collected soil gas sample. The reported PCE concentrations in soil gas samples collected beneath the onsite cleaners at SV-1 and SV-2 were 11,000 and 860 micrograms per cubic meter (µg/m^3), respectively.

- The PCE concentrations in the soil gas samples collected adjacent to the sewer pipeline in the adjoining alley were 560 and 200 µg/m^3 for samples SV-3 and SV-4, respectively .

- The highest PCE concentration was reported in the soil gas sample collected immediately adjacent to the dry cleaning machine, which is the suspected PCE source. The PCE concentrations decrease relatively rapidly with increased distance from this machine.

- Using the methods of risk assessment as outlined in the DTSC, screening risk evaluation manual (DTSC, 1999), the estimated cancer risk (7.8E-07) and non-cancer hazard (0.01) are below the regulatory threshold values of 1E-05 and 1.0 (Proposition 65), respectively. No significant cancer risks or noncancer hazards are anticipated to occur as a result of worker exposures to estimated concentrations of chloroform and PCE in indoor air at the site.

- Results of the evaluation indicate that the levels of chloroform and PCE detected in soil gas do not represent a significant health threat to occupants of the commercial building located at the site. Conclusions are based on reported soil gas chemical concentrations, reported soil gas sampling locations and expected worker exposure conditions.

- Based on data collected during this survey, PCE's detected in soil gas around the adjoining sewer pipeline, beneath the adjoining tenant space north of the alley and the site's eastern side do not pose a significant health risk to onsite receptors. Elevated PCE concentrations in soil gas are also not anticipated beneath the open areas located north of the site's western portion, or west, south, and east of the site.

Recommendation

Based on the findings and conclusions presented above, EFI considers further soil gas surveys unwarranted. EFI recommends closure for the site. Considerations for site closure include the following:

- Past investigations show that the groundwater beneath the site has not been significantly impacted with PCE. Although the PCE concentrations were slightly greater than the PCE's MCL within the site (7 µg/L and 12 µg/L in 2008), significantly higher PCE concentrations are not anticipated within the site or downgradient of the site.

- PCE concentrations reported in soil collected beneath the site during past investigation were less than the SF RWQCB ESLs. Elevated PCE concentrations in soil beneath the site, or concentrations that exceed screening levels, are not anticipated.

- Natural attenuation of PCE in soil, soil gas, and groundwater is anticipated in time (via volatilization, diffusion, and dispersion).

*　　*　　*

If you have any questions or require further information regarding this work plan, please contact either of us indicated below at 832.518.5145.

Sincerely,
EFI Global, Inc.

Quin Kinnebrew P.G.
Project Geologist

Heriberto Robles, Ph.D., D.A.B.T.
Toxicologist

Gary L. Bates
Director, Environmental and Remediation Services

E:\Projects 2012\EFI Global Western Region-Red Hanger\Soil Vapor Phase Of Work\Soil Vapor And SLRE Report.Doc

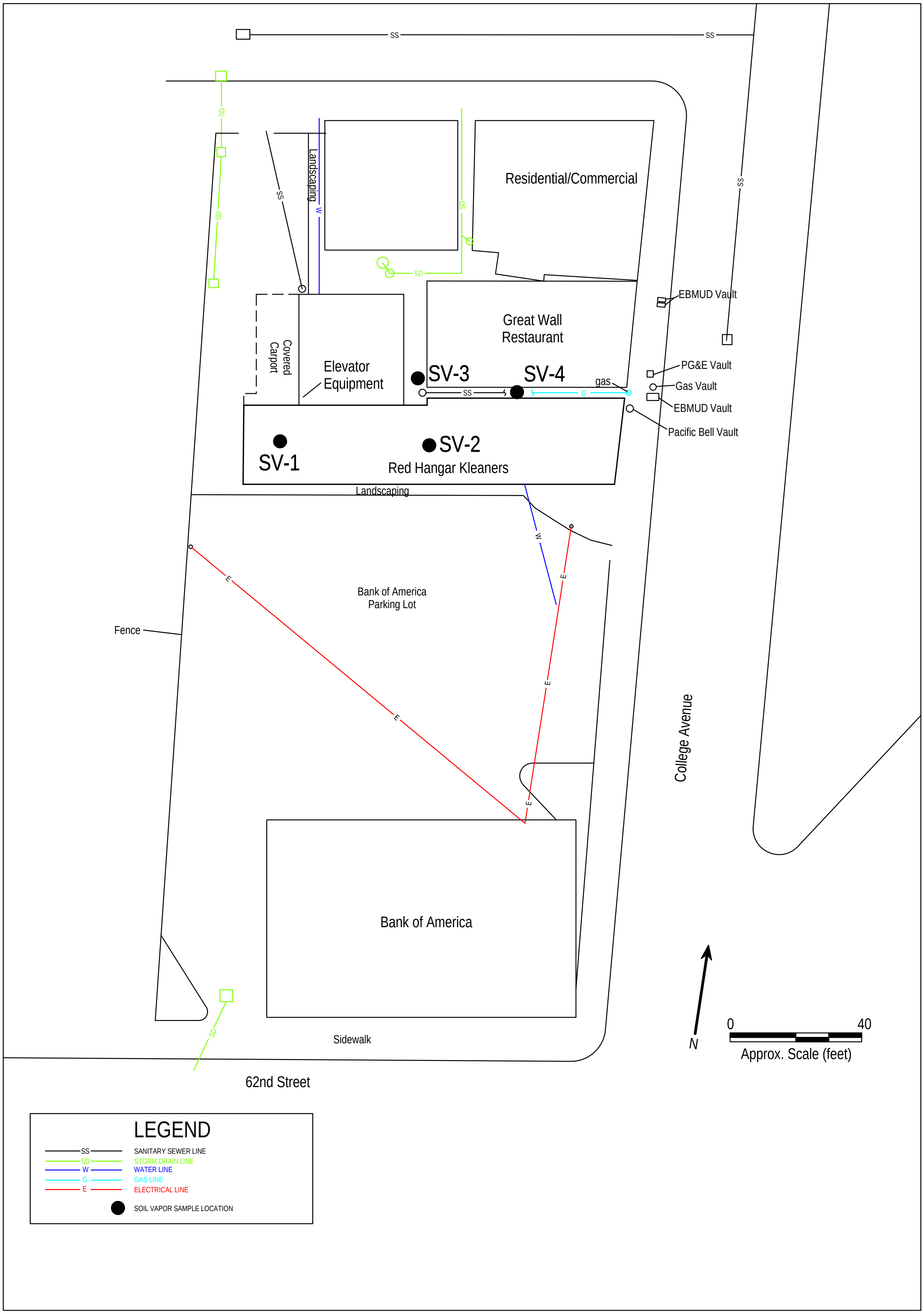
REGISTERED GEOLOGIST
QUIN KINNEBREW
No. 1801
Certified Engineering Geologist
STATE OF CALIFORNIA

TABLE 1
SUMMARY OF ANALYTICAL RESULTS
Red Hangar Cleaners Site

Sample ID	Depth (ft)	Purge Volume	Collection Date	Compounds	
				Chloroform	Tetrachloroethene
SV-1	5	3	12/9/2012	180	11,000
SV-2	5	3	12/9/2012	<100	860
SV-2 dup	5	3	12/9/2012	<100	890
SV-3	4	3	12/9/2012	<100	560
SV-4	4	3	12/9/2012	<100	200
Blank	--	--	12/9/2012	<100	<100

Notes: Results reported as mg/M^3

EFI Global
Complex Issues • Solid Solutions



EFI Global
Complex Issues • Solid Solutions

11000 Richmond Avenue
Suite 250
Houston, TX 77042
Tel: 832.518.5145
Tf: 866.464.2127
Fax: 832.518.5157
www.efiglobal.com

FIGURE 1
VAPOR SAMPLE LOCATIONS
Red Hangar Kleaners
6239 College Avenue
Oakland, California

Date:
12/21/2012

EFI Project No.:

EFI Global
Complex Issues • Solid Solutions

APPENDIX A
JOHNSON & ETTINGER MODEL

Table A-1
Estimated Indoor Air Exposure Point Concentrations
Residential Exposure Scenario
Red Hangar Cleaners Site

Chemical of Potential Concern (COPC)	CAS Number	Soil-Gas Concentration (µg/L)	Estimated Indoor Chemical Air Concentration (ug/m^3)
Chloroform	67663	0.18	3.36E-02
Tetrachloroethylene	127184	11	1.59E+00

Notes:

µg/L = micrograms per liter
NA = Not applicable or not available

Table A-2
Exposure Parameters for Onsite Receptors
Occupational Exposure Scenario
Red Hangar Cleaners Site

Exposure/Site Specific Parameters	Units	Exposure Parameters	
		Indoor Worker	Source
Chemical Concentration in Air (CA)		--	chemical-specific
Exposure Frequency (EF)	days/year	250	HERD 2005
Exposure Duration (ED)	years	25	HERD 2005
Exposure Time (ET)	hr/day	8	Default
Averaging Time for Noncarcinogens (AT_n)	hours	219,000	USEPA 2009
Averaging Time for Carcinogens (AT_c)	hours	613,200	USEPA 2009

Table A-3
Toxicity Criteria of Chemicals of Potential Concern
Red Hangar Cleaners Site

Chemical	Chronic Inhalation Reference Concentration (RfC) (mg/m^3)		Inhalation Unit Risk (ug/m^3)$^{-1}$	
VOCs				
Chloroform	3.0E-01	c	5.3E-06	c
Tetrachloroethylene	3.5E-02	c	5.9E-06	c

Notes:
c = Cal/EPA Cancer Potency Database 2013

Table A-4
Estimated Cumulative Risks and Hazards
Occupational Exposure Scenario
Red Hangar Cleaners Site

COPC	Occupational Exposure Scenario		
	Indoor Air Conc. (ug/m^3)	Cancer Risk	Hazard Index
		Indoor Worker	Indoor Worker
VOCs			
Chloroform	3.4E-02	1.4E-08	2.6E-05
Tetrachloroethylene	1.6E+00	7.6E-07	1.0E-02
TOTAL RISKS and HAZARDS		7.8E-07	1.0E-02

Notes:
" * "   compound not a COPC; " -- "   Not Applicable
Includes Outdor Inhalation of VOCs.
EPC: Exposure Point Concentration in milligrams per cubic meter of air.

DATA ENTRY SHEET

SG-SCREEN
EPA Version 2.0; 04/0

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 12/6/2011)

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)
67663	180
127184	11,000

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SCL		

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SCL	1.63	0.384	0.146	12

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	250

END

Building width (ft)	24
Building length (ft)	110
Area of building sq.ft.	2,640
Area of building (cm2)	2,452,640
Height of building ft.	18
Volume of building (cm^3)	1.35E+09
Air exchange per hour	1
Ventilation rate (cm^3/sec)	373,782
Seam perimeter (cm)	6,264
Depth below grade (ft)	5
Depth below grade (cm)	152.4
Recommended Q_soil (L/m)/Building area (cm2) ratio	5.00E-06

Appendix A - Johnson and Ettinger Model

Area of

Chemicals	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)	Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)
Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	5.3E-06	3.0E-01	119.38	137.4	0.238	0.259	2.09E-09	0.859	1.79E-09
Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	5.9E-06	3.5E-02	165.83	137.4	0.238	0.259	2.09E-09	0.859	1.79E-09

Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy o porization ave. soil emperature $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil emperature H'_{TS} (unitless)	Vapor viscosity at ave. soil emperature μ_{TS} (g/cm-s)	zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
6,264	1.80E+02	3.74E+05	2.45E+06	5.00E-03	15	7,407	3.51E-03	1.44E-01	1.80E-04	5.92E-03	137.4	15	1.80E+02	1.96	2.04E+02	5.92E-03	1.23E+04	1.67E+12	1.86E-04	3.36E-02
6,264	1.10E+04	3.74E+05	2.45E+06	5.00E-03	15	9,410	1.74E-02	7.14E-01	1.80E-04	4.10E-03	137.4	15	1.10E+04	1.96	2.04E+02	4.10E-03	1.23E+04	4.55E+17	1.44E-04	1.59E+00

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α_1 (1/cm)	N (unitless)	M (unitless)	n (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)	Bulk Density (g/cm^3)	θ_w (cm^3/cm^3)	SCS Soil Name
C	0.61	0.01496	1.253	0.2019	0.459	0.098	0.0092	1.43	0.215	Clay
CL	0.34	0.01581	1.416	0.2938	0.442	0.079	0.016	1.48	0.168	Clay Loam
L	0.50	0.01112	1.472	0.3207	0.399	0.061	0.020	1.59	0.148	Loam
LS	4.38	0.03475	1.746	0.4273	0.390	0.049	0.040	1.62	0.076	Loamy Sand
S	26.78	0.03524	3.177	0.6852	0.375	0.053	0.044	1.66	0.054	Sand
SC	0.47	0.03342	1.208	0.1722	0.385	0.117	0.025	1.63	0.197	Sandy Clay
SCL	0.55	0.02109	1.330	0.2481	0.384	0.063	0.029	1.63	0.146	Sandy Clay Loam
SI	1.82	0.00658	1.679	0.4044	0.489	0.050	0.0046	1.35	0.167	Silt
SIC	0.40	0.01622	1.321	0.2430	0.481	0.111	0.0039	1.38	0.216	Silty Clay
SICL	0.46	0.00839	1.521	0.3425	0.482	0.090	0.0056	1.37	0.198	Silty Clay Loam
SIL	0.76	0.00506	1.663	0.3987	0.439	0.065	0.011	1.49	0.180	Silt Loam
SL	1.60	0.02667	1.449	0.3099	0.387	0.039	0.030	1.62	0.103	Sandy Loam

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.24E+00	3.03E-02	25	349.90	556.60	7,127
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	14,000
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	7.30E+00	5.73E-04	1.40E-05	25	596.55	839.36	15,000
60297	Ethyl ether	5.73E+00	7.82E-02	8.61E-06	5.68E+04	1.35E+00	3.29E-02	25	307.50	466.74	6,338
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.18E-04	1.51E-05	25	613.32	842.25	17,000
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.87E-05	25	329.20	508.10	6,955
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.79E+03	2.27E-01	5.54E-03	25	353.24	562.16	7,342
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.03E-01	1.72E-02	25	347.24	545.00	7,136
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	1.00E-01	6.46E-04	1.58E-05	25	651.02	848.49	16,000
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.59E-04	2.09E-05	25	636.44	860.38	15,000
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.55E-01	6.22E-03	25	276.71	467.00	5,714
74873	Methyl chloride (chloromethane)	2.12E+00	1.26E-01	6.50E-06	5.33E+03	3.61E-01	8.80E-03	25	249.00	416.25	5,115
74908	Hydrogen cyanide	3.80E+00	1.93E-01	2.10E-05	1.00E+06	5.44E-03	1.33E-04	25	299.00	456.70	6,676
74953	Methylene bromide	1.26E+01	4.30E-02	8.44E-06	1.19E+04	3.52E-02	8.59E-04	25	370.00	583.00	7,868
75003	Chloroethane (ethyl chloride)	4.40E+00	2.71E-01	1.15E-05	5.68E+03	3.61E-01	8.80E-03	25	285.30	460.40	5,879
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-05	8.80E+03	1.10E+00	2.69E-02	25	259.25	432.00	5,250
75058	Acetonitrile	4.20E+00	1.28E-01	1.66E-05	1.00E+06	1.42E-03	3.45E-05	25	354.60	545.50	7,110
75070	Acetaldehyde	1.06E+00	1.24E-01	1.41E-05	1.00E+06	3.23E-03	7.87E-05	25	293.10	466.00	6,157
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.96E-02	2.18E-03	25	313.00	510.00	6,706
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391
75218	Ethylene oxide	1.33E+00	1.04E-01	1.45E-05	3.04E+05	2.27E-02	5.54E-04	25	283.60	469.00	6,104
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.41E-02	5.88E-04	25	422.35	696.00	9,479
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.54E-02	1.60E-03	25	363.15	585.85	7,800
75296	2-Chloropropane	9.14E+00	8.88E-02	1.01E-05	3.73E+03	5.93E-01	1.45E-02	25	308.70	485.00	6,286
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.60E-02	25	304.75	576.05	6,247
75456	Chlorodifluoromethane	4.79E+01	1.01E-01	1.28E-05	2.00E+00	1.10E+00	2.70E-02	25	232.40	369.30	4,836
75694	Trichlorofluoromethane	4.97E+02	8.70E-02	9.70E-06	1.10E+03	3.97E+00	9.68E-02	25	296.70	471.00	5,999
75718	Dichlorodifluoromethane	4.57E+02	6.65E-02	9.92E-06	2.80E+02	1.40E+01	3.42E-01	25	243.20	384.95	9,421
76131	1,1,2-Trichloro-1,2,2-trifluoroetha	1.11E+04	7.80E-02	8.20E-06	1.70E+02	1.97E+01	4.80E-01	25	320.70	487.30	6,463
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	6.05E+01	1.48E+00	25	603.69	846.31	13,000
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.10E+00	2.69E-02	25	512.15	746.00	10,931
78831	Isobutanol	2.59E+00	8.60E-02	9.30E-06	8.50E+04	4.83E-04	1.18E-05	25	381.04	547.78	10,936
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.79E-03	25	369.52	572.00	7,590
78933	Methylethylketone (2-butanone)	2.30E+00	8.08E-02	9.80E-06	2.23E+05	2.29E-03	5.58E-05	25	352.50	536.78	7,481
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.73E-02	9.11E-04	25	386.15	602.00	8,322
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.47E+03	4.21E-01	1.03E-02	25	360.36	544.20	7,505
79209	Methyl acetate	3.26E+00	1.04E-01	1.00E-05	2.00E+03	4.84E-03	1.18E-04	25	329.80	506.70	7,260
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.96E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996
79469	2-Nitropropane	1.17E+01	9.23E-02	1.01E-05	1.70E+04	5.03E-03	1.23E-04	25	393.20	594.00	8,383
80626	Methylmethacrylate	6.98E+00	7.70E-02	8.60E-06	1.50E+04	1.38E-02	3.36E-04	25	373.50	567.00	8,975
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	3.57E+00	6.34E-03	1.55E-04	25	550.54	803.15	12,155
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.60E-03	6.34E-05	25	570.44	870.00	12,666
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.20E+00	3.33E-01	8.13E-03	25	486.15	738.00	10,206
88722	TBD	3.24E+02	5.87E-02	8.67E-06	6.50E+02	5.11E-04	1.25E-05	25	495.00	720.00	12,239
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.82E-04	25	491.14	748.40	10,373
91576	2-Methylnaphthalene	2.81E+03	5.22E-02	7.75E-06	2.46E+01	2.12E-02	5.17E-04	25	514.26	761.00	12,600
92524	Biphenyl	4.38E+03	4.04E-02	8.15E-06	7.45E+00	1.23E-02	2.99E-04	25	529.10	789.00	10,890
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.12E-01	5.18E-03	25	417.60	630.30	8,661
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.77E-02	1.90E-03	25	453.57	705.00	9,700
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572
95636	1,2,4-Trimethylbenzene	1.35E+03	6.06E-02	7.92E-06	5.70E+01	2.52E-01	6.14E-03	25	442.30	649.17	9,369
96184	1,2,3-Trichloropropane	2.20E+01	7.10E-02	7.90E-06	1.75E+03	1.67E-02	4.08E-04	25	430.00	652.00	9,171
96333	Methyl acrylate	4.53E+00	9.76E-02	1.02E-05	6.00E+04	7.68E-03	1.87E-04	25	353.70	536.00	7,749
97632	Ethylmethacrylate	2.95E+01	6.53E-02	8.37E-06	3.67E+03	3.44E-02	8.40E-04	25	390.00	571.00	10,957
98066	tert-Butylbenzene	7.71E+02	5.65E-02	8.02E-06	2.95E+01	4.87E-01	1.19E-02	25	442.10	1220.00	8,980
98828	Cumene	4.89E+02	6.50E-02	7.10E-06	6.13E+01	4.74E+01	1.16E+00	25	425.56	631.10	10,335
98862	Acetophenone	5.77E+01	6.00E-02	8.73E-06	6.13E+03	4.38E-04	1.07E-05	25	475.00	709.50	11,732
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.82E-04	2.39E-05	25	483.95	719.00	10,566
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.22E-01	7.86E-03	25	409.34	617.20	8,501
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.12E-01	2.74E-03	25	418.31	636.00	8,737
100447	Benzylchloride	6.14E+01	7.50E-02	7.80E-06	5.25E+02	1.70E-02	4.14E-04	25	452.00	685.00	8,773
100527	Benzaldehyde	4.59E+01	7.21E-02	9.07E-06	3.30E+03	9.73E-04	2.37E-05	25	452.00	695.00	11,658
103651	n-Propylbenzene	5.62E+02	6.01E-02	7.83E-06	6.00E+01	4.37E-01	1.07E-02	25	432.20	630.00	9,123

CalEPA Toxicity Criteria in bold
(last updated 12/02/2011 DTSC/HERO)

Original EPA Values

CAS No.	Chemical	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)	URF extrapolated (X)	RfC extrapolated (X)	Original EPA: Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Original EPA: Reference conc., RfC (mg/m^3)	Original EPA: URF extrapolated (X)	Original EPA: RfC extrapolated (X)
56235	Carbon tetrachloride	**4.2E-05**	**4.0E-02**	1.54E+02			1.5E-05	0.0E+00		
57749	Chlordane	**3.4E-04**	7.0E-04	4.10E+02			1.0E-04	7.0E-04		
58899	gamma-HCH (Lindane)	**3.1E-04**	1.1E-03	2.91E+02	?	X	3.7E-04	1.1E-03	X	X
60297	Ethyl ether	0.0E+00	7.0E-01	7.41E+01		X	0.0E+00	7.0E-01		X
60571	Dieldrin	**4.6E-03**	1.8E-04	3.81E+02		X	4.6E-03	1.8E-04		X
67641	Acetone	0.0E+00	**3.1E+01**	5.81E+01		X	0.0E+00	3.5E-01		X
67663	Chloroform	**5.3E-06**	**3.0E-01**	1.19E+02			2.3E-05	0.0E+00		
67721	Hexachloroethane	**1.1E-05**	3.5E-03	2.37E+02		X	4.0E-06	3.5E-03		X
71432	Benzene	**2.9E-05**	3.0E-02	7.81E+01			7.8E-06	0.0E+00		
71556	1,1,1-Trichloroethane	0.0E+00	**5.0E+00**	1.33E+02			0.0E+00	2.2E+00		
72435	Methoxychlor	0.0E+00	1.8E-02	3.46E+02		X	0.0E+00	1.8E-02		X
72559	DDE	**9.7E-05**	NA	3.18E+02	?		9.7E-05	0.0E+00	X	
74839	Methyl bromide	0.0E+00	**5.0E-03**	9.49E+01			0.0E+00	5.0E-03		
74873	Methyl chloride (chloromethane)	**1.8E-06**	9.0E-02	5.05E+01			1.0E-06	9.0E-02		
74908	Hydrogen cyanide	0.0E+00	3.0E-03	2.70E+01			0.0E+00	3.0E-03		
74953	Methylene bromide	0.0E+00	3.5E-02	1.74E+02		X	0.0E+00	3.5E-02		X
75003	Chloroethane (ethyl chloride)	8.3E-07	1.0E+01	6.45E+01	?		8.3E-07	1.0E+01	X	
75014	Vinyl chloride (chloroethene)	**7.8E-05**	1.0E-01	6.25E+01			8.8E-06	1.0E-01		
75058	Acetonitrile	0.0E+00	6.0E-02	4.11E+01			0.0E+00	6.0E-02		
75070	Acetaldehyde	**2.7E-06**	**9.0E-03**	4.41E+01			2.2E-06	9.0E-03		
75092	Methylene chloride	**1.0E-06**	**4.0E-01**	8.49E+01			4.7E-07	3.0E+00		
75150	Carbon disulfide	0.0E+00	7.0E-01	7.61E+01			0.0E+00	7.0E-01		
75218	Ethylene oxide	**8.8E-05**	**3.0E-02**	4.41E+01		?	1.0E-04	0.0E+00		
75252	Bromoform	1.1E-06	7.0E-02	2.53E+02		X	1.1E-06	7.0E-02		X
75274	Bromodichloromethane	**3.7E-05**	7.0E-02	1.64E+02	?	X	1.8E-05	7.0E-02	X	X
75296	2-Chloropropane	0.0E+00	1.0E-01	7.85E+01		?	0.0E+00	1.0E-01		
75343	1,1-Dichloroethane	**1.6E-06**	**7.0E-01**	9.90E+01		X	0.0E+00	5.0E-01		
75354	1,1-Dichloroethylene	0.0E+00	**7.0E-02**	9.69E+01			0.0E+00	2.0E-01		
75456	Chlorodifluoromethane	0.0E+00	5.0E+01	8.65E+01			0.0E+00	5.0E+01		
75694	Trichlorofluoromethane	0.0E+00	7.0E-01	1.37E+02			0.0E+00	7.0E-01		
75718	Dichlorodifluoromethane	0.0E+00	2.0E-01	1.21E+02			0.0E+00	2.0E-01		
76131	1,1,2-Trichloro-1,2,2-trifluoroetha	0.0E+00	3.0E+01	1.87E+02			0.0E+00	3.0E+01		
76448	Heptachlor	**1.2E-03**	1.8E-03	3.73E+02		X	1.3E-03	1.8E-03		X
77474	Hexachlorocyclopentadiene	0.0E+00	2.0E-04	2.73E+02			0.0E+00	2.0E-04		
78831	Isobutanol	0.0E+00	1.1E+00	7.41E+01		X	0.0E+00	1.1E+00		X
78875	1,2-Dichloropropane	**1.0E-05**	4.0E-03	1.13E+02	?		1.9E-05	4.0E-03	X	
78933	Methylethylketone (2-butanone)	0.0E+00	5.0E+00	7.21E+01			0.0E+00	1.0E+00		
79005	1,1,2-Trichloroethane	**1.6E-05**	1.4E-02	1.33E+02		X	1.6E-05	1.4E-02		X
79016	Trichloroethylene	**4.1E-06**	**2.0E-03**	1.31E+02			1.1E-04	4.0E-02	X	
79209	Methyl acetate	0.0E+00	3.5E+00	7.41E+01		X	0.0E+00	3.5E+00		X
79345	1,1,2,2-Tetrachloroethane	**5.8E-05**	**1.4E-02**	1.68E+02		X	5.8E-05	2.1E-01		X
79469	2-Nitropropane	2.7E-03	2.0E-02	8.91E+01			2.7E-03	2.0E-02		
80626	Methylmethacrylate	0.0E+00	7.0E-01	1.00E+02			0.0E+00	7.0E-01		
83329	Acenaphthene	0.0E+00	2.1E-01	1.54E+02		X	0.0E+00	2.1E-01		X
86737	Fluorene	0.0E+00	1.4E-01	1.66E+02		X	0.0E+00	1.4E-01		X
87683	Hexachloro-1,3-butadiene	2.2E-05	**3.5E-03**	2.61E+02		X	2.2E-05	7.0E-04		X
88722	TBD	0.0E+00	**NA**	1.37E+02		X	0.0E+00	3.5E-02		X
91203	Naphthalene	**3.4E-05**	3.0E-03	1.28E+02			0.0E+00	3.0E-03		
91576	2-Methylnaphthalene	0.0E+00	**1.4E-02**	1.42E+02		X	0.0E+00	7.0E-02		X
92524	Biphenyl	0.0E+00	1.8E-01	1.54E+02		X	0.0E+00	1.8E-01		X
95476	o-Xylene	0.0E+00	1.0E-01	1.06E+02			0.0E+00	1.0E-01		
95501	1,2-Dichlorobenzene	0.0E+00	2.0E-01	1.47E+02			0.0E+00	2.0E-01		
95578	2-Chlorophenol	0.0E+00	1.8E-02	1.29E+02		X	0.0E+00	1.8E-02		X
95636	1,2,4-Trimethylbenzene	0.0E+00	**7.0E-03**	1.20E+02			0.0E+00	6.0E-03		
96184	1,2,3-Trichloropropane	**8.6E-03**	**3.0E-04**	1.47E+02	X		5.7E-04	4.9E-03	X	
96333	Methyl acrylate	0.0E+00	1.1E-01	8.61E+01		X	0.0E+00	1.1E-01		X
97632	Ethylmethacrylate	0.0E+00	3.2E-01	1.14E+02		X	0.0E+00	3.2E-01		X
98066	tert-Butylbenzene	0.0E+00	1.4E-01	1.34E+02		X	0.0E+00	1.4E-01		X
98828	Cumene	0.0E+00	4.0E-01	1.20E+02			0.0E+00	4.0E-01		
98862	Acetophenone	0.0E+00	3.5E-01	1.20E+02		X	0.0E+00	3.5E-01		X
98953	Nitrobenzene	0.0E+00	2.0E-03	1.23E+02			0.0E+00	2.0E-03		
100414	Ethylbenzene	**2.5E-06**	1.0E+00	1.06E+02			0.0E+00	1.0E+00		
100425	Styrene	0.0E+00	**9.0E-01**	1.04E+02			0.0E+00	1.0E+00		
100447	Benzylchloride	**4.9E-05**	**1.0E-03**	1.27E+02	?		4.9E-05	0.0E+00	X	
100527	Benzaldehyde	0.0E+00	3.5E-01	1.06E+02		X	0.0E+00	3.5E-01		X
103651	n-Propylbenzene	0.0E+00	1.4E-01	1.20E+02		X	0.0E+00	1.4E-01		X

104518	n-Butylbenzene	1.11E+03	5.70E-02	8.12E-06	2.00E+00	5.38E-01	1.31E-02	25	456.46	660.50	9,290	0.0E+00	1.4E-01	1.34E+02		X	0.0E+00	1.4E-01		X
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.13E-01	7.64E-03	25	411.52	616.20	8,525	0.0E+00	1.0E-01	1.06E+02		?	0.0E+00	1.0E-01		
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.90E+01	9.82E-02	2.39E-03	25	447.21	684.75	9,271	**1.1E-05**	**8.0E-01**	1.47E+02			0.0E+00	8.0E-01		
106934	1,2-Dibromoethane (ethylene dibr	2.50E+01	2.17E-02	1.19E-05	4.18E+03	3.04E-02	7.41E-04	25	404.60	583.00	8,310	**7.1E-05**	**8.0E-04**	1.88E+02			6.0E-04	9.0E-03		
106990	1,3-Butadiene	1.91E+01	2.49E-01	1.08E-05	7.35E+02	3.01E+00	7.34E-02	25	268.60	425.00	5,370	**1.7E-04**	2.0E-03	5.41E+01			3.0E-05	0.0E+00		
107028	Acrolein	2.76E+00	1.05E-01	1.22E-05	2.13E+05	4.99E-03	1.22E-04	25	325.60	506.00	6,731	0.0E+00	2.0E-05	5.61E+01			0.0E+00	2.0E-05		
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.00E-02	9.77E-04	25	356.65	561.00	7,643	**2.1E-05**	**4.0E-01**	9.90E+01			2.6E-05	0.0E+00		
107131	Acrylonitrile	5.90E+00	1.22E-01	1.34E-05	7.40E+04	4.21E-03	1.03E-04	25	350.30	519.00	7,786	**2.9E-04**	2.0E-03	5.31E+01			6.8E-05	2.0E-03		
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.09E-02	5.10E-04	25	345.65	519.13	7,800	0.0E+00	**2.0E-01**	8.61E+01			0.0E+00	2.0E-01		
108101	Methylisobutylketone (4-methyl-2	9.06E+00	7.50E-02	7.80E-06	1.90E+04	5.64E-03	1.38E-04	25	389.50	571.00	8,243	0.0E+00	**3.0E+00**	1.00E+02			0.0E+00	8.0E-02		
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.00E-01	7.32E-03	25	412.27	617.05	8,523	0.0E+00	1.0E-01	1.06E+02		?	0.0E+00	1.0E-01		
108678	1,3,5-Trimethylbenzene	1.35E+03	6.02E-02	8.67E-06	2.00E+00	2.41E-01	5.87E-03	25	437.89	637.25	9,321	0.0E+00	6.0E-03	1.20E+02			0.0E+00	6.0E-03		
108872	Methylcyclohexane	7.85E+01	7.35E-02	8.52E-06	1.40E+01	4.22E+00	1.03E-01	25	373.90	572.20	7,474	0.0E+00	3.0E+00	9.82E+01		?	0.0E+00	3.0E+00		
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.62E-03	25	383.78	591.79	7,930	0.0E+00	**3.0E-01**	9.21E+01			0.0E+00	4.0E-01		
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.51E-01	3.69E-03	25	404.87	632.40	8,410	0.0E+00	**1.0E+00**	1.13E+02			0.0E+00	6.0E-02		
109693	1-Chlorobutane	1.72E+01	8.26E-02	1.00E-05	1.10E+03	6.93E-01	1.69E-02	25	351.60	542.00	7,263	0.0E+00	**1.4E-01**	9.26E+01		X	0.0E+00	1.4E+00		X
110009	Furan	1.86E+01	1.04E-01	1.22E-05	1.00E+04	2.21E-01	5.39E-03	25	304.60	490.20	6,477	0.0E+00	3.5E-03	6.81E+01		X	0.0E+00	3.5E-03		X
110543	Hexane	4.34E+01	2.00E-01	7.77E-06	1.24E+01	6.82E+01	1.66E+00	25	341.70	508.00	6,895	0.0E+00	**7.0E-01**	8.62E+01			0.0E+00	2.0E-01		
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.36E-04	1.80E-05	25	451.15	659.79	10,803	**7.1E-04**	NA	1.43E+02			3.3E-04	0.0E+00		
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.58E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02	4.07E+02		X	0.0E+00	2.1E-02		X
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	5.00E-03	5.40E-02	1.32E-03	25	582.55	825.00	14,447	**5.1E-04**	2.8E-03	2.85E+02		X	4.6E-04	2.8E-03		X
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	4.88E+01	5.81E-02	1.42E-03	25	486.15	725.00	10,471	**0.0E+00**	**4.0E-03**	1.81E+02			0.0E+00	2.0E-01		
123739	Crotonaldehyde (2-butenal)	4.82E+00	9.56E-02	1.07E-05	3.69E+04	7.99E-04	1.95E-05	25	375.20	568.00	9	5.4E-04	NA	7.01E+01	X		5.4E-04	0.0E+00	X	
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.20E-02	7.81E-04	25	416.14	678.20	5,900	**2.7E-05**	7.0E-02	2.08E+02	?	X	2.4E-05	7.0E-02	X	X
126987	Methacrylonitrile	3.58E+01	1.12E-01	1.32E-05	2.54E+04	1.01E-02	2.46E-04	25	363.30	554.00	7,600	0.0E+00	7.0E-04	6.71E+01			0.0E+00	7.0E-04		
126998	2-Chloro-1,3-butadiene (chloropre	6.73E+01	8.58E-02	1.03E-05	2.12E+03	4.91E-01	1.20E-02	25	332.40	525.00	8,075	0.0E+00	7.0E-03	8.85E+01			0.0E+00	7.0E-03		
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.53E-01	1.84E-02	25	394.40	620.20	8,288	**5.9E-06**	**3.5E-02**	1.66E+02			3.0E-06	0.0E+00		
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E+00	4.50E-04	1.10E-05	25	667.95	936	14370	0.0E+00	1.1E-01	2.02E+02		X	0.0E+00	1.1E-01		X
132649	Dibenzofuran	5.15E+03	2.38E-02	6.00E-06	3.10E+00	5.15E-04	1.26E-05	25	560	824	66400	0.0E+00	1.4E-02	1.68E+02		X	0.0E+00	1.4E-02		X
135988	sec-Butylbenzene	9.66E+02	5.70E-02	8.12E-06	3.94E+00	5.68E-01	1.39E-02	25	446.5	679	88730	0.0E+00	1.4E-01	1.34E+02		X	0.0E+00	1.4E-01		X
141786	Ethylacetate	6.44E+00	7.32E-02	9.70E-06	8.03E+04	5.64E-03	1.38E-04	25	350.26	523.3	7633.66	0.0E+00	3.2E+00	8.81E+01		X	0.0E+00	3.2E+00		X
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544	7192	0.0E+00	3.5E-02	9.69E+01		X	0.0E+00	3.5E-02		X
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.84E-01	9.36E-03	25	320.85	516.5	6717	0.0E+00	**6.0E-02**	9.69E+01		X	0.0E+00	7.0E-02		X
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.54E-03	1.11E-04	25	715.9	969.27	17000	**1.1E-04**	NA	2.52E+02	?		2.1E-04	0.0E+00	X	
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	6.30E-03	3.87E-03	9.44E-05	25	714.15	979	16455	**1.1E-05**	NA	2.28E+02	?		2.1E-06	0.0E+00	X	
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.70E-02	6.95E-03	1.70E-04	25	603.01	839.37	15000	**4.9E-03**	1.1E-04	3.65E+02		X	4.9E-03	1.1E-04		X
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.34E-04	1.06E-05	25	596.55	839.36	15000	**7.7E-04**	NA	2.91E+02			1.8E-03	0.0E+00		
541731	1,3-Dichlorobenzene	1.98E+03	6.92E-02	7.86E-06	1.34E+02	1.27E-01	3.09E-03	25	446	684	9230.18	0.0E+00	1.1E-01	1.47E+02		X	0.0E+00	1.1E-01		X
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.24E-01	1.77E-02	25	381.15	587.38	7900	**1.6E-05**	2.0E-02	1.11E+02			4.0E-06	2.0E-02		
630206	1,1,1,2-Tetrachloroethane	1.16E+02	7.10E-02	7.90E-06	1.10E+03	9.90E-02	2.41E-03	25	403.5	624	9768.282525	7.4E-06	1.1E-01	1.68E+02		X	7.4E-06	1.1E-01		X
1634044	MTBE	7.26E+00	1.02E-01	1.05E-05	5.10E+04	2.56E-02	6.23E-04	25	328.3	497.1	6677.66	**2.6E-07**	3.0E+00	8.82E+01			0.0E+00	3.0E+00		
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	2.00E+01	4.40E-01	1.07E-02	25	629.88	1750	14127	0.0E+00	**3.0E-05**	2.01E+02			0.0E+00	3.0E-04		

APPENDIX B
LABORATORY REPORT

TEG Northern California Inc.

20 December 2012

Mr. Tim Herbert
EFI Global, Inc.
11000 Richmond Avenue, Suite 250
Houston, Texas 77042

SUBJECT: DATA REPORT - EFI Global, Inc. Project
Red Hanger Kleaners / 6239 College Avenue, Oakland, California

TEG Project # 21209E

Mr. Herbert:

Please find enclosed a data report for the samples analyzed from the above referenced project for EFI Global, Inc. The samples were analyzed in TEG's mobile laboratory. TEG conducted a total of 10 analyses on 5 soil vapor samples.

-- 5 analyses on soil vapors for volatile organic hydrocarbons by EPA method 8260B.

-- 5 analyses on soil vapors for methane, oxygen, and carbon dioxide by GC/TCD.

The results of the analyses are summarized in the enclosed tables. Applicable detection limits and calibration data are included in the tables.

TEG appreciates the opportunity to have provided analytical services to EFI Global, Inc. on this project. If you have any further questions relating to these data or report, please do not hesitate to contact us.

Sincerely,

Mark Jerpbak
Director, TEG-Northern California

teg

EFI Global
Red Hanger Kleaners
6239 College Avenue, Oakland, California

TEG Project #21209E

Analyses of SOIL VAPOR
EPA Method 8260B (VOCs) in micrograms per cubic meter of Vapor
Oxygen and Carbon Dioxide in percent by Volume; Methane in ppmV

SAMPLE NUMBER:		Blank	SV-1	SV-2	SV-2 dup	SV-3	SV-4
SAMPLE DEPTH (feet):			5.0	5.0	5.0	4.0	4.0
PURGE VOLUME:			3	3	3	3	3
COLLECTION DATE:		12/09/12	12/09/12	12/09/12	12/09/12	12/09/12	12/09/12
DILUTION FACTOR (VOCs):	RL	1	1	1	1	1	1
Dichlorodifluoromethane	100	nd	nd	nd	nd	nd	nd
Vinyl Chloride	100	nd	nd	nd	nd	nd	nd
Chloroethane	100	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	100	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	100	nd	nd	nd	nd	nd	nd
1,1,2-Trichloro-trifluoroethane	100	nd	nd	nd	nd	nd	nd
Methylene Chloride	100	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	100	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	100	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	100	nd	nd	nd	nd	nd	nd
Chloroform	100	nd	180	nd	nd	nd	nd
1,1,1-Trichloroethane	100	nd	nd	nd	nd	nd	nd
Carbon Tetrachloride	100	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane	100	nd	nd	nd	nd	nd	nd
Benzene	80	nd	nd	nd	nd	nd	nd
Trichloroethene	100	nd	nd	nd	nd	nd	nd
Toluene	200	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	100	nd	nd	nd	nd	nd	nd
Tetrachloroethene	100	nd	11000	860	890	560	200
Ethylbenzene	100	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	100	nd	nd	nd	nd	nd	nd
m,p-Xylene	200	nd	nd	nd	nd	nd	nd
o-Xylene	100	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	100	nd	nd	nd	nd	nd	nd
Methane	1000	nd	nd	nd	nd	nd	nd
Oxygen	1.0	21	21	19	18	21	21
Carbon Dioxide	1.0	nd	nd	3.1	2.7	nd	nd
Isopropyl Alcohol (leak check)	10000	nd	nd	nd	nd	nd	nd
Surrogate Recovery (DBFM)		94%	95%	100%	93%	101%	99%
Surrogate Recovery (Toluene-d8)		98%	99%	87%	90%	97%	90%
Surrogate Recovery (1,4-BFB)		83%	82%	87%	81%	85%	89%

'RL' Indicates reporting limit at a dilution factor of 1
'nd' Indicates not detected at listed reporting limits

Analyses performed in TEG-Northern California's lab
Analyses performed by: Mr. Leif Jonsson

11350 Monier Park Place, Rancho Cordova, CA 95742 • Phone (916) 853-8010 • Fax (916) 853-8020

EFI Global
Red Hanger Kleaners
6239 College Avenue, Oakland, California

TEG Project #21209E

CALIBRATION DATA - Calibration Check Compounds

	Vinyl Chloride	1,1 DCE	Chloroform	1,2 DCP	Toluene	Ethylbenzene
Midpoint	50.0	50.0	50.0	50.0	50.0	50.0

Continuing Calibration - Midpoint

12/09/12	40.6	47.5	54.8	46.9	54.1	53.3
	81.2%	95.0%	109.6%	93.8%	108.2%	106.6%