METROVATION

RECEIVED

By Alameda County Environmental Health 8:37 am, Jan 05, 2016

January 4, 2016

Mr. Jerry Wickham
Senior Hazardous Materials Specialist
Alameda County Health Care Services Agency
Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Re: Terradev Jefferson LLC Property
645 Fourth Street, Oakland, CA 94607
Fuel Leak Case No. RO0003001
Blue Rock Project No. ASE-1

Dear Mr. Wickham,

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.

Sincerely,

Sara May
Director of Operations
Metrovation, LLC, managing agent for
Terradev Jefferson, LLC

Attachment:

Blue Rock Environmental, Inc.'s *Indoor Air Study – Report of Initial Findings* dated January 4, 2016.

OAKLAND IRONWORKS BUILDING
580 SECOND STREET, SUITE 260, OAKLAND CA 94607 TELEPHONE (510) 839-4000 FAX (510) 839-4025

BLUE ROCK
ENVIRONMENTAL, INC.

Mr. Jerry Wickham
Senior Hazardous Materials Specialist
Alameda County Health Care Services Agency
Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

January 4, 2016

Re: **Indoor Air Study – Report of Initial Findings**
Terradev Jefferson LLC Property
645 4th Street, Oakland, CA 94607
Fuel Leak Case No. RO0003001
Blue Rock Project No. ASE-1

Dear Mr. Wickham,

This report, prepared by Blue Rock Environmental, Inc. (Blue Rock) on behalf of Terradev Jefferson, LLC, presents the results of additional sub-slab vapor sampling at the subject site, and initial indoor air sampling within the buildings of 645 4th Street, 380 MLK Jr. Way, and 638 3rd Street in Oakland, California (Figure 1). This work was proposed as a contingency plan in the *Workplan for Additional Site Characterization, Sub-Slab Vapor Sampling, and Indoor Air Sampling* dated June 17, 2015, which was approved by the Alameda County Department of Environmental Health (ACDEH) in a letter dated July 13, 2015. Additional information on sampling was presented in Blue Rock's email of November 19, 2015, which was concurred with by the ACDEH in an email of December 1, 2015. Please note that the investigative methodologies documented herein are in general accordance with the California Environmental Protection Agency - Department of Toxic Substances Control's (DTSC's) *Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (DTSC Guidance Document; DTSC, 2011) used in conjunction with the San Francisco Bay Regional Water Quality Control Board's *Users Guide: Derivation and Application of Environmental Screening Levels* (ESLs; SFBRWQCB 2013). The sampling event and following risk assessment evaluations contained herein were conducted to provide an initial assessment of indoor air conditions and potential associated human health risk.

This work was performed as part of an ongoing investigation of a leaking underground storage tank (UST) associated 645 4th Street. The UST, located in the southern sidewalk of 4th Street, was closed in-place under permit in 2006. Historical site investigation sample locations are shown on Figure 2 and well construction and analytical data are summarized in Tables 1, 2, 3, 4, 5, and 6. Please refer to technical documents on the project's GeoTracker web-page for detailed site history: http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T10000001072.

Sub-Slab Vapor Sampling

Sub-Slab Vapor Point Purging and Sampling

On December 5, 2015, Blue Rock purged and sampled four sub-slab vapor points: VP-1, VP-2, VP-4, and VP-5. Sub-slab vapor samples were collected the same day as indoor and outdoor air samples to aid in data evaluation, as recommended in the DTSC guidance document. No significant rainfall (defined as an event of 0.5-inches or greater) occurred in the five days prior to sampling.

The sample train for soil vapor sampling consisted of tubing, connectors, valves, and vacuum canisters. All gauges and canisters were connected by laboratory-supplied stainless steel tubing and dedicated flexible Teflon or nylon tubing. The sample train was assembled using dedicated ¼-inch (outer diameter) tubing for all vapor sampling. Swagelok® connectors were used for all connections between tubing and other sampling components. A flow regulator of 100 – 200 mL/min was placed in-line between the manifold and the downhole side Swagelok® valve. Sampling equipment was inspected to ensure tight fittings between all components. A transparent shroud was placed over each vapor point and sampling train to create an atmosphere with elevated helium concentrations for leak checking.

Leak Testing and Tracer Gas

The sampling manifold was leak tested by inducing a vacuum on the manifold. In preparation for manifold leak testing, the downhole side Swagelok® valve remained closed, as did the valves going to the purge and sample ends of the sample train. To commence leak testing, an electric air pump was connected to the purge valve end of the sample train. The purge valve was opened and the air pump turned on to induce a vacuum of approximately 30" Hg on the assembly, and the purge valve was closed again. The vacuum on the manifold assembly was monitored for at least 15 minutes. The manifold was considered to have passed the leak test if vacuum was maintained for at least 15 minutes with <0.2" Hg vacuum loss. After ensuring that all connections between the purge and sample valves, flow controller, and sample manifold were tight, soil vapor purging and sampling activities were performed.

During sample collection, helium (He) was used as a tracer gas to test for air leakage into the sampling system. The inner-shroud environment was enriched with helium supplied by a cylinder. The helium concentration inside the shroud was maintained at a minimum of 5% to 10%, so as to have detectable levels of tracer gas should leakage into the sampling train occur.

Sub-Slab Vapor Point Purging

Prior to collecting a vapor sample, the sub-slab vapor points were purged to ensure that the vapor samples are representative of actual sub-slab concentrations. The dead-space volume for each vapor probe is approximately 0.02-liters (i.e. the total volume of casing, annular pore space, and sample train tubing). Although a purge step-test is recommended by guidance documents, it cannot be practically completed in a single field day with these sub-slab vapor points due to the comparatively small dead-space volume of 0.02-liters relative to the sample canister volume of 1-liter. In other words, the collection of a single sample volume is significantly greater than the commonly used step-test purge volumes. For the purpose of this sampling, approximately three dead-space volumes (or 0.06–liters) were purged using an electric air pump and known flow limits of the manifold regulators. Based on the flow limiter parameters described above, three dead-space volumes were purged from each point after approximately 30 seconds. After purging was completed, the sample train purge valve was closed in preparation for sample collection.

Sub-Slab Vapor Point Sampling

The laboratory supplied the flow controller and sample canisters. The initial and final vacuum, start and finish times, and helium tracer gas percentages inside the shroud were documented (see attached field sheets).

All samples were collected in clean, laboratory-supplied 1-liter vacuum canisters immediately after purging. Each sample canister had a starting vacuum of approximately 30 "Hg. To collect a sample, the valve on the sample canister was opened and the time and initial vacuum documented. As the canister was being filled, the vacuum gauge on the flow controller was observed to ensure that the vacuum in the canister was decreasing over time. When the vacuum on the sample canister decreased to approximately 5 "Hg, the valve was closed and sampling ended. Helium tracer gas concentrations were monitored inside the shroud during sample collection using a field meter. Helium concentrations in the shroud for this entire sampling event ranged from 5.9% to 10.1%.

Sub-Slab Vapor Sample Analysis

The samples were labeled, documented on a chain-of-custody form, and transported to Analytical Sciences in Petaluma, California for analysis.

The vapor samples were analyzed for the following constituents of potential concern (CPOCs):

- TPHg, BTEX, and MTBE by modified EPA Method TO-15
- Naphthalene, 1,2-DCA, and EDB by modified EPA Method TO-15

In addition, the vapor samples were analyzed for the following fixed gases:

- Helium, Oxygen, Carbon Dioxide, and Methane by Modified ASTM D-1946

Sub-Slab Vapor Sample Results

Sub-slab vapor sample analytical results are summarized below:

- VP-1: No CPOCs were detected above method reporting limits.
- VP-2: No CPOCs were detected above method reporting limits.
- VP-4: TPHg and xylenes were detected at 2,000,000 µg/m^3 and 55,000 µg/m^3, respectively. No other CPOCs were detected above method reporting limits (which were elevated).
- VP-5: TPHg, benzene, toluene, ethylbenzene, and xylenes were detected at 8,200,000 µg/m^3, 170,000 µg/m^3, 180,000 µg/m^3, 150,000 µg/m^3, 1,130,000 µg/m^3, respectively. No other CPOCs were detected above method reporting limits (which were elevated).

No concentrations of the tracer gas (He) were detected in any of the sub-slab vapor samples. Sub-slab vapor analytical data are summarized in Table 5 and the laboratory report is attached.

Comparison of Sub-Slab Vapor Data to Applicable Screening Levels

As recommended in the DTSC *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* dated October 2011, sub-slab vapor data should be evaluated using an attenuation factor for potential migration to indoor air. The attenuation factor (α) of sub-slab vapor to indoor air concentrations is defined by the following equation:

$$\alpha = \frac{Concenration\ (indoor\ air)}{Concentration\ (subslab\ vapor)}$$

The guidance document identifies an attenuation rate (α) of 0.05 for both residential and commercial scenarios. Therefore, the resulting screening level for sub-slab vapor samples is defined by the following equation:

$$Screening\ level\ (subslab\ vapor) = \frac{Screening\ level\ (indoor\ air)}{0.05}$$

The indoor air screening levels shown in the *User's Guide: Derivation of and Application of Environmental Screening Levels – Interim Final (SFBRWQCB 2013)* were used to calculate sub-slab vapor screening levels using the attenuation rate of 0.05.

The constituents detected in VP-4 and VP-5 exceed the calculated sub-slab vapor screening levels, and reporting limits for compounds not detected were also above the calculated screening levels, which is consistent with the initial sampling event performed in September 2015 (Table 5). These exceedances suggested the potential for vapor intrusion and prompted the collection of indoor air samples, which is discussed below.

Indoor and Outdoor Air Sampling

Public Outreach and Building Parameters

The buildings of interest consist of single story construction and form three separate and distinct interior spaces associated with 645 4th Street, 380 MLK Jr Way, and 638 3rd Street. The canisters were placed approximately three feet above the floor and more than 25 feet from any exterior door or window. Additionally, all exterior doors and windows remained shut and the HVAC system operated as normal during the sample collection period. All three buildings are occupied by medical offices providing outpatient pediatric psychological and behavioral services. An on-site tenant representative was notified verbally on November 5, 2015 and a *Fact Sheet and Information on Sub-Slab Vapor and Indoor Air and Sampling* leaflet was provided to them on December 4, 2015.

The three buildings consist of slab-on-grade construction with no basements or crawl spaces. Each building has its own roof mounted heating, ventilation, and air conditioning (HVAC) system. The thermostat for each HVAC system was set to approximately 68 degrees Fahrenheit, which is the normal setting when workers are in the buildings.

The subject property is located approximately one block south of Interstate 880, a busy transit thoroughfare through downtown Oakland.

Building Inspection

On December 5, 2015, prior to sampling, Blue Rock conducted a building inventory in accordance with DTSC guidance documents. The completed Building Inventory Forms are attached.

Sample Locations and Duration

On December 5, 2015, Blue Rock collected indoor air samples from the interior spaces associated with 645 4th Street, 380 MLK Jr Way, and 638 3rd Street. The samples were collected from approximately the center of each building over an 8-bour period at a height of approximately three to five feet above the floor surface. Please see attached photographs of sample locations.

Simultaneously, two outdoor air samples were collected from roof locations of 645 4th Street and 380 MLK Jr Way / 638 3rd Street. The wind conditions at the time of sampling were light and variable. Therefore, the central locations on the roof were selected. Please see attached photographs of sample locations.

Air Sampling Equipment

The samples were collected in 6-liter vacuum canisters. The canisters were certified clean and placed under vacuum by the analytical laboratory prior to shipment. A flow regulator, set to limit flow to fill the canister over an 8-hour period, was connected to the air inlet of the canister. Each canister had vacuums readings of approximately 30 “Hg at the start of sampling.

Air Sampling Procedures

Each sample canister had a starting vacuum of approximately 30 "Hg. To collect a sample, the valve on the sample canister was opened and the time and initial vacuum documented. As the canister was being filled, the vacuum gauge on the flow controller was observed to ensure that the vacuum in the canister was decreasing slowly over time. The valve on the sample canister was closed at the end of the 8-hour sample period. Sampling start time, sampling ending time, initial starting vacuum, and ending vacuum readings for the canisters were recorded. At the end of sampling, the samples were labeled, documented on a chain-of-custody form, and transported to the project laboratory for analysis.

Air Sample Analysis

The air samples were analyzed by Analytical Sciences for concentrations of:

- TPHg, BTEX, and MTBE by modified EPA Method TO-15
- Naphthalene, 1,2-DCA, and EDB by modified EPA Method TO-15

Indoor Air Sample Results

Indoor air sample analytical results are summarized below:

- 645 4th: TPHg, benzene, toluene, ethylbenzene, and xylenes were detected at 36 $\mu g/m^3$, 1.8 $\mu g/m^3$, 5.4 $\mu g/m^3$, 1.2 $\mu g/m^3$, and 5.4 $\mu g/m^3$, respectively. No other CPOCs were detected above method reporting limits.

- 380 MLK: TPHg, benzene, toluene, ethylbenzene, and xylenes were detected at 17 $\mu g/m^3$, 2.0 $\mu g/m^3$, 5.4 $\mu g/m^3$, 1.2 $\mu g/m^3$, and 4.9 $\mu g/m^3$, respectively. No other CPOCs were detected above method reporting limits.

- 638 3rd: Benzene was detected at 1.2 $\mu g/m^3$. No other CPOCs were detected above method reporting limits.

Outdoor Air Sample Results

Outdoor air sample analytical results are summarized below:

- R-1: Benzene was detected at 0.78 $\mu g/m^3$. No other CPOCs were detected above method reporting limits.

- R-2: Benzene was detected at 1.2 $\mu g/m^3$. No other CPOCs were detected above method reporting limits.

Air sample analytical data are summarized in Table 6 and the laboratory report is attached.

Comparison of Indoor Air Data to Applicable Screening Levels

In order to evaluate the significance of the CPOC concentrations detected in indoor air, the reported values were compared with the corresponding ESLs published in the San Francisco Bay Regional Water Quality Control Board's *Users Guide: Derivation and Application of Environmental Screening Levels* (SFBRWQCB 2013) (Table 6). It should be noted that different ESLs are published for commercial and residential exposure scenarios. Exceedances are discussed below:

- 645 4th: This sample was collected within the interior space of 645 4th Street, near the center of the building and sub-slab vapor point VP-4. The benzene level of 1.8 $\mu g/m^3$ exceeds the residential and commercial ESLs of 0.084 $\mu g/m^3$ and 0.42 $\mu g/m^3$. The ethylbenzene level of 1.2 $\mu g/m^3$ exceeds the residential ESL of 0.97 $\mu g/m^3$. All remaining detected CPOCs were below applicable ESLs. Additionally, the reporting limits for non-detected CPOCs were below the applicable ESLs.

- 380 MLK: This sample was collected within the central portion of the interior space of 380 MLK Jr Way, near the center of the building and sub-slab vapor point VP-5. The benzene level of 2.0 $\mu g/m^3$ exceeds the residential and commercial ESLs of 0.084 $\mu g/m^3$ and 0.42 $\mu g/m^3$. The ethylbenzene level of 1.2 $\mu g/m^3$ exceeds the residential ESL of 0.97 $\mu g/m^3$. All remaining detected CPOCs were below applicable ESLs. Additionally, the reporting limits for non-detected CPOCs were below the applicable ESLs.

- 638 3rd: This sample was collected within the interior space of 638 3rd Street. The benzene level of 1.2 $\mu g/m^3$ exceeds the residential and commercial ESLs of 0.084 $\mu g/m^3$ and 0.42 $\mu g/m^3$. All remaining detected CPOCs were below applicable ESLs. Additionally, the reporting limits for non-detected CPOCs were below the applicable ESLs.

It is noteworthy that the outdoor air samples R-1 and R-2 contained benzene concentrations of 0.78 $\mu g/m^3$ and 1.2 $\mu g/m^3$, respectively, which also exceed the residential and commercial ESLs (i.e. 0.084 $\mu g/m^3$ and 0.42 $\mu g/m^3$).

Further, outdoor air benzene concentrations are similar those detected in all three indoor air samples. Benzene concentrations in outdoor air samples ranged from 0.78 to 1.2 $\mu g/m^3$, and benzene concentrations in indoor air samples ranged from 1.2 to 2.0 $\mu g/m^3$.

Human Health Risk Assessment

Based on the findings and discussion contained herein, the quality of data obtained from this indoor air study appears to have been conducted in general accordance with the DTSC Guidance Document.

Exposure Assessment

An exposure assessment was conducted in general accordance with the DTSC Guidance Document. As specified in the DTSC Guidance Document, the following assumptions were made:

- Exposure time is 8 hrs/day for commercial settings and 24 hrs/day residential settings;
- Exposure frequency is 250 days/yr for commercial settings and 350 days/yr for residential settings; and
- Exposure duration is 25 years for commercial settings and 30 years for residential settings.

Toxicity Assessment

In evaluating indoor carcinogenic and non-carcinogenic air toxicity for the selected COPCs, Blue Rock used the inhalation unit risk (IUR) defined in the SFRWQCB ESL Document (SFRWQCB 2013) as the potency of a carcinogenic chemical as risk per $\mu g/m^3$ when inhaled. In evaluating non-carcinogenic risk, Blue Rock used the reference concentration (RfC) presented in the same aforementioned documentation.

Risk Characterization

Methodology

In characterizing risk associated with soil vapor intrusion at the project site, Blue Rock utilized the DTSC Guidance Document's Appendix C - Risk Assessment in combination with the aforementioned IUR and RfC values. The cancer risk, defined as the incremental probability of an individual developing cancer in a lifetime as a result of exposure to a potential carcinogen, was calculated for each COPC using the generic equation:

$$Risk = \frac{Cindoor\ air\ x\ ET\ x\ EF\ x\ ED\ x\ IUR}{ATc\ x\ 365\ \left(\frac{days}{year}\right)\ x\ 24\ \left(\frac{hours}{day}\right)}$$

Where:

$C_{indoor\ air}$ = Concentration of indoor air, in µg/m^3 for COPCs above the reporting limit. For COPCs not detected, the reporting limit was used to be conservative.

ET = Exposure time in hours per day, assumed to be 8 hours per day for commercial exposure and 24 hours per day for residential exposure.

EF = Exposure frequency in days per year, assumed to be 250 days per year for commercial exposure and 350 day per year for residential exposure.

ED = Exposure duration in years, assumed to be 25 years for commercial settings and 30 years for residential settings.

IUR = Inhalation Unit Risk, (risk per µg/m^3 or (µg/m^3)$^{-1}$)

AT_c = Averaging Time for carcinogens, assumed to be 70 years.

The risk for non-carcinogenic chronic toxic effects was evaluated by the determination of a Hazard Quotient (HQ) where:

$$HQ = \frac{Cindoor\ air\ x\ ET\ x\ EF\ x\ ED}{ATnc\ x\ 365\ \left(\frac{days}{year}\right)\ x\ 24\ \left(\frac{hours}{day}\right)\ x\ RfC}$$

Where:

ET = Exposure time in hours per day, assumed to be 8 hours per day for commercial exposure and 24 hours per day for residential exposure.

EF = Exposure frequency in days per year, assumed to be 250 days per year for commercial exposure and 350 day per year for residential exposure.

ED = Exposure duration in years, assumed to be 25 years for commercial settings and 30 years for residential settings.

RfC = Reference Concentration of Contaminant (µg/m^3) that a person can be exposed to without adverse health effects.

AT_{nc} = Averaging Time for non-carcinogens, assumed to be 25 years for commercial settings and 30 years for residential settings.

The cumulative incremental inhaled cancer risk from multiple volatile contaminants is the sum of all the chemical-specific cancer risks for the pathway. For carcinogenic chemical species S_1, S_2, . . . , S_n with chemical-specific risks of $Risk_1S_1$, $Risk_2S_2$, . . . , $Risk_nS_n$ the cumulative incremental cancer risk is:

$$Risk = Risk_1S_1 + Risk_2S_2 + \ldots + Risk_nS_n$$

The hazard index (HI) is the sum of the chemical-specific HQs, including the HQs for non-carcinogenic effects posed by carcinogenic contaminants. For chemical species S_1, S_2, . . . , S_n with chemical-specific hazard quotients of HQ_1S_1, HQ_2S_2, . . . , HQ_nS_n the hazard index is:

$$HI = HQ_1S_1 + HQ_2S_2 + \ldots + HQ_nS_n$$

Carcinogenic risks and hazard quotients, as well as cumulative risks and hazard indices, were calculated for each of the indoor air sample locations (please see attached sheets).

Evaluation of Risk

The following cumulative risk and hazard indices for the three indoor air samples were calculated as:

- 645 4th: Risk = 2.5×10^{-5} and HI = 4.0 (Residential Scenario).
  Risk = 5.0×10^{-6} and HI = 0.96 (Commercial Scenario).
- 380 MLK: Risk = 2.8×10^{-5} and HI = 2.0 (Residential Scenario).
  Risk = 5.5×10^{-6} and HI = 0.47 (Commercial Scenario).
- 638 3rd: Risk = 1.8×10^{-5} and HI = 1.2 (Residential Scenario).
  Risk = 3.5×10^{-6} and HI = 0.29 (Commercial Scenario).

The following table shows recommended responses to numerical risk and hazard evaluations, as published in the DTSC Guidance Document:

Vapor Intrusion Risk / Hazard	***Risk Management Decision***	***Activities***
Risk $< 1\text{x}10^{-6}$ Hazard Index ≤ 1.0	No Further Action	• None
$1\text{x}10^{-6} <$ Risk $< 1\text{x}10^{-4}$ Hazard Index >1.0	Evaluate Need for Action	Possible Actions: • Additional Data Collection • Monitoring • Additional Risk Characterization • Mitigation • Source Remediation
Risk $> 1\text{x}10^{-4}$	Response Action Needed	• Vapor Intrusion Mitigation • Source Remediation

It is notable that the analytical results for the indoor air sample from 638 3rd Street and the two outdoor air samples, R-1 and R-2, are essentially the same. This indicates that the calculated cumulative risk and hazard index would be essentially the same.

As shown in the matrix above, the cumulative risks and hazard indices calculated for the samples collected within 645 4th Street, 380 MLK Jr Way, and 638 3rd Street, while not greatly in excess of screening criteria, do indicate that the appropriate risk management decision would be to evaluate the need for action. Based on the results of this evaluation, possible response activities include: additional data collection, monitoring, additional risk characterization, mitigation, and source remediation. The results of additional evaluation could also show that no additional investigative or mitigation activity is possible or warranted.

Discussion and Conclusions

The indoor air samples from 645 4th Street and 380 MLK Jr Way contained trace concentrations of TPHg and BTEX, and the indoor air sample from 638 3rd Street contained a trace concentration of benzene. Benzene was the primary CPOC exceeding indoor air ESLs.

As discussed above, the outdoor air samples also contained benzene levels similar to those detected in all three indoor air samples. Benzene concentrations in outdoor air samples ranged from 0.78 to 1.2 $\mu g/m^3$, whereas benzene concentrations in indoor air samples ranged from 1.2 to 2.0 $\mu g/m^3$. The outdoor air quality for benzene in the area of site also exceeds the indoor air ESLs. The measurements are not considered unusual in an urban setting proximal to a busy Interstate highway. Due to the similarity between the analytical results, the concentrations of contaminants of concern in indoor air can be attributed to subterranean contamination or "fresh" air introduced by the HVAC system, or a combination of both.

A readily implementable approach to mitigating indoor air impacts typically could be accomplished by adjusting the HVAC system to introduce a greater amount of outdoor air into a subject building. However, based on the results of this study, the benzene concentrations in outdoor air are similar to those in indoor air, and as such introducing more outdoor air into the buildings will not have a significant effect on indoor air benzene concentrations. Even if all other CPOC compounds were reduced to non-detectable levels in the indoor air at the subject site, the presence of benzene from ambient air in this area of Oakland would likely continue to be exhibited in indoor air samples at concentrations exceeding the ESLs until ambient air quality improves.

Another of the DTSC-recommended activities to improve indoor air-quality is remediation of the source of contamination. This activity has already occurred in the area of the closed UST in the form of mobile high-vacuum dual-phase extraction in 2010 and 2012. The extraction of groundwater and soil vapor containing the highest concentrations of fuel-related contamination greatly reduced the mass of residual hydrocarbons in the subsurface near the closed UST.

Other recommended possible activities include: additional data collection, monitoring, and additional risk characterization. At least one additional indoor air sampling event, performed consistent with the methods described herein, would serve confirm these initial observations and is consistent with a minimum of two events recommended in the DTSC Guidance Document for risk determination.

Recommendations

Blue Rock recommends performing a second sampling event using the same methods described herein. Indoor air samples will be collected from the interior spaces of 645 4th Street, 380 MLK Jr. Way, and 638 3rd Street, and two outdoor air samples will be collected. Per the DTSC guidance document, sub-slab vapor samples will be collected concurrently from VP-1, VP-2, VP-4, and VP-5 to aid in evaluation of indoor air sample results. The recommended work will serve to supplement these initial findings and increase the air sample data set.

Other previously ACDEH approved investigation activities will also be undertaken, as permits are obtained and scheduling allows. This includes additional soil and groundwater sampling on the BART property north of the site, on the 3rd Street right-of-way, and within the interior space of Oakland Metro Operahouse.

References

AEI Consultant, 2013, *Site Status Update and Case Closure Request*, Allen Property, 325 Martin Luther King Jr. Way, Oakland, November 5

Amicus Strategic Environmental Consulting, 2009, letter regarding Terradev Jefferson, LLC Property, 645 4th Street, Oakland, March 4.

Amicus Strategic Environmental Consulting, 2009, letter regarding Terradev Jefferson, LLC Property, 645 4th Street, Oakland, September 13.

Blue Rock, 2010, *Removal Action Workplan*, 645 4th Street, Oakland, California, February 3.

Blue Rock, 2010, *Well Installation and Removal Action Report*, 645 4th Street, Oakland, California, October 29.

Blue Rock, 2011, *Groundwater Monitoring Report – First Quarter 2011*, 645 4th Street, Oakland, California, February 1.

Blue Rock, 2012, *Sub-Slab Soil Vapor Sampling Workplan and Project Schedule*, 645 4th Street, Oakland, California, April 23.

Blue Rock, 2012, *Sub-Slab Soil Vapor Sampling Report*, 645 4th Street, Oakland, California, July 7.

Blue Rock, 2012, *Second Removal Action and Groundwater Monitoring Report*, 645 4th Street, Oakland, California, August 16.

Blue Rock, 2012, *Second Sub-Slab Soil Vapor Sampling Report*, 645 4th Street, Oakland, California, October 18.

Blue Rock, 2013, *Confirmation Soil and Groundwater Sampling Report & Low Threat UST Case Closure Policy Evaluation*, 645 4th Street, Oakland, California, March 11.

Blue Rock, 2014, *Additional Site Characterization Report*, 645 4th Street, Oakland, California, May 29.

Blue Rock, 2014, *Report for Geophysical Survey and Additional Site Characterization Workplan,* 645 4th Street, Oakland, California, September 18.

Blue Rock, 2015, *Additional Site Characterization Report,* 645 4th Street, Oakland, California, March 27.

Blue Rock, 2015, *Workplan for Additional Site Characterization, Sub-Slab Vapor Sampling, and Indoor Air Sampling,* 645 4th Street, Oakland, California, June 15.

Blue Rock, 2015, *Sub-Slab Vapor Point Installation and Sampling Report***,** 645 4th Street, Oakland, California, November 6.

California EPA - DTSC. 2011. *Final - Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance).* October

California EPA - DTSC. 2012. *Advisory – Active Soil Gas Investigations.* April.

Clayton Environmental Consultants, 1993, *UST Closure Report*, 424 Martin Luther King Jr. Way, Oakland, California, April 30.

Ninyo & Moore, 2009, *Limited Phase II Environmental Site Assessment*, 645 4th Street, Oakland, California, July 24.

Golden Gate Tank Removal, Inc. 2006, *Tank Closure Report*, 645 4th Street, Oakland, California, September 21.

San Francisco Bay RWQCB. 2013. *Users Guide: Derivation and Application of Environmental Screening Levels*. December.

Certification

This report was prepared under the supervision of a California Professional Geologist at Blue Rock. All statements, conclusions, and recommendations are based upon published results from past consultants, field observations by Blue Rock, and analyses performed by a state-certified laboratory as they relate to the time, location, and depth of points sampled by Blue Rock. Interpretation of data, including spatial distribution and temporal trends, are based on commonly used geologic and scientific principles. It is possible that interpretations, conclusions, and recommendations presented in this report may change, as additional data become available and/or regulations change.

Information and interpretation presented herein are for the sole use of the client and regulating agency. The information and interpretation contained in this document should not be relied upon by a third party.

The service performed by Blue Rock has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in the area of the site. No other warranty, expressed or implied, is made.

If you have any questions regarding this project, please contact us at (650) 522-9292.

Sincerely,
Blue Rock Environmental, Inc.

PROFESSIONAL GEOLOGIST
BRIAN M. GWINN
No 6505
exp. 4/30/17
STATE OF CALIFORNIA

Brian Gwinn, PG
Principal Geologist

Attachments:

Figure 1: Site Location Map
Figure 2: Site Plan
Figure 3: Air Sample Map

Table 1: Well Construction Data
Table 2: Soil Sample Analytical Data
Table 3: Groundwater Analytical Data
Table 4: Passive Soil Gas Sample Analytical Data
Table 5: Sub-Slab Vapor Sample Analytical Data
Table 6: Air Sample Analytical Data

Blue Rock Sub-Slab Vapor Field Sampling Notes (12/5/15)

Building Inventory Forms (645 4th Street, 380 MLK Jr Way, and 638 3rd Street)

Photographs of Indoor Air Samples (645 4th, 380 MLK, and 638 3rd)

Photographs of Outdoor Air Samples (R-1 and R-2)

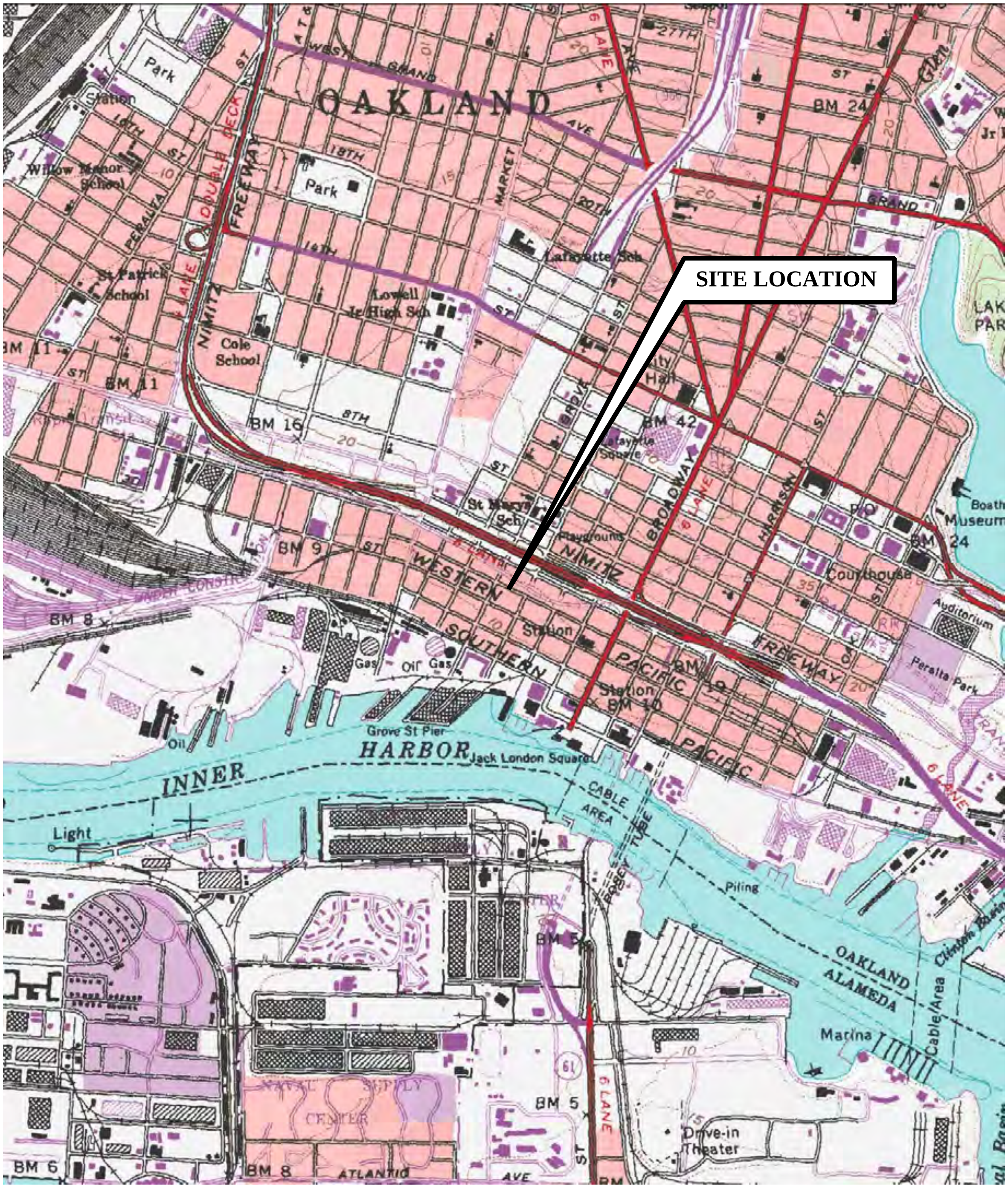
Carcinogenic Risk and Hazard Quotient Calc. Sheets (Samples 645 4th, 380 MLK, and 638 3rd)

Laboratory Report and Chain-of-Custody Form (Sub-Slab Vapor Samples)

Laboratory Report and Chain-of-Custody Form (Indoor and Outdoor Air Samples)

Distribution:

Ms. Sara May, Metrovation, 580 Second St. Suite 260, Oakland, CA 94607



0 2,000

APPROX. SCALE IN FEET

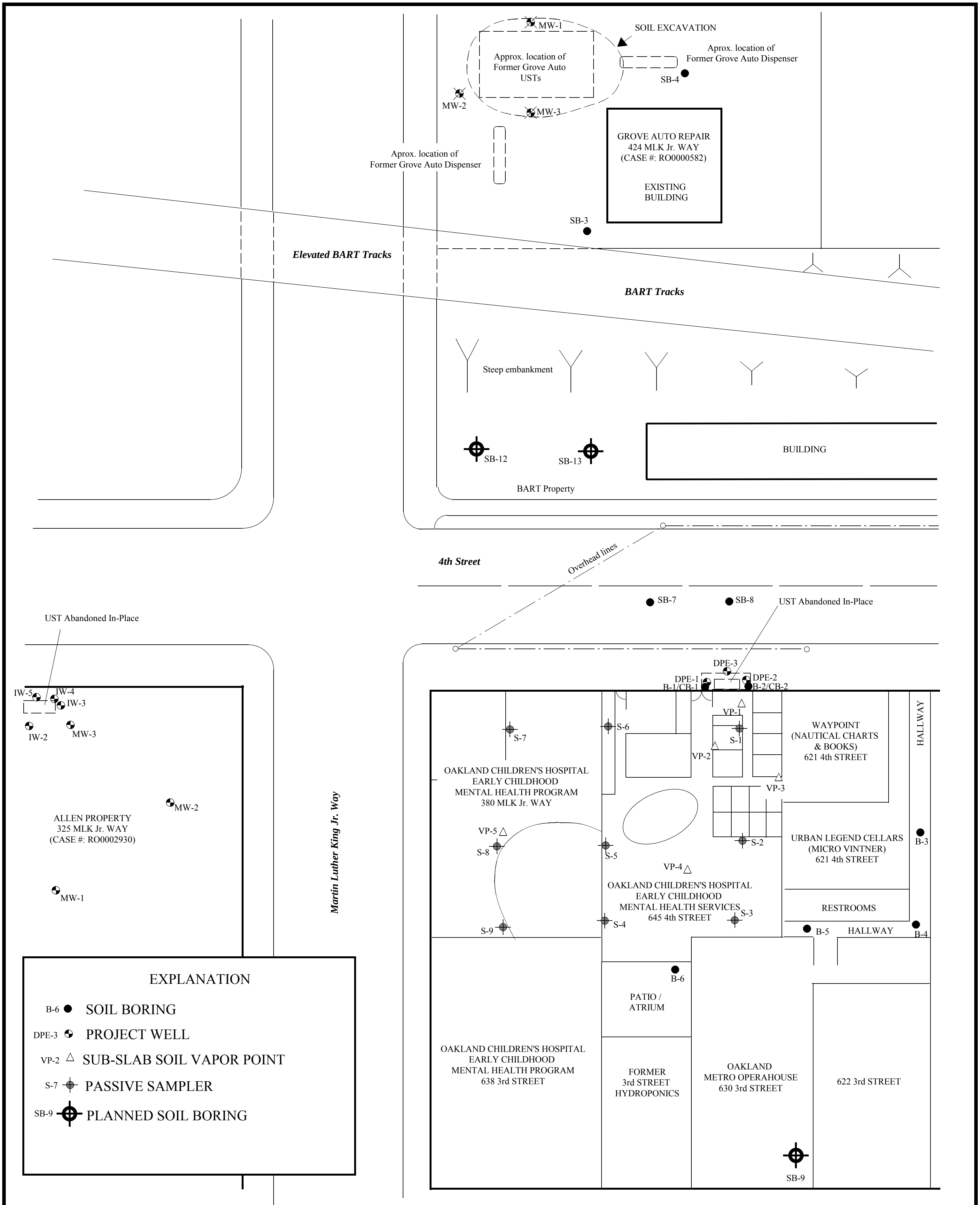
N

SOURCE: MyTopo.com

SITE LOCATION MAP
Terradev Jefferson LLC Property
645 Fourth St.
Oakland, CA

BLUE ROCK
ENVIRONMENTAL, INC.

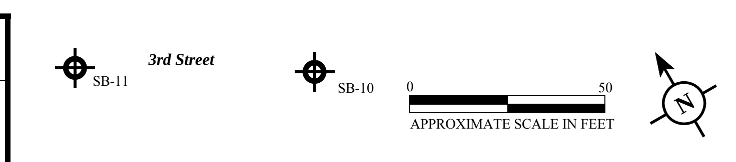
Project No.	Figure Date	Figure
ASE-1	10/10	1



SITE PLAN
Terredev Jefferson LLC Property
645 4th St.
Oakland, CA

BLUE ROCK
ENVIRONMENTAL, INC.

Project No.	Figure Date	Figure
ASE-1	1/16	2



EXPLANATION

■ 645 4th	INDOOR AIR SAMPLE (12/5/15)
⧓ R-1	OUTDOOR AIR SAMPLE (12/5/15)

0 50
APPROXIMATE SCALE IN FEET

N

AIR SAMPLE MAP
Terredev Jefferson LLC Property
645 4th St.
Oakland, CA

BLUE ROCK
ENVIRONMENTAL, INC.

Project No.	Figure Date	Figure
ASE-1	1/16	3

SOURCE: GOOGLE EARTH

TABLE 1
Well Construction Data
Terradev Jefferson, LLC Property
645 4th Street
Oakland, CA

Extraction Wells

Well ID	Date Installed	Total Boring Depth (ft bgs)	Casing Diameter (inches)	Screen Depth (ft bgs)	Sandpack Depth (ft bgs)	Bentonite Depth (ft bgs)	Cement Grout Depth (ft bgs)
DPE-1	9/20/10	15	2	8 - 15	7 - 15	5 - 7	0 - 5
DPE-2	9/20/10	15	2	8 - 15	7 - 15	5 - 7	0 - 5
DPE-3	9/20/10	10	2	6 - 10	5 - 10	3 - 5	0 - 3

Vapor Probes

Well ID	Date Installed	Total Probe Depth (in bgs)	Tubing Diameter (inches)	Slab Thickness (in bgs)	Screen Depth (in bgs)	Rubber Plug / Bentonite (in bgs)	Cement Depth (in bgs)
VP-1	6/16/12	9	0.25	6.0	6 - 9	5.0 - 6.0	0 - 5
VP-2	6/16/12	9	0.25	4.5	6 - 9	3.5 - 4.5	0 - 3.5
VP-3	6/16/12	9	0.25	4.0	6 - 9	3.0 - 4.0	0 - 3
VP-4	8/29/15	9	0.25	5.5	6 - 9	3.0 - 6.0	0 - 3
VP-5	8/29/15	9	0.25	5.5	6 - 9	3.0 - 6.0	0 - 3

Notes:
ft bgs — Feet below ground surface.
in bgs — Inches below ground surface.

TABLE 2
Soil Sample Analytical Data
Terradev Jefferson, LLC Property
645 4th Street
Oakland, CA

Sample ID	Depth (ft bgs)	Sample Date	TPHd (mg/kg)	TPHd w/SGCU (mg/kg)	TPHg (mg/kg)	B (mg/kg)	T (mg/kg)	E (mg/kg)	X (mg/kg)	MTBE (mg/kg)	TBA (mg/kg)	DIPE, ETBE, TAME (mg/kg)	1,2-DCA (mg/kg)	EDB (mg/kg)	Napht. (mg/kg)
UST Removal Samples															
8795-EX-W-9'	9	8/23/06	<120	---	**10,000**	**130**	**1,000**	**230**	**1,200**	<12	<100	all<12	---	---	---
8795-EX-E-9'	9	8/23/06	<25	---	**920**	**6.8**	**55**	**18**	**110**	<1.2	<10	all<1.2	---	---	---
Investigation Samples															
DPE-1-7.5	7.5	9/20/10	**810^**	---	**6,500**	**14**	**320**	**180**	**980**	<0.50	<2.5	---	<0.50	**0.50**	---
DPE-1-12	12	9/20/10	**260^**	---	**2,300**	**26**	**160**	**45**	**240**	**0.71**	<1.5	---	<0.30	<0.30	---
DPE-1-15	15	9/20/10	**92^**	---	**770**	**10**	**53**	**15**	**80**	**0.39**	<0.50	---	**0.11**	<0.090	---
DPE-2-6	6	9/20/10	**15**	---	**1.2**	<0.0050	**0.0054**	<0.0050	**0.021**	<0.0050	<0.0050	---	<0.0050	<0.0050	---
DPE-2-11	11	9/20/10	**1,200^**	---	**160,000**	**1,400**	**10,000**	**3,300**	**19,000**	<0.25	<1.5	---	<0.25	**1.8**	---
DPE-2-15	15	9/20/10	**66^**	---	**430**	**3.8**	**25**	**8.3**	**47**	<0.50	<2.5	---	<0.050	<0.50	---
DPE-3-7	7	9/20/10	**260^**	---	**860**	**2.1**	**37**	**19**	**100**	<0.10	<0.50	---	<0.10	<0.10	---
DPE-3-10	10	9/20/10	**800^**	---	**8,900**	**78**	**580**	**180**	**980**	<0.25	<1.5	---	<0.25	**0.82**	---
CB-1-7.5	7.5	2/18/13	**1.2***	---	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	---	---	<0.0050	<0.0050	---
CB-1-9	9	2/18/13	**110^**	---	**1,200**	**2.8**	**55**	**27**	**150**	<0.25	---	---	<0.25	<0.25	---
CB-1-12	12	2/18/13	**880^**	---	**14,000**	**100**	**850**	**180**	**1,400**	**0.53**	---	---	<0.25	**0.86**	---
CB-1-15	15	2/18/13	**89^**	---	**1,000**	**8.4**	**62**	**15**	**100**	<0.050	---	---	<0.050	<0.050	---
CB-2-9	9	2/18/13	**120^**	---	**840**	**0.44**	**17**	**20**	**110**	<0.15	---	---	<0.15	<0.15	---
CB-2-11	11	2/18/13	**110^**	---	**2,700**	**23**	**160**	**48**	**260**	<0.40	---	---	<0.40	<0.40	---
CB-2-15	15	2/18/13	**45^**	---	**380**	**3.9**	**18**	**6.6**	**34**	<0.050	---	---	<0.050	<0.050	---
B-6-6'	6.5	1/11/14	**340^**	**350^**	**1,700**	**0.13**	**8.0**	**12**	**91**	<0.050	<0.25	---	<0.050	<0.050	---
B-6-10.5'	10.5	1/11/14	**280^**	**280^**	**1,500**	**4.1**	**48**	**26**	**130**	<0.25	<1.5	---	<0.25	<0.25	---
SB7-8.5/9	8.5-9	12/29/14	**1.2^**	---	**4.0**	**0.16**	**0.50**	**0.081**	**0.50**	<0.0050	<0.0050	---	<0.0050	**0.0070**	**0.043**
SB7-10.5/11	10.5-11	12/29/14	**1,400^**	---	**19,000**	**150**	**1,100**	**330**	**1,800**	<0.25	<1.5	---	<0.25	**2.5**	**99**
SB7-12.5/13	12.5-13	12/29/14	**310^**	---	**3,600**	**29**	**200**	**59**	**330**	<0.090	<1.5	---	<0.090	**0.46**	**23**
SB-8-8.5/9	8.5-9	12/29/14	**750^**	---	**6,600**	**30**	**290**	**120**	**580**	<0.25	<1.5	---	<0.25	**0.38**	**38**
SB-8 11.5/12	11.5-12	12/29/14	**170^**	---	**1,400**	**6.4**	**54**	**22**	**130**	<0.25	<1.5	---	<0.25	<0.25	**10**
SB-8 14.5	14.5	12/29/14	<1.0	---	<1.0	**0.026**	**0.060**	**0.011**	**0.065**	<0.0050	<0.0050	---	<0.0050	<0.0050	<0.0050

Notes:

ft bgs	feet below ground surface
mg/kg	milligrams per kilogram
TPHd	total petroleum hydrocarbons as diesel by EPA Method 8015M or 8015B, w/SCGCU = analysis performed after silica-gel clean-up.
TPHg	total petroleum hydrocarbons as gasoline by EPA Method 8260B
BTEX	benzene, toluene, ethylbenzene, and xylenes by EPA Method 8260B
MTBE, TBA, ETBE, DIPE, TAME	methyl tert-butyl ether, tert-butanol, ethyl tert-butyl ether, di-isopropyl ether, tert-amyl methyl ether by EPA Method 8260B,
1,2-DCA, EDB	1,2-dichloroethane, 1,2-dibromoethane by EPA Method 8260B.
µg/L	Micrograms per liter.
<###	Not detected at or above the indicated reporting limit.
^	Laboratory Flag: Hydrocarbons are lower-boiling than typical Diesel Fuel
*	Laboratory Flag: Hydrocarbons are higher-boiling than typical Diesel Fuel
---	Data not available, not monitored, or not sampled

TABLE 3
Groundwater Analytical Data
Terradev Jefferson, LLC Property
645 4th Street
Oakland, CA

Sample ID	Sample Date	TOC (ft MSL)	DTW (ft)	LNAPL (ft)	GWE (ft MSL)	TPHd (µg/L)	TPHd w/SGCU (µg/L)	TPHg (µg/L)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	MTBE (µg/L)	TBA (µg/L)	1,2-DCA (µg/L)	EDB (µg/L)	Napht. (µg/L)
Grab Groundwater Samples																	
B-1-GW*	7/10/09	--	~9.5	--	--	**5,300**	--	**78,000**	**15,000**	**13,000**	**1,700**	**10,500**	**570**	--	--	--	--
B-2-GW*	7/10/09	--	~9.5	--	--	**2,300**	--	**60,000**	**13,000**	**13,000**	**890**	**4,800**	**120**	--	--	--	--
B-3	1/10/14	--	~12	--	--	**58#**	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	--
B-4	1/10/14	--	~12	--	--	**67#**	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<5.0	<0.50	<0.50	--
B-5	1/10/14	--	~12	--	--	**110#**	<50	**110**	**1.2**	**1.4**	**0.65**	**4.5**	**2.7**	**200**	**43**	<0.50	--
B-6 (2)	1/11/14	--	~11	--	--	**5,200^**	**360^**	**84,000**	**1,800**	**7,600**	**2,400**	**12,000**	**5,100**	**180J**	**110**	<20	--
SB-7	12/29/14	--	~9	--	--	**60,000^**	--	**250,000**	**15,000**	**34,000**	**4,000**	**20,000**	<40	<200	**130**	**240**	**1,000**
SB-8	12/29/14	--	~9	--	--	**16,000^**	--	**180,000**	**9,100**	**22,000**	**3,000**	**16,000**	<40	<200	**130**	**140**	**1,200**
Monitoring Well Data																	
DPE-1	9/22/10	15.81	9.21	0.00	6.60	<4,000 (1)	--	**120,000**	**25,000**	**18,000**	**3,300**	**17,000**	**320**	**320**	**620**	<40	--
Screen	9/28-10/3/10	15.81	--	--	--	5-day HVDPE Remedial Event											
~8' - 15'	10/18/10	15.81	9.26	sheen	6.55	<4,000 (1)	--	**97,000**	**15,000**	**20,000**	**1,600**	**11,000**	**490**	**270**	**390**	<40	--
	1/20/11	15.81	8.56	sheen	7.25	<3,000 (1)	--	**83,000**	**12,000**	**16,000**	**2,000**	**11,000**	**270**	<200	**220**	<40	--
	7/6/12	15.81	8.85	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/9-7/24/12	15.81	--	--	--	15-day HVDPE Remedial Event											
	8/12/12	15.81	9.03	0.00	6.78	<2,000 (1)	--	**71,000**	**7,500**	**9,800**	**1,000**	**6,500**	**280**	**89**	**190**	<15	--
	2/11/13	15.81	8.74	0.00	7.07	<3,000 (1)	--	**81,000**	**9,400**	**14,000**	**1,800**	**10,000**	**240**	**110**	**210**	<15	--
	1/10/14	15.81	9.84	0.00	5.97	**1,600^**	**56^**	**98,000**	**14,000**	**13,000**	**2,100**	**12,000**	**270**	**200**	**270**	<25	--
DPE-2	9/22/10	16.01	9.44	0.00	6.57	<4,000 (1)	--	**110,000**	**21,000**	**18,000**	**3,100**	**14,000**	**200**	**260**	**540**	**110**	--
Screen	9/28-10/3/10	16.01	--	--	--	5-day HVDPE Remedial Event											
~8' - 15'	10/18/10	16.01	9.48	sheen	6.53	<5,000 (1)	--	**84,000**	**11,000**	**16,000**	**1,600**	**9,200**	**77**	<200	**220**	**77**	--
	1/20/11	16.01	8.77	sheen	7.24	<5,000 (1)	--	**94,000**	**12,000**	**19,000**	**2,500**	**13,000**	**64**	<200	**220**	**88**	--
	7/6/12	16.01	9.06	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/9-7/24/12	16.01	--	--	--	15-day HVDPE Remedial Event											
	8/12/12	16.01	9.27	0.00	6.74	<2,000 (1)	--	**70,000**	**9,900**	**16,000**	**1,700**	**9,600**	**54**	<200	**160**	**56**	--
	2/11/13	16.01	8.95	0.00	7.06	<4,000 (1)	--	**60,000**	**7,300**	**9,500**	**1,400**	**7,000**	**34**	<90	**120**	<20	--
	1/10/14	16.01	10.08	0.00	5.93	**2,800^**	<50	**100,000**	**17,000**	**15,000**	**2,400**	**11,000**	**120**	**100**	**220**	**27**	--
DPE-3	9/22/10	15.87	9.43	0.00	6.44	insufficient water column for sampling (i.e. <0.5-ft)											
Screen	9/28-10/3/10	15.87	--	--	--	5-day HVDPE Remedial Event											
~6' - 10'	10/18/10	15.87	9.35	0.00	6.52	insufficient water column for sampling (i.e. <0.5-ft)											
	1/20/11	15.87	8.51	**0.13**	7.36	no groundwater sample collected, LNAPL present.											
	7/6/12	15.87	8.65	0.00	--												
	7/9-7/24/12	15.87	--	--	--	15-day HVDPE Remedial Event											
	8/12/12	15.87	9.02	sheen	6.85	<200,000 (1)	--	**190,000**	**1,400**	**7,800**	**3,700**	**29,000**	**27**	**120**	**40**	**130**	--
	2/11/13	15.87	8.34	sheen	7.53	<40,000 (1)	--	**130,000**	**4,700**	**9,000**	**1,900**	**25,000**	<40	<200	**54**	**80**	--
	1/10/14	15.87	Dry	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

Screen	Well screen depth interval.
TOC	Top of casing relative to feet above mean sea level (ft MSL) (ref NAVD88).
DTW	Depth to water (for borings DTW shows "depth to water" and "depth to bottom of boring")
LNAPL	Light non-aqueous phase liquid petroleum, "sheen" is an immeasurable thickness (i.e. <0.01-ft)
GWE	Groundwater Elevation (TOC-DTW) in ft MSL. (This does not account for LNAPL thickness, if present).
TPHd	Total petroleum hydrocarbons as diesel by EPA Method 8015M, *8015B. SGCU = Silica-gel cleanup prior to analysis.
TPHg	Total petroleum hydrocarbons as gasoline by EPA Method 8260B, *8015B.
BTEX	Benzene, toluene, ethylbenzene, and xylenes by EPA Method 8260B, *8021B.
	Note: total xylenes equal the sum of sepearate isomers reported for the 7/09 samples.
MTBE	Methyl tert-butyl ether by EPA Method 8260B, * 8021B.
TBA	Tert-butanol by EPA Method 8260B.
1,2-DCA, EDB	1,2-dichloroethane, 1,2-dibromoethane by EPA Method 8260B.
µg/L	Micrograms per liter.
<###	Not detected at or above the indicated reporting limit.
---	Data not available, not monitored, or not sampled
^	Laboratory Flag: Hydrocarbons are lower-boiling than typical Diesel Fuel
#	Laboratory Flag: Discrete peaks in Diesel range, atypical for Diesel Fuel
J	Laboratory Flag: TBA concentration may be biased slightly high due to conversion of a small fraction of MTBE to TBA during water sample analysis.
(1)	Method detection limit increased due to ineterference from gasoline range hydrocarbons
(2)	Repeat analysis by Method 8260B yielded inconsistent results. The concentrations appear to vary between bottles. The highest valid result is reported.

TABLE 4
Passive Soil Gas Sample Analytical Data
Terradev Jefferson, LLC Property
645 Fourth Street
Oakland, CA

Sample ID	Sample Depth (ft bgs)	Install Date	Retrieval Date	TPH (µg)	DRPH (µg)	GRPH (µg)	B (µg)	T (µg)	E (µg)	X (µg)	MTBE (µg)	1,2-DCA (µg)	Napht. (µg)
S-1	~2 - 3	2/7/15	2/14/15	**13.33**	**2.90**	**10.86**	**0.04**	**0.03**	**0.02**	**0.17**	**0.25**	**0.13**	**0.20**
S-2	~2 - 3	2/7/15	2/14/15	**273.77**	**59.21**	**223.55**	**48.01**	**209.52**	**123.77**	**505.33**	<0.02	**3.97**	**35.44**
S-3	~2 - 3	2/7/15	2/14/15	**183.36**	**72.98**	**115.01**	**33.38**	**127.13**	**113.16**	**367.48**	<0.02	**2.35**	**37.35**
S-4	~2 - 3	2/7/15	2/14/15	**1.00**	<0.50	**0.66**	**0.02**	**0.02**	<0.02	**0.18**	<0.02	**2.35**	<0.50
S-5	~2 - 3	2/7/15	2/14/15	**220.53**	**107.91**	**117.33**	**20.23**	**90.58**	**24.79**	**369.71**	<0.02	**2.01**	**30.63**
S-6	~2 - 3	2/7/15	2/14/15	**169.75**	**54.69**	**119.88**	**15.94**	**29.38**	**31.45**	**337.65**	<0.02	**0.90**	**2.45**
S-7	~2 - 3	2/7/15	2/14/15	**1.03**	**0.74**	<0.50	**0.07**	**0.15**	**0.06**	**0.59**	<0.02	<0.02	<0.50
S-8	~2 - 3	2/7/15	2/14/15	**245.41**	**106.20**	**145.04**	**32.86**	**103.45**	**76.32**	**421.35**	<0.02	**2.53**	**36.09**
S-9	~2 - 3	2/7/15	2/14/15	<0.50	<0.50	<0.50	**0.36**	**0.36**	**0.03**	**0.16**	<0.02	**0.02**	<0.50

Notes:

ft bgs	feet below ground surface
µg	micrograms
TPH	Total petroleum hydrocarbons by SPG-WI-0292
DRPH	Diesel range petroleum hydrocarbons by SPG-WI-0292
GRPH	Gasoline range petroleum hydrocarbons by SPG-WI-0292
BTEX	benzene, toluene, ethylbenzene, and xylenes by SPG-WI-0292
MTBE	methyl tert-butyl ether by SPG-WI-0292
1,2-DCA	1,2-dichloroethane by SPG-WI-0292
Naphthalene	Naphthalene by SPG-WI-0292
<###	Not detected at or above the indicated reporting limit.

Table 5
SUB-SLAB VAPOR SAMPLE ANALYTICAL DATA
Terradev Jefferson LLC Property
645 4th St.
Oakland, CA

			Consituent Concentrations									Soil Gas Concentrations			Tracer Gas: In Shroud	Tracer Gas: In Sample	Tracer Gas: Leak Percent^	Sample Can Vacuum: End of	Sample Can Vacuum: Arrival
Sample I.D.	Sample Date	sample container	TPHg (µg/m³)	B (µg/m³)	T (µg/m³)	E (µg/m³)	X (µg/m³)	MTBE (µg/m³)	Naphthalene (µg/m³)	1,2-DCA (µg/m³)	EDB (µg/m³)	O_2 (%)	CO_2 (%)	CH_4 (%)	He - Avg (%)	He (%)	Leak (%)	Sampling ("Hg)	at Lab ("Hg)
VP-1	6/16/12	1-L	1,300	38	120	21	138	7.3	<0.09	<0.14	<0.050	15	0.096	<0.008	22.2	2.4	10.8%	~8	~6
VP-1	9/22/12	1-L	<330	<8.0	<9.4	<11	<22	<9.0	<13	<10	<3.8	19	0.78	<0.008	20.0	0.19	1.0%	~5	~6
VP-1	1/25/14	1-L	<330	<8.0	<9.4	<11	<22	<9.0	<13	<10	<3.8	14	4.7	<0.008	5.7	0.023	0.40%	~5	~5
VP-1	12/5/15	1-L	<330	<8.0	<9.4	<11	<22	<9.0	<13	<10	<3.8	11	2.6	<0.008	8.0	<0.003	<0.04%	~5	~1
VP-2	6/16/12	1-L	1,200	66	25	2.6	8.2	<6.3	<0.090	<0.14	<0.050	11	1.3	<0.009	13.8	<0.003	<0.02%	~8	~7
VP-2	9/22/12	1-L	<330	<8.0	<9.4	<11	<22	<9.0	<13	<10	<3.8	14	4.0	<0.008	19.0	<0.003	<0.02%	~7	~6
VP-2	1/25/14	1-L	<330	<8.0	<9.4	<11	<22	<9.0	<13	<10	<3.8	12	7.4	<0.008	6.6	<0.003	<0.05%	~5	~5
VP-2	12/5/15	1-L	<330	<8.0	<9.4	<11	<22	<9.0	<13	<10	<3.8	5.2	4.2	<0.010	8.3	<0.003	<0.04%	~5	~2
VP-3	6/16/12	1-L	960	16	19	2.9	20	<5.8	<0.08	<0.13	<0.050	16	0.029	<0.008	23.6	2.6	11%	~5	~5
VP-3	9/22/12	1-L	<330	<8.0	<9.4	<11	<22	<9.0	<13	<10	<3.8	20	0.46	<0.008	15.7	0.036	0.23%	~5	~6
VP-3	1/25/14	1-L	<330	<8.0	<9.4	<11	<22	<9.0	<13	<10	<3.8	19	1.5	<0.008	6.6	0.012	0.18%	~5	~1
VP-4	9/6/15	1-L	5,600,000	<58,000	<69,000	<79,000	600,000	<66,000	<95,000	<74,000	<140,000	7.5	0.37	<0.009	6.5	0.004	0.06%	~5	~2
VP-4	12/5/15	1-L	2,000,000	<1,100	<1,300	<1,500	55,000	<1,200	<1,800	<1,400	<530	17	2.9	<0.007	8.2	<0.003	<0.04%	~5	~3
VP-5	9/6/15	1-L	5,000,000	180,000	140,000	110,000	1,390,000	<54,000	<78,000	<60,000	<110,000	2.7	3.3	<0.007	7.0	<0.003	<0.04%	~5	~3
VP-5	12/5/15	1-L	8,200,000	170,000	180,000	150,000	1,310,000	<12,000	<18,000	<14,000	<5,300	1.9	13	0.008	8.2	<0.003	<0.04%	~5	~1

Subslab Soil Gas Sceening Levels Calculated as: Screening level (subslab soil gas) = Screening level (indoor air) / 0.05

ESLs Residential Indoor Air divided by 0.05	*2,000*	*1.68*	*6,200*	*19.4*	*2,000*	*188*	*1.44*	*2.4*	*0.68*
ESLs Comm/Indus Indoor Air divided by 0.05	*2,000*	*8.4*	*26,000*	*98*	*8,800*	*940*	*7.2*	*11.6*	*3.4*

Indoor Air Screening Levels

ESLs Residential Indoor Air	*100*	*0.084*	*310*	*0.97*	*100*	*9.4*	*0.072*	*0.12*	*0.034*
ESLs Comm/Indus Indoor Air	*100*	*0.42*	*1,300*	*4.9*	*440*	*47*	*0.36*	*0.58*	*0.17*

Notes:

TPHg	Total Petroluem Hydrocarbons as gasoline by EPA Method TO-15
BTEX, MTBE	Benzene, Toluene, Ethylbenzene, and Total Xylenes, Methyl tert-Butyl Ether by EPA Method TO-15(M) GC/MS (note: Xylene number shown in table is the sum of xylene isomers reported by lab)
Naphthalene	Naphthalene by EPA Method TO-15
1,2-DCA, EDB	1,2-dichloroethane, 1,2-dibromoethane by EPA Method TO-15
O_2, CO_2, CH_4, He	Oxygen, Carbon Dioxide, Methane, and Helium by modified ASTM D-1946
µg/m³	Micrograms per cubic meter
<#.##	Compound not detected at or above the reported laboratory detection limit
ESLs	Environmental Screening Levels for Indoor Air in Commercial/Industrial or Residential setting (SFBRWQCB 2013)
Tracer Gas in Shroud	Concentration range of tracer gas in shroud recorded during sample collection. Average = (Max + Min) / 2
Tracer Gas in Sample	Concentration of tracer gas in sample as detected by lab analysis.
Tracer Gas Leak into Sample	If helium was detected in the sample, the concentration measured in the sample was divided by the average concentration in the shroud (and multiplied by 100 to convert to percent).
	^ a leak of less than 5% is considered acceptable for data evaluation.
	Shaded samples indicate a tracer gas leak of more than 5%.

Table 6

AIR SAMPLE ANALYTICAL DATA

Terradev Jefferson LLC Property

645 4th St.

Oakland, CA

				Consituent Concentrations									Sample Can Vacuum	
Sample I.D.	Sample Date	Sample Duration	sample container	TPHg ($\mu g/m^3$)	B ($\mu g/m^3$)	T ($\mu g/m^3$)	E ($\mu g/m^3$)	X ($\mu g/m^3$)	MTBE ($\mu g/m^3$)	Naphthalene ($\mu g/m^3$)	1,2-DCA ($\mu g/m^3$)	EDB ($\mu g/m^3$)	End of Sampling ("Hg)	Arrival at Lab ("Hg)
Indoor Air Samples														
645 4th	12/5/15	8 hrs	6-L	36	1.8	5.4	1.2	5.4	<3.6	<0.05	<0.08	<0.03	~2.5	~1
380 MLK	12/5/15	8 hrs	6-L	17	2.0	5.4	1.2	4.9	<3.6	<0.05	<0.08	<0.03	~0	~0
638 3rd	12/5/15	8 hrs	6-L	<9.8	1.2	<3.8	<0.87	<8.6	<3.6	<0.05	<0.08	<0.03	~5	~3
Outdoor Air Samples														
R-1	12/5/15	8 hrs	6-L	<9.8	0.78	<3.8	<0.87	<8.6	<3.6	<0.05	<0.08	<0.03	~5	~2
R-2	12/5/15	8 hrs	6-L	<9.8	1.2	<3.8	<0.87	<8.6	<3.6	<0.05	<0.08	<0.03	~4.5	~1

Indoor Air Screening Levels

ESLs Residential Indoor Air	*100*	*0.084*	*310*	*0.97*	*100*	*9.4*	*0.072*	*0.12*	*0.034*
ESLs Comm/Indus Indoor Air	*100*	*0.42*	*1,300*	*4.9*	*440*	*47*	*0.36*	*0.58*	*0.17*

Notes:

TPHg	Total Petroluem Hydrocarbons as gasoline by EPA Method TO-15
BTEX, MTBE	Benzene, Toluene, Ethylbenzene, and Total Xylenes, Methyl tert-Butyl Ether by EPA Method TO-15(M) GC/MS (note: Xylene number shown in table is the sum of xylene isomers reported by lab)
Naphthalene	Naphthalene by EPA Method TO-15
1,2-DCA, EDB	1,2-dichloroethane, 1,2-dibromoethane by EPA Method TO-15
$\mu g/m^3$	Micrograms per cubic meter
<#.##	Compound not detected at or above the reported laboratory detection limit
ESLs	Environmental Screening Levels for Indoor Air in Commercial/Industrial or Residential setting (SFBRWQCB 2013)

Date: 12/5/15
Technician: ST
Job No.: ASE-1

WELL ID: VP-1		Manifold ID#: 13
Purge ~~Suma ID#~~ VAC Pump	Volume: NA	Start Presure:
Sample Suma ID#: 1002	Volume: 1L	Start Presure: >30" Hg
Shut-in Test Start Time/Pressure: 0949/>30" Hg		Shut-in Test End Time/Pressure: 1016 />30" Hg PASS
Shut-in Test Start Time/Pressure:		Shut-in Test End Time/Pressure:

	Time (24 Hr)	Pre-Regulator Presure (-"H_2O)	Post-Regulator Presure (-"Hg)	He Tracer (%)	
Purge	1728.5	NA	25"	NA	~0.0CL purged
	1730.0	NA	25"	NA	
	1737.	↓	>30	5.9	
	1740		24	10.1	
	1743		17	8.9	
	1746		9	7.2	
	1748	↓	5	6.3	

Notes:

Date: 12/3/15
Technician: LT
Job No.: ASE-1

WELL ID: VP-2	Manifold ID#: 24
Purge ~~Suma ID~~#: Vac pump Volume:	Start Presure:
Sample Suma ID#: 140 Volume: 1 L	Start Presure:
Shut-in Test Start Time/Pressure: 0938/29" Hg	Shut-in Test End Time/Pressure: 1000/29" Hg PASS
Shut-in Test Start Time/Pressure:	Shut-in Test End Time/Pressure:

	Time (24 Hr)	Pre-Regulator Presure (-"H_2O)	Post-Regulator Presure (-"Hg)	He Tracer (%)	
purge {	1754.5	NA	25	NA	~0.06 L purged
	1755.0	NA	25	NA	
	1756	↓	29	9.8	
	1759		24	6.8	
	1802		19	9.2	
	1805		15	7.2	
	1808		11	8.6	
end	1811	↓	5	7.1	

Notes:

Date: 12/5/15
Technician: LT
Job No.: ASE-1

WELL ID: VP-5	Manifold ID#: 3
Purge ~~Suma ID#:~~ Vac Pump — Volume:	Start Presure:
Sample Suma ID#: 306 — Volume: 1L	Start Presure: >30"Hg
Shut-in Test Start Time/Pressure: 1014/>30"Hg	Shut-in Test End Time/Pressure: 1040/>30"Hg PASS
Shut-in Test Start Time/Pressure:	Shut-in Test End Time/Pressure:

	Time (24 Hr)	Pre-Regulator Presure (-"H_2O)	Post-Regulator Presure (-"Hg)	He Tracer (%)
Purge no-docs	1903.0	NA	25	NA
	1904.5	↓	25	NA
	1905	↓	30	10.1
	1908	↓	22	8.4
	1911	↓	13	7.6
end	1914	↓	5	6.3

Notes:

Date: 12/5/15

Technician: LT

Job No.: ASE-1

WELL ID: VP-4		Manifold ID#: 5
Purge ~~Suma ID#~~: vac pump	Volume: NA	Start Presure:
Sample Suma ID#: 1009	Volume: 1L	Start Presure: 30"Hg
Shut-in Test Start Time/Pressure: 1005 / 30"Hg		Shut-in Test End Time/Pressure: 1025/30"Hg PA
Shut-in Test Start Time/Pressure:		Shut-in Test End Time/Pressure:

	Time (24 Hr)	Pre-Regulator Presure (-"H_2O)	Post-Regulator Presure (-"Hg)	He Tracer (%)
Purge ~0.06L	1834.0	NA	25	NA
	1835.5	↓	25	NA
	1836		30	9.8
	1839		24	8.3
	1842		17	8.5
	1845	↓	10	6.9
end	1847	↓	5	6.6

Notes:

APPENDIX L - BUILDING SURVEY FORM

Preparer's Name: Bryan Gurun Date/Time Prepared: 12/5/15 - 8 Am
Affiliation: Blue Rock Environmental, Inc. Phone Number: 650-522-9292

Occupant Information

Occupant Name: Oakland Children Hosp. Behavioral Services Interviewed: ☐ Yes ☒ No
Building ~~Mailing~~ Address: 645 4th St.
City: Oakland State: CA Zip Code: 94607
Phone: Email:

Owner/Landlord Information (Check if same as occupant ☐)

~~Occupant~~ Name: Terrader Jefferson, Attn. Sara May Interviewed: ☒ Yes ☐ No
Mailing Address: 580 2nd St.
City: Oakland State: CA Zip Code: 94607
Phone: Email:

Building Type (Check appropriate boxes)

☐ Residential ☐ Residential Duplex ☐ Apartment Building ☐ Mobile Home ☒ Commercial (office)
☐ Commercial (warehouse) ☐ Industrial ☐ Strip Mall ☐ Split Level ☐ Church ☐ School

Building Characteristics

Approximate Building Age (years): Number of Stories: 1
Approximate Building Area (square feet): Number of Elevators: Ø

Foundation Type (Check appropriate boxes)

☒ Slab-on-Grade ☐ Crawl Space ☐ Basement

Basement Characteristics (Check appropriate boxes) NA

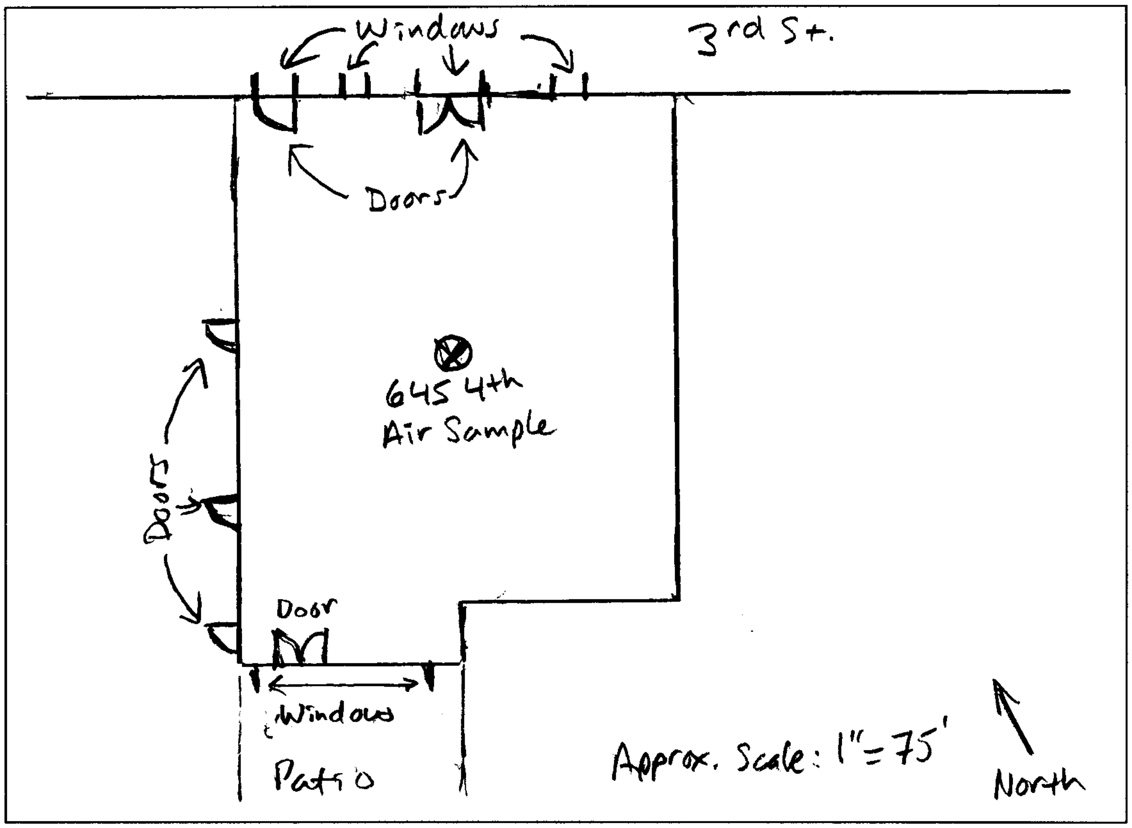
☐ Dirt Floor ☐ Sealed ☐ Wet Surfaces ☐ Sump Pump ☐ Concrete Cracks ☐ Floor Drains

Factors Influencing Indoor Air Quality

Is there an attached garage?	☐ Yes	☒ No	
Is there smoking in the building?	☐ Yes	☒ No	
Is there new carpet or furniture?	☐ Yes	☒ No	Describe:
Have clothes or drapes been recently dry cleaned?	☐ Yes	☒ No	Describe:
Has painting or staining been done with the last six months?	☐ Yes	☒ No	Describe:
Has the building been recently remodeled?	☐ Yes	☒ No	Describe:
Has the building ever had a fire?	☐ Yes	☒ No	
Is there a hobby or craft area in the building?	☐ Yes	☒ No	Describe:
Is gun cleaner stored in the building?	☐ Yes	☒ No	
Is there a fuel oil tank on the property?	☐ Yes	☒ No	Closed UST in 4th St. sidewalk
Is there a septic tank on the property?	☐ Yes	☒ No	
Has the building been fumigated or sprayed for pests recently?	☐ Yes	☒ No	Describe:
Do any building occupants use solvents at work?	☐ Yes	☒ No	Describe:

Sampling Locations

Draw the general floor plan of the building and denote locations of sample collection. Indicate locations of doors, windows, indoor air contaminant sources and field instrument readings.



Primary Type of Energy Used (Check appropriate boxes)

☒ Natural Gas ☐ Fuel Oil ☐ Propane ☒ Electricity ☐ Wood ☐ Kerosene

Meteorological Conditions

Describe the general weather conditions during the indoor air sampling event.
50°F, overcast, light variable winds.

General Comments

Provide any other information that may be of importance in understanding the indoor air quality of this building.
Typical amount of markers, "liquid paper", and dry erase boards and markers associated with administrative offices.

APPENDIX L - BUILDING SURVEY FORM

Preparer's Name: Bryan Gunn Date/Time Prepared: 12/5/15 - 8Am
Affiliation: Blue Rock Environmental Inc. Phone Number: 650-522-9232

Occupant Information

Occupant Name: Oakland Children's Hosp. Behavioral Services Interviewed: ☐ Yes ☒ No
Building ~~Mailing~~ Address: 380 MLK Jr. Way
City: Oakland State: CA Zip Code: 94607
Phone: ____ Email: ____

Owner/Landlord Information (Check if same as occupant ☐)

~~Occupant~~ Name: Terra dev Jefferson, Attn: Sara May Interviewed: ☒ Yes ☐ No
Mailing Address: 580 2nd St.
City: Oakland State: CA Zip Code: 94607
Phone: ____ Email: ____

Building Type (Check appropriate boxes)

☐ Residential ☐ Residential Duplex ☐ Apartment Building ☐ Mobile Home ☒ Commercial (office)
☐ Commercial (warehouse) ☐ Industrial ☐ Strip Mall ☐ Split Level ☐ Church ☐ School

Building Characteristics

Approximate Building Age (years): ____ Number of Stories: 1
Approximate Building Area (square feet): ____ Number of Elevators: Ø

Foundation Type (Check appropriate boxes)

☒ Slab-on-Grade ☐ Crawl Space ☐ Basement

Basement Characteristics (Check appropriate boxes) NA

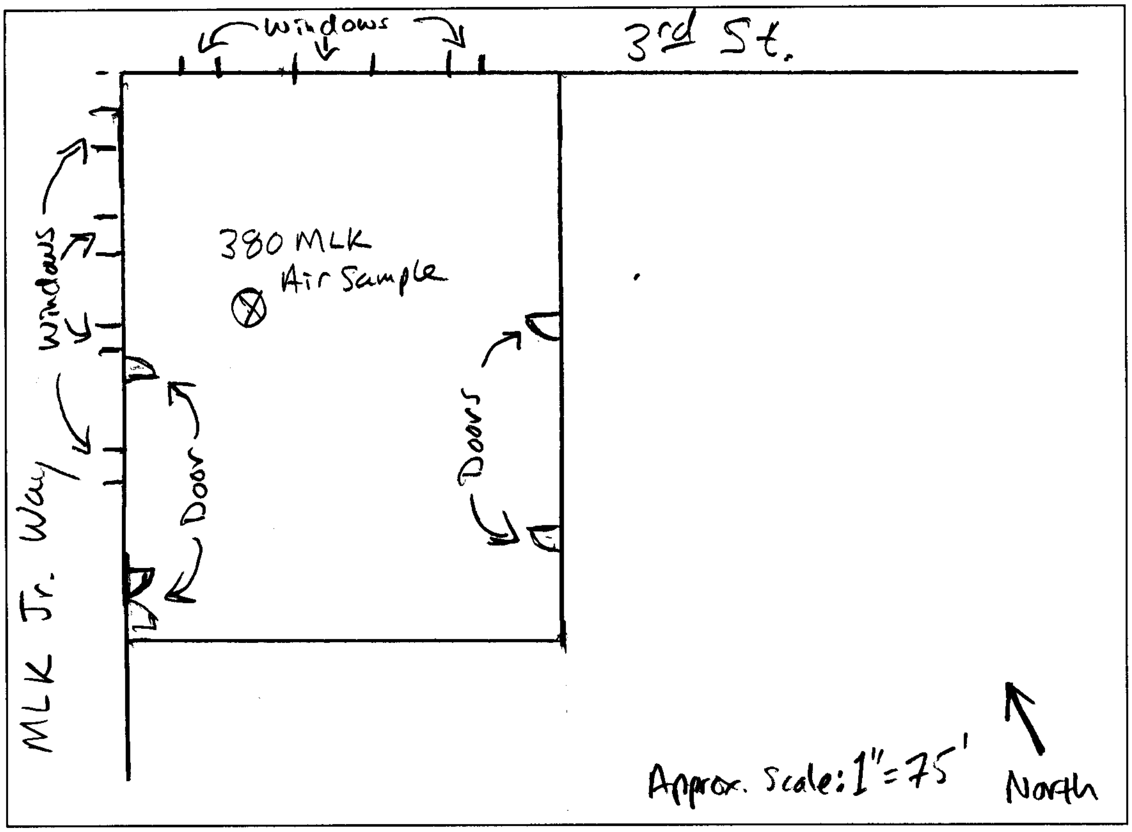
☐ Dirt Floor ☐ Sealed ☐ Wet Surfaces ☐ Sump Pump ☐ Concrete Cracks ☐ Floor Drains

Factors Influencing Indoor Air Quality

Is there an attached garage?	☐ Yes	☒ No	
Is there smoking in the building?	☐ Yes	☒ No	
Is there new carpet or furniture?	☐ Yes	☒ No	Describe: ____
Have clothes or drapes been recently dry cleaned?	☐ Yes	☒ No	Describe: ____
Has painting or staining been done with the last six months?	☐ Yes	☒ No	Describe: ____
Has the building been recently remodeled?	☐ Yes	☒ No	Describe: ____
Has the building ever had a fire?	☐ Yes	☒ No	
Is there a hobby or craft area in the building?	☐ Yes	☒ No	Describe: ____
Is gun cleaner stored in the building?	☐ Yes	☒ No	
Is there a fuel oil tank on the property?	☐ Yes	☒ No	
Is there a septic tank on the property?	☐ Yes	☒ No	
Has the building been fumigated or sprayed for pests recently?	☐ Yes	☒ No	Describe: ____
Do any building occupants use solvents at work?	☐ Yes	☒ No	Describe: ____

Sampling Locations

Draw the general floor plan of the building and denote locations of sample collection. Indicate locations of doors, windows, indoor air contaminant sources and field instrument readings.



Primary Type of Energy Used (Check appropriate boxes)

☒ Natural Gas ☐ Fuel Oil ☐ Propane ☒ Electricity ☐ Wood ☐ Kerosene

Meteorological Conditions

Describe the general weather conditions during the indoor air sampling event.
50°F, overcast, light variable winds

General Comments

Provide any other information that may be of importance in understanding the indoor air quality of this building.
Typical amounts of markers, "liquid paper", dry erase boards & markers associated with admin offices.
Janitorial closet adjacent to restrooms with cleaning agents & one can of paint.
Slight odor of household cleaning agent(?) in the space.

APPENDIX L - BUILDING SURVEY FORM

Preparer's Name: Brian Gwinn Date/Time Prepared: 12/5/15 - 8 AM
Affiliation: Blue Rock Environmental, Inc. Phone Number: 650-527-9242

Occupant Information

Occupant Name: Oakland Children Hosp. Behavioral Services Interviewed: ☐ Yes ☒ No
Building ~~Mailing~~ Address: 638 3rd St.
City: Oakland State: CA Zip Code: 94607
Phone: Email:

Owner/Landlord Information (Check if same as occupant ☐)

~~Occupant~~ Name: Terrader Jefferson, Attn: Sara May Interviewed: ☒ Yes ☐ No
Mailing Address: 580 2nd St.
City: Oakland State: CA Zip Code: 94607
Phone: Email:

Building Type (Check appropriate boxes)

☐ Residential ☐ Residential Duplex ☐ Apartment Building ☐ Mobile Home ☒ Commercial (office)
☐ Commercial (warehouse) ☐ Industrial ☐ Strip Mall ☐ Split Level ☐ Church ☐ School

Building Characteristics

Approximate Building Age (years): ________ Number of Stories: 1
Approximate Building Area (square feet): ________ Number of Elevators: Ø

Foundation Type (Check appropriate boxes)

☒ Slab-on-Grade ☐ Crawl Space ☐ Basement

Basement Characteristics (Check appropriate boxes) NA

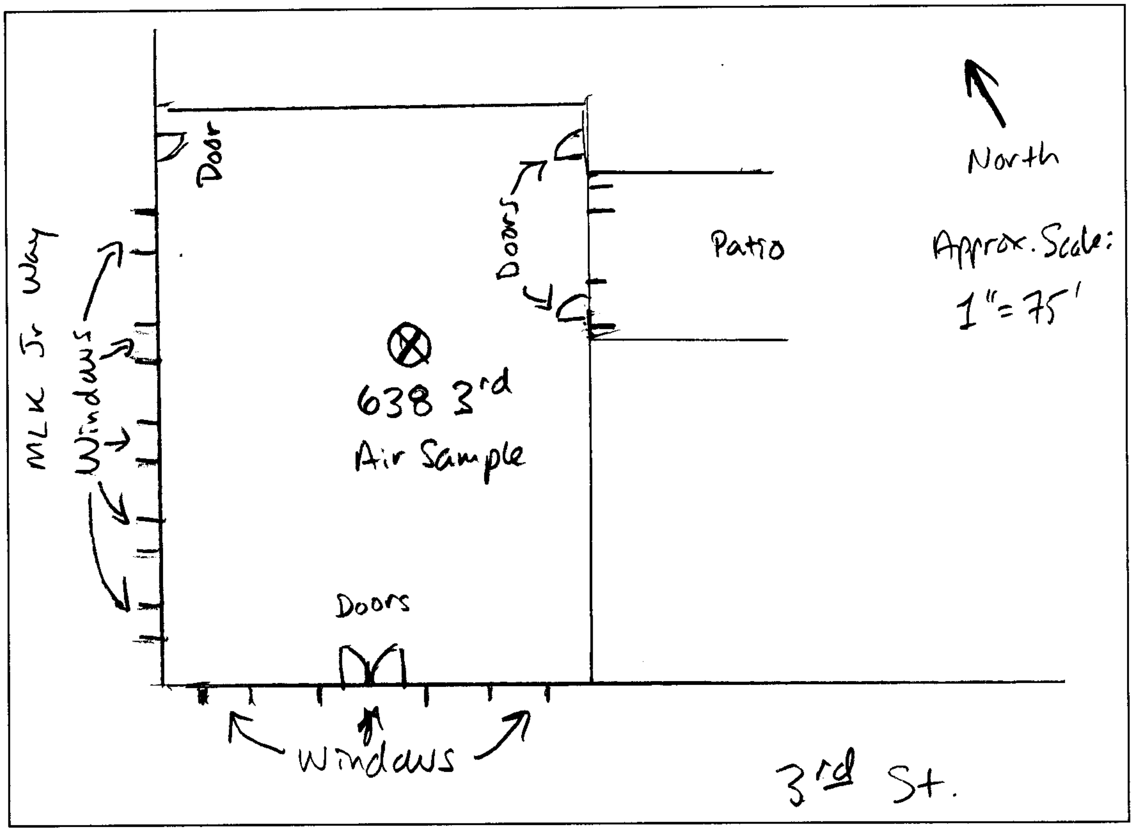
☐ Dirt Floor ☐ Sealed ☐ Wet Surfaces ☐ Sump Pump ☐ Concrete Cracks ☐ Floor Drains

Factors Influencing Indoor Air Quality

Is there an attached garage?	☐ Yes	☒ No	
Is there smoking in the building?	☐ Yes	☒ No	
Is there new carpet or furniture?	☐ Yes	☒ No	Describe:
Have clothes or drapes been recently dry cleaned?	☐ Yes	☒ No	Describe:
Has painting or staining been done with the last six months?	☐ Yes	☒ No	Describe:
Has the building been recently remodeled?	☐ Yes	☒ No	Describe:
Has the building ever had a fire?	☐ Yes	☒ No	
Is there a hobby or craft area in the building?	☐ Yes	☒ No	Describe:
Is gun cleaner stored in the building?	☐ Yes	☒ No	
Is there a fuel oil tank on the property?	☐ Yes	☒ No	
Is there a septic tank on the property?	☐ Yes	☒ No	
Has the building been fumigated or sprayed for pests recently?	☐ Yes	☒ No	Describe:
Do any building occupants use solvents at work?	☐ Yes	☒ No	Describe:

Sampling Locations

Draw the general floor plan of the building and denote locations of sample collection. Indicate locations of doors, windows, indoor air contaminant sources and field instrument readings.



Primary Type of Energy Used (Check appropriate boxes)

☒ Natural Gas ☐ Fuel Oil ☐ Propane ☒ Electricity ☐ Wood ☐ Kerosene

Meteorological Conditions

Describe the general weather conditions during the indoor air sampling event.

50°F, overcast, light variable winds

General Comments

Provide any other information that may be of importance in understanding the indoor air quality of this building.

Typical amount of markers, "liquid paper", and dry erase boards and makers associated with offices.

Sara May indicated that the tenants complained of off-gas odor from new blinds ~~someti~~ a while back, but that it had been taken care of.

Indoor Air Sample: 645 4th

Indoor Air Sample: 380 MLK

Indoor Air Sample: 638 3rd

Outdoor Air Sample: R-1

Outdoor Air Sample: R-2

Summary of Cumulative Risk and Hazard Index

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **645 4th**
Sample date: **12/5/2015**

		TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Naphtha-lene	1,2-DCA	EDB		
Residential	Risk	No Value	2.1E-05	No Value	1.2E-06	No Value	3.8E-07	7.0E-07	6.9E-07	8.8E-07	**CR**	**2.5E-05**
	HQ	3.8	0.058	0.017	0.0012	0.082	0.0012	0.016	0.032	0.0032	**HI**	**4.0**
Commercial	Risk	No Value	4.3E-06	No Value	2.4E-07	No Value	7.6E-08	1.4E-07	1.4E-07	1.7E-07	**CR**	**5.0E-06**
	HQ	0.91	0.014	0.0041	0.00027	0.020	0.00027	0.0038	0.0076	0.00076	**HI**	**0.96**

Risk Calculations for Indoor Air Inhalation Exposure

Project:	**Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID:	**645 4th**
Sample date:	**12/5/2015**
Constituent:	**TPHg**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	36	36	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	No Value	No Value	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	9.0E+00	9.0E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	No Value
	HQ =	3.8E+00

Commercial	Risk =	No Value
	HQ =	9.1E-01

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **645 4th**
Sample date: **12/5/2015**
Constituent: **Benzene**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ \text{day/yr} \times 24\ \text{hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365\ \text{day/yr} \times 24\ \text{hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	1.8	1.8	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.9E-05	2.9E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+01	3.0E+01	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	2.1E-05
	HQ =	5.8E-02

Commercial	Risk =	4.3E-06
	HQ =	1.4E-02

Risk Calculations for Indoor Air Inhalation Exposure

Project:	**Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID:	**645 4th**
Sample date:	**12/5/2015**
Constituent:	**Toluene**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario: Residential	Exposure Scenario: Commercial	Units	Reference
$C_{\text{indoor air}}$ =	5.4	5.4	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	No Value	No Value	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+02	3.0E+02	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	No Value
	HQ =	1.7E-02

Commercial	Risk =	No Value
	HQ =	4.1E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **645 4th**
Sample date: **12/5/2015**
Constituent: **Ethylbenzene**

$$\text{Risk} = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ \text{day/yr} \times 24\ \text{hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ \text{day/yr} \times 24\ \text{hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{indoor\ air}$ =	1.2	1.2	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.5E-06	2.5E-06	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	1.0E+03	1.0E+03	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	1.2E-06
	HQ =	1.2E-03

Commercial	Risk =	2.4E-07
	HQ =	2.7E-04

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **645 4th**
Sample date: **12/5/2015**
Constituent: **Xylenes**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<8.6	<8.6	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	No Value	No Value	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	1.0E+02	1.0E+02	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	No Value
	HQ =	8.2E-02

Commercial	Risk =	No Value
	HQ =	2.0E-02

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **645 4th**
Sample date: **12/5/2015**
Constituent: **Methyl tert-butyl ether**

$$\text{Risk} = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ \text{day/yr} \times 24\ \text{hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ \text{day/yr} \times 24\ \text{hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{indoor\ air}$ =	<3.6	<3.6	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.6E-07	2.6E-07	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+03	3.0E+03	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	3.8E-07
	HQ =	1.2E-03

Commercial	Risk =	7.6E-08
	HQ =	2.7E-04

Risk Calculations for Indoor Air Inhalation Exposure

Project:	**Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID:	**645 4th**
Sample date:	**12/5/2015**
Constituent:	**Naphthalene**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<0.05	<0.05	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	3.4E-05	3.4E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+00	3.0E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	7.0E-07
	HQ =	1.6E-02

Commercial	Risk =	1.4E-07
	HQ =	3.8E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **645 4th**
Sample date: **12/5/2015**
Constituent: **1,2-Dichloroethane**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<0.08	<0.08	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.1E-05	2.1E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	2.4E+00	2.4E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	6.9E-07
	HQ =	3.2E-02

Commercial	Risk =	1.4E-07
	HQ =	7.6E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **645 4th**
Sample date: **12/5/2015**
Constituent: **1,2-Dibromoethane**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ \text{day/yr} \times 24\ \text{hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365\ \text{day/yr} \times 24\ \text{hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<0.03	<0.03	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	7.1E-05	7.1E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	9.0E+00	9.0E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	8.8E-07
	HQ =	3.2E-03

Commercial	Risk =	1.7E-07
	HQ =	7.6E-04

Summary of Cumulative Risk and Hazard Index

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **380 MLK**
Sample date: **12/5/2015**

		TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Naphtha-lene	1,2-DCA	EDB		
Residential	Risk	No Value	2.4E-05	No Value	1.2E-06	No Value	3.8E-07	7.0E-07	7.3E-07	8.8E-07	**CR**	**2.8E-05**
	HQ	1.8	0.064	0.017	0.0012	0.047	0.0012	0.016	0.034	0.0032	**HI**	**2.0**
Commercial	Risk	No Value	4.7E-06	No Value	2.4E-07	No Value	7.6E-08	1.4E-07	1.4E-07	1.7E-07	**CR**	**5.5E-06**
	HQ	0.43	0.015	0.0041	0.00027	0.011	0.00027	0.0038	0.0076	0.00076	**HI**	**0.47**

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **380 MLK Jr**
Sample date: **12/5/2015**
Constituent: **TPHg**

$$Risk = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ day/yr \times 24\ hr/day}$$

$$Hazard\ Quotient\ (HQ) = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ day/yr \times 24\ hr/day \times RfC}$$

where:

	Exposure Scenario: Residential	Exposure Scenario: Commercial	Units	Reference
$C_{indoor\ air}$ =	17	17	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	No Value	No Value	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	9.0E+00	9.0E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	No Value
	HQ =	1.8E+00

Commercial	Risk =	No Value
	HQ =	4.3E-01

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **380 MLK Jr**
Sample date: **12/5/2015**
Constituent: **Benzene**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	2.0	2.0	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.9E-05	2.9E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+01	3.0E+01	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	2.4E-05
	HQ =	6.4E-02

Commercial	Risk =	4.7E-06
	HQ =	1.5E-02

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **380 MLK Jr**
Sample date: **12/5/2015**
Constituent: **Toluene**

$$\text{Risk} = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ day/yr \times 24\ hr/day}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ day/yr \times 24\ hr/day \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{indoor\ air}$ =	5.4	5.4	µg/m^3	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	No Value	No Value	(µg/m^3)$^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+02	3.0E+02	µg/m^3	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	No Value
	HQ =	1.7E-02

Commercial	Risk =	No Value
	HQ =	4.1E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project:	**Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID:	**380 MLK Jr**
Sample date:	**12/5/2015**
Constituent:	**Ethylbenzene**

$$\text{Risk} = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ \text{day/yr} \times 24\ \text{hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ \text{day/yr} \times 24\ \text{hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{indoor\ air}$ =	1.2	1.2	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.5E-06	2.5E-06	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	1.0E+03	1.0E+03	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	1.2E-06
	HQ =	1.2E-03

Commercial	Risk =	2.4E-07
	HQ =	2.7E-04

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **380 MLK Jr**
Sample date: **12/5/2015**
Constituent: **Xylenes**

$$\text{Risk} = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ day/yr \times 24\ hr/day}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ day/yr \times 24\ hr/day \times RfC}$$

where:

	Exposure Scenario: Residential	Exposure Scenario: Commercial	Units	Reference
$C_{indoor\ air}$ =	4.9	4.9	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	No Value	No Value	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	1.0E+02	1.0E+02	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	No Value
	HQ =	4.7E-02

Commercial	Risk =	No Value
	HQ =	1.1E-02

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **380 MLK Jr**
Sample date: **12/5/2015**
Constituent: **Methyl tert-butyl ether**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ \text{day/yr} \times 24\ \text{hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365\ \text{day/yr} \times 24\ \text{hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<3.6	<3.6	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.6E-07	2.6E-07	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+03	3.0E+03	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	3.8E-07
	HQ =	1.2E-03

Commercial	Risk =	7.6E-08
	HQ =	2.7E-04

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **380 MLK Jr**
Sample date: **12/5/2015**
Constituent: **Naphthalene**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<0.05	<0.05	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	3.4E-05	3.4E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+00	3.0E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	7.0E-07
	HQ =	1.6E-02

Commercial	Risk =	1.4E-07
	HQ =	3.8E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project:	**Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID:	**380 MLK Jr**
Sample date:	**12/5/2015**
Constituent:	**1,2-Dichloroethane**

$$\text{Risk} = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ day/yr \times 24\ hr/day}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ day/yr \times 24\ hr/day \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{indoor\ air}$ =	<0.08	<0.08	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	370	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.1E-05	2.1E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	2.4E+00	2.4E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	7.3E-07
	HQ =	3.4E-02

Commercial	Risk =	1.4E-07
	HQ =	7.6E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project:	**Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID:	**380 MLK Jr**
Sample date:	**12/5/2015**
Constituent:	**1,2-Dibromoethane**

$$\text{Risk} = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ day/yr \times 24\ hr/day}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ day/yr \times 24\ hr/day \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{indoor\ air}$ =	<0.03	<0.03	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	7.1E-05	7.1E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	9.0E+00	9.0E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	8.8E-07
	HQ =	3.2E-03

Commercial	Risk =	1.7E-07
	HQ =	7.6E-04

Summary of Cumulative Risk and Hazard Index

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **638 3rd**
Sample date: **12/5/2015**

		TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Naphtha-lene	1,2-DCA	EDB		
Residential	Risk	No Value	1.4E-05	No Value	8.9E-07	No Value	3.8E-07	7.0E-07	6.9E-07	8.8E-07	**CR**	**1.8E-05**
	HQ	1.0	0.038	0.012	0.00083	0.082	0.0012	0.016	0.032	0.0032	**HI**	**1.2**
Commercial	Risk	No Value	2.8E-06	No Value	1.8E-07	No Value	7.6E-08	1.4E-07	1.4E-07	1.7E-07	**CR**	**3.5E-06**
	HQ	0.25	0.0091	0.0029	0.00020	0.020	0.00027	0.0038	0.0076	0.00076	**HI**	**0.29**

Risk Calculations for Indoor Air Inhalation Exposure

Project:	**Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID:	**638 3rd**
Sample date:	**12/5/2015**
Constituent:	**TPHg**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<9.8	<9.8	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	No Value	No Value	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	9.0E+00	9.0E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	No Value
	HQ =	1.0E+00

Commercial	Risk =	No Value
	HQ =	2.5E-01

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **638 3rd**
Sample date: **12/5/2015**
Constituent: **Benzene**

$$Risk = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ day/yr \times 24\ hr/day}$$

$$Hazard\ Quotient\ (HQ) = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ day/yr \times 24\ hr/day \times RfC}$$

where:

	Exposure Scenario: Residential	Exposure Scenario: Commercial	Units	Reference
$C_{indoor\ air}$ =	1.2	1.2	µg/m^3	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.9E-05	2.9E-05	(µg/m^3)$^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+01	3.0E+01	µg/m^3	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	1.4E-05
	HQ =	3.8E-02

Commercial	Risk =	2.8E-06
	HQ =	9.1E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project:	**Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID:	**638 3rd**
Sample date:	**12/5/2015**
Constituent:	**Toluene**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<3.8	<3.8	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	No Value	No Value	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+02	3.0E+02	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	No Value
	HQ =	1.2E-02

Commercial	Risk =	No Value
	HQ =	2.9E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **638 3rd**
Sample date: **12/5/2015**
Constituent: **Ethylbenzene**

$$\text{Risk} = \frac{C_{\text{indoor air}} \text{ x ET x EF x ED x IUR}}{AT_c \text{ x 365 day/yr x 24 hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \text{ x ET x EF x ED}}{AT_{nc} \text{ x 365 day/yr x 24 hr/day x RfC}}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<0.87	<0.87	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.5E-06	2.5E-06	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	1.0E+03	1.0E+03	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	8.9E-07
	HQ =	8.3E-04

Commercial	Risk =	1.8E-07
	HQ =	2.0E-04

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **638 3rd**
Sample date: **12/5/2015**
Constituent: **Xylenes**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ \text{day/yr} \times 24\ \text{hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365\ \text{day/yr} \times 24\ \text{hr/day} \times RfC}$$

where:

	Exposure Scenario: Residential	Exposure Scenario: Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<8.6	<8.6	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	No Value	No Value	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	1.0E+02	1.0E+02	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	No Value
	HQ =	8.2E-02

Commercial	Risk =	No Value
	HQ =	2.0E-02

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **638 3rd**
Sample date: **12/5/2015**
Constituent: **Methyl tert-butyl ether**

$$\text{Risk} = \frac{C_{\text{indoor air}} \text{ x ET x EF x ED x IUR}}{AT_c \text{ x 365 day/yr x 24 hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \text{ x ET x EF x ED}}{AT_{nc} \text{ x 365 day/yr x 24 hr/day x RfC}}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<3.6	<3.6	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.6E-07	2.6E-07	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+03	3.0E+03	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	3.8E-07
	HQ =	1.2E-03

Commercial	Risk =	7.6E-08
	HQ =	2.7E-04

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **638 3rd**
Sample date: **12/5/2015**
Constituent: **Naphthalene**

$$\text{Risk} = \frac{C_{indoor\ air} \times ET \times EF \times ED \times IUR}{AT_c \times 365\ day/yr \times 24\ hr/day}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{indoor\ air} \times ET \times EF \times ED}{AT_{nc} \times 365\ day/yr \times 24\ hr/day \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{indoor\ air}$ =	<0.05	<0.05	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	3.4E-05	3.4E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	3.0E+00	3.0E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	7.0E-07
	HQ =	1.6E-02

Commercial	Risk =	1.4E-07
	HQ =	3.8E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project: **Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID: **638 3rd**
Sample date: **12/5/2015**
Constituent: **1,2-Dichloroethane**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<0.08	<0.08	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	2.1E-05	2.1E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	2.4E+00	2.4E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	6.9E-07
	HQ =	3.2E-02

Commercial	Risk =	1.4E-07
	HQ =	7.6E-03

Risk Calculations for Indoor Air Inhalation Exposure

Project:	**Terradev Jefferson LCC property, 645 4th St., Oakland, CA**
Sample ID:	**638 3rd**
Sample date:	**12/5/2015**
Constituent:	**1,2-Dibromoethane**

$$\text{Risk} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED \times IUR}{AT_c \times 365 \text{ day/yr} \times 24 \text{ hr/day}}$$

$$\text{Hazard Quotient (HQ)} = \frac{C_{\text{indoor air}} \times ET \times EF \times ED}{AT_{nc} \times 365 \text{ day/yr} \times 24 \text{ hr/day} \times RfC}$$

where:

	Exposure Scenario Residential	Exposure Scenario Commercial	Units	Reference
$C_{\text{indoor air}}$ =	<0.03	<0.03	$\mu g/m^3$	site specific data
ET =	24	8	hr/day	DTSC Oct 2011
EF =	350	250	day/yr	DTSC Oct 2011
ED =	30	25	yr	DTSC Oct 2011
IUR =	7.1E-05	7.1E-05	$(\mu g/m^3)^{-1}$	SFRWQCB Dec 2013
AT_c =	70	70	yr	DTSC Oct 2011
RfC =	9.0E+00	9.0E+00	$\mu g/m^3$	SFRWQCB Dec 2013
AT_{nc} =	30	25	yr	DTSC Oct 2011

Residential	Risk =	8.8E-07
	HQ =	3.2E-03

Commercial	Risk =	1.7E-07
	HQ =	7.6E-04

Analytical Sciences

Report Date: December 16, 2015

Laboratory Report

Brian Gwinn
Blue Rock Environmental
1157 Chess Drive, Ste. 107
Foster City, CA 94404

Project Name:	**Terradev Jefferson LLC**	**ASE-1**
Lab Project Number:	**5120906**	

This 6 page report of analytical data has been reviewed and approved for release.

Mark A. Valentini, Ph.D.

Laboratory Director

P.O. Box 750336
Petaluma, CA 94975-0336
Telephone: (707) 769-3128

110 Liberty Street
Petaluma, CA
94952

Volatile Hydrocarbons by GC/MS in Air (μg/m³)

Lab#	Sample ID	Compound Name	Result (μg/m³)		RDL (μg/m³)
5120906-01	**645 4th**	Gasoline	36	VAa	9.8
		Benzene	1.8		0.06
		Toluene	5.4		3.8
		Ethylbenzene	1.2		0.87
		m,p-Xylene	5.4		4.3
		o-Xylene	ND		4.3
		Methyl tert-Butyl Ether (MTBE)	ND		3.6
		1,2-Dichloroethane (EDC)	ND		0.08
		1,2-Dibromoethane (EDB)	ND		0.03
		Naphthalene	ND		0.05

Surrogates	Result (μg/m³)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	7.69	99	70-130
4-Bromofluorobenzene	6.73	87	70-130

Date Sampled:	12/05/15	Date Analyzed:	12/09/15	QC Batch: B015286
Date Received:	12/09/15	Method:	EPA TO-15	

Volatile Hydrocarbons by GC/MS in Air (μg/m³)

Lab#	Sample ID	Compound Name	Result (μg/m³)		RDL (μg/m³)
5120906-02	**380 MLK**	Gasoline	17	VA	9.8
		Benzene	2.0		0.06
		Toluene	5.4		3.8
		Ethylbenzene	1.2		0.87
		m,p-Xylene	4.9		4.3
		o-Xylene	ND		4.3
		Methyl tert-Butyl Ether (MTBE)	ND		3.6
		1,2-Dichloroethane (EDC)	ND		0.08
		1,2-Dibromoethane (EDB)	ND		0.03
		Naphthalene	ND		0.05

Surrogates	Result (μg/m³)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	7.72	99	70-130
4-Bromofluorobenzene	6.53	84	70-130

Date Sampled:	12/05/15	Date Analyzed:	12/09/15	QC Batch: B015286
Date Received:	12/09/15	Method:	EPA TO-15	

Volatile Hydrocarbons by GC/MS in Air (µg/m³)

Lab#	Sample ID	Compound Name	Result (µg/m³)		RDL (µg/m³)
5120906-03	**638 3rd**	Gasoline	ND	VAc	9.8
		Benzene	1.2		0.06
		Toluene	ND		3.8
		Ethylbenzene	ND		0.87
		m,p-Xylene	ND		4.3
		o-Xylene	ND		4.3
		Methyl tert-Butyl Ether (MTBE)	ND		3.6
		1,2-Dichloroethane (EDC)	ND		0.08
		1,2-Dibromoethane (EDB)	ND		0.03
		Naphthalene	ND		0.05

Surrogates	Result (µg/m³)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	7.75	100	70-130
4-Bromofluorobenzene	7.33	94	70-130

Date Sampled:	12/05/15	Date Analyzed:	12/09/15	QC Batch:	B015286
Date Received:	12/09/15	Method:	EPA TO-15		

Volatile Hydrocarbons by GC/MS in Air (µg/m³)

Lab#	Sample ID	Compound Name	Result (µg/m³)		RDL (µg/m³)
5120906-04	**R-1**	Gasoline	ND	VAb	9.8
		Benzene	0.78		0.06
		Toluene	ND		3.8
		Ethylbenzene	ND		0.87
		m,p-Xylene	ND		4.3
		o-Xylene	ND		4.3
		Methyl tert-Butyl Ether (MTBE)	ND		3.6
		1,2-Dichloroethane (EDC)	ND		0.08
		1,2-Dibromoethane (EDB)	ND		0.03
		Naphthalene	ND		0.05

Surrogates	Result (µg/m³)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	7.72	99	70-130
4-Bromofluorobenzene	6.67	86	70-130

Date Sampled:	12/05/15	Date Analyzed:	12/09/15	QC Batch:	B015286
Date Received:	12/09/15	Method:	EPA TO-15		

Volatile Hydrocarbons by GC/MS in Air (µg/m³)

Lab#	Sample ID	Compound Name	Result (µg/m³)		RDL (µg/m³)
5120906-05	**R-2**	Gasoline	ND	VAa	9.8
		Benzene	1.2		0.06
		Toluene	ND		3.8
		Ethylbenzene	ND		0.87
		m,p-Xylene	ND		4.3
		o-Xylene	ND		4.3
		Methyl tert-Butyl Ether (MTBE)	ND		3.6
		1,2-Dichloroethane (EDC)	ND		0.08
		1,2-Dibromoethane (EDB)	ND		0.03
		Naphthalene	ND		0.05

Surrogates	Result (µg/m³)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	7.75	100	70-130
4-Bromofluorobenzene	6.73	87	70-130

Date Sampled:	12/05/15	Date Analyzed:	12/09/15	QC Batch: B015286
Date Received:	12/09/15	Method:	EPA TO-15	

Quality Assurance Report

Volatile Hydrocarbons by GC/MS in Air (µg/m³)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B015286 - Air prep GC/MS										
Blank (B015286-BLK1)				Prepared & Analyzed: 12/09/15						
Gasoline	ND	9.8	µg/m³							
Benzene	ND	0.06	µg/m³							
Toluene	ND	3.8	µg/m³							
Ethylbenzene	ND	0.87	µg/m³							
m,p-Xylene	ND	4.3	µg/m³							
o-Xylene	ND	4.3	µg/m³							
Methyl tert-Butyl Ether (MTBE)	ND	3.6	µg/m³							
1,2-Dichloroethane (EDC)	ND	0.08	µg/m³							
1,2-Dibromoethane (EDB)	ND	0.03	µg/m³							
Naphthalene	ND	0.05	µg/m³							
Surrogate: Dibromofluoromethane	*4.82*		*µg/m³*	*4.87*		*99*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*5.37*		*µg/m³*	*4.85*		*111*	*70-130*			

Notes and Definitions

VAc	The sample canister was received by the laboratory with a vacuum gauge reading of 3 inches of mercury.
VAb	The sample canister was received by the laboratory with a vacuum gauge reading of 2 inches of mercury.
VAa	The sample canister was received by the laboratory with a vacuum gauge reading of 1 inches of mercury.
VA	The sample canister was received by the laboratory with a vacuum gauge reading of 0 inches of mercury.
RDL	Reporting Detection Limit
ND	Analyte NOT DETECTED at or above the reporting detection limit (RDL)
RPD	Relative Percent Difference
NR	Not Reported

Analytical Sciences
P.O. Box 750336, Petaluma, CA 94975-0336
110 Liberty Street, Petaluma, CA 94952
(707) 769-3128

CHAIN OF CUSTODY

LAB PROJECT NUMBER: 5120906
CLIENT'S PROJECT NAME: Terradev Jefferson, LLC Property
CLIENT'S PROJECT NUMBER: ASE-1

CLIENT INFORMATION

COMPANY NAME: Blue Rock Environmental
ADDRESS: 1157 Chess, #107
Foster City, CA
CONTACT: Brian Gwinn
PHONE#: (650) 522-9292
FAX #:

BILLING INFORMATION

CONTACT: brian@bluerockenv.com
COMPANY NAME: SAME
ADDRESS:
PHONE#:
FAX #:

TURNAROUND TIME (check one)

MOBILE LAB ____
SAME DAY ____ 24 HOURS ____
48 HOURS ____ 72 HOURS ____
5 DAYS ____ NORMAL X

GEOTRACKER EDF: X Y ___ N
GLOBAL ID: T10000001072

COOLER TEMPERATURE ____ °C

COC PAGE 1 OF 1

ANALYSIS

ITEM	CLIENT SAMPLE I.D.	Summa Canister Serial #	Regulator Serial #	Sample Start Time / "Hg	Sample End Time / "Hg	Date Sampled	Matrix	EPA TO-15 BTEX, MTBE	EPA TO-15 Naphthalene, 1,2-DCA, EDB	EPA TO-3 TPH gasoline			COMMENTS	LAB SAMPLE #
1	645 4th	7004	7900	0851/30	1651/2.5	12/5/15	AIR	X	X	X		-01	Please Report sample container	
2	380 MLK	15889	3385	0854/30	1654/0	↓	↓	↓	↓	↓		-02	vacuums pre-	
3	638 3rd	15884	7902	0857/30	1657/5	↓	↓	↓	↓	↓		-03	Analysis and consult with	
4	R-1	7003	7399	0900/30	1700/5	↓	↓	↓	↓	↓		-04	Blue Rock	
5	R-2	15885	931	0903/30	1703/4.5	12/5/15	AIR	X	X	X		-05	before analyzing if substantially	
6													different from	
7													and vacuums reported on COC. (BG)	
8													Please record container	
9													vacuums prior to	
10													analysis. (BG)	

SIGNATURES

SAMPLED BY: Loren Taylor, BlueRockEnv.

RELINQUISHED BY: [signature] DATE 12/9/15 TIME 11:09

RECEIVED BY LABORATORY: [signature] DATE 12/9/15 TIME 11:09

Analytical Sciences

Report Date: December 17, 2015

Laboratory Report

Brian Gwinn
Blue Rock Environmental
1157 Chess Drive, Ste. 107
Foster City, CA 94404

Project Name: **Terradev Jefferson LLC** **ASE-1**

Lab Project Number: **5120907**

This 8 page report of analytical data has been reviewed and approved for release.

Mark A. Valentini, Ph.D.

Laboratory Director

P.O. Box 750336
Petaluma, CA 94975-0336
Telephone: (707) 769-3128

110 Liberty Street
Petaluma, CA
94952

Volatile Hydrocarbons by GC/MS in Air (µg/m³)

Lab#	Sample ID	Compound Name	Result (µg/m³)		RDL (µg/m³)
5120907-01	**VP-1**	Gasoline	ND	VA	330
		Benzene	ND		8.0
		Toluene	ND		9.4
		Ethylbenzene	ND		11
		m,p-Xylene	ND		11
		o-Xylene	ND		11
		Naphthalene	ND		13
		Methyl tert-Butyl Ether (MTBE)	ND		9.0
		1,2-Dichloroethane (EDC)	ND		10
		1,2-Dibromoethane (EDB)	ND		3.8

Surrogates	Result (µg/m³)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	38.8	100	70-130
4-Bromofluorobenzene	40.5	104	70-130

Date Sampled:	12/05/15	Date Analyzed:	12/09/15	QC Batch: B015286
Date Received:	12/09/15	Method:	EPA TO-15	

Volatile Hydrocarbons by GC/MS in Air (µg/m³)

Lab#	Sample ID	Compound Name	Result (µg/m³)		RDL (µg/m³)
5120907-02	**VP-2**	Gasoline	ND	VAa	330
		Benzene	ND		8.0
		Toluene	ND		9.4
		Ethylbenzene	ND		11
		m,p-Xylene	ND		11
		o-Xylene	ND		11
		Naphthalene	ND		13
		Methyl tert-Butyl Ether (MTBE)	ND		9.0
		1,2-Dichloroethane (EDC)	ND		10
		1,2-Dibromoethane (EDB)	ND		3.8

Surrogates	Result (µg/m³)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	38.8	100	70-130
4-Bromofluorobenzene	38.9	100	70-130

Date Sampled:	12/05/15	Date Analyzed:	12/09/15	QC Batch: B015286
Date Received:	12/09/15	Method:	EPA TO-15	

Volatile Hydrocarbons by GC/MS in Air (µg/m³)

Lab#	Sample ID	Compound Name	Result (µg/m³)		RDL (µg/m³)
5120907-03	**VP-4**	Gasoline	2000000	VA	45000
		Benzene	ND		1100
		Toluene	ND		1300
		Ethylbenzene	ND		1500
		m,p-Xylene	38000		1500
		o-Xylene	17000		1500
		Naphthalene	ND		1800
		Methyl tert-Butyl Ether (MTBE)	ND		1200
		1,2-Dichloroethane (EDC)	ND		1400
		1,2-Dibromoethane (EDB)	ND		530

Surrogates	Result (µg/m³)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	38.9	100	70-130
4-Bromofluorobenzene	43.4	112	70-130

Date Sampled:	12/05/15	Date Analyzed:	12/10/15	QC Batch:	B015286
Date Received:	12/09/15	Method:	EPA TO-15		

Volatile Hydrocarbons by GC/MS in Air (µg/m³)

Lab#	Sample ID	Compound Name	Result (µg/m³)		RDL (µg/m³)
5120907-04	**VP-5**	Gasoline	8200000	VA	450000
		Benzene	170000		11000
		Toluene	180000		13000
		Ethylbenzene	150000		15000
		m,p-Xylene	1000000		15000
		o-Xylene	310000		15000
		Naphthalene	ND		18000
		Methyl tert-Butyl Ether (MTBE)	ND		12000
		1,2-Dichloroethane (EDC)	ND		14000
		1,2-Dibromoethane (EDB)	ND		5300

Surrogates	Result (µg/m³)	% Recovery	Acceptance Range (%)
Dibromofluoromethane	38.8	100	70-130
4-Bromofluorobenzene	34.2	88	70-130

Date Sampled:	12/05/15	Date Analyzed:	12/10/15	QC Batch:	B015286
Date Received:	12/09/15	Method:	EPA TO-15		

Fixed Gases (%)

Lab#	Sample ID	Compound Name	Result (%)	RDL (%)
5120907-01	**VP-1**	Oxygen (O2)	11	0.008
		Carbon Dioxide (CO2)	2.6	0.008
		Methane	ND	0.008
		Helium	ND	0.003

Date Sampled:	12/05/15	Date Analyzed:	12/11/15	QC Batch:	B015283
Date Received:	12/09/15	Method:	ASTM 1946 D		

Fixed Gases (%)

Lab#	Sample ID	Compound Name	Result (%)	RDL (%)
5120907-02	**VP-2**	Oxygen (O2)	5.2	0.010
		Carbon Dioxide (CO2)	4.2	0.010
		Methane	ND	0.010
		Helium	ND	0.004

Date Sampled:	12/05/15	Date Analyzed:	12/11/15	QC Batch:	B015283
Date Received:	12/09/15	Method:	ASTM 1946 D		

Fixed Gases (%)

Lab#	Sample ID	Compound Name	Result (%)	RDL (%)
5120907-03	**VP-4**	Oxygen (O2)	17	0.007
		Carbon Dioxide (CO2)	2.9	0.007
		Methane	ND	0.007
		Helium	ND	0.003

Date Sampled:	12/05/15	Date Analyzed:	12/11/15	QC Batch:	B015283
Date Received:	12/09/15	Method:	ASTM 1946 D		

Fixed Gases (%)

Lab#	Sample ID	Compound Name	Result (%)	RDL (%)
5120907-04	**VP-5**	Oxygen (O_2)	1.9	0.007
		Carbon Dioxide (CO_2)	13	0.007
		Methane	0.008	0.007
		Helium	ND	0.003

Date Sampled:	12/05/15	Date Analyzed:	12/11/15	QC Batch: B015283
Date Received:	12/09/15	Method:	ASTM 1946 D	

Quality Assurance Report

Volatile Hydrocarbons by GC/MS in Air (µg/m³)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B015286 - Air prep GC/MS										
Blank (B015286-BLK1)				Prepared & Analyzed: 12/09/15						
Gasoline	ND	330	µg/m³							
Benzene	ND	8.0	µg/m³							
Toluene	ND	9.4	µg/m³							
Ethylbenzene	ND	11	µg/m³							
m,p-Xylene	ND	11	µg/m³							
o-Xylene	ND	11	µg/m³							
Naphthalene	ND	13	µg/m³							
Methyl tert-Butyl Ether (MTBE)	ND	9.0	µg/m³							
1,2-Dichloroethane (EDC)	ND	10	µg/m³							
1,2-Dibromoethane (EDB)	ND	3.8	µg/m³							

Fixed Gases (%)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B015283 - Air prep GC										
Duplicate (B015283-DUP1)		**Source: 5120907-01**		Prepared & Analyzed: 12/11/15						
Oxygen (O2)	11.0	0.008	%		11.1			1	20	
Carbon Dioxide (CO2)	2.6	0.008	%		2.6			0	20	
Methane	ND	0.008	%		ND				20	
Helium	ND	0.003	%		ND				20	

Notes and Definitions

VAa	The sample canister was received by the laboratory with a vacuum gauge reading of 3 inches of mercury.
VA	The sample canister was received by the laboratory with a vacuum gauge reading of 1 inches of mercury.
RDL	Reporting Detection Limit
ND	Analyte NOT DETECTED at or above the reporting detection limit (RDL)
RPD	Relative Percent Difference
NR	Not Reported

Analytical Sciences
P.O. Box 750336, Petaluma, CA 94975-0336
110 Liberty Street, Petaluma, CA 94952
(707) 769-3128

CHAIN OF CUSTODY

LAB PROJECT NUMBER: 5120907
CLIENT'S PROJECT NAME: Terrader Jefferson, LLC Property
CLIENT'S PROJECT NUMBER: ASE-1

CLIENT INFORMATION

COMPANY NAME: BlueRock Environmental
ADDRESS: 1157 Chess Dr #107
Foster City, CA 94404
CONTACT: Brian Gwinn
PHONE#: (650)522-9292
FAX #:

BILLING INFORMATION

CONTACT: brian@bluerockenv.com
COMPANY NAME: SAME
ADDRESS:
PHONE#:
FAX #:

TURNAROUND TIME (check one)

MOBILE LAB			
SAME DAY		24 HOURS	
48 HOURS		72 HOURS	
5 DAYS		NORMAL	X

GEOTRACKER EDF: X Y ___ N
GLOBAL ID: T10000001072

COOLER TEMPERATURE
_____ °C

COC
PAGE 1 OF 1

ITEM	CLIENT SAMPLE I.D.	Summa Canister Serial #	Regulator Serial #	Sample Start Time/ "Hg	Sample End Time/ "Hg	Date Sampled	Matrix	ANALYSIS: EPA TO-15 BTEX, MTBE;	ANALYSIS: EPA TO-15 Napthalene, EDB, 1,2-DCA	ANALYSIS: EPA TO3 TPH gasoline	ANALYSIS: Mod ASTM D-1946 He, O2, CO2, Methane		COMMENTS 5120907	LAB SAMPLE #
1	VP-1	1002	13	1737/30	1748/5	12/5/15	AIR	X	X	X	X		Please record	-01
2	VP-2	140	24	1756/29	1811/5	↓	↓	↓	↓	↓	↓		container	-02
3	VP-4	1009	5	1836/30	1847/5	↓	↓	↓	↓	↓	↓		vacuums	-03
4	VP-5	306	3	1905/30	1914/5	12/5/15	AIR	X	X	X	X		prior to	-04
5													analysis.	
6														
7														
8														
9														
10														

SIGNATURES

SAMPLED BY: [signature] Loren Taylor, BlueRock

RELINQUISHED BY: [signature] — DATE: 12/9/15 — TIME: 1109

RECEIVED BY LABORATORY: [signature] — DATE: 12/9/15 — TIME: 11:09