

RECEIVED
By Alameda County Environmental Health 8:17 am, Apr 14, 2016

13 April 2016

Mr. Karel Detterman, P.G.
Hazardous Materials Specialist
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502
San Francisco, CA 94102

**Re: Petroleum Vapor Intrusion Risk Evaluation Dated 1 October 2015
3093 Broadway, Oakland, CA
Site Cleanup Program Case No. Ro0000199**

Dear Ms. Detterman,


Please find attached *Petroleum Vapor Intrusion Risk Evaluation*, dated 1 October 2015 for the Former Connell Oldsmobile site, located at 3093 Broadway in Oakland, California. The Report was prepared by Langan Treadwell Rollo.

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.

OWNER:
3093 BROADWAY HOLDINGS, L.L.C.

**By: 3093 BROADWAY VENTURE, L.L.C.,
as its sole member**

**By: CV 3093 Broadway, LLC,
as its Administrative Member**

By:  _____

Name: Stephen Siri _____

Title: Principal _____

1 October 2015

Ms. Karel Detterman, P.G.
Hazardous Materials Specialist
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, California 94502

**Re: Petroleum Vapor Intrusion Risk Evaluation
3093 Broadway Street
Oakland, California
Project No.: 731637001**

Dear Ms. Detterman,

On behalf of 3093 Broadway Holdings, L.L.C, Langan Treadwell Rollo (Langan) has prepared this Petroleum Vapor Intrusion (PVI) risk evaluation for the proposed development at 3093 Broadway in Oakland, California (the site; Figure 1). The approximately 3.4-acre site will be developed for mixed commercial and residential use. The two lowest levels of the development will consist of a commercial strip fronting Broadway and a two-story parking garage. Residential units will be developed on the third story and higher. The northern portion of the development will be constructed over an area where petroleum compounds have impacted the subsurface. The extent of the impacts has been defined, and cleanup activity is progressing. The residual petroleum compounds at the site will degrade over time; however, because residual petroleum compounds will remain in groundwater and soil vapor after construction, the Alameda County Department of Environmental Health (ACEH) requested this risk evaluation. This risk evaluation supersedes the future use risk screening presented in the Feasibility Study and Corrective Action Plan (FS/CAP; Langan, 2015), and incorporates the cumulative site data set, including additional data collected through August 2015, after preparation of the FS/CAP.

RISK EVALUATION APPROACH AND DOCUMENT ORGANIZATION

The technical approach to the risk evaluation consists of the assessment of qualitative and quantitative factors that affect the fate and transport of subsurface vapors. Additional soil gas sampling conducted in August 2015 is described first. The subsequent section considers empirical information regarding plume stability, biodegradation, and vapor attenuation. The remainder of the document presents an analytical modeling assessment to evaluate the potential transport of volatile organic compounds (VOCs) to indoor air. The modeling results are then integrated with the qualitative assessment to develop an overall conclusion about risk. For this risk evaluation, maximum detected concentrations were used and conservative estimates of exposure were assumed. This approach was used with the intention of deriving a reasonable upper bound human health risk from PVI, based on the site data.

SOIL GAS SAMPLING

Seven soil gas samples were collected, five of which were from soil gas well installations (SV-2, SV-4, SV-9, SV-10, SV-12) and two of which were from groundwater monitoring wells (MW-1 and MW-4). The soil gas well locations are shown on Figure 2. The soil gas samples were collected on 14 August 2015, except for the sample collected from well SV-10. Approximately 80 milliliters of water were encountered during purging of SV-10 during the first sampling attempt. Following the first sampling attempt, SV-10 was fully purged of water on August 19, 2015. During purging, a sample of the purged water was collected submitted for laboratory analysis for VOCs. No VOCs are detected; the analytical report is included in Attachment A. A soil gas sample was subsequently collected from SV-10 on 24 August 2015. No water was encountered at SV-10 on 24 August 2015.

The soil gas sampling locations and sample collection methods are summarized below and were described in Langan's Work Plan for Soil Gas Sampling, dated 4 September 2014, and in Langan's Addendum to Work Plan for Soil Gas Sampling dated 14 November, 2014. The soil gas samples were collected in general accordance with California Department of Toxic Substances Control (DTSC) approved methods (DTSC, 2015). The sampling and analysis plan was approved by the ACEH in its 7 August 2015 letter, sent via electronic mail.

Soil Gas Sample Collection

Connections were made to existing semi-permanent soil gas well installations SV-2, SV-4, SV-9, SV-10 and SV-12. Soil gas samples were collected after withdrawing three purge volumes, according to DTSC guidelines, at 200 milliliters per minute (mL/min). Soil gas samples were collected into 1-Liter Summa canisters.

Connections were also made to groundwater monitoring wells MW-1 and MW-4 by pressing a tight-fitting PVC slip-cap with a drilled sample port onto the 2-inch well casing. A sealing compound was placed around the cap, at the junction with the well casing, to help prevent intrusion of ambient air into the well. The wells were purged of three casing volumes of air at a rate of 1 liter per minute (L/min). The applied vacuum was minimized and the water levels in the wells did not measurably rise as a result of vapor extraction. Soil gas samples were then collected, according to DTSC guidelines. Soil gas samples were collected into 1-Liter Summa canisters at 200 mL/min.

Helium was used as a tracer gas around the aforementioned boreholes during sampling as a quality assurance/quality control (QA/QC) measure to confirm sample integrity. A shut-in test and leak check were performed to ensure that no leaks were present in the laboratory provided sampling equipment. A detailed description of the sampling train assembly, shut-in test, leak check and sample collection methodology is provided in the Work Plan (Langan, 2014).

Ambient air samples were collected on 14 August 2015 and on 24 August 2015, and were analyzed as control samples. The ambient air samples were collected into 6-Liter summa canisters using 8-hour flow regulators. The summa canisters were placed on top of the steps

located south of the building, immediately west of the former air-sparge/dual-phase extraction treatment compound. Soil gas samples were transported under chain-of-custody procedures to Eurofins CalScience (CalScience), a State of California-certified laboratory for analysis.

Soil Gas Analytical Results

The soil gas analytical results are presented in Tables 1 and 2. The laboratory analytical reports are included as Attachment A. The petroleum compound results from the sampling event conducted in August 2015 are generally consistent with the results from the November 2014 sampling event. Methane was detected in the soil gas samples from wells SV-2 and MW-1 at 1.3 percent and 0.59 percent, respectively. Groundwater is being monitored for methane production; however, groundwater cleanup is expected to reduce production of methane. Based on the methane concentrations detected in soil gas, methane is unlikely to accumulate at concentrations that would pose an explosion hazard within the future development.

VAPOR INTRUSION PATHWAY AND POTENTIAL RECEPTORS

Residual petroleum compound concentrations in soil gas have the potential to migrate via seams and cracks in a foundation into an overlying structure. Petroleum compounds in groundwater are a potential source of petroleum compounds in soil gas. After construction, residents and commercial workers at the site could potentially be exposed to petroleum compounds by vapor intrusion and subsequent inhalation of indoor air.

CONCEPTUAL SITE MODEL

The residual petroleum impacts to soil, groundwater and soil vapor at the site are described in the Conceptual Site Model (CSM; Langan, 2014). Additional site data collected from November 2014 through May 2015 is described in the 5 December 2014 letter regarding Additional Investigation Results, the FS/CAP, the 1 July 2015 Soil Investigation Report, and the 30 July 2015 Enhanced Bioremediation Pilot Study Report and Full Scale Implementation Plan. The following subsections describe the CSM, based on the cumulative data collected for the site.

Background Information

Gasoline and diesel were released from leaking underground storage tanks (USTs). Although the three USTs were removed from the site in 1989, and cleanup activities were performed between 1989 and 2013, residual concentrations remain in soil, soil vapor, and groundwater. Natural attenuation is reducing residual petroleum concentrations at the site, and in May 2015, Broadway Holdings initiated enhanced bioremediation using gypsum emplacement to increase sulfate concentrations in source area groundwater, and thereby increase the biodegradation rate for petroleum compounds.

Plume Stability

Residual petroleum impact to groundwater at the site is the primary source of petroleum compounds to soil gas. Plume stability is supported by the dominantly stable and decreasing trends of contaminant concentrations in site wells. To evaluate plume stability, two approaches were employed: 1) a qualitative approach, where graphs with Ordinary Least Squares

regression lines were prepared comparing petroleum compound concentrations for specific wells vs. time, and 2) a quantitative approach where Mann-Kendall statistical evaluations were conducted for benzene in impacted and downgradient wells. The results of these evaluations

indicate source well concentrations of benzene at MW-1 and MW-4 present statistically significant evidence of a decreasing trend at 95% confidence. Concentrations in downgradient wells (MW-7 and MW-8) rapidly decreased as the plume receded (Attachment B).

Biodegradation of Petroleum in Groundwater

The depletion of electron acceptors (oxygen, sulfate and nitrate) and generation of metabolic byproducts (methane and ferrous iron) at groundwater monitoring wells MW-1 and MW-6 indicate active natural attenuation processes are occurring (Langan, 2015). The abundance of electron acceptors outside the residual source areas (e.g. cross-gradient wells MW-3 and MW-9) serves to restrict migration of petroleum compounds by degrading potential advances of the plume. Further, Broadway Holdings installed a network of gypsum columns in August 2015. Gypsum dissolves and releases sulfate over-time, which in turn acts to enhance biodegradation of petroleum compounds in groundwater.

Bioattenuation of Petroleum Compounds in Soil Gas

Depth-to-groundwater at the site ranges from approximately 15 to 34 feet below ground surface. Site excavation for the redevelopment will reduce existing grade by approximately 0 to 18 feet. Post development, there will remain a sufficiently thick layer of soil between proposed future building foundations and the groundwater surface to permit biological processes: the vadose zone thickness beneath the foundation bottom is projected to range from approximately 8 to 10 feet in the area underlying the garage building (Langan, 2015). The vadose zone underlying the showroom is conservatively projected to be 10 to approximately 21 feet thick after construction (Langan 2015). This assumes a generalized foundation thickness of 5 feet; Langan understands that the development design includes column footings that will extend up to 4 feet below the future floor elevation, and that the non-structural portions of the floor slab will be less than 1 foot thick. Langan and previous site boring logs document underlying deposits as predominantly sandy and silty clay, and clayey sand with gravel (Langan, 2014). Sandy and silty clays result in attenuated vapor concentrations by limiting the rate of upward vapor migration away from a source (USEPA, 2002).

To evaluate the vertical concentration gradients at the site, soil vapor wells SV-2 and SV-12 were sampled concurrently with collection of deeper soil gas samples from nearby monitoring wells MW-1 and MW-4, respectively, in August 2015. Groundwater monitoring wells MW-1 and MW-4 are screened both below and above the water table, so vapor samples may be retrieved from the subsurface using the section of the well screen that is in the vadose zone. The approximate depth of samples collected from groundwater monitoring wells was calculated as the midpoint of the depth-to-water and the top of the screened interval. The length of the screened interval at MW-1 is from 19 to 35 feet bgs, and the May 2015 depth-to-water was 21.14 feet bgs, so the sample was collected from vapors entering the well through the approximately 2 feet thick interval between 19 and 21.14 feet bgs. The screened interval at MW-4 is from 15 to 30 feet bgs, and depth-to-water was 17.95 feet bgs during the May 2015

sampling event, so the sample was collected from vapors entering the well through the approximately 3 feet thick interval between 15 and 18 feet bgs. Location MW-1/SV-2 demonstrated attenuation on the order of 200X for benzene within a 4 feet vertical distance. Location MW-4/SV-12 exhibited a 2X attenuation of benzene and a 4X attenuation of ethylbenzene within a 4 feet vertical distance. The reduced attenuation factor for MW-4/SV-12 is likely attributable to low concentrations of PHC in both samples. The concentration gradients are presented as Attachment C. These results are consistent with the results obtained by Fischer et al., 1996; Lahvis et al., 1999; DeVaul, 2007; Davis, 2009; and Hartman, 2010, as summarized in the Technical Justification for Vapor Intrusion Media-Specific Criteria developed in support of the Low-Threat UST Closure Policy (LTCP) (SWRCB 2012).

Summary

In summary, four lines of evidence were applied to assess the vapor intrusion pathway:

- Plume stability
- The presence of an aerobic biodegradation zone
- Site-specific soil properties
- Soil gas data and vertical concentration gradients

Each component qualitatively and semi-quantitatively supports the conclusion that vapor intrusion is not a pathway of concern for future receptors following redevelopment.

VAPOR INTRUSION MODELING

To quantitatively evaluate vapor intrusion into indoor air, the American Petroleum Institute (API) BioVapor Model (API 2010, version 2.1) was used. BioVapor is a steady-state, 1-dimensional spreadsheet that incorporates first-order aerobic biodegradation with the heuristic vapor intrusion model developed by Johnson and Ettinger (J&E). The model was used to assess risk attributable PVI from groundwater throughout the site (Attachment D). The J&E SG-SCREEN model was used to evaluate 1,2-dichloroethane (1,2-DCA), a non-PHC VOC. The United States Environmental Protection Agency (EPA) endorses computer modeling of PVI using BioVapor and J&E (USEPA 2015). Further, EPA's PVIScreen assessment tool utilizes the BioVapor equations recoded in Java.

Key input parameters for biodegradation and vapor intrusion modeling include building parameters, vadose zone properties, and source zone parameters. Default residential and non-residential building parameters were used in the BioVapor and J&E models, with the exception of the residential indoor mixing height (H_p). A site-specific residential mixing height (366 cm) was utilized to account for residential exposure on the second floor of a multi-story building (USEPA 2002). This represents a conservative approach given that residential units are not planned below the third floor. Site-specific values for soil porosity ($0.385 \text{ cm}^3\text{-void/cm}^3\text{-soil}$), soil water content ($0.197 \text{ cm}^3\text{-water/cm}^3\text{-soil}$), and dry bulk density (1.63 g/cm^3) were selected from the J&E default values for sandy clay. Modeled constituent concentrations and groundwater depths corresponded to maximum concentrations of risk drivers at shallow depths subsequent to site-grading.

Petroleum compounds in groundwater that could potentially volatilize and migrate to indoor air include benzene, toluene, ethylbenzene, xylenes (BTEX), 1,2-DCA, and naphthalene (Langan 2015). Based on the groundwater results from 2013 through 2015, wells MW-1 and MW-16B were selected for modeling because they represent locations with maximum contaminant concentrations for the upper plume underlying the future parking garage (Langan, 2015). Similarly, groundwater data from wells MW-4 and MW-10 were selected to evaluate PVI at the lower plume beneath the showroom because these locations have the highest detected BTEX and gasoline range Total Petroleum Hydrocarbon concentrations (Langan 2015). The post-development depth-to-water for each location was conservatively estimated to be 9 feet bgs. This represents the 90th percentile of the projected post-construction depth-to-groundwater distribution, which is expected to range from 7 to 16 feet beneath the future foundation bottom of the parking garage and 12 to 22 feet beneath the future foundation bottom of the commercial strip. For the soil gas J&E models associated with the evaluation of 1,2-DCA, the sample depth was set to 6 feet bgs.

The development design is presented in the drawings prepared by Van Tilburg, Babvard & Soderbergh, AIA, dated 2 March 2015. The locations of stairwells, elevator shafts, or other such deeper building features will be reviewed during construction, as described in the Construction Soil and Groundwater Management Plan (CSGMP; Langan, 2015). According to the CSGMP, if a deeper building feature will be located within or near the areas with residual petroleum impacts, the potential for the feature to act as a preferential pathway will be evaluated, and if necessary, the soil thickness assumptions in this risk evaluation will be updated accordingly.

The San Francisco Bay Regional Water Quality Control Board default exposure parameters used to derive the Environmental Screening Levels (SFBRWQCB, 2013) for residential and commercial exposures were utilized in the receptor-specific models, with the exception of the residential exposure duration (ED). The residential ED was set to 26 years consistent with the value recommended by the California Department of Toxic Substances Control (DTSC) and the EPA's Exposure Factors Update (DTSC, 2014). The following toxicity values were applied in the BioVapor and J&E models:

Toxicity Criteria

Compound	Inhalation Slope Factor (mg/kg-day) ⁻¹	Source	Reference Concentration (mg/m ³)	Source
Benzene	0.1 ¹	OEHHA	0.03 ¹	IRIS
Ethylbenzene	0.0087 ²	OEHHA	1.0 ¹	IRIS
Naphthalene	0.12 ²	OEHHA	0.003 ¹	IRIS
Toluene	--	--	0.3 ¹	OEHHA
Xylenes	--	--	0.1 ¹	IRIS
Compound	Inhalation Unit Risk (µg/m ³) ⁻¹	Source	Reference Concentration (mg/m ³)	Source
1,2-DCA	2.6E-05 ³	IRIS	0.007 ³	PPRTV

Notes: 1 – Value used to develop ESLs (ESL Table J-2)
 2 – OEHHA Criteria for Inhalation
 3 – Value recommended by DTSC
 OEHHA = Office of Environmental Health Hazard Assessment
 IRIS = Integrated Risk Information System
 PPRTV = EPA Provisionally Peer Reviewed Toxicity Values

Cancer risk estimates were compared to an acceptable cumulative risk threshold of 1E-06 for multiple chemicals and a single-chemical target risk of 1E-06. This represents an incremental increase of 1 in 1,000,000 in the chance of developing cancer over a lifetime. Systemic hazards were compared to a hazard quotient of 1 for single chemicals and an unsegregated hazard index of 1 for multiple chemicals (Attachment D). If the site-specific exposure level exceeds the effects-based threshold (i.e. the hazard index exceeds 1), there may be concern for potential non-carcinogenic effects.

Results of the BioVapor and J&E models indicate acceptable cumulative excess cancer risk and hazard indices at each modeled location for residential and commercial receptors. The individual hazard quotients and HIs associated with the vapor intrusion pathway do not exceed the threshold level of 1. Individual excess cancer risks and cumulative cancer risk estimates associated with indoor air inhalation are below the target risk of 1E-06. The following table summarizes the results of the BioVapor and J&E models for each location:

Risk Characterization

Location	Model	Cumulative Cancer Risk	Hazard Index	Acceptable
SV-10	J&E Residential	9E-07	1E-02	Yes
MW-1	BioVapor Residential	6E-11	3E-07	Yes
MW-4	BioVapor Residential	5E-07	3E-03	Yes
MW-10	BioVapor Residential	8E-09	5E-05	Yes
MW-16B	BioVapor Residential	2E-17	8E-14	Yes
SV-10	J&E Commercial	1E-07	1.6E-03	Yes
MW-1	BioVapor Commercial	2E-11	1E-07	Yes
MW-4	BioVapor Commercial	2E-07	1E-03	Yes
MW-10	BioVapor Commercial	3E-09	2E-05	Yes
MW-16B	BioVapor Commercial	8E-18	3E-14	Yes

SUMMARY AND CONCLUSIONS

The objectives of the PVI risk evaluation were to determine whether concentrations of site-related constituents in groundwater and soil vapor pose unacceptable risks to human health under site-specific exposure conditions, and to provide information to support decisions concerning the need for mitigation based on future land use. Langan concludes that residual hydrocarbons in soil vapor and groundwater beneath the site do not pose an unacceptable carcinogenic risk or non-carcinogenic hazard by potential PVI to future residents or commercial workers at the proposed development.

Sincerely,
Langan Treadwell Rollo

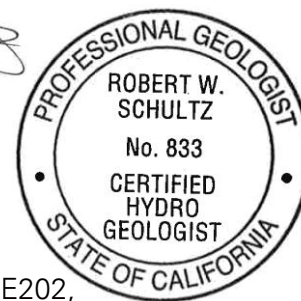


Emily Strake
Senior Project Chemist/Risk Assessor

731637001.01_RS_3093 Broadway Street



Robert W. Schultz, CHG
Senior Project Manager



cc: Mr. Stephen Siri – 3093 Broadway Holdings L.L.C., 2235 3rd Street, St. E202,
San Francisco, CA 94107

Attachments:

Table 1 – Soil Gas Analytical Results

Table 2 – Soil Gas Analytical Results – Additional VOCs

Figure 1 – Site Location Map

Figure 2 – Site Plan and Sampling Locations

Attachment A – Analytical Laboratory Report

Attachment B – Trend Charts

Attachment C – Concentration Gradient Charts

Attachment D – BioVapor and J&E Model Outputs

REFERENCES

API, 2007, Technical Protocol for Evaluating the Natural Attenuation of MTBE. Regulatory and Scientific Affairs Department. API Publication 4761. May.

Davis, R.V., 2009, Bioattenuation of petroleum hydrocarbon vapors in the subsurface update on recent studies and proposed screening criteria for the vapor-intrusion pathway, LUSTLine Report 61, May 2009, New England Interstate Water Pollution Control Commission (NEIWPC), pp. 11-14. (<http://www.neiwpcc.org>).

DeVaull, 2007, Indoor vapor intrusion with oxygen-limited biodegradation for a subsurface gasoline source, Environ. Sci. Technol., 41, 3241-3248.

DTSC, 2014, Human Health Risk Assessment Note Number 1 - Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities. Human and Ecological Risk Office, Department of Toxic Substances Control, California Environmental Protection Agency. September 30.

DTSC, 2015, Advisory – Active Soil Gas Investigations, July.

Fischer, D. and C. G. Uchrin, 1996, Laboratory simulation of VOC entry into residence basements from soil gas, Environ. Sci. Technol., 30, 2598-2603.

Hartman, B., 2010, The vapor-intrusion pathway: Petroleum hydrocarbon issues, LUSTLine Report 66, December 2010, New England Interstate Water Pollution Control Commission (NEIWPC), pp. 11-14. (<http://www.neiwpcc.org>).

Lahvis, M.A., Baehr, A.L., and R.J. Baker, 1999, Quantification of aerobic-biodegradation and volatilization rates of gasoline hydrocarbons near the water table during natural-attenuation conditions: Water Resources Res., 35, 753-765.

Langan, 2014, Work Plan for Soil Gas Sampling, 3093 Broadway, Oakland, California. September 4.

Langan, 2014, Addendum to Work Plan for Soil Gas Sampling, 3093 Broadway, Oakland, California. November 14.

Langan, 2014, Additional Investigation Results, 3093 Broadway, Oakland, California. December 5.

Langan, 2014, Conceptual Site Model, 3093 Broadway, Oakland, California. October 24, 2014.

Langan, 2015, Soil Investigation Report, 3093 Broadway, Oakland, California. July 1.

Langan, 2015, Feasibility Study and Corrective Action Plan, 3093 Broadway, Oakland, California. May 21.

REFERENCES (Continued)

Langan, 2015, Enhanced Bioremediation Pilot Study Report and Full Scale Implementation Plan. July 30.

Interstate Technology and Regulatory Council (ITRC), 2007, Vapor Intrusion Pathway: A Practical Guideline. January.

San Francisco Bay Regional Water Quality Control Board, 2013, User's Guide: Derivation and Application of Environmental Screening Levels.

State Water Resources Control Board (SWRCB), 2011, Technical Justification for Low-Threat Closure Scenarios for Petroleum Vapor Intrusion Pathway. State Water Resources Control Board. June 1.

SWRBC, 2012, Technical Justification for Vapor Intrusion Media-Specific Criteria. State Water Resources Control Board. March.

USEPA, 2002, Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA/530-D-02-20. Office of Superfund Programs, Hazardous Waste Management Division. Washington, DC

USEPA, 2011, Petroleum Hydrocarbons and Chlorinated Hydrocarbons Differ in their Potential for Vapor Intrusion, Office of Underground Storage Tanks, Washington, D.C.

USEPA, 2015, Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tanks. Office of Underground Storage Tanks, Washington, D.C.

TABLES

Table 1
Soil Gas/Ambient Air Analytical Results
3093 Broadway Street
Oakland, California

Location	Sample ID	Date Sampled	Sample Depth	Benzene	Toluene	Ethylbenzene	Naphthalene	MTBE	Helium	Oxygen	Carbon Dioxide	Methane
			(ft bgs)	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	%v	%v	%v	%
SV-1	SV-1-111814	11/18/14	7.0	7.8	39	<2.2	<26	<7.2	0.0566	13.2	5.06	0.00028
SV-2	SV-2-111914	11/19/14	16.0	130	71	120	<260	<72	<0.01	19.4	<0.5	0.024
SV-2	SV-2-081415	08/14/15	16.0	78	22	<22	<260	<72	0.0302	10.5	8.15	1.3
SV-3	SV-3-111814	11/18/14	11.5	72	89	<17	<210	<58	<0.01	14.2	1.21	0.0160
SV-3	SV-3-111814DUP	11/18/14	11.5	69	89	<17	<210	<58	<0.01	13.3	1.44	0.0170
SV-4	SV-4-111814	11/18/14	8.0	94	64	<17	<210	<58	<0.01	17.8	<0.5	0.0068
SV-4	SV-4-081415	08/14/15	8.0	<3.2	6.1	<4.3	<52	<14	<0.01	21.2	1.05	0.00082
SV-6	SV-6-111814	11/18/14	7.0	38	130	5.4	<26	<7.2	<0.01	17.0	1.05	0.0071
SV-7	SV-7-111814	11/18/14	6.5	65	68	7.1	<47	<13	<0.01	15.3	<0.5	-
SV-8	SV-8-111814	11/18/14	9.0	<1.6	36	<2.2	<26	<7.2	4.41	21.0	<0.5	-
SV-9	SV-9-111714	11/17/14	14.5	53	76	3.7	<30	<8.3	<0.01	18.6	1.18	0.0067
SV-9	SV-9-111914	11/19/14	14.5	-	-	-	<17 ^c	-	-	-	-	-
SV-9	SV-9-081415	08/14/15	14.5	41	7.8	16	<35	<9.6	4.85	17.9	1.36	0.0013
SV-10	SV-10-111914	11/19/14	6.0	4,300	110	390	<160	<45	<0.01	11.6	<0.5	0.00049
SV-10	SV-10-082415	08/24/15	6.0	2.3	47	<3	<36	<10	0.0253	17.9	1.96	0.000142
SV-11	SV-11-111914	11/19/14	7.0	6.8	23	<6.3	<76	<21	<0.01	8.97	<0.5	0.00046
SV-12	SV-12-111814	11/18/14	12.5	30	41	<8.4	<100	<28	<0.01	18.5	<0.5	0.013
SV-12	SV-12-081415	08/14/15	12.5	13	45	6.5	<42	<11	<0.01	20.5	0.93	0.0049
MW-1	MW-1-081415	08/14/15	20.0	14,000	2,800	1,300	<2600	<720	<0.01	17.2	4.45	0.590
MW-4	MW-4-081415	08/14/15	16.5	29	120	26	<30	<8.1	2.4	20.8	<0.5	0.00016
	Ambient-111714	11/17/14	-	<1.6	<1.9	<2.2	<26	<7.2	-	-	-	0.00018
	Ambient-111814	11/18/14	-	<1.6	2.7	<2.2	<26	<7.2	-	-	-	0.0002
	Ambient-081415	08/14/15	-	<1.6	2.0	<2.2	<26	<7.2	-	-	-	0.00017
	Ambient-082415	08/24/15	-	<1.7	<2.0	<2.3	<28	<7.6	-	-	-	0.0001795
Residential Soil Gas Criteria				8.5E+04	-	1.1E+06	9.3E+04	-	-	4.0 ^a	-	1.25 ^b
Commercial Soil Gas Criteria				2.8E+05	-	3.6E+06	3.1E+05	-	-	-	-	5.0 ^b
Residential ESL, Soil Gas				4.2E+01	1.6E+05	4.9E+02	3.6E+01	4.7E+03	-	-	-	-
Commercial ESL, Soil Gas				4.2E+02	1.3E+06	4.9E+03	3.6E+02	4.7E+04	-	-	-	-

Notes:

^aOxygen soil gas results are compared to the minimum four percent (where a bioattenuation zone is present) as presented in Appendix 4 - Direct Measurement of Soil Gas Concentrations Low-Threat Underground Storage Tank Case Closure Policy, as established by the State Water Resources Control Board, May 2012

^bMethane soil gas results are compared to California State Regulations (Title 27) limit for protection of indoor air quality in overlying structures (1.25%) and the Lower Explosive Limit (5%)

Residential Soil Gas Criteria - Appendix 4 - Direct Measurement of Soil Gas Concentrations Low-Threat Underground Storage Tank Case Closure Policy, as established by the State Water Resources Control Board, May 2012.

Table 1
Soil Gas/Ambient Air Analytical Results
3093 Broadway Street
Oakland, California

Location	Sample ID	Date Sampled	Sample Depth	Benzene	Toluene	Ethylbenzene	Naphthalene	MTBE	Helium	Oxygen	Carbon Dioxide	Methane
			(ft bgs)	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	%v	%v	%v	%

Commercial Soil Gas Criteria - Appendix 4 - Direct Measurement of Soil Gas Concentrations Low-Threat Underground Storage Tank Case Closure Policy, as established by the State Water Resources Control Board, May 2012.

Residential and Commercial ESLs for Indoor Air and Soil Gas provided by Summary Table E- Environmental Screening Levels (ESLs) Indoor Air and Soil Gas (Vapor Intrusion Concerns), as established by the RWQCB-SFBR, Dec 2013.

ft bgs = feet below ground surface.

µg/m³ = micrograms per cubic meter

Benzene, toluene, ethylbenzene, naphthalene, and MTBE by EPA Method TO-15, unless otherwise indicated

☐Naphthalene by EPA Method TO-17

Helium, oxygen and carbon dioxide by ASTM Method D-1946

Methane by EPA TO-3M

-- = Not collected, not analyzed, or not applicable.

<17 = Not detected above laboratory reporting limits.

MTBE = Methyl tert-butyl ether

ASTM = American Society for Testing and Materials

Table 2
Soil Gas/Ambient Air Analytical Results
Additional VOCs
3093 Broadway Street
Oakland, California

Sample ID	Date Sampled	Sample Depth (ft bgs)	1,1,1-Trichloroethane	1,1,2-Trichloro-1,2,2-Trifluoroethane	1,1-Difluoroethane	1,2,4-Trimethylbenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,2-Dichlorobenzene	1,3,5-Trimethylbenzene	2-Butanone	4-Ethyltoluene	4-Methyl-2-Pentanone	Acetone	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Chloroethane	Chloromethane	Dichlorodifluoroethane	Ethanol	Methylene Chloride	Vinyl Acetate	o-Xylene	p/m-Xylene	Styrene	Tert-Butyl Alcohol	Tetrachloroethene	Trichlorofluoromethane
SV-1-111814	11/18/14	7.0	5.5	ND	ND	ND	ND	ND	ND	ND	14	ND	ND	110	ND	ND	ND	190	ND	2.4	3.1	18	ND	ND	ND	ND	ND	ND	87	6.0
SV-2-111914	11/19/14	16.0	ND	ND	ND	ND	ND	ND	ND	33	45	44	ND	57	ND	ND	ND	ND	ND	ND	ND	ND	ND	220	460	ND	ND	ND	ND	
SV-2-081415	08/14/15	16.0	ND	ND	ND	ND	60	31	ND	ND	ND	ND	ND	ND	ND	ND	ND	13	ND	ND	ND	ND	ND	43	ND	ND	ND	ND	ND	
SV-3-111814	11/18/14	11.5	ND	ND	ND	ND	ND	ND	ND	ND	67	ND	ND	140	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SV-3-111814DUP	11/18/14	11.5	ND	ND	ND	ND	ND	ND	ND	ND	60	ND	ND	110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SV-4-111814	11/18/14	8.0	ND	ND	ND	ND	ND	ND	ND	ND	84	ND	ND	140	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SV-4-081415	08/14/15	8.0	ND	ND	ND	ND	7.5	ND	ND	ND	ND	ND	ND	470	ND	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SV-6-111814	11/18/14	7.0	ND	ND	ND	ND	ND	ND	ND	ND	13	ND	ND	210	ND	66	ND	5.7	ND	6.9	ND	37	ND	ND	4.4	15	ND	ND	ND	
SV-7-111814	11/18/14	6.5	ND	ND	ND	ND	ND	ND	ND	ND	56	ND	ND	160	ND	18	ND	ND	ND	ND	ND	23	ND	ND	ND	ND	ND	ND	ND	
SV-8-111814	11/18/14	9.0	ND	ND	ND	ND	ND	ND	ND	ND	8.3	ND	ND	58	ND	ND	ND	ND	ND	1.2	ND	17	ND	ND	ND	ND	ND	ND	ND	
SV-9-111714	11/17/14	14.5	ND	ND	ND	ND	ND	ND	ND	ND	27	ND	ND	86	ND	8.7	ND	ND	ND	6.8	ND	34	ND	ND	2.9	ND	ND	ND	ND	
SV-9-111914	11/19/14	14.5	-	-	-	-	-	-	ND	ND	-	-	-	ND	-	-	-	-	ND	-	-	-	-	-	-	-	-	-	-	
SV-9-081415	08/14/15	14.5	ND	ND	ND	19	ND	ND	ND	5.6	8.0	5.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.6	23	ND	ND	19	ND	ND	
SV-10-111914	11/19/14	6.0	ND	ND	ND	94	290	ND	ND	51	270	43	ND	330	ND	ND	ND	ND	ND	ND	ND	ND	360	ND	ND	120	ND	ND	ND	
SV-10-082415	08/24/15	6.0	ND	ND	ND	ND	ND	ND	ND	ND	6.2	ND	ND	220	ND	ND	ND	ND	ND	4.3	ND	28	ND	ND	ND	ND	ND	ND	ND	
SV-11-111914	11/19/14	7.0	ND	ND	ND	ND	ND	ND	ND	ND	23	ND	ND	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SV-12-111814	11/18/14	12.5	ND	ND	ND	ND	ND	ND	ND	ND	20	ND	ND	96	ND	ND	ND	ND	ND	7.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SV-12-081415	08/14/15	12.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	23	ND	ND	ND	ND	ND	ND	65	31	ND	7.7	22	ND	ND	5.6	ND
MW-1-081415	08/14/15	20.0	ND	ND	ND	ND	ND	ND	ND	380	ND	280	ND	ND	ND	ND	ND	ND	ND	ND	1,800	ND	ND	2,300	6,900	ND	ND	ND	ND	
MW-4-081415	08/14/15	16.5	ND	ND	ND	57	ND	ND	ND	<3.4	23	6.4	19	ND	67	ND	ND	ND	1.5	ND	11	ND	ND	29	110	ND	32	ND	ND	
Ambient-111714	11/17/14	-	ND	0.57	0.30	0.35	ND	ND	ND	ND	3.3	0.14	ND	11	ND	ND	0.51	ND	ND	1.3	2.5	ND	0.56	ND	0.34	0.84	0.11	ND	0.21	1.3
Ambient-111814	11/18/14	-	ND	0.57	0.33	0.28	ND	ND	ND	ND	ND	0.15	ND	11	0.10	ND	0.57	ND	ND	1.2	2.7	12	0.44	ND	0.38	0.99	ND	ND	1.4	
Ambient-081415	08/14/15	-	ND	ND	ND	ND	ND	ND	ND	ND	15	ND	6.2	110	ND	ND	ND	ND	ND	ND	ND	20	ND	ND	ND	ND	ND	ND	ND	
Ambient-082415	08/24/15	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20	ND	ND	ND	ND	ND	3.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Residential ESL, Soil Gas			2.6E+06	-	-	-	5.8E+01	1.2E+02	1.0E+05	-	1.60E+06	-	-	1.6E+07	2.6E+03	-	2.9E+01	2.3E+02	1.6E+07	4.7E+04	-	-	2.6E+03	-	5.2E+04	5.2E+04	4.7E+05	-	2.1E+02	-
Commercial ESL, Soil Gas			2.2E+07	-	-	-	5.8E+02	1.2E+03	8.8E+05	-	1.30E+07	-	-	1.4E+08	2.2E+04	-	2.9E+02	2.3E+03	1.3E+08	3.9E+05	-	-	2.6E+04	-	4.4E+05	4.4E+05	3.9E+06	-	2.1E+03	-

Notes:

Residential and Commercial ESLs for Indoor Air and Soil Gas provided by Summary Table E- Environmental Screening Levels (ESLs) Indoor Air and Soil Gas (Vapor Intrusion Concerns), as established by the RWQCB-SFBR, Dec 2013.

ft bgs = feet below ground surface.

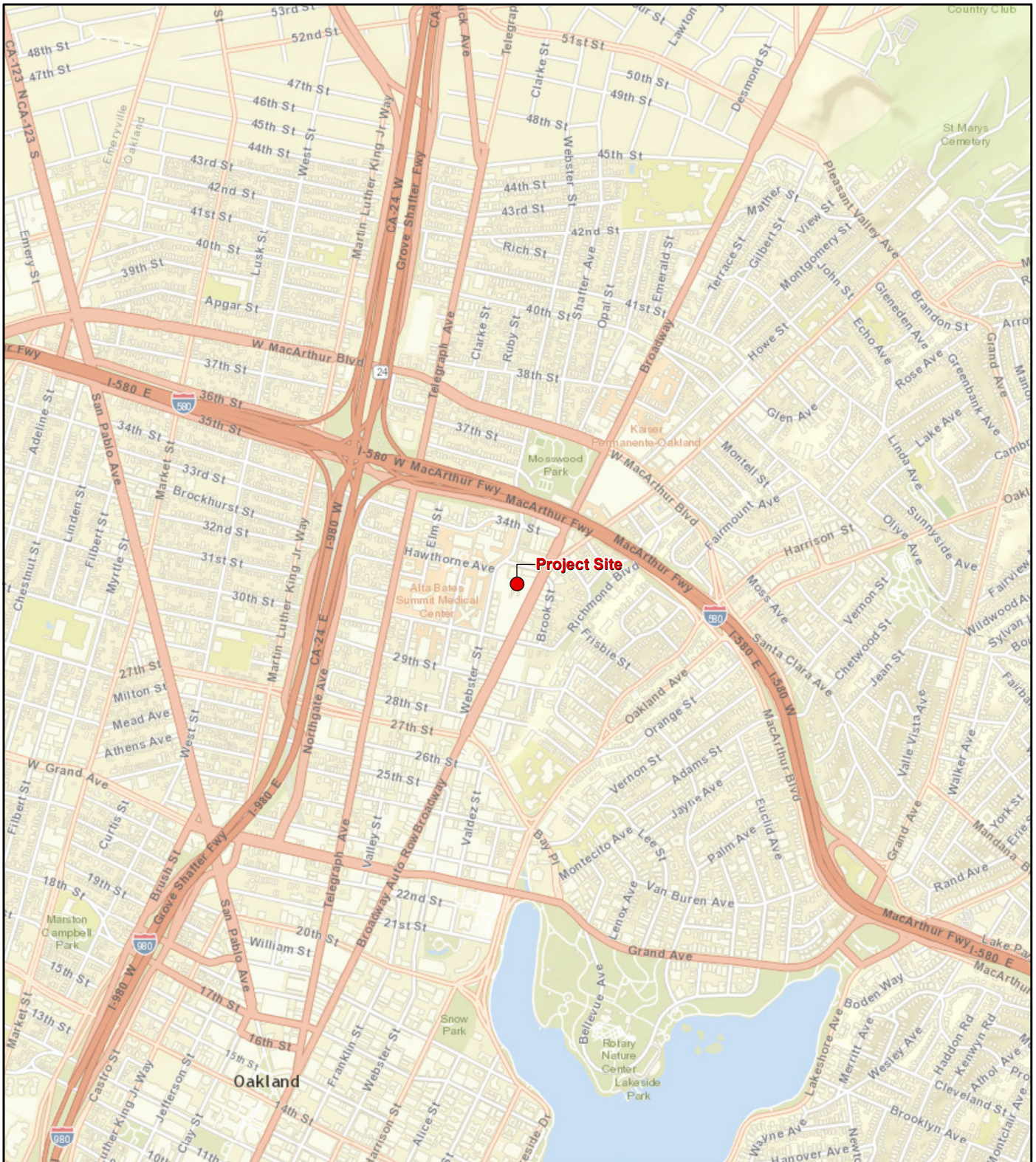
µg/m³ = micrograms per cubic meter

VOCs = volatile organic compounds using EPA Method TO-15

- = Not collected, not analyzed, or not applicable.

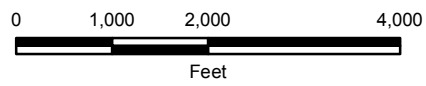
ND = Not detected above laboratory reporting limits, see laboratory analytical report for reporting limit

FIGURES



Notes:

1. World street basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online. Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN.
2. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.



3093 BROADWAY
Oakland, California

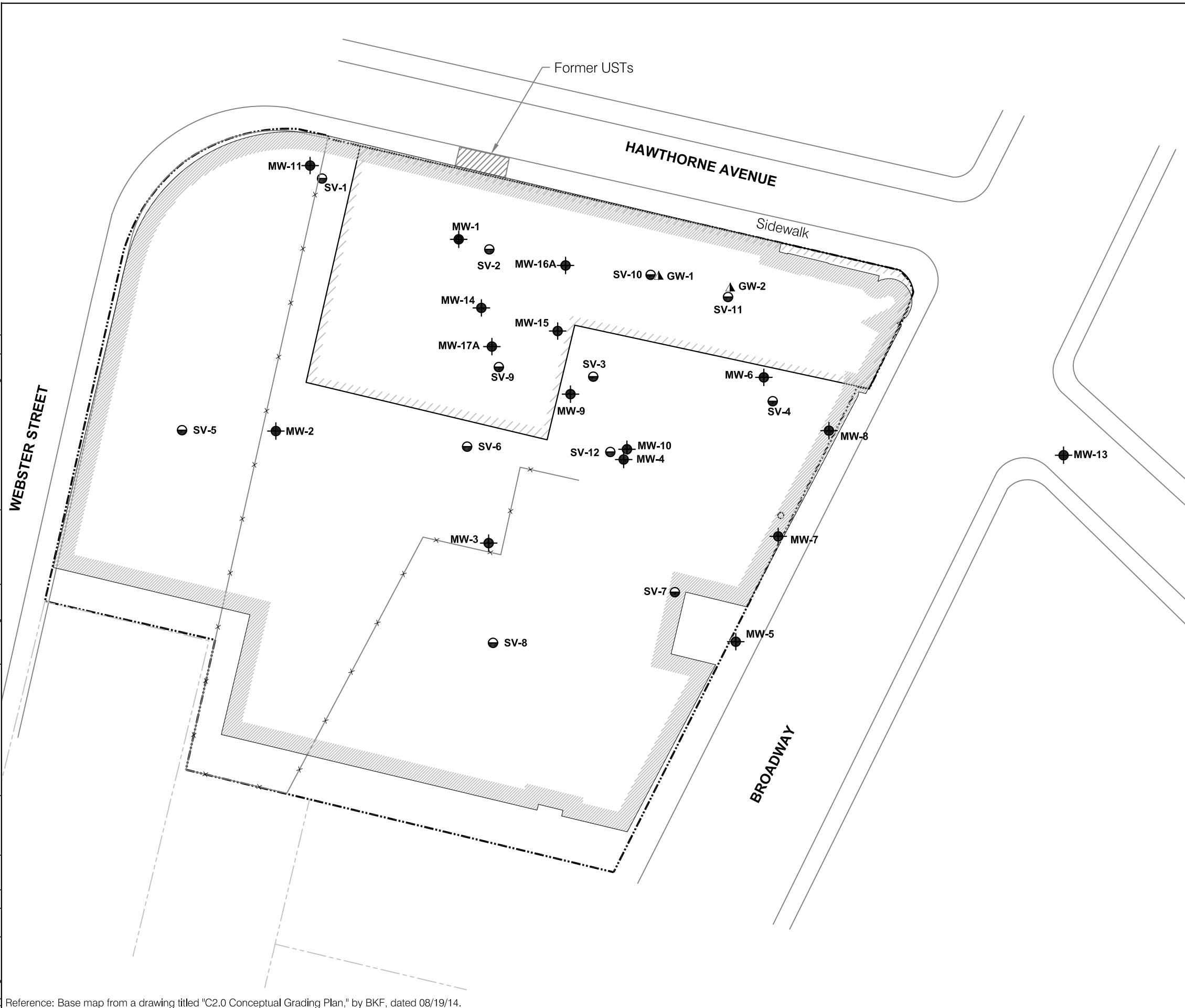
SITE LOCATION MAP

LANGAN TREADWELL ROLLO

Date 8/18/2014	Project 731637001	Figure 1
----------------	-------------------	----------

\langan.com\data\SF\data\0731637001\ArcGIS\ArcMap_Documents\SiteLocation.mxd User: cstatham

\\langan.com\data\SF\data\731637001\Cadd Data - 731637001\2D-DesignFiles\Environmental\731637001-N-SP0116.dwg 12/05/14



EXPLANATION

- GW-1 ▲ Attempted groundwater sampling location
- SV-1 ● Soil vapor well location
- MW-1 ● Monitoring well location
- Site boundary
- x-x- Fence
- ▨ Building footprint

Notes:

1. Groundwater Samples GW-1 and GW-2 were not collected because groundwater did not enter the boreholes.
2. Due to the presence of shallow groundwater, a soil vapor well was not installed at location SV-5.



0 60 Feet
Approximate scale

3093 BROADWAY
Oakland, California

SITE PLAN AND SAMPLING LOCATIONS

Date 12/05/14 | Project No. 731637001 | Figure 2

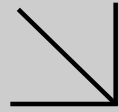
LANGAN TREADWELL ROLLO

Reference: Base map from a drawing titled "C2.0 Conceptual Grading Plan," by BKF, dated 08/19/14.

ATTACHMENT A
Analytical Laboratory Report



Calscience



WORK ORDER NUMBER: 15-08-1204

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Treadwell & Rollo - A Langan Company

Client Project Name: 3093 Broadway / 731637001

Attention: Christina Rain
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Vikas Patel

Approved for release on 08/20/2015 by:
Vikas Patel
Project Manager

ResultLink ▶

Email your PM ▶



Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

Contents

Client Project Name: 3093 Broadway / 731637001
 Work Order Number: 15-08-1204

1	Work Order Narrative.	3
2	Sample Summary.	4
3	Detections Summary.	5
4	Client Sample Data.	8
	4.1 ASTM D-1946 Fixed Gases (Air).	8
	4.2 ASTM D-1946 (M) Fixed Gases (H2 and/or He) (Air).	10
	4.3 EPA TO-15 Full List (Air).	11
	4.4 EPA TO-3 (M) C1-C6 (Air).	27
5	Quality Control Sample Data.	28
	5.1 LCS/LCSD.	28
6	Summa Canister Vacuum Summary.	33
7	Sample Analysis Summary.	34
8	Glossary of Terms and Qualifiers.	35
9	Chain-of-Custody/Sample Receipt Form.	36

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 08/18/15. They were assigned to Work Order 15-08-1204.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



Calscience

Sample Summary

Client: Treadwell & Rollo - A Langan Company	Work Order:	15-08-1204
555 Montgomery St., Suite 1300	Project Name:	3093 Broadway / 731637001
San Francisco, CA 94111-2554	PO Number:	
	Date/Time Received:	08/18/15 10:00
	Number of Containers:	7

Attn: Christina Rain

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
SV-2-081415	15-08-1204-1	08/14/15 07:40	1	Air
SV-9-081415	15-08-1204-2	08/14/15 08:18	1	Air
SV-12-081415	15-08-1204-3	08/14/15 09:31	1	Air
SV-4-081415	15-08-1204-4	08/14/15 11:30	1	Air
MW-4-081415	15-08-1204-5	08/14/15 12:20	1	Air
MW-1-081415	15-08-1204-6	08/14/15 14:43	1	Air
AMBIENT-081415	15-08-1204-7	08/14/15 15:00	1	Air

Return to Contents



Calscience

Detections Summary

Client: Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Work Order: 15-08-1204
Project Name: 3093 Broadway / 731637001
Received: 08/18/15

Attn: Christina Rain

Page 1 of 3

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
SV-2-081415 (15-08-1204-1)						
Carbon Dioxide	8.15		0.500	%v	ASTM D-1946	N/A
Oxygen (+ Argon)	10.5		0.500	%v	ASTM D-1946	N/A
Helium	0.0302		0.0100	%v	ASTM D-1946 (M)	N/A
Benzene	78		16	ug/m3	EPA TO-15	N/A
Chloroethane	13		13	ug/m3	EPA TO-15	N/A
1,2-Dichloroethane	60		20	ug/m3	EPA TO-15	N/A
1,2-Dichloropropane	31		23	ug/m3	EPA TO-15	N/A
o-Xylene	43		22	ug/m3	EPA TO-15	N/A
Toluene	22		19	ug/m3	EPA TO-15	N/A
Methane	1.3		0.00050	%	EPA TO-3M	N/A
SV-9-081415 (15-08-1204-2)						
Carbon Dioxide	1.36		0.500	%v	ASTM D-1946	N/A
Oxygen (+ Argon)	17.9		0.500	%v	ASTM D-1946	N/A
Helium	4.85		0.0100	%v	ASTM D-1946 (M)	N/A
Benzene	41		2.1	ug/m3	EPA TO-15	N/A
2-Butanone	8.0		5.9	ug/m3	EPA TO-15	N/A
Ethylbenzene	16		2.9	ug/m3	EPA TO-15	N/A
4-Ethyltoluene	5.8		3.3	ug/m3	EPA TO-15	N/A
o-Xylene	5.6		2.9	ug/m3	EPA TO-15	N/A
p/m-Xylene	23		12	ug/m3	EPA TO-15	N/A
Tetrachloroethene	19		4.5	ug/m3	EPA TO-15	N/A
Toluene	7.8		2.5	ug/m3	EPA TO-15	N/A
1,3,5-Trimethylbenzene	5.6		3.3	ug/m3	EPA TO-15	N/A
1,2,4-Trimethylbenzene	19		9.8	ug/m3	EPA TO-15	N/A
Methane	0.0013		0.00012	%	EPA TO-3M	N/A
SV-12-081415 (15-08-1204-3)						
Carbon Dioxide	0.930		0.500	%v	ASTM D-1946	N/A
Oxygen (+ Argon)	20.5		0.500	%v	ASTM D-1946	N/A
Benzene	13		2.5	ug/m3	EPA TO-15	N/A
Carbon Disulfide	23		9.9	ug/m3	EPA TO-15	N/A
Ethanol	65		15	ug/m3	EPA TO-15	N/A
Ethylbenzene	6.5		3.5	ug/m3	EPA TO-15	N/A
Methylene Chloride	31		28	ug/m3	EPA TO-15	N/A
o-Xylene	7.7		3.5	ug/m3	EPA TO-15	N/A
p/m-Xylene	22		14	ug/m3	EPA TO-15	N/A
Tetrachloroethene	5.6		5.4	ug/m3	EPA TO-15	N/A
Toluene	45		3.0	ug/m3	EPA TO-15	N/A
Methane	0.0049		0.00012	%	EPA TO-3M	N/A

* MDL is shown



Calscience

Detections Summary

Client: Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Work Order: 15-08-1204
Project Name: 3093 Broadway / 731637001
Received: 08/18/15

Attn: Christina Rain

Page 2 of 3

Client SampleID

Analyte	Result	Qualifiers	RL	Units	Method	Extraction
SV-4-081415 (15-08-1204-4)						
Carbon Dioxide	1.05		0.500	%v	ASTM D-1946	N/A
Oxygen (+ Argon)	21.2		0.500	%v	ASTM D-1946	N/A
Acetone	470		9.5	ug/m3	EPA TO-15	N/A
Carbon Disulfide	20		12	ug/m3	EPA TO-15	N/A
1,2-Dichloroethane	7.5		4.0	ug/m3	EPA TO-15	N/A
Toluene	6.1		3.8	ug/m3	EPA TO-15	N/A
Methane	0.00082		0.00012	%	EPA TO-3M	N/A
MW-4-081415 (15-08-1204-5)						
Oxygen (+ Argon)	20.8		0.500	%v	ASTM D-1946	N/A
Helium	2.40		0.0100	%v	ASTM D-1946 (M)	N/A
Acetone	67		5.4	ug/m3	EPA TO-15	N/A
Benzene	29		1.8	ug/m3	EPA TO-15	N/A
2-Butanone	6.4		5.0	ug/m3	EPA TO-15	N/A
Chloromethane	1.5		1.2	ug/m3	EPA TO-15	N/A
1,3-Dichlorobenzene	4.5		3.4	ug/m3	EPA TO-15	N/A
Ethanol	11		11	ug/m3	EPA TO-15	N/A
Ethylbenzene	26		2.5	ug/m3	EPA TO-15	N/A
4-Ethyltoluene	19		2.8	ug/m3	EPA TO-15	N/A
o-Xylene	29		2.5	ug/m3	EPA TO-15	N/A
p/m-Xylene	110		9.8	ug/m3	EPA TO-15	N/A
Tert-Butyl Alcohol (TBA)	32		6.9	ug/m3	EPA TO-15	N/A
Toluene	120		2.1	ug/m3	EPA TO-15	N/A
1,3,5-Trimethylbenzene	23		2.8	ug/m3	EPA TO-15	N/A
1,2,4-Trimethylbenzene	57		8.3	ug/m3	EPA TO-15	N/A
Methane	0.00016		0.00012	%	EPA TO-3M	N/A
MW-1-081415 (15-08-1204-6)						
Carbon Dioxide	4.45		0.500	%v	ASTM D-1946	N/A
Oxygen (+ Argon)	17.2		0.500	%v	ASTM D-1946	N/A
Benzene	14000		160	ug/m3	EPA TO-15	N/A
Ethanol	1800		940	ug/m3	EPA TO-15	N/A
Ethylbenzene	1300		220	ug/m3	EPA TO-15	N/A
4-Ethyltoluene	280		250	ug/m3	EPA TO-15	N/A
o-Xylene	2300		220	ug/m3	EPA TO-15	N/A
p/m-Xylene	6900		870	ug/m3	EPA TO-15	N/A
Toluene	2800		190	ug/m3	EPA TO-15	N/A
1,3,5-Trimethylbenzene	380		250	ug/m3	EPA TO-15	N/A
Methane	0.59		0.00025	%	EPA TO-3M	N/A

* MDL is shown



Calscience

Detections Summary

Client: Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Work Order: 15-08-1204
 Project Name: 3093 Broadway / 731637001
 Received: 08/18/15

Attn: Christina Rain

Page 3 of 3

Client SampleID

<u>Analyte</u>	<u>Result</u>	<u>Qualifiers</u>	<u>RL</u>	<u>Units</u>	<u>Method</u>	<u>Extraction</u>
AMBIENT-081415 (15-08-1204-7)						
Acetone	110		4.8	ug/m3	EPA TO-15	N/A
2-Butanone	15		4.4	ug/m3	EPA TO-15	N/A
4-Methyl-2-Pentanone	6.2		6.1	ug/m3	EPA TO-15	N/A
Toluene	2.0		1.9	ug/m3	EPA TO-15	N/A
Vinyl Acetate	20		7.0	ug/m3	EPA TO-15	N/A
Methane	0.00017		0.00012	%	EPA TO-3M	N/A

Subcontracted analyses, if any, are not included in this summary.


Return to Contents

* MDL is shown



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: ASTM D-1946
Units: %v

Project: 3093 Broadway / 731637001

Page 1 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-2-081415	15-08-1204-1-A	08/14/15 07:40	Air	GC 65	N/A	08/18/15 16:43	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Carbon Dioxide		8.15		0.500		1.00	
Oxygen (+ Argon)		10.5		0.500		1.00	
SV-9-081415	15-08-1204-2-A	08/14/15 08:18	Air	GC 65	N/A	08/18/15 15:59	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Carbon Dioxide		1.36		0.500		1.00	
Oxygen (+ Argon)		17.9		0.500		1.00	
SV-12-081415	15-08-1204-3-A	08/14/15 09:31	Air	GC 65	N/A	08/18/15 14:57	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Carbon Dioxide		0.930		0.500		1.00	
Oxygen (+ Argon)		20.5		0.500		1.00	
SV-4-081415	15-08-1204-4-A	08/14/15 11:30	Air	GC 65	N/A	08/18/15 14:10	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Carbon Dioxide		1.05		0.500		1.00	
Oxygen (+ Argon)		21.2		0.500		1.00	
MW-4-081415	15-08-1204-5-A	08/14/15 12:20	Air	GC 65	N/A	08/18/15 13:26	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Carbon Dioxide		ND		0.500		1.00	
Oxygen (+ Argon)		20.8		0.500		1.00	
MW-1-081415	15-08-1204-6-A	08/14/15 14:43	Air	GC 65	N/A	08/18/15 13:02	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Carbon Dioxide		4.45		0.500		1.00	
Oxygen (+ Argon)		17.2		0.500		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/18/15
 Work Order: 15-08-1204
 Preparation: N/A
 Method: ASTM D-1946
 Units: %v

Project: 3093 Broadway / 731637001

Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-444-256	N/A	Air	GC 65	N/A	08/18/15 10:32	150818L01

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Carbon Dioxide	ND	0.500	1.00	
Oxygen (+ Argon)	ND	0.500	1.00	



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: ASTM D-1946 (M)
Units: %v

Project: 3093 Broadway / 731637001

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-2-081415	15-08-1204-1-A	08/14/15 07:40	Air	GC 55	N/A	08/18/15 16:33	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Helium		0.0302		0.0100		1.00	
SV-9-081415	15-08-1204-2-A	08/14/15 08:18	Air	GC 55	N/A	08/18/15 15:33	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Helium		4.85		0.0100		1.00	
SV-12-081415	15-08-1204-3-A	08/14/15 09:31	Air	GC 55	N/A	08/18/15 15:00	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Helium		ND		0.0100		1.00	
SV-4-081415	15-08-1204-4-A	08/14/15 11:30	Air	GC 55	N/A	08/18/15 14:35	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Helium		ND		0.0100		1.00	
MW-4-081415	15-08-1204-5-A	08/14/15 12:20	Air	GC 55	N/A	08/18/15 13:29	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Helium		2.40		0.0100		1.00	
MW-1-081415	15-08-1204-6-A	08/14/15 14:43	Air	GC 55	N/A	08/18/15 13:05	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Helium		ND		0.0100		1.00	
Method Blank	099-12-872-841	N/A	Air	GC 55	N/A	08/18/15 10:24	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Helium		ND		0.0100		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 1 of 16

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-2-081415	15-08-1204-1-A	08/14/15 07:40	Air	GC/MS KKK	N/A	08/18/15 22:52	150818L01

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	48	10.0	
Benzene	78	16	10.0	
Benzyl Chloride	ND	78	10.0	
Bromodichloromethane	ND	34	10.0	
Bromoform	ND	52	10.0	
Bromomethane	ND	19	10.0	
2-Butanone	ND	44	10.0	
Carbon Disulfide	ND	62	10.0	
Carbon Tetrachloride	ND	31	10.0	
Chlorobenzene	ND	23	10.0	
Chloroethane	13	13	10.0	
Chloroform	ND	24	10.0	
Chloromethane	ND	10	10.0	
Dibromochloromethane	ND	43	10.0	
Dichlorodifluoromethane	ND	25	10.0	
Diisopropyl Ether (DIPE)	ND	84	10.0	
1,1-Dichloroethane	ND	20	10.0	
1,1-Dichloroethene	ND	20	10.0	
1,2-Dibromoethane	ND	38	10.0	
Dichlorotetrafluoroethane	ND	140	10.0	
1,2-Dichlorobenzene	ND	30	10.0	
1,2-Dichloroethane	60	20	10.0	
1,2-Dichloropropane	31	23	10.0	
1,3-Dichlorobenzene	ND	30	10.0	
1,4-Dichlorobenzene	ND	30	10.0	
c-1,3-Dichloropropene	ND	23	10.0	
c-1,2-Dichloroethene	ND	20	10.0	
t-1,2-Dichloroethene	ND	20	10.0	
t-1,3-Dichloropropene	ND	45	10.0	
Ethanol	ND	94	10.0	
Ethyl-t-Butyl Ether (ETBE)	ND	84	10.0	
Ethylbenzene	ND	22	10.0	
4-Ethyltoluene	ND	25	10.0	
Hexachloro-1,3-Butadiene	ND	160	10.0	
2-Hexanone	ND	61	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 2 of 16

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	72	10.0	
Methylene Chloride	ND	170	10.0	
4-Methyl-2-Pentanone	ND	61	10.0	
Naphthalene	ND	260	10.0	
o-Xylene	43	22	10.0	
p/m-Xylene	ND	87	10.0	
Styrene	ND	64	10.0	
Tert-Amyl-Methyl Ether (TAME)	ND	84	10.0	
Tert-Butyl Alcohol (TBA)	ND	61	10.0	
Tetrachloroethene	ND	34	10.0	
Toluene	22	19	10.0	
Trichloroethene	ND	27	10.0	
Trichlorofluoromethane	ND	56	10.0	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	110	10.0	
1,1,1-Trichloroethane	ND	27	10.0	
1,1,2-Trichloroethane	ND	27	10.0	
1,3,5-Trimethylbenzene	ND	25	10.0	
1,1,2,2-Tetrachloroethane	ND	69	10.0	
1,2,4-Trimethylbenzene	ND	74	10.0	
1,2,4-Trichlorobenzene	ND	150	10.0	
Vinyl Acetate	ND	70	10.0	
Vinyl Chloride	ND	13	10.0	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	103	68-134		
1,2-Dichloroethane-d4	102	67-133		
Toluene-d8	93	70-130		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 3 of 16

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-9-081415	15-08-1204-2-A	08/14/15 08:18	Air	GC/MS KKK	N/A	08/18/15 18:21	150818L01

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	6.3	1.33	
Benzene	41	2.1	1.33	
Benzyl Chloride	ND	10	1.33	
Bromodichloromethane	ND	4.5	1.33	
Bromoform	ND	6.9	1.33	
Bromomethane	ND	2.6	1.33	
2-Butanone	8.0	5.9	1.33	
Carbon Disulfide	ND	8.3	1.33	
Carbon Tetrachloride	ND	4.2	1.33	
Chlorobenzene	ND	3.1	1.33	
Chloroethane	ND	1.8	1.33	
Chloroform	ND	3.2	1.33	
Chloromethane	ND	1.4	1.33	
Dibromochloromethane	ND	5.7	1.33	
Dichlorodifluoromethane	ND	3.3	1.33	
Diisopropyl Ether (DIPE)	ND	11	1.33	
1,1-Dichloroethane	ND	2.7	1.33	
1,1-Dichloroethene	ND	2.6	1.33	
1,2-Dibromoethane	ND	5.1	1.33	
Dichlorotetrafluoroethane	ND	19	1.33	
1,2-Dichlorobenzene	ND	4.0	1.33	
1,2-Dichloroethane	ND	2.7	1.33	
1,2-Dichloropropane	ND	3.1	1.33	
1,3-Dichlorobenzene	ND	4.0	1.33	
1,4-Dichlorobenzene	ND	4.0	1.33	
c-1,3-Dichloropropene	ND	3.0	1.33	
c-1,2-Dichloroethene	ND	2.6	1.33	
t-1,2-Dichloroethene	ND	2.6	1.33	
t-1,3-Dichloropropene	ND	6.0	1.33	
Ethanol	ND	13	1.33	
Ethyl-t-Butyl Ether (ETBE)	ND	11	1.33	
Ethylbenzene	16	2.9	1.33	
4-Ethyltoluene	5.8	3.3	1.33	
Hexachloro-1,3-Butadiene	ND	21	1.33	
2-Hexanone	ND	8.2	1.33	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/18/15
 Work Order: 15-08-1204
 Preparation: N/A
 Method: EPA TO-15
 Units: ug/m3

Project: 3093 Broadway / 731637001

Page 4 of 16

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	9.6	1.33	
Methylene Chloride	ND	23	1.33	
4-Methyl-2-Pentanone	ND	8.2	1.33	
Naphthalene	ND	35	1.33	
o-Xylene	5.6	2.9	1.33	
p/m-Xylene	23	12	1.33	
Styrene	ND	8.5	1.33	
Tert-Amyl-Methyl Ether (TAME)	ND	11	1.33	
Tert-Butyl Alcohol (TBA)	ND	8.1	1.33	
Tetrachloroethene	19	4.5	1.33	
Toluene	7.8	2.5	1.33	
Trichloroethene	ND	3.6	1.33	
Trichlorofluoromethane	ND	7.5	1.33	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	15	1.33	
1,1,1-Trichloroethane	ND	3.6	1.33	
1,1,2-Trichloroethane	ND	3.6	1.33	
1,3,5-Trimethylbenzene	5.6	3.3	1.33	
1,1,2,2-Tetrachloroethane	ND	9.1	1.33	
1,2,4-Trimethylbenzene	19	9.8	1.33	
1,2,4-Trichlorobenzene	ND	20	1.33	
Vinyl Acetate	ND	9.4	1.33	
Vinyl Chloride	ND	1.7	1.33	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	96	68-134		
1,2-Dichloroethane-d4	99	67-133		
Toluene-d8	93	70-130		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 5 of 16

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-12-081415	15-08-1204-3-A	08/14/15 09:31	Air	GC/MS KKK	N/A	08/19/15 01:30	150818L01

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	7.6	1.59	
Benzene	13	2.5	1.59	
Benzyl Chloride	ND	12	1.59	
Bromodichloromethane	ND	5.3	1.59	
Bromoform	ND	8.2	1.59	
Bromomethane	ND	3.1	1.59	
2-Butanone	ND	7.0	1.59	
Carbon Disulfide	23	9.9	1.59	
Carbon Tetrachloride	ND	5.0	1.59	
Chlorobenzene	ND	3.7	1.59	
Chloroethane	ND	2.1	1.59	
Chloroform	ND	3.9	1.59	
Chloromethane	ND	1.6	1.59	
Dibromochloromethane	ND	6.8	1.59	
Dichlorodifluoromethane	ND	3.9	1.59	
Diisopropyl Ether (DIPE)	ND	13	1.59	
1,1-Dichloroethane	ND	3.2	1.59	
1,1-Dichloroethene	ND	3.2	1.59	
1,2-Dibromoethane	ND	6.1	1.59	
Dichlorotetrafluoroethane	ND	22	1.59	
1,2-Dichlorobenzene	ND	4.8	1.59	
1,2-Dichloroethane	ND	3.2	1.59	
1,2-Dichloropropane	ND	3.7	1.59	
1,3-Dichlorobenzene	ND	4.8	1.59	
1,4-Dichlorobenzene	ND	4.8	1.59	
c-1,3-Dichloropropene	ND	3.6	1.59	
c-1,2-Dichloroethene	ND	3.2	1.59	
t-1,2-Dichloroethene	ND	3.2	1.59	
t-1,3-Dichloropropene	ND	7.2	1.59	
Ethanol	65	15	1.59	
Ethyl-t-Butyl Ether (ETBE)	ND	13	1.59	
Ethylbenzene	6.5	3.5	1.59	
4-Ethyltoluene	ND	3.9	1.59	
Hexachloro-1,3-Butadiene	ND	25	1.59	
2-Hexanone	ND	9.8	1.59	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 6 of 16

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	11	1.59	
Methylene Chloride	31	28	1.59	
4-Methyl-2-Pentanone	ND	9.8	1.59	
Naphthalene	ND	42	1.59	
o-Xylene	7.7	3.5	1.59	
p/m-Xylene	22	14	1.59	
Styrene	ND	10	1.59	
Tert-Amyl-Methyl Ether (TAME)	ND	13	1.59	
Tert-Butyl Alcohol (TBA)	ND	9.6	1.59	
Tetrachloroethene	5.6	5.4	1.59	
Toluene	45	3.0	1.59	
Trichloroethene	ND	4.3	1.59	
Trichlorofluoromethane	ND	8.9	1.59	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	18	1.59	
1,1,1-Trichloroethane	ND	4.3	1.59	
1,1,2-Trichloroethane	ND	4.3	1.59	
1,3,5-Trimethylbenzene	ND	3.9	1.59	
1,1,2,2-Tetrachloroethane	ND	11	1.59	
1,2,4-Trimethylbenzene	ND	12	1.59	
1,2,4-Trichlorobenzene	ND	24	1.59	
Vinyl Acetate	ND	11	1.59	
Vinyl Chloride	ND	2.0	1.59	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	101	68-134		
1,2-Dichloroethane-d4	101	67-133		
Toluene-d8	100	70-130		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 7 of 16

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-4-081415	15-08-1204-4-A	08/14/15 11:30	Air	GC/MS KKK	N/A	08/18/15 21:11	150818L01

Parameter	Result	RL	DF	Qualifiers
Acetone	470	9.5	2.00	
Benzene	ND	3.2	2.00	
Benzyl Chloride	ND	16	2.00	
Bromodichloromethane	ND	6.7	2.00	
Bromoform	ND	10	2.00	
Bromomethane	ND	3.9	2.00	
2-Butanone	ND	8.8	2.00	
Carbon Disulfide	20	12	2.00	
Carbon Tetrachloride	ND	6.3	2.00	
Chlorobenzene	ND	4.6	2.00	
Chloroethane	ND	2.6	2.00	
Chloroform	ND	4.9	2.00	
Chloromethane	ND	2.1	2.00	
Dibromochloromethane	ND	8.5	2.00	
Dichlorodifluoromethane	ND	4.9	2.00	
Diisopropyl Ether (DIPE)	ND	17	2.00	
1,1-Dichloroethane	ND	4.0	2.00	
1,1-Dichloroethene	ND	4.0	2.00	
1,2-Dibromoethane	ND	7.7	2.00	
Dichlorotetrafluoroethane	ND	28	2.00	
1,2-Dichlorobenzene	ND	6.0	2.00	
1,2-Dichloroethane	7.5	4.0	2.00	
1,2-Dichloropropane	ND	4.6	2.00	
1,3-Dichlorobenzene	ND	6.0	2.00	
1,4-Dichlorobenzene	ND	6.0	2.00	
c-1,3-Dichloropropene	ND	4.5	2.00	
c-1,2-Dichloroethene	ND	4.0	2.00	
t-1,2-Dichloroethene	ND	4.0	2.00	
t-1,3-Dichloropropene	ND	9.1	2.00	
Ethanol	ND	19	2.00	
Ethyl-t-Butyl Ether (ETBE)	ND	17	2.00	
Ethylbenzene	ND	4.3	2.00	
4-Ethyltoluene	ND	4.9	2.00	
Hexachloro-1,3-Butadiene	ND	32	2.00	
2-Hexanone	ND	12	2.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/18/15
 Work Order: 15-08-1204
 Preparation: N/A
 Method: EPA TO-15
 Units: ug/m3

Project: 3093 Broadway / 731637001

Page 8 of 16

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	14	2.00	
Methylene Chloride	ND	35	2.00	
4-Methyl-2-Pentanone	ND	12	2.00	
Naphthalene	ND	52	2.00	
o-Xylene	ND	4.3	2.00	
p/m-Xylene	ND	17	2.00	
Styrene	ND	13	2.00	
Tert-Amyl-Methyl Ether (TAME)	ND	17	2.00	
Tert-Butyl Alcohol (TBA)	ND	12	2.00	
Tetrachloroethene	ND	6.8	2.00	
Toluene	6.1	3.8	2.00	
Trichloroethene	ND	5.4	2.00	
Trichlorofluoromethane	ND	11	2.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	23	2.00	
1,1,1-Trichloroethane	ND	5.5	2.00	
1,1,2-Trichloroethane	ND	5.5	2.00	
1,3,5-Trimethylbenzene	ND	4.9	2.00	
1,1,2,2-Tetrachloroethane	ND	14	2.00	
1,2,4-Trimethylbenzene	ND	15	2.00	
1,2,4-Trichlorobenzene	ND	30	2.00	
Vinyl Acetate	ND	14	2.00	
Vinyl Chloride	ND	2.6	2.00	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	92	68-134		
1,2-Dichloroethane-d4	103	67-133		
Toluene-d8	94	70-130		


 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 9 of 16

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-4-081415	15-08-1204-5-A	08/14/15 12:20	Air	GC/MS KKK	N/A	08/18/15 20:19	150818L01

Parameter	Result	RL	DF	Qualifiers
Acetone	67	5.4	1.13	
Benzene	29	1.8	1.13	
Benzyl Chloride	ND	8.8	1.13	
Bromodichloromethane	ND	3.8	1.13	
Bromoform	ND	5.8	1.13	
Bromomethane	ND	2.2	1.13	
2-Butanone	6.4	5.0	1.13	
Carbon Disulfide	ND	7.0	1.13	
Carbon Tetrachloride	ND	3.6	1.13	
Chlorobenzene	ND	2.6	1.13	
Chloroethane	ND	1.5	1.13	
Chloroform	ND	2.8	1.13	
Chloromethane	1.5	1.2	1.13	
Dibromochloromethane	ND	4.8	1.13	
Dichlorodifluoromethane	ND	2.8	1.13	
Diisopropyl Ether (DIPE)	ND	9.4	1.13	
1,1-Dichloroethane	ND	2.3	1.13	
1,1-Dichloroethene	ND	2.2	1.13	
1,2-Dibromoethane	ND	4.3	1.13	
Dichlorotetrafluoroethane	ND	16	1.13	
1,2-Dichlorobenzene	ND	3.4	1.13	
1,2-Dichloroethane	ND	2.3	1.13	
1,2-Dichloropropane	ND	2.6	1.13	
1,3-Dichlorobenzene	4.5	3.4	1.13	
1,4-Dichlorobenzene	ND	3.4	1.13	
c-1,3-Dichloropropene	ND	2.6	1.13	
c-1,2-Dichloroethene	ND	2.2	1.13	
t-1,2-Dichloroethene	ND	2.2	1.13	
t-1,3-Dichloropropene	ND	5.1	1.13	
Ethanol	11	11	1.13	
Ethyl-t-Butyl Ether (ETBE)	ND	9.4	1.13	
Ethylbenzene	26	2.5	1.13	
4-Ethyltoluene	19	2.8	1.13	
Hexachloro-1,3-Butadiene	ND	18	1.13	
2-Hexanone	ND	6.9	1.13	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 10 of 16

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	8.1	1.13	
Methylene Chloride	ND	20	1.13	
4-Methyl-2-Pentanone	ND	6.9	1.13	
Naphthalene	ND	30	1.13	
o-Xylene	29	2.5	1.13	
p/m-Xylene	110	9.8	1.13	
Styrene	ND	7.2	1.13	
Tert-Amyl-Methyl Ether (TAME)	ND	9.4	1.13	
Tert-Butyl Alcohol (TBA)	32	6.9	1.13	
Tetrachloroethene	ND	3.8	1.13	
Toluene	120	2.1	1.13	
Trichloroethene	ND	3.0	1.13	
Trichlorofluoromethane	ND	6.3	1.13	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	13	1.13	
1,1,1-Trichloroethane	ND	3.1	1.13	
1,1,2-Trichloroethane	ND	3.1	1.13	
1,3,5-Trimethylbenzene	23	2.8	1.13	
1,1,2,2-Tetrachloroethane	ND	7.8	1.13	
1,2,4-Trimethylbenzene	57	8.3	1.13	
1,2,4-Trichlorobenzene	ND	17	1.13	
Vinyl Acetate	ND	8.0	1.13	
Vinyl Chloride	ND	1.4	1.13	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	100	68-134		
1,2-Dichloroethane-d4	101	67-133		
Toluene-d8	93	70-130		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 11 of 16

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-1-081415	15-08-1204-6-A	08/14/15 14:43	Air	GC/MS KKK	N/A	08/19/15 10:03	150818L01

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	480	100	
Benzene	14000	160	100	
Benzyl Chloride	ND	780	100	
Bromodichloromethane	ND	340	100	
Bromoform	ND	520	100	
Bromomethane	ND	190	100	
2-Butanone	ND	440	100	
Carbon Disulfide	ND	620	100	
Carbon Tetrachloride	ND	310	100	
Chlorobenzene	ND	230	100	
Chloroethane	ND	130	100	
Chloroform	ND	240	100	
Chloromethane	ND	100	100	
Dibromochloromethane	ND	430	100	
Dichlorodifluoromethane	ND	250	100	
Diisopropyl Ether (DIPE)	ND	840	100	
1,1-Dichloroethane	ND	200	100	
1,1-Dichloroethene	ND	200	100	
1,2-Dibromoethane	ND	380	100	
Dichlorotetrafluoroethane	ND	1400	100	
1,2-Dichlorobenzene	ND	300	100	
1,2-Dichloroethane	ND	200	100	
1,2-Dichloropropane	ND	230	100	
1,3-Dichlorobenzene	ND	300	100	
1,4-Dichlorobenzene	ND	300	100	
c-1,3-Dichloropropene	ND	230	100	
c-1,2-Dichloroethene	ND	200	100	
t-1,2-Dichloroethene	ND	200	100	
t-1,3-Dichloropropene	ND	450	100	
Ethanol	1800	940	100	
Ethyl-t-Butyl Ether (ETBE)	ND	840	100	
Ethylbenzene	1300	220	100	
4-Ethyltoluene	280	250	100	
Hexachloro-1,3-Butadiene	ND	1600	100	
2-Hexanone	ND	610	100	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/18/15
 Work Order: 15-08-1204
 Preparation: N/A
 Method: EPA TO-15
 Units: ug/m3

Project: 3093 Broadway / 731637001

Page 12 of 16

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	720	100	
Methylene Chloride	ND	1700	100	
4-Methyl-2-Pentanone	ND	610	100	
Naphthalene	ND	2600	100	
o-Xylene	2300	220	100	
p/m-Xylene	6900	870	100	
Styrene	ND	640	100	
Tert-Amyl-Methyl Ether (TAME)	ND	840	100	
Tert-Butyl Alcohol (TBA)	ND	610	100	
Tetrachloroethene	ND	340	100	
Toluene	2800	190	100	
Trichloroethene	ND	270	100	
Trichlorofluoromethane	ND	560	100	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	1100	100	
1,1,1-Trichloroethane	ND	270	100	
1,1,2-Trichloroethane	ND	270	100	
1,3,5-Trimethylbenzene	380	250	100	
1,1,2,2-Tetrachloroethane	ND	690	100	
1,2,4-Trimethylbenzene	ND	740	100	
1,2,4-Trichlorobenzene	ND	1500	100	
Vinyl Acetate	ND	700	100	
Vinyl Chloride	ND	130	100	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	104	68-134		
1,2-Dichloroethane-d4	100	67-133		
Toluene-d8	97	70-130		


 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 13 of 16

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
AMBIENT-081415	15-08-1204-7-A	08/14/15 15:00	Air	GC/MS KKK	N/A	08/18/15 17:23	150818L01

Parameter	Result	RL	DF	Qualifiers
Acetone	110	4.8	1.00	
Benzene	ND	1.6	1.00	
Benzyl Chloride	ND	7.8	1.00	
Bromodichloromethane	ND	3.4	1.00	
Bromoform	ND	5.2	1.00	
Bromomethane	ND	1.9	1.00	
2-Butanone	15	4.4	1.00	
Carbon Disulfide	ND	6.2	1.00	
Carbon Tetrachloride	ND	3.1	1.00	
Chlorobenzene	ND	2.3	1.00	
Chloroethane	ND	1.3	1.00	
Chloroform	ND	2.4	1.00	
Chloromethane	ND	1.0	1.00	
Dibromochloromethane	ND	4.3	1.00	
Dichlorodifluoromethane	ND	2.5	1.00	
Diisopropyl Ether (DIPE)	ND	8.4	1.00	
1,1-Dichloroethane	ND	2.0	1.00	
1,1-Dichloroethene	ND	2.0	1.00	
1,2-Dibromoethane	ND	3.8	1.00	
Dichlorotetrafluoroethane	ND	14	1.00	
1,2-Dichlorobenzene	ND	3.0	1.00	
1,2-Dichloroethane	ND	2.0	1.00	
1,2-Dichloropropane	ND	2.3	1.00	
1,3-Dichlorobenzene	ND	3.0	1.00	
1,4-Dichlorobenzene	ND	3.0	1.00	
c-1,3-Dichloropropene	ND	2.3	1.00	
c-1,2-Dichloroethene	ND	2.0	1.00	
t-1,2-Dichloroethene	ND	2.0	1.00	
t-1,3-Dichloropropene	ND	4.5	1.00	
Ethanol	ND	9.4	1.00	
Ethyl-t-Butyl Ether (ETBE)	ND	8.4	1.00	
Ethylbenzene	ND	2.2	1.00	
4-Ethyltoluene	ND	2.5	1.00	
Hexachloro-1,3-Butadiene	ND	16	1.00	
2-Hexanone	ND	6.1	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 14 of 16

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	7.2	1.00	
Methylene Chloride	ND	17	1.00	
4-Methyl-2-Pentanone	6.2	6.1	1.00	
Naphthalene	ND	26	1.00	
o-Xylene	ND	2.2	1.00	
p/m-Xylene	ND	8.7	1.00	
Styrene	ND	6.4	1.00	
Tert-Amyl-Methyl Ether (TAME)	ND	8.4	1.00	
Tert-Butyl Alcohol (TBA)	ND	6.1	1.00	
Tetrachloroethene	ND	3.4	1.00	
Toluene	2.0	1.9	1.00	
Trichloroethene	ND	2.7	1.00	
Trichlorofluoromethane	ND	5.6	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	11	1.00	
1,1,1-Trichloroethane	ND	2.7	1.00	
1,1,2-Trichloroethane	ND	2.7	1.00	
1,3,5-Trimethylbenzene	ND	2.5	1.00	
1,1,2,2-Tetrachloroethane	ND	6.9	1.00	
1,2,4-Trimethylbenzene	ND	7.4	1.00	
1,2,4-Trichlorobenzene	ND	15	1.00	
Vinyl Acetate	20	7.0	1.00	
Vinyl Chloride	ND	1.3	1.00	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	97	68-134		
1,2-Dichloroethane-d4	99	67-133		
Toluene-d8	92	70-130		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 15 of 16

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	095-01-021-15829	N/A	Air	GC/MS KKK	N/A	08/18/15 15:29	150818L01

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	4.8	1.00	
Benzene	ND	1.6	1.00	
Benzyl Chloride	ND	7.8	1.00	
Bromodichloromethane	ND	3.4	1.00	
Bromoform	ND	5.2	1.00	
Bromomethane	ND	1.9	1.00	
2-Butanone	ND	4.4	1.00	
Carbon Disulfide	ND	6.2	1.00	
Carbon Tetrachloride	ND	3.1	1.00	
Chlorobenzene	ND	2.3	1.00	
Chloroethane	ND	1.3	1.00	
Chloroform	ND	2.4	1.00	
Chloromethane	ND	1.0	1.00	
Dibromochloromethane	ND	4.3	1.00	
Dichlorodifluoromethane	ND	2.5	1.00	
Diisopropyl Ether (DIPE)	ND	8.4	1.00	
1,1-Dichloroethane	ND	2.0	1.00	
1,1-Dichloroethene	ND	2.0	1.00	
1,2-Dibromoethane	ND	3.8	1.00	
Dichlorotetrafluoroethane	ND	14	1.00	
1,2-Dichlorobenzene	ND	3.0	1.00	
1,2-Dichloroethane	ND	2.0	1.00	
1,2-Dichloropropane	ND	2.3	1.00	
1,3-Dichlorobenzene	ND	3.0	1.00	
1,4-Dichlorobenzene	ND	3.0	1.00	
c-1,3-Dichloropropene	ND	2.3	1.00	
c-1,2-Dichloroethene	ND	2.0	1.00	
t-1,2-Dichloroethene	ND	2.0	1.00	
t-1,3-Dichloropropene	ND	4.5	1.00	
Ethanol	ND	9.4	1.00	
Ethyl-t-Butyl Ether (ETBE)	ND	8.4	1.00	
Ethylbenzene	ND	2.2	1.00	
4-Ethyltoluene	ND	2.5	1.00	
Hexachloro-1,3-Butadiene	ND	16	1.00	
2-Hexanone	ND	6.1	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 16 of 16

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	7.2	1.00	
Methylene Chloride	ND	17	1.00	
4-Methyl-2-Pentanone	ND	6.1	1.00	
Naphthalene	ND	26	1.00	
o-Xylene	ND	2.2	1.00	
p/m-Xylene	ND	8.7	1.00	
Styrene	ND	6.4	1.00	
Tert-Amyl-Methyl Ether (TAME)	ND	8.4	1.00	
Tert-Butyl Alcohol (TBA)	ND	6.1	1.00	
Tetrachloroethene	ND	3.4	1.00	
Toluene	ND	1.9	1.00	
Trichloroethene	ND	2.7	1.00	
Trichlorofluoromethane	ND	5.6	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	11	1.00	
1,1,1-Trichloroethane	ND	2.7	1.00	
1,1,2-Trichloroethane	ND	2.7	1.00	
1,3,5-Trimethylbenzene	ND	2.5	1.00	
1,1,2,2-Tetrachloroethane	ND	6.9	1.00	
1,2,4-Trimethylbenzene	ND	7.4	1.00	
1,2,4-Trichlorobenzene	ND	15	1.00	
Vinyl Acetate	ND	7.0	1.00	
Vinyl Chloride	ND	1.3	1.00	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	94	68-134		
1,2-Dichloroethane-d4	99	67-133		
Toluene-d8	97	70-130		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-3M
Units: %

Project: 3093 Broadway / 731637001

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-2-081415	15-08-1204-1-A	08/14/15 07:40	Air	GC 52	N/A	08/18/15 18:24	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		1.3		0.00050		4.00	
SV-9-081415	15-08-1204-2-A	08/14/15 08:18	Air	GC 52	N/A	08/18/15 16:56	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		0.0013		0.00012		1.00	
SV-12-081415	15-08-1204-3-A	08/14/15 09:31	Air	GC 52	N/A	08/18/15 17:22	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		0.0049		0.00012		1.00	
SV-4-081415	15-08-1204-4-A	08/14/15 11:30	Air	GC 52	N/A	08/18/15 13:54	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		0.00082		0.00012		1.00	
MW-4-081415	15-08-1204-5-A	08/14/15 12:20	Air	GC 52	N/A	08/18/15 15:54	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		0.00016		0.00012		1.00	
MW-1-081415	15-08-1204-6-A	08/14/15 14:43	Air	GC 52	N/A	08/18/15 17:51	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		0.59		0.00025		2.00	
AMBIENT-081415	15-08-1204-7-A	08/14/15 15:00	Air	GC 52	N/A	08/18/15 13:24	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		0.00017		0.00012		1.00	
Method Blank	099-12-476-435	N/A	Air	GC 52	N/A	08/18/15 10:59	150818L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		ND		0.00012		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/18/15
 Work Order: 15-08-1204
 Preparation: N/A
 Method: ASTM D-1946

Project: 3093 Broadway / 731637001

Page 1 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-16-444-256	LCS	Air	GC 65	N/A	08/18/15 09:55	150818L01			
099-16-444-256	LCSD	Air	GC 65	N/A	08/18/15 10:13	150818L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Carbon Dioxide	15.00	14.69	98	14.87	99	80-120	1	0-30	
Oxygen (+ Argon)	4.010	4.208	105	4.195	105	80-120	0	0-30	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/18/15
 Work Order: 15-08-1204
 Preparation: N/A
 Method: ASTM D-1946 (M)

Project: 3093 Broadway / 731637001

Page 2 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-872-841	LCS	Air	GC 55	N/A	08/18/15 09:42	150818L01
099-12-872-841	LCSD	Air	GC 55	N/A	08/18/15 10:03	150818L01

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Helium	1.000	0.9370	94	0.9621	96	80-120	3	0-30	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15

Project: 3093 Broadway / 731637001

Page 3 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number				
095-01-021-15829	LCS	Air	GC/MS KKK	N/A	08/18/15 12:41	150818L01				
095-01-021-15829	LCSD	Air	GC/MS KKK	N/A	08/18/15 13:36	150818L01				
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Acetone	59.39	59.85	101	53.46	90	67-133	56-144	11	0-30	
Benzene	79.87	77.76	97	78.90	99	70-130	60-140	1	0-30	
Benzyl Chloride	129.4	123.7	96	136.9	106	38-158	18-178	10	0-30	
Bromodichloromethane	167.5	174.3	104	174.0	104	70-130	60-140	0	0-30	
Bromoform	258.4	256.7	99	269.6	104	63-147	49-161	5	0-30	
Bromomethane	97.08	102.9	106	100.1	103	70-139	58-150	3	0-30	
2-Butanone	73.73	75.58	103	74.77	101	66-132	55-143	1	0-30	
Carbon Disulfide	77.85	81.33	104	80.51	103	68-146	55-159	1	0-30	
Carbon Tetrachloride	157.3	166.2	106	163.1	104	70-136	59-147	2	0-30	
Chlorobenzene	115.1	112.8	98	116.5	101	70-130	60-140	3	0-30	
Chloroethane	65.96	68.29	104	67.53	102	65-149	51-163	1	0-30	
Chloroform	122.1	119.0	98	118.1	97	70-130	60-140	1	0-30	
Chloromethane	51.63	53.80	104	53.03	103	69-141	57-153	1	0-30	
Dibromochloromethane	213.0	218.0	102	221.5	104	70-138	59-149	2	0-30	
Dichlorodifluoromethane	123.6	127.9	103	125.6	102	67-139	55-151	2	0-30	
Diisopropyl Ether (DIPE)	104.5	98.22	94	97.31	93	63-130	52-141	1	0-30	
1,1-Dichloroethane	101.2	100.8	100	99.74	99	70-130	60-140	1	0-30	
1,1-Dichloroethene	99.12	95.00	96	93.28	94	70-135	59-146	2	0-30	
1,2-Dibromoethane	192.1	193.4	101	199.1	104	70-133	60-144	3	0-30	
Dichlorotetrafluoroethane	174.8	160.3	92	155.4	89	51-135	37-149	3	0-30	
1,2-Dichlorobenzene	150.3	136.9	91	148.7	99	48-138	33-153	8	0-30	
1,2-Dichloroethane	101.2	105.8	105	104.1	103	70-132	60-142	2	0-30	
1,2-Dichloropropane	115.5	112.9	98	113.6	98	70-130	60-140	1	0-30	
1,3-Dichlorobenzene	150.3	131.4	87	143.6	96	56-134	43-147	9	0-30	
1,4-Dichlorobenzene	150.3	128.6	86	141.7	94	52-136	38-150	10	0-30	
c-1,3-Dichloropropene	113.5	119.3	105	120.4	106	70-130	60-140	1	0-30	
c-1,2-Dichloroethene	99.12	93.11	94	92.83	94	70-130	60-140	0	0-30	
t-1,2-Dichloroethene	99.12	95.26	96	96.15	97	70-130	60-140	1	0-30	
t-1,3-Dichloropropene	113.5	126.1	111	127.1	112	70-147	57-160	1	0-30	
Ethanol	188.4	188.7	100	186.0	99	37-139	20-156	1	0-30	
Ethyl-t-Butyl Ether (ETBE)	104.5	102.9	99	102.9	99	67-130	56-140	0	0-30	
Ethylbenzene	108.6	106.9	98	109.2	101	70-130	60-140	2	0-30	
4-Ethyltoluene	122.9	115.1	94	121.6	99	68-130	58-140	5	0-30	
Hexachloro-1,3-Butadiene	266.6	328.5	123	315.9	118	44-146	27-163	4	0-30	
2-Hexanone	102.4	104.9	102	106.5	104	70-136	59-147	1	0-30	
Methyl-t-Butyl Ether (MTBE)	90.13	91.60	102	90.19	100	68-130	58-140	2	0-30	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/18/15
Work Order: 15-08-1204
Preparation: N/A
Method: EPA TO-15

Project: 3093 Broadway / 731637001

Page 4 of 5

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Methylene Chloride	86.84	74.59	86	74.78	86	69-130	59-140	0	0-30	
4-Methyl-2-Pentanone	102.4	101.9	99	102.4	100	70-130	60-140	1	0-30	
Naphthalene	131.1	143.6	110	142.1	108	24-144	4-164	1	0-30	
o-Xylene	108.6	105.7	97	107.5	99	69-130	59-140	2	0-30	
p/m-Xylene	217.1	215.8	99	220.3	101	70-132	60-142	2	0-30	
Styrene	106.5	101.7	96	105.7	99	65-131	54-142	4	0-30	
Tert-Amyl-Methyl Ether (TAME)	104.5	98.95	95	99.40	95	69-130	59-140	0	0-30	
Tert-Butyl Alcohol (TBA)	151.6	146.5	97	144.5	95	66-144	53-157	1	0-30	
Tetrachloroethene	169.6	170.3	100	172.7	102	70-130	60-140	1	0-30	
Toluene	94.21	95.44	101	96.94	103	70-130	60-140	2	0-30	
Trichloroethene	134.3	130.7	97	131.1	98	70-130	60-140	0	0-30	
Trichlorofluoromethane	140.5	147.8	105	144.5	103	63-141	50-154	2	0-30	
1,1,2-Trichloro-1,2,2-Trifluoroethane	191.6	181.8	95	180.7	94	70-136	59-147	1	0-30	
1,1,1-Trichloroethane	136.4	135.0	99	133.7	98	70-130	60-140	1	0-30	
1,1,2-Trichloroethane	136.4	132.8	97	136.7	100	70-130	60-140	3	0-30	
1,3,5-Trimethylbenzene	122.9	115.0	94	120.1	98	62-130	51-141	4	0-30	
1,1,2,2-Tetrachloroethane	171.6	156.3	91	162.7	95	63-130	52-141	4	0-30	
1,2,4-Trimethylbenzene	122.9	116.5	95	122.2	99	60-132	48-144	5	0-30	
1,2,4-Trichlorobenzene	185.5	225.6	122	221.1	119	31-151	11-171	2	0-30	
Vinyl Acetate	88.03	83.85	95	82.87	94	58-130	46-142	1	0-30	
Vinyl Chloride	63.91	65.98	103	64.35	101	70-134	59-145	3	0-30	

Total number of LCS compounds: 57

Total number of ME compounds: 0

Total number of ME compounds allowed: 3

LCS ME CL validation result: Pass

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/18/15
 Work Order: 15-08-1204
 Preparation: N/A
 Method: EPA TO-3M

Project: 3093 Broadway / 731637001

Page 5 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-12-476-435	LCS	Air	GC 52	N/A	08/18/15 10:09	150818L01			
099-12-476-435	LCSD	Air	GC 52	N/A	08/18/15 10:33	150818L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Methane	0.01020	0.01020	100	0.01023	100	80-120	0	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits

Summa Canister Vacuum Summary

Work Order: 15-08-1204

Page 1 of 1

Sample Name	Vacuum Out	Vacuum In	Equipment	Description
SV-2-081415	-29.50 in Hg	-3.90 in Hg	LC914	Summa Canister 1L
SV-9-081415	-29.50 in Hg	-4.70 in Hg	LC216	Summa Canister 1L
SV-12-081415	-29.50 in Hg	-9.90 in Hg	LC246	Summa Canister 1L
SV-4-081415	-29.50 in Hg	-16.90 in Hg	SLC041	Summa Canister 1L
MW-4-081415	-29.50 in Hg	-5.00 in Hg	LC207	Summa Canister 1L
MW-1-081415	-29.50 in Hg	-3.70 in Hg	LC602	Summa Canister 1L
AMBIENT-081415	-29.50 in Hg	-7.50 in Hg	D264	Summa Canister 6L

Sample Analysis Summary Report

Work Order: 15-08-1204

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
ASTM D-1946	N/A	929	GC 65	2
ASTM D-1946	N/A	982	GC 65	2
ASTM D-1946	N/A	1008	GC 65	2
ASTM D-1946 (M)	N/A	929	GC 55	2
ASTM D-1946 (M)	N/A	1008	GC 55	2
EPA TO-15	N/A	884	GC/MS KKK	2
EPA TO-3M	N/A	929	GC 52	2
EPA TO-3M	N/A	1008	GC 52	2

Glossary of Terms and Qualifiers

Work Order: 15-08-1204

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

WO NO. / LAB USE ONLY

15-08-1204

DATE: 8/14/15

PAGE: 1 OF 1

LABORATORY CLIENT: Langan Treadwell Rollo		CLIENT PROJECT NAME / NO.: 731637001		P.O. NO.: 731637001	
ADDRESS: 555 Montgomery Street		PROJECT CONTACT: Christine Ravi		LAB CONTACT OR QUOTE NO.: VIK PATEL	
CITY: San Francisco STATE: CA ZIP: 94111		PROJECT ADDRESS: 3093 Broadway		SAMPLER(S): (PRINT) ANTHONY GATLID	
TEL: 415 955 5292 E-MAIL: crain@langan.com		CITY: Oakland STATE: CA ZIP:		REQUESTED ANALYSES VOCs (TO-15) Helium (ASTM D-1946) Oxygen (ASTM D-1916) Carbon Dioxide (ASTM D-1946) Methane (TO-3M)	
TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"): <input type="checkbox"/> SAME DAY <input type="checkbox"/> 24 HR <input type="checkbox"/> 48 HR <input type="checkbox"/> 72 HR <input type="checkbox"/> 5 DAYS <input checked="" type="checkbox"/> STANDARD (RUSH)					
EDD: <input type="checkbox"/> COELT EDF <input type="checkbox"/> OTHER					

SPECIAL INSTRUCTIONS:

RUSH TAT

LAB USE ONLY	SAMPLE ID	FIELD ID / POINT OF COLLECTION	MATRIX	SAMPLING EQUIPMENT			START SAMPLING INFORMATION			STOP SAMPLING INFORMATION			VOCs (TO-15)	Helium (ASTM D-1946)	Oxygen (ASTM D-1916)	Carbon Dioxide (ASTM D-1946)	Methane (TO-3M)
			Indoor (I) Soil Vap. (SV) Ambient (A)	Media ID	Canister Size 6L or 1L	Flow Controller ID	Date	Time (24 hr clock)	Canister Pressure (in Hg)	Date	Time (24 hr clock)	Canister Pressure (in Hg)					
	1 SV-2-081415	SV-2	SV	B2362	1L	AD05	8/14/15	7:20	-30	8/14/15	7:40	-5	X	X	X	X	X
	2 SV-9-081415	SV-9	SV	1192	1L	AD86	8/14/15	8:08	-30	8/14/15	8:18	-5	X	X	X	X	X
	3 SV-17-081415	SV-17	SV	1269	1L	SGM264	8/14/15	8:31	-30	8/14/15	9:31	-10	X	X	X	X	X
	4 SV-4-081415	SV-4	SV	1269	1L	SGM264	8/14/15	9:38	-30	8/14/15	11:30	-16	X	X	X	X	X
	5 MW-4-081415	MW-4	SV	LC207	1L	SGM222	8/14/15	12:10	-30	8/14/15	12:20	-5	X	X	X	X	X
	6 MW-1-081415	MW-1	SV	LC602	1L	SGM231	8/14/15	13:35	-30	8/14/15	14:43	-5	X	X	X	X	X
	7 AMBIENT-081415	AMB-1	A	D264	6L	FC567	8/14/15	7:00	-30	8/14/15	15:00	-5	X				X

Relinquished by: (Signature) <i>[Signature]</i>	Received by: (Signature/Affiliation) <i>To O'Malley ECI</i>	Date: 8/17/15	Time: 1040
Relinquished by: (Signature) <i>To O'Malley 78650 8/17/15 1730</i>	Received by: (Signature/Affiliation) <i>J. Meyer</i>	Date: 8/18/15	Time: 1000
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

SGM 210

Canister 1173

Page 36 of 38

1204

<https://app.gso.com/Shipping/ShippingLabel>



800-322-5555 www.gso.com

Ship From
CAL SCIENCE- CONCORD
ALAN KEMP
5063 COMMERCIAL CIRCLE
#H

Tracking #: 528952805

NPS



<https://app.gso.com/Shipping/ShippingLabel>



800-322-5555 www.gso.com

Ship From
CAL SCIENCE- CONCORD
ALAN KEMP
5063 COMMERCIAL CIRCLE
#H
CONCORD, CA 94520

Tracking #: 528952806

NPS



Ship To
CEL
SAMPLE RECEIVING
7440 LINCOLN WAY
GARDEN GROVE, CA 92841

ORC
GARDEN GROVE

A

N92648A

COB: \$0.00

Return to Contents

SAMPLE RECEIPT CHECKLIST

COOLER 0 OF 0

CLIENT: Langan Treadwell Rollo

DATE: 08/18/2015

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)
 Thermometer ID: SC5 (CF:-0.2°C); Temperature (w/o CF): _____ °C (w/ CF): _____ °C; Blank Sample
 Sample(s) outside temperature criteria (PM/APM contacted by: _____)
 Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling
 Sample(s) received at ambient temperature; placed on ice for transport by courier
 Ambient Temperature: Air Filter Checked by: 836

CUSTODY SEAL:
~~Box~~ Present and Intact Present but Not Intact Not Present N/A Checked by: 836
~~Cooler~~ Present and Intact Present but Not Intact Not Present N/A Checked by: 300
 ps 8/18/15
 Sample(s) Present and Intact Present but Not Intact Not Present N/A

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers <input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Container(s) for certain analysis free of headspace	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE: (Trip Blank Lot Number: _____)

Aqueous: VOA VOA_h VOA_{na2} 100PJ 100PJ_{na2} 125AGB 125AGB_h 125AGB_p 125PB
 125PB_z 250AGB 250CGB 250CGB_s 250PB 250PB_n 500AGB 500AGJ 500AGJ_s
 500PB 1AGB 1AGB_{na2} 1AGB_s 1PB 1PB_{na} _____ _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (_____) EnCores® (_____) TerraCores® (_____) _____

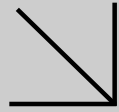
Air: Tedlar™ Canister Sorbent Tube PUF _____ **Other Matrix** (____): _____ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag
 Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO₃, **na** = NaOH, **na₂** = Na₂S₂O₃, **p** = H₃PO₄, Labeled/Checked by: 300
s = H₂SO₄, **u** = ultra-pure, **z**na = Zn(CH₃CO₂)₂ + NaOH Reviewed by: 836

Return to Contents



Calscience



WORK ORDER NUMBER: 15-08-1684

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Treadwell & Rollo - A Langan Company

Client Project Name: 3093 Broadway / 731637001

Attention: Christina Rain
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Vikas Patel

Approved for release on 08/27/2015 by:
Vikas Patel
Project Manager

ResultLink ▶

Email your PM ▶



Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

Contents

Client Project Name: 3093 Broadway / 731637001

Work Order Number: 15-08-1684

1	Work Order Narrative.	3
2	Sample Summary.	4
3	Detections Summary.	5
4	Client Sample Data.	6
	4.1 ASTM D-1946 Fixed Gases (Air).	6
	4.2 ASTM D-1946 (M) Fixed Gases (H2 and/or He) (Air).	7
	4.3 EPA TO-15 Full List (Air).	8
	4.4 EPA TO-3 (M) C1-C6 (Air).	14
5	Quality Control Sample Data.	15
	5.1 LCS/LCSD.	15
6	Summa Canister Vacuum Summary.	20
7	Sample Analysis Summary.	21
8	Glossary of Terms and Qualifiers.	22
9	Chain-of-Custody/Sample Receipt Form.	23

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 08/25/15. They were assigned to Work Order 15-08-1684.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



Calscience

Sample Summary

Client: Treadwell & Rollo - A Langan Company	Work Order:	15-08-1684
555 Montgomery St., Suite 1300	Project Name:	3093 Broadway / 731637001
San Francisco, CA 94111-2554	PO Number:	
	Date/Time Received:	08/25/15 10:15
	Number of Containers:	2

Attn: Christina Rain

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
SV-10-082415	15-08-1684-1	08/24/15 10:50	1	Air
AMBIENT-082415	15-08-1684-2	08/24/15 10:36	1	Air



Return to Contents



Calscience

Detections Summary

Client: Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Work Order: 15-08-1684
 Project Name: 3093 Broadway / 731637001
 Received: 08/25/15

Attn: Christina Rain

Page 1 of 1

Client SampleID

<u>Analyte</u>	<u>Result</u>	<u>Qualifiers</u>	<u>RL</u>	<u>Units</u>	<u>Method</u>	<u>Extraction</u>
SV-10-082415 (15-08-1684-1)						
Carbon Dioxide	1.96		0.500	%v	ASTM D-1946	N/A
Oxygen (+ Argon)	17.9		0.500	%v	ASTM D-1946	N/A
Helium	0.0253		0.0100	%v	ASTM D-1946 (M)	N/A
Acetone	220		6.6	ug/m3	EPA TO-15	N/A
Benzene	2.3		2.2	ug/m3	EPA TO-15	N/A
2-Butanone	6.2		6.1	ug/m3	EPA TO-15	N/A
Chloromethane	4.3		1.4	ug/m3	EPA TO-15	N/A
Ethanol	28		13	ug/m3	EPA TO-15	N/A
Toluene	47		2.6	ug/m3	EPA TO-15	N/A
Methane	930		820	ug/m3	EPA TO-3M	N/A
AMBIENT-082415 (15-08-1684-2)						
Acetone	20		5.0	ug/m3	EPA TO-15	N/A
Dichlorodifluoromethane	3.0		2.6	ug/m3	EPA TO-15	N/A
Methane	1200		820	ug/m3	EPA TO-3M	N/A

Subcontracted analyses, if any, are not included in this summary.


 Return to Contents

* MDL is shown



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/25/15
 Work Order: 15-08-1684
 Preparation: N/A
 Method: ASTM D-1946
 Units: %v

Project: 3093 Broadway / 731637001

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-10-082415	15-08-1684-1-A	08/24/15 10:50	Air	GC 65	N/A	08/25/15 11:15	150825L01

Parameter	Result	RL	DF	Qualifiers
Carbon Dioxide	1.96	0.500	1.00	
Oxygen (+ Argon)	17.9	0.500	1.00	

Method Blank	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-444-261	N/A	Air	GC 65	N/A	08/25/15 10:44	150825L01

Parameter	Result	RL	DF	Qualifiers
Carbon Dioxide	ND	0.500	1.00	
Oxygen (+ Argon)	ND	0.500	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/25/15
 Work Order: 15-08-1684
 Preparation: N/A
 Method: ASTM D-1946 (M)
 Units: %v

Project: 3093 Broadway / 731637001

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-10-082415	15-08-1684-1-A	08/24/15 10:50	Air	GC 55	N/A	08/25/15 11:16	150825L01

Parameter	Result	RL	DF	Qualifiers
Helium	0.0253	0.0100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-12-872-846	N/A	Air	GC 55	N/A	08/25/15 10:44	150825L01

Parameter	Result	RL	DF	Qualifiers
Helium	ND	0.0100	1.00	



Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/25/15
Work Order: 15-08-1684
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 1 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-10-082415	15-08-1684-1-A	08/24/15 10:50	Air	GC/MS AA	N/A	08/25/15 23:51	150825L01

Parameter	Result	RL	DF	Qualifiers
Acetone	220	6.6	1.38	
Benzene	2.3	2.2	1.38	
Benzyl Chloride	ND	11	1.38	
Bromodichloromethane	ND	4.6	1.38	
Bromoform	ND	7.1	1.38	
Bromomethane	ND	2.7	1.38	
2-Butanone	6.2	6.1	1.38	
Carbon Disulfide	ND	8.6	1.38	
Carbon Tetrachloride	ND	4.3	1.38	
Chlorobenzene	ND	3.2	1.38	
Chloroethane	ND	1.8	1.38	
Chloroform	ND	3.4	1.38	
Chloromethane	4.3	1.4	1.38	
Dibromochloromethane	ND	5.9	1.38	
Dichlorodifluoromethane	ND	3.4	1.38	
Diisopropyl Ether (DIPE)	ND	12	1.38	
1,1-Dichloroethane	ND	2.8	1.38	
1,1-Dichloroethene	ND	2.7	1.38	
1,2-Dibromoethane	ND	5.3	1.38	
Dichlorotetrafluoroethane	ND	19	1.38	
1,2-Dichlorobenzene	ND	4.1	1.38	
1,2-Dichloroethane	ND	2.8	1.38	
1,2-Dichloropropane	ND	3.2	1.38	
1,3-Dichlorobenzene	ND	4.1	1.38	
1,4-Dichlorobenzene	ND	4.1	1.38	
c-1,3-Dichloropropene	ND	3.1	1.38	
c-1,2-Dichloroethene	ND	2.7	1.38	
t-1,2-Dichloroethene	ND	2.7	1.38	
t-1,3-Dichloropropene	ND	6.3	1.38	
Ethanol	28	13	1.38	
Ethyl-t-Butyl Ether (ETBE)	ND	12	1.38	
Ethylbenzene	ND	3.0	1.38	
4-Ethyltoluene	ND	3.4	1.38	
Hexachloro-1,3-Butadiene	ND	22	1.38	
2-Hexanone	ND	8.5	1.38	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/25/15
 Work Order: 15-08-1684
 Preparation: N/A
 Method: EPA TO-15
 Units: ug/m3

Project: 3093 Broadway / 731637001

Page 2 of 6

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	10	1.38	
Methylene Chloride	ND	24	1.38	
4-Methyl-2-Pentanone	ND	8.5	1.38	
Naphthalene	ND	36	1.38	
o-Xylene	ND	3.0	1.38	
p/m-Xylene	ND	12	1.38	
Styrene	ND	8.8	1.38	
Tert-Amyl-Methyl Ether (TAME)	ND	12	1.38	
Tert-Butyl Alcohol (TBA)	ND	8.4	1.38	
Tetrachloroethene	ND	4.7	1.38	
Toluene	47	2.6	1.38	
Trichloroethene	ND	3.7	1.38	
Trichlorofluoromethane	ND	7.8	1.38	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	16	1.38	
1,1,1-Trichloroethane	ND	3.8	1.38	
1,1,2-Trichloroethane	ND	3.8	1.38	
1,3,5-Trimethylbenzene	ND	3.4	1.38	
1,1,2,2-Tetrachloroethane	ND	9.5	1.38	
1,2,4-Trimethylbenzene	ND	10	1.38	
1,2,4-Trichlorobenzene	ND	20	1.38	
Vinyl Acetate	ND	9.7	1.38	
Vinyl Chloride	ND	1.8	1.38	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	107	68-134		
1,2-Dichloroethane-d4	112	67-133		
Toluene-d8	103	70-130		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/25/15
Work Order: 15-08-1684
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 3 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
AMBIENT-082415	15-08-1684-2-A	08/24/15 10:36	Air	GC/MS AA	N/A	08/25/15 22:58	150825L01

Parameter	Result	RL	DF	Qualifiers
Acetone	20	5.0	1.06	
Benzene	ND	1.7	1.06	
Benzyl Chloride	ND	8.2	1.06	
Bromodichloromethane	ND	3.6	1.06	
Bromoform	ND	5.5	1.06	
Bromomethane	ND	2.1	1.06	
2-Butanone	ND	4.7	1.06	
Carbon Disulfide	ND	6.6	1.06	
Carbon Tetrachloride	ND	3.3	1.06	
Chlorobenzene	ND	2.4	1.06	
Chloroethane	ND	1.4	1.06	
Chloroform	ND	2.6	1.06	
Chloromethane	ND	1.1	1.06	
Dibromochloromethane	ND	4.5	1.06	
Dichlorodifluoromethane	3.0	2.6	1.06	
Diisopropyl Ether (DIPE)	ND	8.9	1.06	
1,1-Dichloroethane	ND	2.1	1.06	
1,1-Dichloroethene	ND	2.1	1.06	
1,2-Dibromoethane	ND	4.1	1.06	
Dichlorotetrafluoroethane	ND	15	1.06	
1,2-Dichlorobenzene	ND	3.2	1.06	
1,2-Dichloroethane	ND	2.1	1.06	
1,2-Dichloropropane	ND	2.4	1.06	
1,3-Dichlorobenzene	ND	3.2	1.06	
1,4-Dichlorobenzene	ND	3.2	1.06	
c-1,3-Dichloropropene	ND	2.4	1.06	
c-1,2-Dichloroethene	ND	2.1	1.06	
t-1,2-Dichloroethene	ND	2.1	1.06	
t-1,3-Dichloropropene	ND	4.8	1.06	
Ethanol	ND	10	1.06	
Ethyl-t-Butyl Ether (ETBE)	ND	8.9	1.06	
Ethylbenzene	ND	2.3	1.06	
4-Ethyltoluene	ND	2.6	1.06	
Hexachloro-1,3-Butadiene	ND	17	1.06	
2-Hexanone	ND	6.5	1.06	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/25/15
Work Order: 15-08-1684
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 4 of 6

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	7.6	1.06	
Methylene Chloride	ND	18	1.06	
4-Methyl-2-Pentanone	ND	6.5	1.06	
Naphthalene	ND	28	1.06	
o-Xylene	ND	2.3	1.06	
p/m-Xylene	ND	9.2	1.06	
Styrene	ND	6.8	1.06	
Tert-Amyl-Methyl Ether (TAME)	ND	8.9	1.06	
Tert-Butyl Alcohol (TBA)	ND	6.4	1.06	
Tetrachloroethene	ND	3.6	1.06	
Toluene	ND	2.0	1.06	
Trichloroethene	ND	2.8	1.06	
Trichlorofluoromethane	ND	6.0	1.06	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	12	1.06	
1,1,1-Trichloroethane	ND	2.9	1.06	
1,1,2-Trichloroethane	ND	2.9	1.06	
1,3,5-Trimethylbenzene	ND	2.6	1.06	
1,1,2,2-Tetrachloroethane	ND	7.3	1.06	
1,2,4-Trimethylbenzene	ND	7.8	1.06	
1,2,4-Trichlorobenzene	ND	16	1.06	
Vinyl Acetate	ND	7.5	1.06	
Vinyl Chloride	ND	1.4	1.06	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	109	68-134		
1,2-Dichloroethane-d4	109	67-133		
Toluene-d8	97	70-130		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/25/15
Work Order: 15-08-1684
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 5 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	095-01-021-15859	N/A	Air	GC/MS AA	N/A	08/25/15 15:44	150825L01

Parameter	Result	RL	DF	Qualifiers
Acetone	ND	4.8	1.00	
Benzene	ND	1.6	1.00	
Benzyl Chloride	ND	7.8	1.00	
Bromodichloromethane	ND	3.4	1.00	
Bromoform	ND	5.2	1.00	
Bromomethane	ND	1.9	1.00	
2-Butanone	ND	4.4	1.00	
Carbon Disulfide	ND	6.2	1.00	
Carbon Tetrachloride	ND	3.1	1.00	
Chlorobenzene	ND	2.3	1.00	
Chloroethane	ND	1.3	1.00	
Chloroform	ND	2.4	1.00	
Chloromethane	ND	1.0	1.00	
Dibromochloromethane	ND	4.3	1.00	
Dichlorodifluoromethane	ND	2.5	1.00	
Diisopropyl Ether (DIPE)	ND	8.4	1.00	
1,1-Dichloroethane	ND	2.0	1.00	
1,1-Dichloroethene	ND	2.0	1.00	
1,2-Dibromoethane	ND	3.8	1.00	
Dichlorotetrafluoroethane	ND	14	1.00	
1,2-Dichlorobenzene	ND	3.0	1.00	
1,2-Dichloroethane	ND	2.0	1.00	
1,2-Dichloropropane	ND	2.3	1.00	
1,3-Dichlorobenzene	ND	3.0	1.00	
1,4-Dichlorobenzene	ND	3.0	1.00	
c-1,3-Dichloropropene	ND	2.3	1.00	
c-1,2-Dichloroethene	ND	2.0	1.00	
t-1,2-Dichloroethene	ND	2.0	1.00	
t-1,3-Dichloropropene	ND	4.5	1.00	
Ethanol	ND	9.4	1.00	
Ethyl-t-Butyl Ether (ETBE)	ND	8.4	1.00	
Ethylbenzene	ND	2.2	1.00	
4-Ethyltoluene	ND	2.5	1.00	
Hexachloro-1,3-Butadiene	ND	16	1.00	
2-Hexanone	ND	6.1	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/25/15
Work Order: 15-08-1684
Preparation: N/A
Method: EPA TO-15
Units: ug/m3

Project: 3093 Broadway / 731637001

Page 6 of 6

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Methyl-t-Butyl Ether (MTBE)	ND	7.2	1.00	
Methylene Chloride	ND	17	1.00	
4-Methyl-2-Pentanone	ND	6.1	1.00	
Naphthalene	ND	26	1.00	
o-Xylene	ND	2.2	1.00	
p/m-Xylene	ND	8.7	1.00	
Styrene	ND	6.4	1.00	
Tert-Amyl-Methyl Ether (TAME)	ND	8.4	1.00	
Tert-Butyl Alcohol (TBA)	ND	6.1	1.00	
Tetrachloroethene	ND	3.4	1.00	
Toluene	ND	1.9	1.00	
Trichloroethene	ND	2.7	1.00	
Trichlorofluoromethane	ND	5.6	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	11	1.00	
1,1,1-Trichloroethane	ND	2.7	1.00	
1,1,2-Trichloroethane	ND	2.7	1.00	
1,3,5-Trimethylbenzene	ND	2.5	1.00	
1,1,2,2-Tetrachloroethane	ND	6.9	1.00	
1,2,4-Trimethylbenzene	ND	7.4	1.00	
1,2,4-Trichlorobenzene	ND	15	1.00	
Vinyl Acetate	ND	7.0	1.00	
Vinyl Chloride	ND	1.3	1.00	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
1,4-Bromofluorobenzene	100	68-134		
1,2-Dichloroethane-d4	97	67-133		
Toluene-d8	96	70-130		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Analytical Report

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/25/15
 Work Order: 15-08-1684
 Preparation: N/A
 Method: EPA TO-3M
 Units: ug/m3

Project: 3093 Broadway / 731637001

Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SV-10-082415	15-08-1684-1-A	08/24/15 10:50	Air	GC 61	N/A	08/25/15 12:04	150825L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		930		820		1.00	
AMBIENT-082415	15-08-1684-2-A	08/24/15 10:36	Air	GC 61	N/A	08/25/15 11:38	150825L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		1200		820		1.00	
Method Blank	099-12-476-441	N/A	Air	GC 61	N/A	08/25/15 11:11	150825L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Methane		ND		820		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/25/15
 Work Order: 15-08-1684
 Preparation: N/A
 Method: ASTM D-1946

Project: 3093 Broadway / 731637001

Page 1 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-16-444-261	LCS	Air	GC 65	N/A	08/25/15 10:02	150825L01			
099-16-444-261	LCSD	Air	GC 65	N/A	08/25/15 10:22	150825L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Carbon Dioxide	15.00	14.68	98	14.90	99	80-120	1	0-30	
Oxygen (+ Argon)	4.010	4.220	105	4.185	104	80-120	1	0-30	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/25/15
 Work Order: 15-08-1684
 Preparation: N/A
 Method: ASTM D-1946 (M)

Project: 3093 Broadway / 731637001

Page 2 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-12-872-846	LCS	Air	GC 55	N/A	08/25/15 09:49	150825L01			
099-12-872-846	LCSD	Air	GC 55	N/A	08/25/15 10:14	150825L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Helium	1.000	0.9304	93	0.9592	96	80-120	3	0-30	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/25/15
Work Order: 15-08-1684
Preparation: N/A
Method: EPA TO-15

Project: 3093 Broadway / 731637001

Page 3 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
095-01-021-15859	LCS	Air	GC/MS AA	N/A	08/25/15 14:03	150825L01
095-01-021-15859	LCSD	Air	GC/MS AA	N/A	08/25/15 14:55	150825L01

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Acetone	59.39	58.29	98	59.29	100	67-133	56-144	2	0-30	
Benzene	79.87	71.25	89	71.33	89	70-130	60-140	0	0-30	
Benzyl Chloride	129.4	129.6	100	127.9	99	38-158	18-178	1	0-30	
Bromodichloromethane	167.5	183.2	109	181.1	108	70-130	60-140	1	0-30	
Bromoform	258.4	254.0	98	254.0	98	63-147	49-161	0	0-30	
Bromomethane	97.08	114.5	118	114.8	118	70-139	58-150	0	0-30	
2-Butanone	73.73	62.34	85	62.30	84	66-132	55-143	0	0-30	
Carbon Disulfide	77.85	81.72	105	82.32	106	68-146	55-159	1	0-30	
Carbon Tetrachloride	157.3	182.5	116	181.0	115	70-136	59-147	1	0-30	
Chlorobenzene	115.1	114.3	99	111.9	97	70-130	60-140	2	0-30	
Chloroethane	65.96	66.23	100	65.62	99	65-149	51-163	1	0-30	
Chloroform	122.1	120.0	98	118.1	97	70-130	60-140	2	0-30	
Chloromethane	51.63	45.93	89	45.53	88	69-141	57-153	1	0-30	
Dibromochloromethane	213.0	246.1	116	243.6	114	70-138	59-149	1	0-30	
Dichlorodifluoromethane	123.6	133.8	108	130.4	105	67-139	55-151	3	0-30	
Diisopropyl Ether (DIPE)	104.5	77.74	74	76.29	73	63-130	52-141	2	0-30	
1,1-Dichloroethane	101.2	87.13	86	86.43	85	70-130	60-140	1	0-30	
1,1-Dichloroethene	99.12	102.0	103	102.3	103	70-135	59-146	0	0-30	
1,2-Dibromoethane	192.1	207.6	108	205.3	107	70-133	60-144	1	0-30	
Dichlorotetrafluoroethane	174.8	171.2	98	170.2	97	51-135	37-149	1	0-30	
1,2-Dichlorobenzene	150.3	155.1	103	152.9	102	48-138	33-153	1	0-30	
1,2-Dichloroethane	101.2	100.0	99	97.77	97	70-132	60-142	2	0-30	
1,2-Dichloropropane	115.5	99.43	86	99.36	86	70-130	60-140	0	0-30	
1,3-Dichlorobenzene	150.3	165.5	110	164.4	109	56-134	43-147	1	0-30	
1,4-Dichlorobenzene	150.3	162.1	108	160.2	107	52-136	38-150	1	0-30	
c-1,3-Dichloropropene	113.5	113.7	100	111.6	98	70-130	60-140	2	0-30	
c-1,2-Dichloroethene	99.12	86.22	87	85.92	87	70-130	60-140	0	0-30	
t-1,2-Dichloroethene	99.12	93.68	95	92.84	94	70-130	60-140	1	0-30	
t-1,3-Dichloropropene	113.5	121.9	107	121.5	107	70-147	57-160	0	0-30	
Ethanol	188.4	172.0	91	176.3	94	37-139	20-156	2	0-30	
Ethyl-t-Butyl Ether (ETBE)	104.5	81.30	78	80.36	77	67-130	56-140	1	0-30	
Ethylbenzene	108.6	105.3	97	105.4	97	70-130	60-140	0	0-30	
4-Ethyltoluene	122.9	130.7	106	129.5	105	68-130	58-140	1	0-30	
Hexachloro-1,3-Butadiene	266.6	214.8	81	217.1	81	44-146	27-163	1	0-30	
2-Hexanone	102.4	94.04	92	93.59	91	70-136	59-147	0	0-30	
Methyl-t-Butyl Ether (MTBE)	90.13	75.22	83	75.02	83	68-130	58-140	0	0-30	

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
555 Montgomery St., Suite 1300
San Francisco, CA 94111-2554

Date Received: 08/25/15
Work Order: 15-08-1684
Preparation: N/A
Method: EPA TO-15

Project: 3093 Broadway / 731637001

Page 4 of 5

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Methylene Chloride	86.84	84.94	98	85.15	98	69-130	59-140	0	0-30	
4-Methyl-2-Pentanone	102.4	90.63	88	89.85	88	70-130	60-140	1	0-30	
Naphthalene	131.1	135.3	103	135.9	104	24-144	4-164	0	0-30	
o-Xylene	108.6	110.4	102	107.8	99	69-130	59-140	2	0-30	
p/m-Xylene	217.1	223.0	103	223.5	103	70-132	60-142	0	0-30	
Styrene	106.5	101.0	95	99.37	93	65-131	54-142	2	0-30	
Tert-Amyl-Methyl Ether (TAME)	104.5	82.90	79	82.29	79	69-130	59-140	1	0-30	
Tert-Butyl Alcohol (TBA)	151.6	142.1	94	145.3	96	66-144	53-157	2	0-30	
Tetrachloroethene	169.6	157.1	93	153.8	91	70-130	60-140	2	0-30	
Toluene	94.21	87.87	93	87.30	93	70-130	60-140	1	0-30	
Trichloroethene	134.3	134.8	100	133.9	100	70-130	60-140	1	0-30	
Trichlorofluoromethane	140.5	177.6	126	180.3	128	63-141	50-154	2	0-30	
1,1,2-Trichloro-1,2,2-Trifluoroethane	191.6	205.3	107	205.0	107	70-136	59-147	0	0-30	
1,1,1-Trichloroethane	136.4	132.6	97	131.6	96	70-130	60-140	1	0-30	
1,1,2-Trichloroethane	136.4	136.3	100	134.7	99	70-130	60-140	1	0-30	
1,3,5-Trimethylbenzene	122.9	127.3	104	126.4	103	62-130	51-141	1	0-30	
1,1,2,2-Tetrachloroethane	171.6	173.9	101	171.2	100	63-130	52-141	2	0-30	
1,2,4-Trimethylbenzene	122.9	133.6	109	133.7	109	60-132	48-144	0	0-30	
1,2,4-Trichlorobenzene	185.5	162.6	88	163.5	88	31-151	11-171	1	0-30	
Vinyl Acetate	88.03	65.09	74	64.71	74	58-130	46-142	1	0-30	
Vinyl Chloride	63.91	60.00	94	60.92	95	70-134	59-145	2	0-30	

Total number of LCS compounds: 57

Total number of ME compounds: 0

Total number of ME compounds allowed: 3

LCS ME CL validation result: Pass

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Quality Control - LCS/LCSD

Treadwell & Rollo - A Langan Company
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111-2554

Date Received: 08/25/15
 Work Order: 15-08-1684
 Preparation: N/A
 Method: EPA TO-3M

Project: 3093 Broadway / 731637001

Page 5 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number			
099-12-476-441	LCS	Air	GC 61	N/A	08/25/15 10:11	150825L01			
099-12-476-441	LCSD	Air	GC 61	N/A	08/25/15 10:34	150825L01			
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Methane	66920	63090	94	62850	94	80-120	0	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

Summa Canister Vacuum Summary

Work Order: 15-08-1684

Page 1 of 1

Sample Name	Vacuum Out	Vacuum In	Equipment	Description
SV-10-082415	-29.50 in Hg	-5.00 in Hg	LC128	Summa Canister 1L
AMBIENT-082415	-29.50 in Hg	-4.50 in Hg	LC837	Summa Canister 1L


Return to Contents

Sample Analysis Summary Report

Work Order: 15-08-1684

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
ASTM D-1946	N/A	982	GC 65	2
ASTM D-1946 (M)	N/A	982	GC 55	2
EPA TO-15	N/A	953	GC/MS AA	2
EPA TO-3M	N/A	929	GC 61	2


Return to Contents

Glossary of Terms and Qualifiers

Work Order: 15-08-1684

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.



Calscience

7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494
For courier service / sample drop off information, contact us26_sales@eurofinsus.com or call us.

AIR CHAIN-OF-CUSTODY RECORD

WO NO. / LAB USE ONLY

15-08-1684

DATE: 8/24/15
PAGE: 1 OF 1

LABORATORY CLIENT: LANGAN TREADWELL BOLLG		CLIENT PROJECT NAME / NO.: 3093 BROADWAY		P.O. NO.: 73163700	
ADDRESS: 555 MONTGOMERY STREET		PROJECT CONTACT: CHRISTINA RAIN		LAB CONTACT OR QUOTE NO.: VIK PATEL	
CITY: SAN FRANCISCO	STATE: CA	ZIP: 94111	PROJECT ADDRESS: 3093 BROADWAY		SAMPLER(S): (PRINT) ANTHONY GAKLE
TEL: 415 955 5292	E-MAIL: crain@langan.com		CITY: OAKLAND		STATE: CA
TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"): <input type="checkbox"/> SAME DAY <input type="checkbox"/> 24 HR <input type="checkbox"/> 48 HR <input type="checkbox"/> 72 HR <input type="checkbox"/> 5 DAYS <input type="checkbox"/> STANDARD <input checked="" type="checkbox"/> RUSH			UNITS:		REQUESTED ANALYSES
EDD: <input type="checkbox"/> COELT EDF <input type="checkbox"/> OTHER		SPECIAL INSTRUCTIONS: RUSH TAT			

LAB USE ONLY	SAMPLE ID	FIELD ID / POINT OF COLLECTION	MATRIX	SAMPLING EQUIPMENT			START SAMPLING INFORMATION			STOP SAMPLING INFORMATION			VOCs (10-15)	Volatile (ASTM-D 1546)	Methane (TO-15)	CO2 (ASTM-D 1946)	Oxygen (ASTM-D 1761)
			Indoor (I) Soil Vap. (SV) Ambient (A)	Media ID	Canister Size 6L or 1L	Flow Controller ID	Date	Time (24 hr clock)	Canister Pressure (in Hg)	Date	Time (24 hr clock)	Canister Pressure (in Hg)					
1	SV-10-08245	SV-10	SV	LC128	1L	SCM 46	8/24/15	10:30	-30	8/24/15	10:50	-5	X	X	X	X	X
2	AMBIENT-08245	AMBIENT	A	LC837	1L	SGMIOT	8/24/15	10:30	-30	8/24/15	10:36	-4	X	X			

Relinquished by: (Signature) <i>[Signature]</i>	Received by: (Signature/Affiliation) <i>Tom O'Malley ECI</i>	Date: 8/24/15	Time: 1230
Relinquished by: (Signature) <i>Tom O'Malley TO 680 8/24/15 1730</i>	Received by: (Signature/Affiliation) <i>[Signature] ECI</i>	Date: 8/25/15	Time: 1015
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:



800-322-5555 www.gso.com

1684

Ship From
CAL SCIENCE- CONCORD
ALAN KEMP
5063 COMMERCIAL CIRCLE
#H
CONCORD, CA 94520

Tracking #: 529036684

NPS



Ship To
CEL
SAMPLE RECEIVING
7440 LINCOLN WAY
GARDEN GROVE, CA 92841

ORC
GARDEN GROVE

A

COD: \$0.00
Weight: 0 lb(s)
Reference:
LANGAN TREADWELL ROLLO
Delivery Instructions:

D92845A



Signature Type: REQUIRED

41590815

Print Date: 8/24/2015 4:07 PM

LABEL INSTRUCTIONS:

Do not copy or reprint this label for additional shipments - each package must have a unique barcode.

Use the "Print Label" button on this page to print the shipping label on a laser or inkjet printer. Securely attach this label to your package, do not cover the barcode.

Return to Contents

SAMPLE RECEIPT CHECKLIST

BOX 1 OF 1

CLIENT: Langen Treadwell + Rollo

DATE: 08 / 25 / 2015

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC5 (CF:-0.2°C); Temperature (w/o CF): _____ °C (w/ CF): _____ °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: 300

CUSTODY SEAL:

Box Present and Intact Present but Not Intact Not Present N/A

Checked by: 300

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: 300

SAMPLE CONDITION:

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Container(s) for certain analysis free of headspace	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE:

(Trip Blank Lot Number: _____)

Aqueous: VOA VOA_h VOA_{na₂} 100PJ 100PJ_{na₂} 125AGB 125AGB_h 125AGB_p 125PB
 125PB_{z_{na}} 250AGB 250CGB 250CGB_s 250PB 250PB_n 500AGB 500AGJ 500AGJ_s
 500PB 1AGB 1AGB_{na₂} 1AGB_s 1PB 1PB_{na} _____ _____ _____ _____

Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (_____) EnCores® (_____) TerraCores® (_____) _____

Air: Tedlar™ Canister Sorbent Tube PUF _____ **Other Matrix** (____): _____ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO₃, **na** = NaOH, **na₂** = Na₂S₂O₃, **p** = H₃PO₄,

Labeled/Checked by: 300

s = H₂SO₄, **u** = ultra-pure, **z_{na}** = Zn(CH₃CO₂)₂ + NaOH

Reviewed by: 836



McC Campbell Analytical, Inc.

"When Quality Counts"

Analytical Report

WorkOrder: 1508655

Report Created for: Treadwell & Rollo

555 Montgomery St., Suite 1300
San Francisco, CA 94111

Project Contact: Annie Lee

Project P.O.:

Project Name: 731637001; 3093 Broadway

Project Received: 08/19/2015

Analytical Report reviewed & approved for release on 08/20/2015 by:

Angela Rydelius,
Laboratory Manager

The report shall not be reproduced except in full, without the written approval of the laboratory. The analytical results relate only to the items tested. Results reported conform to the most current NELAP standards, where applicable, unless otherwise stated in the case narrative.





Glossary of Terms & Qualifier Definitions

Client: Treadwell & Rollo
Project: 731637001; 3093 Broadway
WorkOrder: 1508655

Glossary Abbreviation

95% Interval	95% Confident Interval
DF	Dilution Factor
DI WET	(DISTLC) Waste Extraction Test using DI water
DISS	Dissolved (direct analysis of 0.45 µm filtered and acidified water sample)
DUP	Duplicate
EDL	Estimated Detection Limit
ITEF	International Toxicity Equivalence Factor
LCS	Laboratory Control Sample
MB	Method Blank
MB % Rec	% Recovery of Surrogate in Method Blank, if applicable
MDL	Method Detection Limit
ML	Minimum Level of Quantitation
MS	Matrix Spike
MSD	Matrix Spike Duplicate
N/A	Not Applicable
ND	Not detected at or above the indicated MDL or RL
NR	Data Not Reported due to matrix interference or insufficient sample amount.
PF	Prep Factor
RD	Relative Difference
RL	Reporting Limit (The RL is the lowest calibration standard in a multipoint calibration.)
RPD	Relative Percent Deviation
RRT	Relative Retention Time
SPK Val	Spike Value
SPKRef Val	Spike Reference Value
SPLP	Synthetic Precipitation Leachate Procedure
TCLP	Toxicity Characteristic Leachate Procedure
TEQ	Toxicity Equivalents
WET (STLC)	Waste Extraction Test (Soluble Threshold Limit Concentration)



Analytical Report

Client: Treadwell & Rollo
Date Received: 8/19/15 15:59
Date Prepared: 8/19/15
Project: 731637001; 3093 Broadway

WorkOrder: 1508655
Extraction Method: SW5030B
Analytical Method: SW8260B
Unit: µg/L

Volatile Organics by P&T and GC/MS (Basic Target List)

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
SV-10 Purge	1508655-001A	Water	08/19/2015 11:00	GC10	109221

Analytes	Result	RL	DF	Date Analyzed
Acetone	ND	10	1	08/19/2015 21:47
tert-Amyl methyl ether (TAME)	ND	0.50	1	08/19/2015 21:47
Benzene	ND	0.50	1	08/19/2015 21:47
Bromobenzene	ND	0.50	1	08/19/2015 21:47
Bromochloromethane	ND	0.50	1	08/19/2015 21:47
Bromodichloromethane	ND	0.50	1	08/19/2015 21:47
Bromoform	ND	0.50	1	08/19/2015 21:47
Bromomethane	ND	0.50	1	08/19/2015 21:47
2-Butanone (MEK)	ND	2.0	1	08/19/2015 21:47
t-Butyl alcohol (TBA)	ND	2.0	1	08/19/2015 21:47
n-Butyl benzene	ND	0.50	1	08/19/2015 21:47
sec-Butyl benzene	ND	0.50	1	08/19/2015 21:47
tert-Butyl benzene	ND	0.50	1	08/19/2015 21:47
Carbon Disulfide	ND	0.50	1	08/19/2015 21:47
Carbon Tetrachloride	ND	0.50	1	08/19/2015 21:47
Chlorobenzene	ND	0.50	1	08/19/2015 21:47
Chloroethane	ND	0.50	1	08/19/2015 21:47
Chloroform	ND	0.50	1	08/19/2015 21:47
Chloromethane	ND	0.50	1	08/19/2015 21:47
2-Chlorotoluene	ND	0.50	1	08/19/2015 21:47
4-Chlorotoluene	ND	0.50	1	08/19/2015 21:47
Dibromochloromethane	ND	0.50	1	08/19/2015 21:47
1,2-Dibromo-3-chloropropane	ND	0.20	1	08/19/2015 21:47
1,2-Dibromoethane (EDB)	ND	0.50	1	08/19/2015 21:47
Dibromomethane	ND	0.50	1	08/19/2015 21:47
1,2-Dichlorobenzene	ND	0.50	1	08/19/2015 21:47
1,3-Dichlorobenzene	ND	0.50	1	08/19/2015 21:47
1,4-Dichlorobenzene	ND	0.50	1	08/19/2015 21:47
Dichlorodifluoromethane	ND	0.50	1	08/19/2015 21:47
1,1-Dichloroethane	ND	0.50	1	08/19/2015 21:47
1,2-Dichloroethane (1,2-DCA)	ND	0.50	1	08/19/2015 21:47
1,1-Dichloroethene	ND	0.50	1	08/19/2015 21:47
cis-1,2-Dichloroethene	ND	0.50	1	08/19/2015 21:47
trans-1,2-Dichloroethene	ND	0.50	1	08/19/2015 21:47
1,2-Dichloropropane	ND	0.50	1	08/19/2015 21:47
1,3-Dichloropropane	ND	0.50	1	08/19/2015 21:47
2,2-Dichloropropane	ND	0.50	1	08/19/2015 21:47

(Cont.)



Analytical Report

Client: Treadwell & Rollo
Date Received: 8/19/15 15:59
Date Prepared: 8/19/15
Project: 731637001; 3093 Broadway

WorkOrder: 1508655
Extraction Method: SW5030B
Analytical Method: SW8260B
Unit: µg/L

Volatile Organics by P&T and GC/MS (Basic Target List)

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
SV-10 Purge	1508655-001A	Water	08/19/2015 11:00	GC10	109221
Analytes	Result	RL	DF	Date Analyzed	
1,1-Dichloropropene	ND	0.50	1	08/19/2015 21:47	
cis-1,3-Dichloropropene	ND	0.50	1	08/19/2015 21:47	
trans-1,3-Dichloropropene	ND	0.50	1	08/19/2015 21:47	
Diisopropyl ether (DIPE)	ND	0.50	1	08/19/2015 21:47	
Ethylbenzene	ND	0.50	1	08/19/2015 21:47	
Ethyl tert-butyl ether (ETBE)	ND	0.50	1	08/19/2015 21:47	
Freon 113	ND	0.50	1	08/19/2015 21:47	
Hexachlorobutadiene	ND	0.50	1	08/19/2015 21:47	
Hexachloroethane	ND	0.50	1	08/19/2015 21:47	
2-Hexanone	ND	0.50	1	08/19/2015 21:47	
Isopropylbenzene	ND	0.50	1	08/19/2015 21:47	
4-Isopropyl toluene	ND	0.50	1	08/19/2015 21:47	
Methyl-t-butyl ether (MTBE)	ND	0.50	1	08/19/2015 21:47	
Methylene chloride	ND	0.50	1	08/19/2015 21:47	
4-Methyl-2-pentanone (MIBK)	ND	0.50	1	08/19/2015 21:47	
Naphthalene	ND	0.50	1	08/19/2015 21:47	
n-Propyl benzene	ND	0.50	1	08/19/2015 21:47	
Styrene	ND	0.50	1	08/19/2015 21:47	
1,1,1,2-Tetrachloroethane	ND	0.50	1	08/19/2015 21:47	
1,1,2,2-Tetrachloroethane	ND	0.50	1	08/19/2015 21:47	
Tetrachloroethene	ND	0.50	1	08/19/2015 21:47	
Toluene	ND	0.50	1	08/19/2015 21:47	
1,2,3-Trichlorobenzene	ND	0.50	1	08/19/2015 21:47	
1,2,4-Trichlorobenzene	ND	0.50	1	08/19/2015 21:47	
1,1,1-Trichloroethane	ND	0.50	1	08/19/2015 21:47	
1,1,2-Trichloroethane	ND	0.50	1	08/19/2015 21:47	
Trichloroethene	ND	0.50	1	08/19/2015 21:47	
Trichlorofluoromethane	ND	0.50	1	08/19/2015 21:47	
1,2,3-Trichloropropane	ND	0.50	1	08/19/2015 21:47	
1,2,4-Trimethylbenzene	ND	0.50	1	08/19/2015 21:47	
1,3,5-Trimethylbenzene	ND	0.50	1	08/19/2015 21:47	
Vinyl Chloride	ND	0.50	1	08/19/2015 21:47	
Xylenes, Total	ND	0.50	1	08/19/2015 21:47	

(Cont.)



Analytical Report

Client: Treadwell & Rollo
Date Received: 8/19/15 15:59
Date Prepared: 8/19/15
Project: 731637001; 3093 Broadway

WorkOrder: 1508655
Extraction Method: SW5030B
Analytical Method: SW8260B
Unit: µg/L

Volatile Organics by P&T and GC/MS (Basic Target List)

Client ID	Lab ID	Matrix	Date Collected	Instrument	Batch ID
SV-10 Purge	1508655-001A	Water	08/19/2015 11:00	GC10	109221

Analytes	Result	RL	DF	Date Analyzed
<u>Surrogates</u>	<u>REC (%)</u>	<u>Limits</u>		
Dibromofluoromethane	119	70-130		08/19/2015 21:47
Toluene-d8	97	70-130		08/19/2015 21:47
4-BFB	109	70-130		08/19/2015 21:47

Analyst(s): KF



Quality Control Report

Client: Treadwell & Rollo
Date Prepared: 8/19/15
Date Analyzed: 8/19/15
Instrument: GC10
Matrix: Water
Project: 731637001; 3093 Broadway

WorkOrder: 1508655
BatchID: 109221
Extraction Method: SW5030B
Analytical Method: SW8260B
Unit: µg/L
Sample ID: MB/LCS-109221
 1508655-001AMS/MSD

QC Summary Report for SW8260B

Analyte	MB Result	LCS Result	RL	SPK Val	MB SS %REC	LCS %REC	LCS Limits
Acetone	ND	-	10	-	-	-	-
tert-Amyl methyl ether (TAME)	ND	9.73	0.50	10	-	97	54-140
Benzene	ND	10.8	0.50	10	-	107	47-158
Bromobenzene	ND	-	0.50	-	-	-	-
Bromochloromethane	ND	-	0.50	-	-	-	-
Bromodichloromethane	ND	-	0.50	-	-	-	-
Bromoform	ND	-	0.50	-	-	-	-
Bromomethane	ND	-	0.50	-	-	-	-
2-Butanone (MEK)	ND	-	2.0	-	-	-	-
t-Butyl alcohol (TBA)	ND	42.1	2.0	40	-	105	42-140
n-Butyl benzene	ND	-	0.50	-	-	-	-
sec-Butyl benzene	ND	-	0.50	-	-	-	-
tert-Butyl benzene	ND	-	0.50	-	-	-	-
Carbon Disulfide	ND	-	0.50	-	-	-	-
Carbon Tetrachloride	ND	-	0.50	-	-	-	-
Chlorobenzene	ND	10.2	0.50	10	-	102	43-157
Chloroethane	ND	-	0.50	-	-	-	-
Chloroform	ND	-	0.50	-	-	-	-
Chloromethane	ND	-	0.50	-	-	-	-
2-Chlorotoluene	ND	-	0.50	-	-	-	-
4-Chlorotoluene	ND	-	0.50	-	-	-	-
Dibromochloromethane	ND	-	0.50	-	-	-	-
1,2-Dibromo-3-chloropropane	ND	-	0.20	-	-	-	-
1,2-Dibromoethane (EDB)	ND	10.5	0.50	10	-	105	44-155
Dibromomethane	ND	-	0.50	-	-	-	-
1,2-Dichlorobenzene	ND	-	0.50	-	-	-	-
1,3-Dichlorobenzene	ND	-	0.50	-	-	-	-
1,4-Dichlorobenzene	ND	-	0.50	-	-	-	-
Dichlorodifluoromethane	ND	-	0.50	-	-	-	-
1,1-Dichloroethane	ND	-	0.50	-	-	-	-
1,2-Dichloroethane (1,2-DCA)	ND	10.7	0.50	10	-	107	66-125
1,1-Dichloroethene	ND	10.3	0.50	10	-	103	47-149
cis-1,2-Dichloroethene	ND	-	0.50	-	-	-	-
trans-1,2-Dichloroethene	ND	-	0.50	-	-	-	-
1,2-Dichloropropane	ND	-	0.50	-	-	-	-
1,3-Dichloropropane	ND	-	0.50	-	-	-	-
2,2-Dichloropropane	ND	-	0.50	-	-	-	-
1,1-Dichloropropene	ND	-	0.50	-	-	-	-

(Cont.)



Quality Control Report

Client: Treadwell & Rollo
Date Prepared: 8/19/15
Date Analyzed: 8/19/15
Instrument: GC10
Matrix: Water
Project: 731637001; 3093 Broadway

WorkOrder: 1508655
BatchID: 109221
Extraction Method: SW5030B
Analytical Method: SW8260B
Unit: µg/L
Sample ID: MB/LCS-109221
 1508655-001AMS/MSD

QC Summary Report for SW8260B

Analyte	MB Result	LCS Result	RL	SPK Val	MB SS %REC	LCS %REC	LCS Limits
cis-1,3-Dichloropropene	ND	-	0.50	-	-	-	-
trans-1,3-Dichloropropene	ND	-	0.50	-	-	-	-
Diisopropyl ether (DIPE)	ND	10.4	0.50	10	-	104	57-136
Ethylbenzene	ND	-	0.50	-	-	-	-
Ethyl tert-butyl ether (ETBE)	ND	10.2	0.50	10	-	102	55-137
Freon 113	ND	-	0.50	-	-	-	-
Hexachlorobutadiene	ND	-	0.50	-	-	-	-
Hexachloroethane	ND	-	0.50	-	-	-	-
2-Hexanone	ND	-	0.50	-	-	-	-
Isopropylbenzene	ND	-	0.50	-	-	-	-
4-Isopropyl toluene	ND	-	0.50	-	-	-	-
Methyl-t-butyl ether (MTBE)	ND	10.3	0.50	10	-	103	53-139
Methylene chloride	ND	-	0.50	-	-	-	-
4-Methyl-2-pentanone (MIBK)	ND	-	0.50	-	-	-	-
Naphthalene	ND	-	0.50	-	-	-	-
n-Propyl benzene	ND	-	0.50	-	-	-	-
Styrene	ND	-	0.50	-	-	-	-
1,1,1,2-Tetrachloroethane	ND	-	0.50	-	-	-	-
1,1,2,2-Tetrachloroethane	ND	-	0.50	-	-	-	-
Tetrachloroethene	ND	-	0.50	-	-	-	-
Toluene	ND	9.58	0.50	10	-	96	52-137
1,2,3-Trichlorobenzene	ND	-	0.50	-	-	-	-
1,2,4-Trichlorobenzene	ND	-	0.50	-	-	-	-
1,1,1-Trichloroethane	ND	-	0.50	-	-	-	-
1,1,2-Trichloroethane	ND	-	0.50	-	-	-	-
Trichloroethene	ND	9.95	0.50	10	-	100	43-157
Trichlorofluoromethane	ND	-	0.50	-	-	-	-
1,2,3-Trichloropropane	ND	-	0.50	-	-	-	-
1,2,4-Trimethylbenzene	ND	-	0.50	-	-	-	-
1,3,5-Trimethylbenzene	ND	-	0.50	-	-	-	-
Vinyl Chloride	ND	-	0.50	-	-	-	-
Xylenes, Total	ND	-	0.50	-	-	-	-

(Cont.)



Quality Control Report

Client: Treadwell & Rollo
Date Prepared: 8/19/15
Date Analyzed: 8/19/15
Instrument: GC10
Matrix: Water
Project: 731637001; 3093 Broadway

WorkOrder: 1508655
BatchID: 109221
Extraction Method: SW5030B
Analytical Method: SW8260B
Unit: µg/L
Sample ID: MB/LCS-109221
 1508655-001AMS/MSD

QC Summary Report for SW8260B

Analyte	MB Result	LCS Result	RL	SPK Val	MB SS %REC	LCS %REC	LCS Limits
Surrogate Recovery							
Dibromofluoromethane	28.8	30.3		25	115	121	70-130
Toluene-d8	24.0	23.6		25	96	95	70-130
4-BFB	2.58	2.58		2.5	103	103	70-130

Analyte	MS Result	MSD Result	SPK Val	SPKRef Val	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD Limit
tert-Amyl methyl ether (TAME)	9.14	9.83	10	ND	91	98	69-139	7.26	20
Benzene	9.66	10.5	10	ND	97	105	69-141	8.46	20
t-Butyl alcohol (TBA)	37.7	42.9	40	ND	94	107	41-152	12.8	20
Chlorobenzene	9.11	9.88	10	ND	91	99	77-120	8.07	20
1,2-Dibromoethane (EDB)	9.64	10.2	10	ND	96	102	76-135	5.53	20
1,2-Dichloroethane (1,2-DCA)	9.76	10.5	10	ND	98	105	73-139	7.23	20
1,1-Dichloroethene	9.22	10.1	10	ND	92	101	59-140	9.20	20
Diisopropyl ether (DIPE)	9.60	10.4	10	ND	96	104	72-140	7.67	20
Ethyl tert-butyl ether (ETBE)	9.52	10.3	10	ND	95	103	71-140	7.70	20
Methyl-t-butyl ether (MTBE)	9.68	10.5	10	ND	97	105	73-139	8.09	20
Toluene	8.58	9.46	10	ND	86	95	71-128	9.74	20
Trichloroethene	8.89	9.70	10	ND	89	97	64-132	8.77	20

Surrogate Recovery									
Dibromofluoromethane	29.8	29.9	25		119	120	70-130	0.298	20
Toluene-d8	23.6	23.9	25		94	96	70-130	1.42	20
4-BFB	2.66	2.55	2.5		106	102	70-130	4.18	20



1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 1508655

ClientCode: TWRF

WaterTrax
 WriteOn
 EDF
 Excel
 EQuIS
 Email
 HardCopy
 ThirdParty
 J-flag

Report to:
 Annie Lee
 Treadwell & Rollo
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111
 (415) 955-5244 FAX: (415) 955-9041

Email: alee@langan.com
 cc/3rd Party:
 PO:
 ProjectNo: 731637001; 3093 Broadway

Bill to:
 Accounts Payable
 Treadwell & Rollo
 555 Montgomery St., Suite 1300
 San Francisco, CA 94111
 Langan_InvoiceCapture@concursoft.com

Requested TAT: 1 day;

Date Received: 08/19/2015
Date Printed: 08/19/2015

Lab ID	Client ID	Matrix	Collection Date	Hold	Requested Tests (See legend below)												
					1	2	3	4	5	6	7	8	9	10	11	12	
1508655-001	SV-10 Purge	Water	8/19/2015 11:00	<input type="checkbox"/>	A												

Test Legend:

1	8260B_W	2		3		4		5	
6		7		8		9		10	
11		12							

Prepared by: Briana Cutino

Comments: SEND HARD COPY/ Always notify the PM when TAT is not going to be met! JEL 9-9-14

NOTE: Soil samples are discarded 60 days after results are reported unless other arrangements are made (Water samples are 30 days). Hazardous samples will be returned to client or disposed of at client expense.



WORK ORDER SUMMARY

Client Name: TREADWELL & ROLLO

QC Level: LEVEL 2

Work Order: 1508655

Project: 731637001; 3093 Broadway

Client Contact: Annie Lee

Date Received: 8/19/2015

Comments: SEND HARD COPY/ Always notify the PM when TAT is not going to be met! JEL 9-9-14

Contact's Email: alee@langan.com

WaterTrax WriteOn EDF Excel Fax Email HardCopy ThirdParty J-flag

Lab ID	Client ID	Matrix	Test Name	Containers /Composites	Bottle & Preservative	De-chlorinated	Collection Date & Time	TAT	Sediment Content	Hold	SubOut
1508655-001A	SV-10 Purge	Water	SW8260B (VOCs)	3	VOA w/ HCl	<input type="checkbox"/>	8/19/2015 11:00	1 day	Trace	<input type="checkbox"/>	

NOTES: - STLC and TCLP extractions require 2 days to complete; therefore, all TATs begin after the extraction is completed (i.e., One-day TAT yields results in 3 days from sample submission).

- MAI assumes that all material present in the provided sampling container is considered part of the sample - MAI does not exclude any material from the sample prior to sample preparation unless requested in writing by the client.



Sample Receipt Checklist

Client Name: **Treadwell & Rollo** Date and Time Received: **8/19/2015 3:59:27 PM**
 Project Name: **731637001; 3093 Broadway** LogIn Reviewed by: **Briana Cutino**
 WorkOrder No: **1508655** Matrix: Water Carrier: Bernie Cummins (MAI Courier)

Chain of Custody (COC) Information

Chain of custody present? Yes No
 Chain of custody signed when relinquished and received? Yes No
 Chain of custody agrees with sample labels? Yes No
 Sample IDs noted by Client on COC? Yes No
 Date and Time of collection noted by Client on COC? Yes No
 Sampler's name noted on COC? Yes No

Sample Receipt Information

Custody seals intact on shipping container/cooler? Yes No NA
 Shipping container/cooler in good condition? Yes No
 Samples in proper containers/bottles? Yes No
 Sample containers intact? Yes No
 Sufficient sample volume for indicated test? Yes No

Sample Preservation and Hold Time (HT) Information

All samples received within holding time? Yes No
 Sample/Temp Blank temperature Temp: 1.9°C NA
 Water - VOA vials have zero headspace / no bubbles? Yes No NA
 Sample labels checked for correct preservation? Yes No
 pH acceptable upon receipt (Metal: <2; 522: <4; 218.7: >8)? Yes No NA
 Samples Received on Ice? Yes No

(Ice Type: WET ICE)

UCMR3 Samples:

Total Chlorine tested and acceptable upon receipt for EPA 522? Yes No NA
 Free Chlorine tested and acceptable upon receipt for EPA 218.7, 300.1, 537, 539? Yes No NA

* NOTE: If the "No" box is checked, see comments below.

 Comments:

ATTACHMENT B

Trend Charts

Mann-Kendall Trend Test

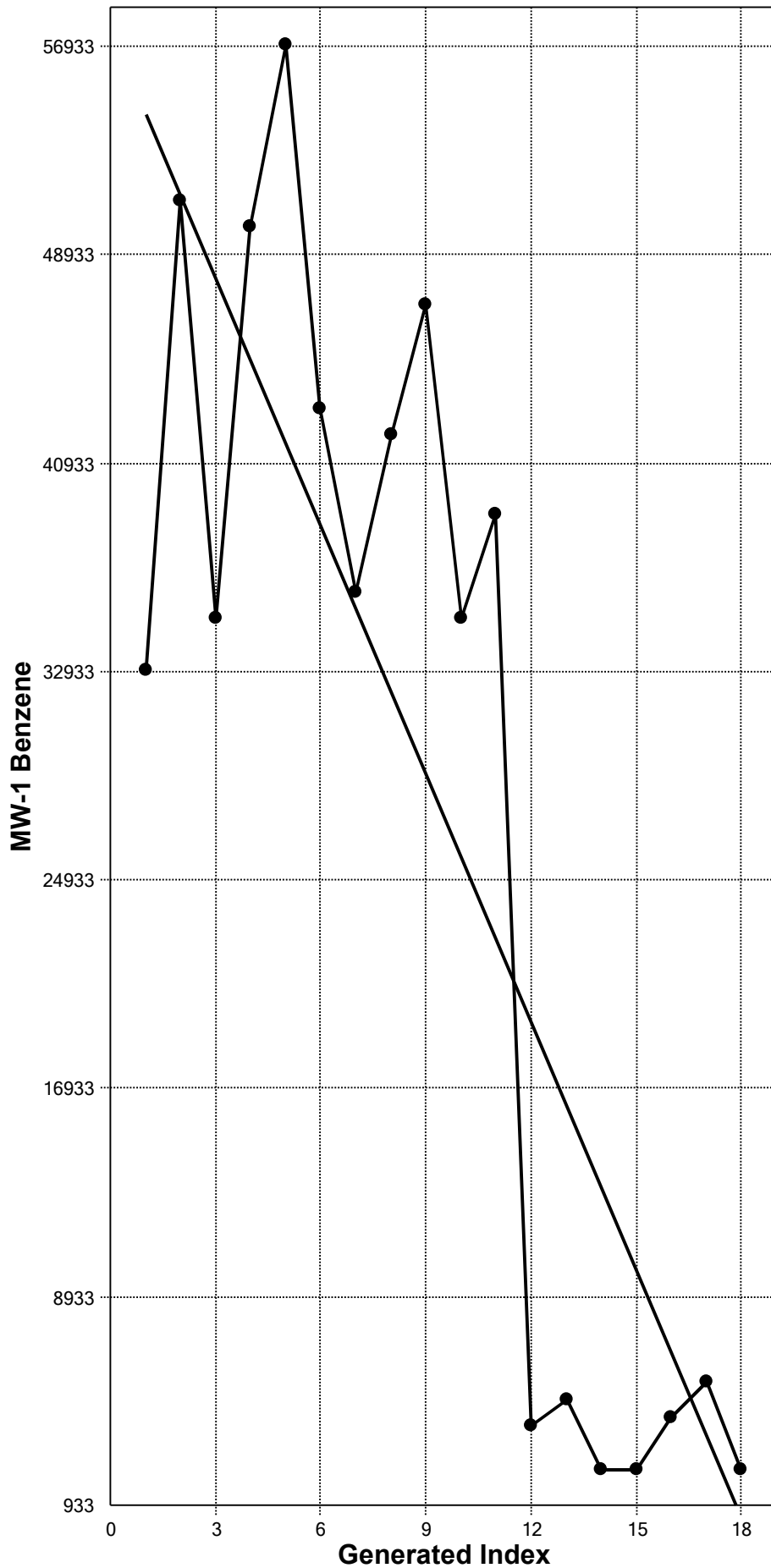
Mann-Kendall Trend Analysis

n	18
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	26.3122
Standardized Value of S	-3.0404
Test Value (S)	-81
Tabulated p-value	0.0010
Approximate p-value	0.0012

OLS Regression Line (Blue)

OLS Regression Slope	-3,162.5387
OLS Regression Intercept	57,483.0065

Statistically significant evidence of a decreasing trend at the specified level of significance.



	A	B	C	D	E	F	G	H	I	J	K	L
1				Mann-Kendall Trend Test Analysis								
2	User Selected Options											
3	Date/Time of Computation			7/29/2015 4:29:20 PM								
4	From File			Benzene Data Input.xls								
5	Full Precision			OFF								
6	Confidence Coefficient			0.95								
7	Level of Significance			0.05								
8												
9	MW-1 Benzene											
10												
11	General Statistics											
12	Number of Reported Events Not Used			0								
13	Number of Generated Events			18								
14	Number Values Reported (n)			18								
15	Minimum			2300								
16	Maximum			57000								
17	Mean			27439								
18	Geometric Mean			15891								
19	Median			35000								
20	Standard Deviation			20413								
21												
22	Mann-Kendall Test											
23	Test Value (S)			-81								
24	Tabulated p-value			0.001								
25	Standard Deviation of S			26.31								
26	Standardized Value of S			-3.04								
27	Approximate p-value			0.00118								
28												
29	Statistically significant evidence of a decreasing											
30	trend at the specified level of significance.											

Mann-Kendall Trend Test

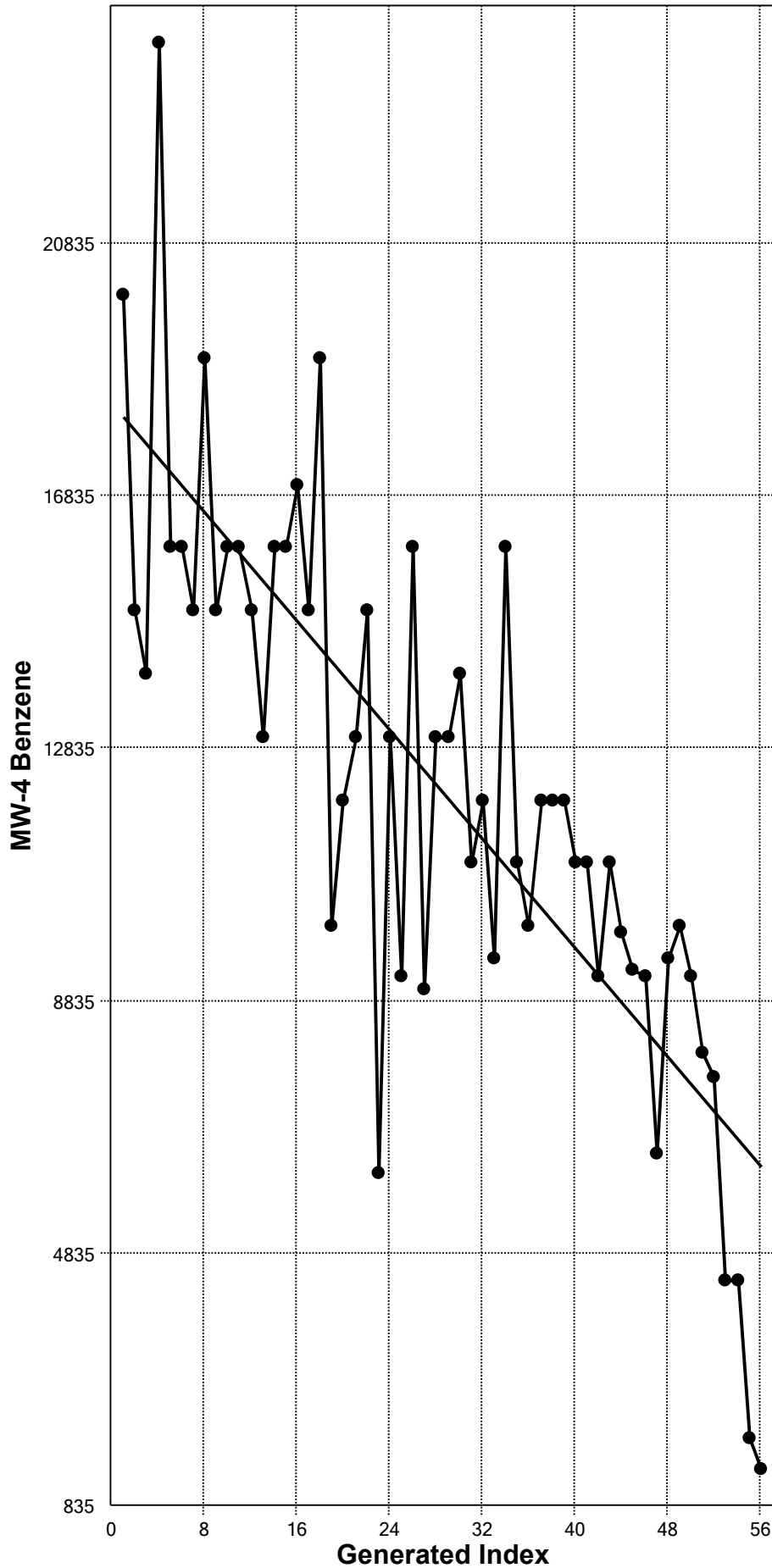
Mann-Kendall Trend Analysis

n	56
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	140.9255
Standardized Value of S	-7.0037
Test Value (S)	-988
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

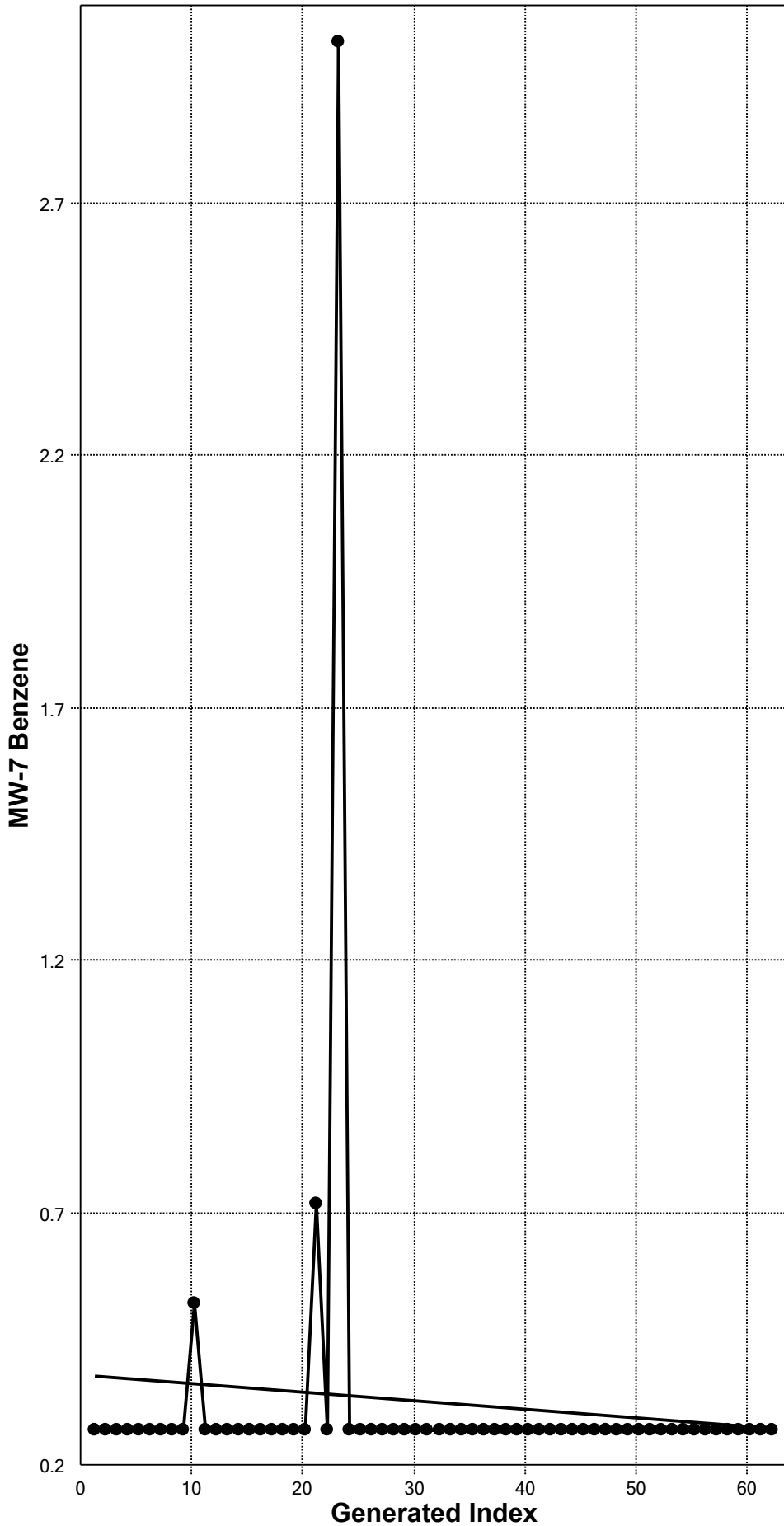
OLS Regression Slope	-216.0629
OLS Regression Intercept	18,286.3636

Statistically significant evidence of a decreasing trend at the specified level of significance.



	A	B	C	D	E	F	G	H	I	J	K	L
1				Mann-Kendall Trend Test Analysis								
2	User Selected Options											
3	Date/Time of Computation			7/29/2015 4:31:32 PM								
4	From File			Benzene Data Input.xls								
5	Full Precision			OFF								
6	Confidence Coefficient			0.95								
7	Level of Significance			0.05								
8												
9	MW-4 Benzene											
10												
11	General Statistics											
12	Number of Reported Events Not Used			0								
13	Number of Generated Events			56								
14	Number Values Reported (n)			56								
15	Minimum			1400								
16	Maximum			24000								
17	Mean			12129								
18	Geometric Mean			11055								
19	Median			12000								
20	Standard Deviation			4344								
21												
22	Mann-Kendall Test											
23	Test Value (S)			-988								
24	Critical Value (0.05)			-1.645								
25	Standard Deviation of S			140.9								
26	Standardized Value of S			-7.004								
27	Approximate p-value			1.246E-12								
28												
29	Statistically significant evidence of a decreasing											
30	trend at the specified level of significance.											

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

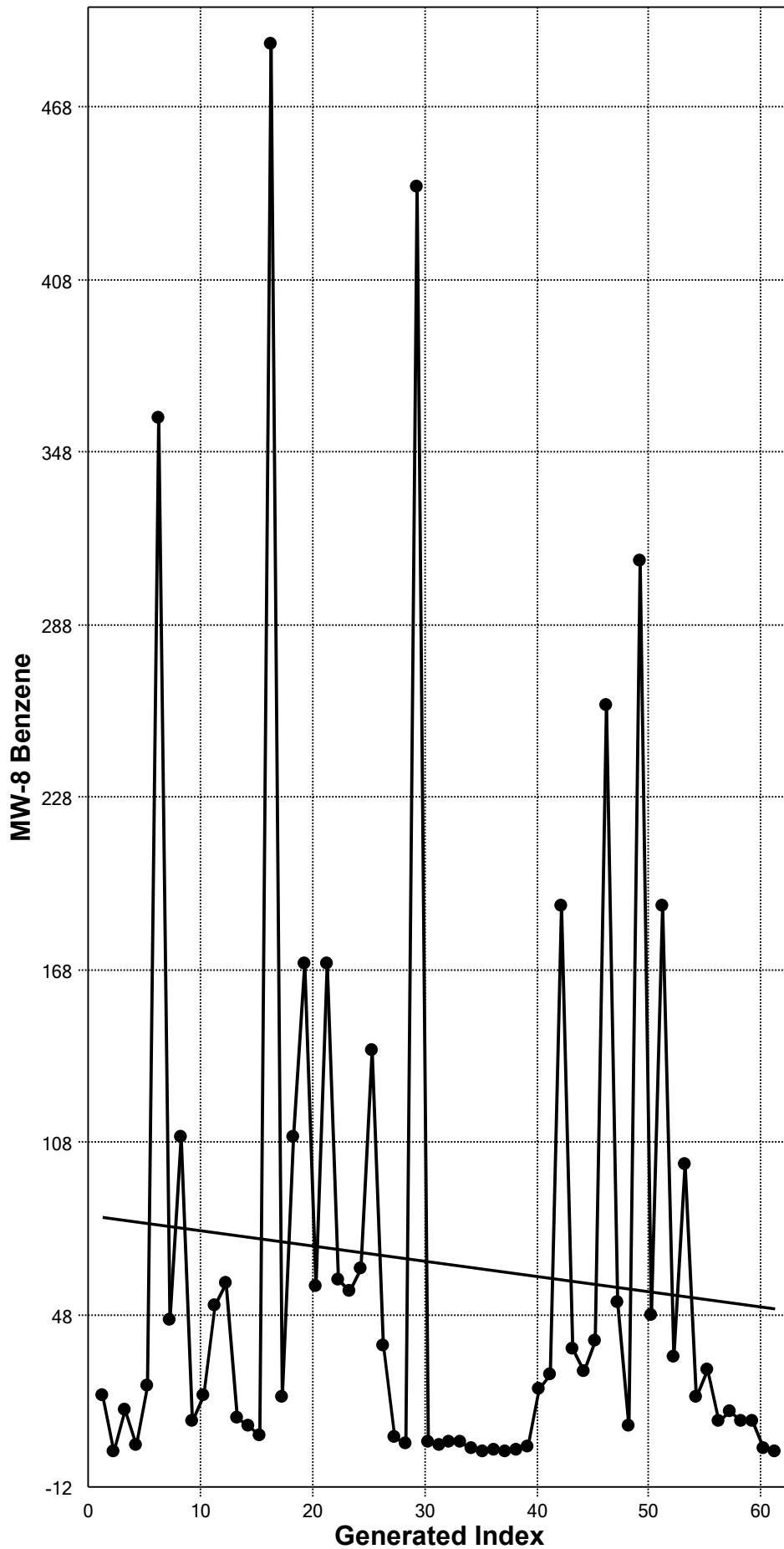
n	62
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	60.9973
Standardized Value of S	-1.2624
Test Value (S)	-78
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.1034

OLS Regression Line (Blue)

OLS Regression Slope	-0.0017
OLS Regression Intercept	0.3588

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test



Mann-Kendall Trend Analysis

n	61
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	160.6238
Standardized Value of S	-0.9774
Test Value (S)	-158
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.1642

OLS Regression Line (Blue)

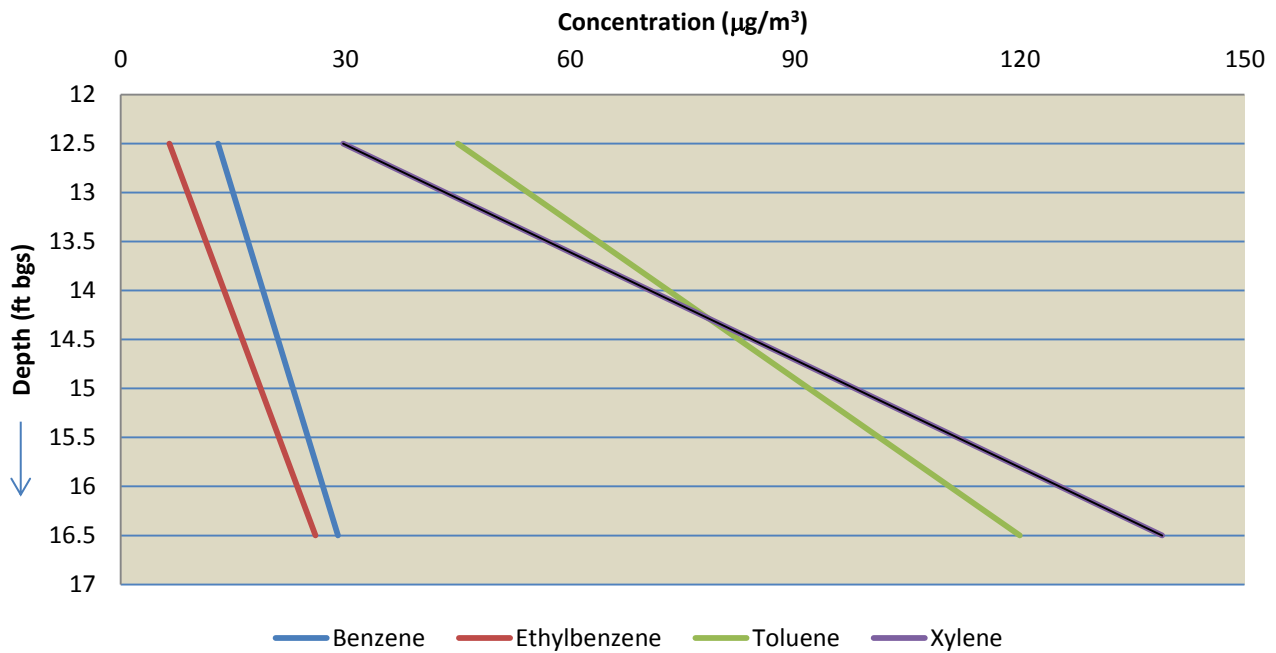
OLS Regression Slope	-0.5270
OLS Regression Intercept	82.3610

Insufficient statistical evidence of a significant trend at the specified level of significance.

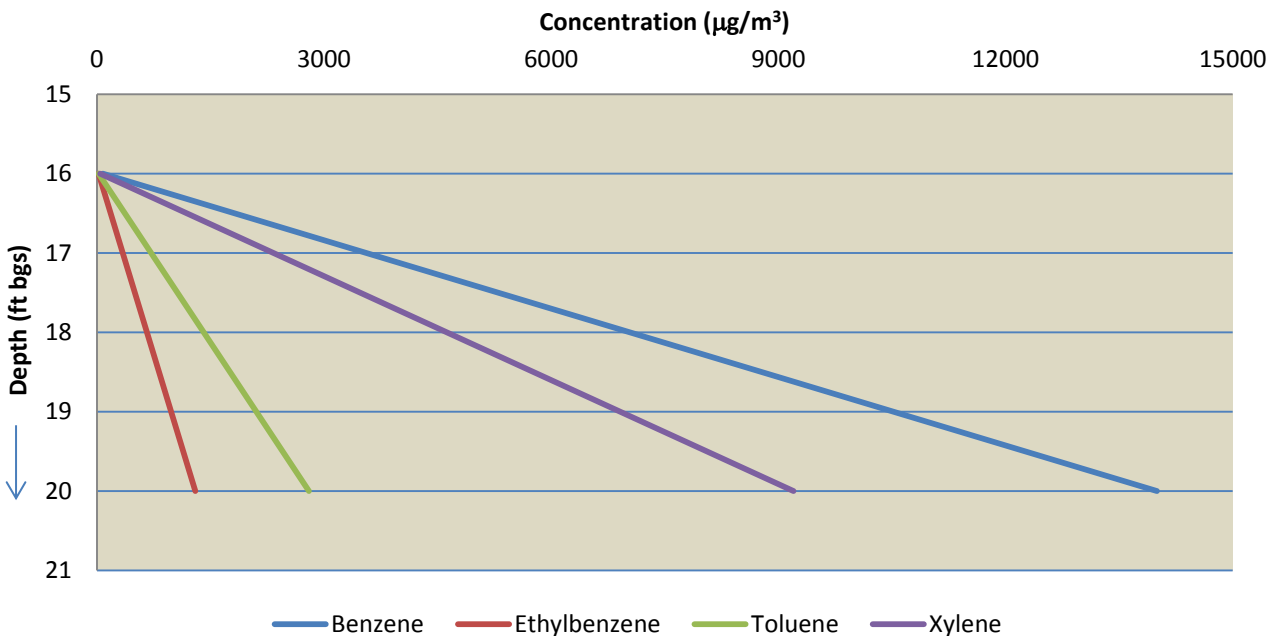
	A	B	C	D	E	F	G	H	I	J	K	L
1				Mann-Kendall Trend Test Analysis								
2	User Selected Options											
3	Date/Time of Computation			7/29/2015 4:33:37 PM								
4	From File			Benzene Data Input.xls								
5	Full Precision			OFF								
6	Confidence Coefficient			0.95								
7	Level of Significance			0.05								
8												
9	MW-8 Benzene											
10												
11	General Statistics											
12	Number of Reported Events Not Used			0								
13	Number of Generated Events			61								
14	Number Values Reported (n)			61								
15	Minimum			0.25								
16	Maximum			490								
17	Mean			66.02								
18	Geometric Mean			17.64								
19	Median			22								
20	Standard Deviation			106.8								
21												
22	Mann-Kendall Test											
23	Test Value (S)			-158								
24	Critical Value (0.05)			-1.645								
25	Standard Deviation of S			160.6								
26	Standardized Value of S			-0.977								
27	Approximate p-value			0.164								
28												
29	Insufficient evidence to identify a significant											
30	trend at the specified level of significance.											

ATTACHMENT C
Concentration Gradient Charts

MW-4/SV-12 Vertical Profile



MW-1/SV-2 Vertical Profile



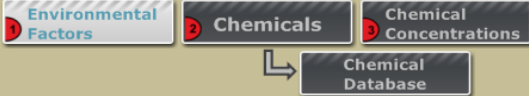
ATTACHMENT D
BioVapor and J&E Model Outputs

MW-1
Commercial

BioVapor Input



Model Input Screens



1. Oxygen Surface Boundary Condition

Slab or Basement Foundation (e.g., Specify Airflow) ▼

2. Indoor Target Criteria

- Do not perform backward Calculation
- Based on Indoor Risk / Hazard Target
- Specified Indoor Air Concentration Target

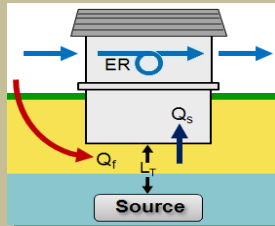
Note: Target indoor air concentrations can be edited on the "Chemical Database" screen

3. Exposure and Risk Factors

Target Hazard Quotient For Individual Chemicals	THQ	1.00	(-)
Target Excess Individual Lifetime Cancer Risk	TR	1.00E-06	(-)
Carcinogen Averaging Time	AT _C	70.00	yrs
Non-carcinogenic Averaging Time	AT _{NC}	25.00	yrs
Body Weight - Adult	BW	70.00	kg
Exposure Duration	ED	25.00	yrs
Exposure Frequency	EF	250.00	days/yr
Indoor Inhalation Rate Exposure Adjustment	CF	1.00	(-)

Legend

- 80.00 Calculated Value
- 80.00 User Input Value
- 80.00 Value Outside Normal Range



4. Building Parameters

Indoor Mixing Height	L _{mix}	366.00	cm
Air Exchange Rate	ER	12.00	1/day
Foundation Thickness	L _{crack}	15.00	cm
Foundation Area	A _b	1060000.00	cm ²
Foundation Crack Fraction	η	3.77E-04	cm ² -cracks/cm ² -total
Total Porosity (Soil-filled Cracks)	θ _{T-crack}	1.00	cm ³ -void/cm ³ -soil
Water Filled Porosity (Soil-filled Cracks)	θ _{w-crack}	0.00	cm ³ -void/cm ³ -soil
Airflow Through Basement Foundation	Q _s	83.00	cm ³ -air/sec
Building Envelope Resistance	L _{mix} * ER	0.05	cm/sec

5. Vadose Zone Parameters

Soil Porosity	θ _{T-soil}	0.39	cm ³ -void/cm ³ -soil
Soil Water Content	θ _{w-soil}	0.20	cm ³ -water/cm ³ -soil
Soil Organic Carbon Fraction	f _{oc}	5.00E-03	g-oc/g-soil
Soil Density - Bulk	ρ _S	1.63	g-soil/cm ³ -soil
Airflow Under Foundation	Q _f	83.00	cm ³ -air/sec
Depth of Aerobic Zone Under Foundation	L _A	-	cm
O ₂ Concentration Under Foundation	CO ₂ -e	-	%
Annual Median Soil Temperature	T	24.00	°C
Baseline Soil Oxygen Respiration Rate	Δ _{base}	Calculated from Foc	9.780E-08 mg-O ₂ / g-soil - sec
Depth to Source (from bottom of foundation)	LT	274.32	cm
Minimum O ₂ Conc. For Aerobic Biodegradation		1.00	%

6. Commands and Options

- Default Values
- Residential
- Commercial / Industrial

Paste

Home

Print

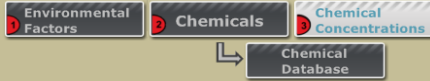
Reset

Next

BioVapor Results



Model Input Screens



2. Commands and Options

Home

Print

Previous

Next :: Results

1. Ground Water Source Chemical Concentrations

Chemical	ug/L
benzene	5.70E+03
ethylbenzene	6.80E+02
toluene	6.40E+03
xylenes (mixed isomers)	1.30E+04
naphthalene	8.30E+02
TPH-GRO (C6-C10)	6.80E+04


9.46E+04 Total Entered
Hydrocarbon Concentration (ug/L)

Note: The total hydrocarbon concentration should equal the total concentration of all hydrocarbons in the source area

3. Attenuation Factor

0.1

Groundwater to Deep Soil Gas
Attenuation Factor



Model Output Screens

VI Risk
Subsurface Profile
Detailed Results

Commands and Options

Home
Print

Previous
Next
Unprotect

Target Hazard Quotient	Target Risk Level
1	1.00E-08

Forward Risk Calculation

Chemical Name	Groundwater Source Concentration <small>ug/L</small>	Soil Gas Source Concentration <small>ug/m³</small>	Soil Gas to Indoor Air Attenuation Factor <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Predicted Indoor Air Concentration <small>ug/m³-air</small>	Hazard Quotient <small>(-)</small>	Risk Level <small>(-)</small>
benzene	5.70E+03	1.24E+05	2.38E-11	3.10E-01	2.96E-06	6.76E-08	2.07E-11
ethylbenzene	6.80E+02	2.11E+04	9.56E-11	9.70E-01	2.02E-06	1.38E-09	1.23E-12
toluene	6.40E+03	1.68E+05	8.64E-11	5.20E+03	1.45E-05	3.32E-08	-
xylene (mixed isomers)	1.30E+04	2.69E+05	2.79E-12	7.30E+02	7.49E-07	5.13E-09	-
naphthalene	8.30E+02	1.55E+03	2.27E-25	7.00E-02	3.51E-22	8.01E-23	2.94E-27
						1.07E-07	2.19E-11

NOTE A: "< 1E-100" means calculated attenuation factor is less than 1E-100

Backward Risk Calculation

Critical Chemical for Backward Risk Calculation: Not Selected

Chemical Name	Target Hazard Quotient <small>(-)</small>	Target Cancer Risk <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Soil Gas Source Concentration <small>ug/m³</small>	Effective Saturated Vapor Concentration <small>ug/m³</small>	Groundwater Source Concentration <small>ug/L</small>	Effective Solubility <small>ug/L</small>
benzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
ethylbenzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
toluene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
xylene (mixed isomers)	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
naphthalene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected

NOTE B: Target indoor air concentrations can be edited on the "Chemical Database" screen

NOTE C: Red value indicates source concentration greater than saturation limit

NOTE D: Backward Risk Calculation not applicable when aerobic depth directly specified

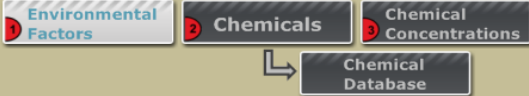
NOTE E: Backward Calculation not completed due to Excel calculation error

MW-1
Residential

BioVapor Input



Model Input Screens



1. Oxygen Surface Boundary Condition

Slab or Basement Foundation (e.g., Specify Airflow) ▼

2. Indoor Target Criteria

- Do not perform backward Calculation
- Based on Indoor Risk / Hazard Target
- Specified Indoor Air Concentration Target

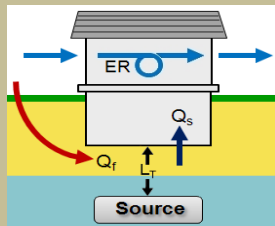
Note: Target indoor air concentrations can be edited on the "Chemical Database" screen

3. Exposure and Risk Factors

Target Hazard Quotient For Individual Chemicals	THQ	1.00	(-)
Target Excess Individual Lifetime Cancer Risk	TR	1.00E-06	(-)
Carcinogen Averaging Time	AT _C	70.00	yrs
Non-carcinogenic Averaging Time	AT _{NC}	26.00	yrs
Body Weight - Adult	BW	70.00	kg
Exposure Duration	ED	26.00	yrs
Exposure Frequency	EF	350.00	days/yr
Indoor Inhalation Rate Exposure Adjustment	CF	1.00	(-)

Legend

- 80.00 Calculated Value
- 80.00 User Input Value
- 80.00 Value Outside Normal Range



4. Building Parameters

Indoor Mixing Height	L _{mix}	366.00	cm
Air Exchange Rate	ER	6.00	1/day
Foundation Thickness	L _{crack}	15.00	cm
Foundation Area	A _b	1060000.00	cm ²
Foundation Crack Fraction	η	3.77E-04	cm ² -cracks/cm ² -total
Total Porosity (Soil-filled Cracks)	θ _{T-crack}	1.00	cm ³ -void/cm ³ -soil
Water Filled Porosity (Soil-filled Cracks)	θ _{w-crack}	0.00	cm ³ -void/cm ³ -soil
Airflow Through Basement Foundation	Q _s	83.00	cm ³ -air/sec
Building Envelope Resistance	L _{mix} * ER	0.03	cm/sec

5. Vadose Zone Parameters

Soil Porosity	θ _{T-soil}	0.39	cm ³ -void/cm ³ -soil
Soil Water Content	θ _{w-soil}	0.20	cm ³ -water/cm ³ -soil
Soil Organic Carbon Fraction	f _{oc}	5.00E-03	g-oc/g-soil
Soil Density - Bulk	ρ _S	1.63	g-soil/cm ³ -soil
Airflow Under Foundation	Q _f	83.00	cm ³ -air/sec
Depth of Aerobic Zone Under Foundation	L _A	-	cm
O ₂ Concentration Under Foundation	CO ₂ -e	-	%
Annual Median Soil Temperature	T	24.00	°C
Baseline Soil Oxygen Respiration Rate	Δ _{base}	Calculated from Foc	9.780E-08 mg-O ₂ / g-soil - sec
Depth to Source (from bottom of foundation)	LT	274.32	cm
Minimum O ₂ Conc. For Aerobic Biodegradation		1.00	%

6. Commands and Options

- Default Values
- Residential
- Commercial / Industrial

Paste

Home

Print

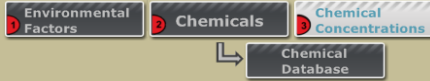
Reset

Next

BioVapor Results



Model Input Screens



2. Commands and Options

Home

Print

Previous

Next :: Results

1. Ground Water Source Chemical Concentrations

Chemical	ug/L
benzene	5.70E+03
ethylbenzene	6.80E+02
toluene	6.40E+03
xylenes (mixed isomers)	1.30E+04
naphthalene	8.30E+02
TPH-GRO (C6-C10)	6.80E+04


9.46E+04 Total Entered
Hydrocarbon Concentration (ug/L)

Note: The total hydrocarbon concentration should equal the total concentration of all hydrocarbons in the source area

3. Attenuation Factor

0.1

Groundwater to Deep Soil Gas
Attenuation Factor



Model Output Screens

VI Risk
Subsurface Profile
Detailed Results

Commands and Options

Home
Print

Previous
Next
Unprotect

Target Hazard Quotient	Target Risk Level
1	1.00E-06

Forward Risk Calculation

Chemical Name	Groundwater Source Concentration <small>ug/L</small>	Soil Gas Source Concentration <small>ug/m³</small>	Soil Gas to Indoor Air Attenuation Factor <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Predicted Indoor Air Concentration <small>ug/m³-air</small>	Hazard Quotient <small>(-)</small>	Risk Level <small>(-)</small>
benzene	5.70E+03	1.24E+05	4.77E-11	3.10E-01	5.92E-06	1.89E-07	6.02E-11
ethylbenzene	6.80E+02	2.11E+04	1.91E-10	9.70E-01	4.03E-06	3.87E-09	3.57E-12
toluene	6.40E+03	1.68E+05	1.73E-10	5.20E+03	2.91E-05	9.29E-08	-
xylene (mixed isomers)	1.30E+04	2.69E+05	5.57E-12	7.30E+02	1.50E-06	1.44E-08	-
naphthalene	8.30E+02	1.55E+03	4.53E-25	7.00E-02	7.02E-22	2.24E-22	8.57E-27
						3.00E-07	6.38E-11

NOTE A: "< 1E-100" means calculated attenuation factor is less than 1E-100

Backward Risk Calculation

Critical Chemical for Backward Risk Calculation: Not Selected

Chemical Name	Target Hazard Quotient <small>(-)</small>	Target Cancer Risk <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Soil Gas Source Concentration <small>ug/m³</small>	Effective Saturated Vapor Concentration <small>ug/m³</small>	Groundwater Source Concentration <small>ug/L</small>	Effective Solubility <small>ug/L</small>
benzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
ethylbenzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
toluene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
xylene (mixed isomers)	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
naphthalene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected

NOTE B: Target indoor air concentrations can be edited on the "Chemical Database" screen

NOTE C: Red value indicates source concentration greater than saturation limit

NOTE D: Backward Risk Calculation not applicable when aerobic depth directly specified

NOTE E: Backward Calculation not completed due to Excel calculation error

MW-4
Commercial

BioVapor Input



Model Input Screens

Environmental Factors | Chemicals | Chemical Concentrations

Chemical Database

1. Oxygen Surface Boundary Condition

Slab or Basement Foundation (e.g., Specify Airflow)

2. Indoor Target Criteria

Do not perform backward Calculation
 Based on Indoor Risk / Hazard Target
 Specified Indoor Air Concentration Target

Note: Target indoor air concentrations can be edited on the "Chemical Database" screen

3. Exposure and Risk Factors

Target Hazard Quotient For Individual Chemicals	THQ	1.00	(-)
Target Excess Individual Lifetime Cancer Risk	TR	1.00E-06	(-)
Carcinogen Averaging Time	AT _C	70.00	yrs
Non-carcinogenic Averaging Time	AT _{NC}	25.00	yrs
Body Weight - Adult	BW	70.00	kg
Exposure Duration	ED	25.00	yrs
Exposure Frequency	EF	250.00	days/yr
Indoor Inhalation Rate Exposure Adjustment	CF	1.00	(-)

4. Building Parameters

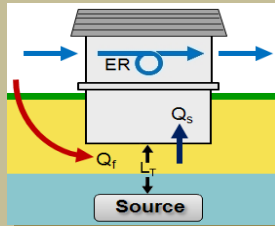
Indoor Mixing Height	L _{mix}	366.00	cm
Air Exchange Rate	ER	12.00	1/day
Foundation Thickness	L _{crack}	15.00	cm
Foundation Area	A _b	1060000.00	cm ²
Foundation Crack Fraction	η	3.77E-04	cm ² -cracks/cm ² -total
Total Porosity (Soil-filled Cracks)	θ _{T-crack}	1.00	cm ³ -void/cm ³ -soil
Water Filled Porosity (Soil-filled Cracks)	θ _{w-crack}	0.00	cm ³ -void/cm ³ -soil
Airflow Through Basement Foundation	Q _s	83.00	cm ³ -air/sec
Building Envelope Resistance	L _{mix} * ER	0.05	cm/sec

5. Vadose Zone Parameters

Soil Porosity	θ _{T-soil}	0.39	cm ³ -void/cm ³ -soil
Soil Water Content	θ _{w-soil}	0.20	cm ³ -water/cm ³ -soil
Soil Organic Carbon Fraction	f _{oc}	5.00E-03	g-oc/g-soil
Soil Density - Bulk	ρ _S	1.63	g-soil/cm ³ -soil
Airflow Under Foundation	Q _f	83.00	cm ³ -air/sec
Depth of Aerobic Zone Under Foundation	L _A	-	cm
O ₂ Concentration Under Foundation	CO ₂ -e	-	%
Annual Median Soil Temperature	T	24.00	°C
Baseline Soil Oxygen Respiration Rate	Δ _{base}	Calculated from Foc	9.780E-08 mg-O ₂ / g-soil - sec
Depth to Source (from bottom of foundation)	LT	274.32	cm
Minimum O ₂ Conc. For Aerobic Biodegradation		1.00	%

Legend

- 80.00 Calculated Value
- 80.00 User Input Value
- 80.00 Value Outside Normal Range



6. Commands and Options

Default Values
 Residential
 Commercial / Industrial

Paste

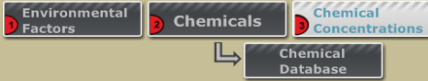
Home | Print

Reset | Next

BioVapor Results



Model Input Screens



2. Commands and Options

Home

Print

Previous

Next :: Results

1. Ground Water Source Chemical Concentrations

Chemical	ug/L
benzene	4.40E+03
ethylbenzene	1.70E+03
toluene	1.50E+04
xylenes (mixed isomers)	1.30E+04
TPH-GRO (C6-C10)	1.10E+05
naphthalene	1.10E+03


1.45E+05 Total Entered
Hydrocarbon Concentration (ug/L)

Note: The total hydrocarbon concentration should equal the total concentration of all hydrocarbons in the source area

3. Attenuation Factor

0.1

Groundwater to Deep Soil Gas
Attenuation Factor



Model Output Screens

VI Risk
Subsurface Profile
Detailed Results

Commands and Options

Home

Print

Previous

Next

Unprotect

Target Hazard Quotient	Target Risk Level
1	1.00E-06

Forward Risk Calculation

Chemical Name	Groundwater Source Concentration <small>ug/L</small>	Soil Gas Source Concentration <small>ug/m³</small>	Soil Gas to Indoor Air Attenuation Factor <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Predicted Indoor Air Concentration <small>ug/m³-air</small>	Hazard Quotient <small>(-)</small>	Risk Level <small>(-)</small>
benzene	4.40E+03	9.59E+04	2.57E-07	3.10E-01	2.47E-02	5.63E-04	1.72E-07
ethylbenzene	1.70E+03	5.28E+04	4.33E-07	9.70E-01	2.28E-02	1.56E-05	1.39E-08
toluene	1.50E+04	3.95E+05	4.21E-07	5.20E+03	1.66E-01	3.79E-04	-
xylenes (mixed isomers)	1.30E+04	2.69E+05	1.12E-07	7.30E+02	3.02E-02	2.07E-04	-
naphthalene	1.10E+03	2.05E+03	1.89E-12	7.00E-02	3.89E-09	8.87E-10	3.26E-14
						1.16E-03	1.86E-07

NOTE A: "< 1E-100" means calculated attenuation factor is less than 1E-100

Backward Risk Calculation

Critical Chemical for Backward Risk Calculation: Not Selected

Chemical Name	Target Hazard Quotient <small>(-)</small>	Target Cancer Risk <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Soil Gas Source Concentration <small>ug/m³</small>	Effective Saturated Vapor Concentration <small>ug/m³</small>	Groundwater Source Concentration <small>ug/L</small>	Effective Solubility <small>ug/L</small>
benzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
ethylbenzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
toluene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
xylenes (mixed isomers)	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
naphthalene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected

NOTE B: Target indoor air concentrations can be edited on the "Chemical Database" screen

NOTE C: Red value indicates source concentration greater than saturation limit

NOTE D: Backward Risk Calculation not applicable when aerobic depth directly specified

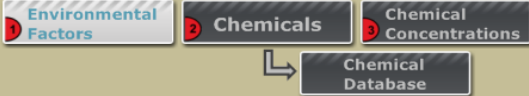
NOTE E: Backward Calculation not completed due to Excel calculation error

MW-4
Residential

BioVapor Input



Model Input Screens



1. Oxygen Surface Boundary Condition

Slab or Basement Foundation (e.g., Specify Airflow) ▼

2. Indoor Target Criteria

- Do not perform backward Calculation
- Based on Indoor Risk / Hazard Target
- Specified Indoor Air Concentration Target

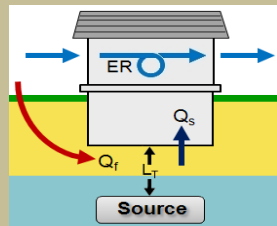
Note: Target indoor air concentrations can be edited on the "Chemical Database" screen

3. Exposure and Risk Factors

Target Hazard Quotient For Individual Chemicals	THQ	1.00	(-)
Target Excess Individual Lifetime Cancer Risk	TR	1.00E-06	(-)
Carcinogen Averaging Time	AT _C	70.00	yrs
Non-carcinogenic Averaging Time	AT _{NC}	26.00	yrs
Body Weight - Adult	BW	70.00	kg
Exposure Duration	ED	26.00	yrs
Exposure Frequency	EF	350.00	days/yr
Indoor Inhalation Rate Exposure Adjustment	CF	1.00	(-)

Legend

- 80.00 Calculated Value
- 80.00 User Input Value
- 80.00 Value Outside Normal Range



4. Building Parameters

Indoor Mixing Height	L _{mix}	366.00	cm
Air Exchange Rate	ER	6.00	1/day
Foundation Thickness	L _{crack}	15.00	cm
Foundation Area	A _b	1060000.00	cm ²
Foundation Crack Fraction	η	3.77E-04	cm ² -cracks/cm ² -total
Total Porosity (Soil-filled Cracks)	θ _{T-crack}	1.00	cm ³ -void/cm ³ -soil
Water Filled Porosity (Soil-filled Cracks)	θ _{w-crack}	0.00	cm ³ -void/cm ³ -soil
Airflow Through Basement Foundation	Q _s	83.00	cm ³ -air/sec
Building Envelope Resistance	L _{mix} * ER	0.03	cm/sec

5. Vadose Zone Parameters

Soil Porosity	θ _{T-soil}	0.39	cm ³ -void/cm ³ -soil
Soil Water Content	θ _{w-soil}	0.20	cm ³ -water/cm ³ -soil
Soil Organic Carbon Fraction	f _{oc}	5.00E-03	g-oc/g-soil
Soil Density - Bulk	ρ _S	1.63	g-soil/cm ³ -soil
Airflow Under Foundation	Q _f	83.00	cm ³ -air/sec
Depth of Aerobic Zone Under Foundation	L _A	-	cm
O ₂ Concentration Under Foundation	CO ₂ -e	-	%
Annual Median Soil Temperature	T	24.00	°C
Baseline Soil Oxygen Respiration Rate	Δ _{base}	Calculated from Foc	9.780E-08 mg-O ₂ / g-soil - sec
Depth to Source (from bottom of foundation)	LT	274.32	cm
Minimum O ₂ Conc. For Aerobic Biodegradation		1.00	%

6. Commands and Options

- Default Values
- Residential
- Commercial / Industrial

Paste

Home

Print

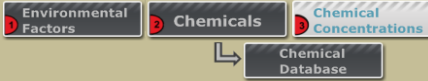
Reset

Next

BioVapor Results



Model Input Screens



2. Commands and Options

Home

Print

Previous

Next :: Results

1. Ground Water Source Chemical Concentrations

Chemical	ug/L
benzene	4.40E+03
ethylbenzene	1.70E+03
toluene	1.50E+04
xylenes (mixed isomers)	1.30E+04
TPH-GRO (C6-C10)	1.10E+05
naphthalene	1.10E+03


1.45E+05 Total Entered
Hydrocarbon Concentration (ug/L)

Note: The total hydrocarbon concentration should equal the total concentration of all hydrocarbons in the source area

3. Attenuation Factor

0.1

Groundwater to Deep Soil Gas
Attenuation Factor



Model Output Screens

VI Risk
Subsurface Profile
Detailed Results

Commands and Options

Home
Print

Previous
Next
Unprotect

Target Hazard Quotient	Target Risk Level
1	1.00E-06

Forward Risk Calculation

Chemical Name	Groundwater Source Concentration <small>ug/L</small>	Soil Gas Source Concentration <small>ug/m³</small>	Soil Gas to Indoor Air Attenuation Factor <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Predicted Indoor Air Concentration <small>ug/m³-air</small>	Hazard Quotient <small>(-)</small>	Risk Level <small>(-)</small>
benzene	4.40E+03	9.59E+04	5.14E-07	3.10E-01	4.93E-02	1.58E-03	5.02E-07
ethylbenzene	1.70E+03	5.28E+04	8.65E-07	9.70E-01	4.57E-02	4.38E-05	4.04E-08
toluene	1.50E+04	3.95E+05	8.42E-07	5.20E+03	3.32E-01	1.06E-03	-
xylene (mixed isomers)	1.30E+04	2.69E+05	2.24E-07	7.30E+02	6.03E-02	5.78E-04	-
naphthalene	1.10E+03	2.05E+03	3.79E-12	7.00E-02	7.77E-09	2.48E-09	9.49E-14
						3.259E-03	5.42E-07

NOTE A: "< 1E-100" means calculated attenuation factor is less than IE-100

Backward Risk Calculation

Critical Chemical for Backward Risk Calculation: Not Selected

Chemical Name	Target Hazard Quotient <small>(-)</small>	Target Cancer Risk <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Soil Gas Source Concentration <small>ug/m³</small>	Effective Saturated Vapor Concentration <small>ug/m³</small>	Groundwater Source Concentration <small>ug/L</small>	Effective Solubility <small>ug/L</small>
benzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
ethylbenzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
toluene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
xylene (mixed isomers)	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
naphthalene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected

NOTE B: Target indoor air concentrations can be edited on the "Chemical Database" screen

NOTE C: Red value indicates source concentration greater than saturation limit

NOTE D: Backward Risk Calculation not applicable when aerobic depth directly specified

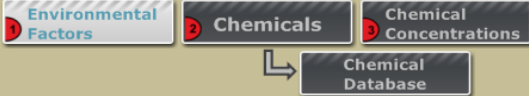
NOTE E: Backward Calculation not completed due to Excel calculation error

MW-10
Commercial

BioVapor Input



Model Input Screens



1. Oxygen Surface Boundary Condition

Slab or Basement Foundation (e.g., Specify Airflow) ▼

2. Indoor Target Criteria

- Do not perform backward Calculation
- Based on Indoor Risk / Hazard Target
- Specified Indoor Air Concentration Target

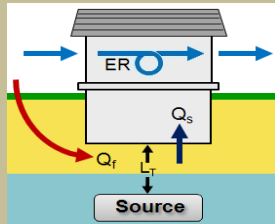
Note: Target indoor air concentrations can be edited on the "Chemical Database" screen

3. Exposure and Risk Factors

Target Hazard Quotient For Individual Chemicals	THQ	1.00	(-)
Target Excess Individual Lifetime Cancer Risk	TR	1.00E-06	(-)
Carcinogen Averaging Time	AT _C	70.00	yrs
Non-carcinogenic Averaging Time	AT _{NC}	25.00	yrs
Body Weight - Adult	BW	70.00	kg
Exposure Duration	ED	25.00	yrs
Exposure Frequency	EF	250.00	days/yr
Indoor Inhalation Rate Exposure Adjustment	CF	1.00	(-)

Legend

- 80.00 Calculated Value
- 80.00 User Input Value
- 80.00 Value Outside Normal Range



4. Building Parameters

Indoor Mixing Height	L _{mix}	366.00	cm
Air Exchange Rate	ER	12.00	1/day
Foundation Thickness	L _{crack}	15.00	cm
Foundation Area	A _b	1060000.00	cm ²
Foundation Crack Fraction	η	3.77E-04	cm ² -cracks/cm ² -total
Total Porosity (Soil-filled Cracks)	θ _{T-crack}	1.00	cm ³ -void/cm ³ -soil
Water Filled Porosity (Soil-filled Cracks)	θ _{w-crack}	0.00	cm ³ -void/cm ³ -soil
Airflow Through Basement Foundation	Q _s	83.00	cm ³ -air/sec
Building Envelope Resistance	L _{mix} * ER	0.05	cm/sec

5. Vadose Zone Parameters

Soil Porosity	θ _{T-soil}	0.39	cm ³ -void/cm ³ -soil
Soil Water Content	θ _{w-soil}	0.20	cm ³ -water/cm ³ -soil
Soil Organic Carbon Fraction	f _{oc}	5.00E-03	g-oc/g-soil
Soil Density - Bulk	ρ _S	1.63	g-soil/cm ³ -soil
Airflow Under Foundation	Q _f	83.00	cm ³ -air/sec
Depth of Aerobic Zone Under Foundation	L _A	-	cm
O ₂ Concentration Under Foundation	CO ₂ -e	-	%
Annual Median Soil Temperature	T	24.00	°C
Baseline Soil Oxygen Respiration Rate	Δ _{base}	Calculated from Foc	9.780E-08 mg-O ₂ / g-soil - sec
Depth to Source (from bottom of foundation)	LT	274.32	cm
Minimum O ₂ Conc. For Aerobic Biodegradation		1.00	%

6. Commands and Options

- Default Values
- Residential
- Commercial / Industrial

Paste

Home

Print

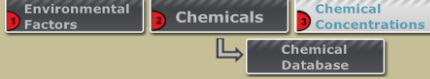
Reset

Next

BioVapor Results



Model Input Screens



2. Commands and Options

Home

Print

Previous

Next :: Results

1. Ground Water Source Chemical Concentrations

Chemical	ug/L
benzene	5.60E+03
ethylbenzene	1.70E+03
toluene	1.80E+04
xylenes (mixed isomers)	9.90E+03
naphthalene	7.70E+02
TPH-GRO (C6-C10)	8.80E+04

Total Entered
1.24E+05 Hydrocarbon Concentration (ug/L)

Note: The total hydrocarbon concentration should equal the total concentration of all hydrocarbons in the source area

3. Attenuation Factor

0.1

Groundwater to Deep Soil Gas
Attenuation Factor

Model Output Screens

VI Risk
Subsurface Profile
Detailed Results

Commands and Options

Home

Print

Previous

Next

Unprotect

Target Hazard Quotient	Target Risk Level
1	1.00E-06

Forward Risk Calculation

Chemical Name	Groundwater Source Concentration <small>ug/L</small>	Soil Gas Source Concentration <small>ug/m³</small>	Soil Gas to Indoor Air Attenuation Factor <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Predicted Indoor Air Concentration <small>ug/m³-air</small>	Hazard Quotient <small>(-)</small>	Risk Level <small>(-)</small>
benzene	5.60E+03	1.22E+05	2.98E-09	3.10E-01	3.64E-04	8.30E-06	2.54E-09
ethylbenzene	1.70E+03	5.28E+04	7.60E-09	9.70E-01	4.01E-04	2.75E-07	2.44E-10
toluene	1.80E+04	4.73E+05	7.14E-09	5.20E+03	3.38E-03	7.72E-06	-
xylene (mixed isomers)	9.90E+03	2.05E+05	6.91E-10	7.30E+02	1.41E-04	9.69E-07	-
naphthalene	7.70E+02	1.44E+03	1.19E-18	7.00E-02	1.71E-15	3.91E-16	1.44E-20
						1.73E-05	2.78E-09

NOTE A: "< 1E-100" means calculated attenuation factor is less than 1E-100

Backward Risk Calculation

Critical Chemical for Backward Risk Calculation: Not Selected

Chemical Name	Target Hazard Quotient <small>(-)</small>	Target Cancer Risk <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Soil Gas Source Concentration <small>ug/m³</small>	Effective Saturated Vapor Concentration <small>ug/m³</small>	Groundwater Source Concentration <small>ug/L</small>	Effective Solubility <small>ug/L</small>
benzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
ethylbenzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
toluene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
xylene (mixed isomers)	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
naphthalene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected

NOTE B: Target indoor air concentrations can be edited on the "Chemical Database" screen

NOTE C: Red value indicates source concentration greater than saturation limit

NOTE D: Backward Risk Calculation not applicable when aerobic depth directly specified

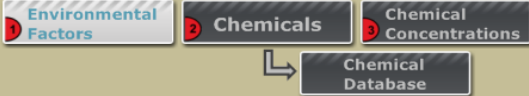
NOTE E: Backward Calculation not completed due to Excel calculation error

MW-10
Residential

BioVapor Input



Model Input Screens



1. Oxygen Surface Boundary Condition

Slab or Basement Foundation (e.g., Specify Airflow) ▼

2. Indoor Target Criteria

- Do not perform backward Calculation
- Based on Indoor Risk / Hazard Target
- Specified Indoor Air Concentration Target

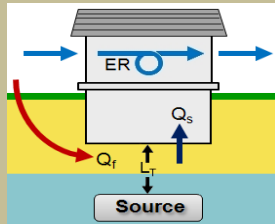
Note: Target indoor air concentrations can be edited on the "Chemical Database" screen

3. Exposure and Risk Factors

Target Hazard Quotient For Individual Chemicals	THQ	1.00	(-)
Target Excess Individual Lifetime Cancer Risk	TR	1.00E-06	(-)
Carcinogen Averaging Time	AT _C	70.00	yrs
Non-carcinogenic Averaging Time	AT _{NC}	26.00	yrs
Body Weight - Adult	BW	70.00	kg
Exposure Duration	ED	26.00	yrs
Exposure Frequency	EF	350.00	days/yr
Indoor Inhalation Rate Exposure Adjustment	CF	1.00	(-)

Legend

80.00	Calculated Value
80.00	User Input Value
80.00	Value Outside Normal Range



4. Building Parameters

Indoor Mixing Height	L _{mix}	366.00	cm
Air Exchange Rate	ER	6.00	1/day
Foundation Thickness	L _{crack}	15.00	cm
Foundation Area	A _b	1060000.00	cm ²
Foundation Crack Fraction	η	3.77E-04	cm ² -cracks/cm ² -total
Total Porosity (Soil-filled Cracks)	θ _{T-crack}	1.00	cm ³ -void/cm ³ -soil
Water Filled Porosity (Soil-filled Cracks)	θ _{w-crack}	0.00	cm ³ -void/cm ³ -soil
Airflow Through Basement Foundation	Q _s	83.00	cm ³ -air/sec
Building Envelope Resistance	L _{mix} * ER	0.03	cm/sec

5. Vadose Zone Parameters

Soil Porosity	θ _{T-soil}	0.39	cm ³ -void/cm ³ -soil
Soil Water Content	θ _{w-soil}	0.20	cm ³ -water/cm ³ -soil
Soil Organic Carbon Fraction	f _{oc}	5.00E-03	g-oc/g-soil
Soil Density - Bulk	ρ _s	1.63	g-soil/cm ³ -soil
Airflow Under Foundation	Q _f	83.00	cm ³ -air/sec
Depth of Aerobic Zone Under Foundation	L _A	-	cm
O ₂ Concentration Under Foundation	CO ₂ -e	-	%
Annual Median Soil Temperature	T	24.00	°C
Baseline Soil Oxygen Respiration Rate	Δ _{base}	Calculated from Foc	9.780E-08 mg-O ₂ / g-soil - sec
Depth to Source (from bottom of foundation)	LT	274.32	cm
Minimum O ₂ Conc. For Aerobic Biodegradation		1.00	%

6. Commands and Options

- Default Values
- Residential
- Commercial / Industrial

Paste

Home

Print

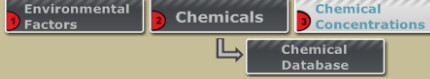
Reset

Next

BioVapor Results



Model Input Screens



2. Commands and Options

Home

Print

Previous

Next :: Results

1. Ground Water Source Chemical Concentrations

Chemical	ug/L
benzene	5.60E+03
ethylbenzene	1.70E+03
toluene	1.80E+04
xylenes (mixed isomers)	9.90E+03
naphthalene	7.70E+02
TPH-GRO (C6-C10)	8.80E+04


Total Entered
1.24E+05 Hydrocarbon Concentration (ug/L)

Note: The total hydrocarbon concentration should equal the total concentration of all hydrocarbons in the source area

3. Attenuation Factor

0.1

Groundwater to Deep Soil Gas
Attenuation Factor



Model Output Screens

VI Risk
Subsurface Profile
Detailed Results

Commands and Options

Home
Print

Previous
Next
Unprotect

Target Hazard Quotient	Target Risk Level
1	1.00E-06

Forward Risk Calculation

Chemical Name	Groundwater Source Concentration <small>ug/L</small>	Soil Gas Source Concentration <small>ug/m³</small>	Soil Gas to Indoor Air Attenuation Factor <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Predicted Indoor Air Concentration <small>ug/m³-air</small>	Hazard Quotient <small>(-)</small>	Risk Level <small>(-)</small>
benzene	5.60E+03	1.22E+05	5.96E-09	3.10E-01	7.27E-04	2.32E-05	7.40E-09
ethylbenzene	1.70E+03	5.28E+04	1.52E-08	9.70E-01	8.02E-04	7.69E-07	7.10E-10
toluene	1.80E+04	4.73E+05	1.43E-08	5.20E+03	6.76E-03	2.16E-05	-
xylenes (mixed isomers)	9.90E+03	2.05E+05	1.38E-09	7.30E+02	2.83E-04	2.71E-06	-
naphthalene	7.70E+02	1.44E+03	2.38E-18	7.00E-02	3.42E-15	1.09E-15	4.18E-20
						4.833E-05	8.11E-09

NOTE A: "< 1E-100" means calculated attenuation factor is less than 1E-100

Backward Risk Calculation

Critical Chemical for Backward Risk Calculation: Not Selected

Chemical Name	Target Hazard Quotient <small>(-)</small>	Target Cancer Risk <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Soil Gas Source Concentration <small>ug/m³</small>	Effective Saturated Vapor Concentration <small>ug/m³</small>	Groundwater Source Concentration <small>ug/L</small>	Effective Solubility <small>ug/L</small>
benzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
ethylbenzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
toluene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
xylenes (mixed isomers)	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
naphthalene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected

NOTE B: Target indoor air concentrations can be edited on the "Chemical Database" screen

NOTE C: Red value indicates source concentration greater than saturation limit

NOTE D: Backward Risk Calculation not applicable when aerobic depth directly specified

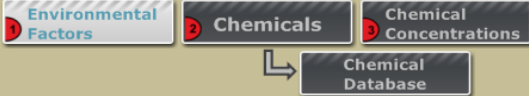
NOTE E: Backward Calculation not completed due to Excel calculation error

MW-16B
Commercial

BioVapor Input



Model Input Screens



1. Oxygen Surface Boundary Condition

Slab or Basement Foundation (e.g., Specify Airflow) ▼

2. Indoor Target Criteria

- Do not perform backward Calculation
- Based on Indoor Risk / Hazard Target
- Specified Indoor Air Concentration Target

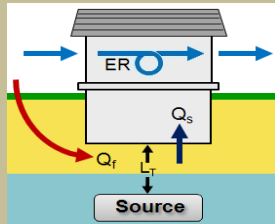
Note: Target indoor air concentrations can be edited on the "Chemical Database" screen

3. Exposure and Risk Factors

Target Hazard Quotient For Individual Chemicals	THQ	1.00	(-)
Target Excess Individual Lifetime Cancer Risk	TR	1.00E-06	(-)
Carcinogen Averaging Time	AT _C	70.00	yrs
Non-carcinogenic Averaging Time	AT _{NC}	25.00	yrs
Body Weight - Adult	BW	70.00	kg
Exposure Duration	ED	25.00	yrs
Exposure Frequency	EF	250.00	days/yr
Indoor Inhalation Rate Exposure Adjustment	CF	1.00	(-)

Legend

- 80.00 Calculated Value
- 80.00 User Input Value
- 80.00 Value Outside Normal Range



4. Building Parameters

Indoor Mixing Height	L _{mix}	366.00	cm
Air Exchange Rate	ER	12.00	1/day
Foundation Thickness	L _{crack}	15.00	cm
Foundation Area	A _b	1060000.00	cm ²
Foundation Crack Fraction	η	3.77E-04	cm ² -cracks/cm ² -total
Total Porosity (Soil-filled Cracks)	θ _{T-crack}	1.00	cm ³ -void/cm ³ -soil
Water Filled Porosity (Soil-filled Cracks)	θ _{w-crack}	0.00	cm ³ -void/cm ³ -soil
Airflow Through Basement Foundation	Q _s	83.00	cm ³ -air/sec
Building Envelope Resistance	L _{mix} * ER	0.05	cm/sec

5. Vadose Zone Parameters

Soil Porosity	θ _{T-soil}	0.39	cm ³ -void/cm ³ -soil
Soil Water Content	θ _{w-soil}	0.20	cm ³ -water/cm ³ -soil
Soil Organic Carbon Fraction	f _{oc}	5.00E-03	g-oc/g-soil
Soil Density - Bulk	ρ _S	1.63	g-soil/cm ³ -soil
Airflow Under Foundation	Q _f	83.00	cm ³ -air/sec
Depth of Aerobic Zone Under Foundation	L _A	-	cm
O ₂ Concentration Under Foundation	CO ₂ -e	-	%
Annual Median Soil Temperature	T	24.00	°C
Baseline Soil Oxygen Respiration Rate	Δ _{base}	Calculated from Foc	9.780E-08 mg-O ₂ / g-soil - sec
Depth to Source (from bottom of foundation)	LT	274.32	cm
Minimum O ₂ Conc. For Aerobic Biodegradation		1.00	%

6. Commands and Options

- Default Values
- Residential
- Commercial / Industrial

Paste

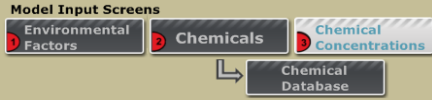
Home

Print

Reset

Next

BioVapor Results



2. Commands and Options

Home

Print

Previous

Next :: Results

1. Ground Water Source Chemical Concentrations

Chemical	ug/L
benzene	1.10E+04
ethylbenzene	1.00E+03
toluene	7.10E+02
xylenes (mixed isomers)	2.00E+03
TPH-GRO (C6-C10)	1.50E+04
naphthalene	2.50E+02

3.00E+04 Total Entered
Hydrocarbon Concentration (ug/L)

Note: The total hydrocarbon concentration should equal the total concentration of all hydrocarbons in the source area

3. Attenuation Factor

0.1

Groundwater to Deep Soil Gas
Attenuation Factor

Model Output Screens

VI Risk
Subsurface Profile
Detailed Results

Commands and Options

Home

Print

Previous

Next

Unprotect

Target Hazard Quotient	Target Risk Level
1	1.00E-08

Forward Risk Calculation

Chemical Name	Groundwater Source Concentration <small>ug/L</small>	Soil Gas Source Concentration <small>ug/m³</small>	Soil Gas to Indoor Air Attenuation Factor <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Predicted Indoor Air Concentration <small>ug/m³-air</small>	Hazard Quotient <small>(-)</small>	Risk Level <small>(-)</small>
benzene	1.10E+04	2.40E+05	4.21E-18	3.10E-01	1.01E-12	2.30E-14	7.05E-18
ethylbenzene	1.00E+03	3.10E+04	7.26E-17	9.70E-01	2.25E-12	1.54E-15	1.37E-18
toluene	7.10E+02	1.87E+04	5.80E-17	5.20E+03	1.08E-12	2.47E-15	-
xylene (mixed isomers)	2.00E+03	4.13E+04	5.39E-20	7.30E+02	2.23E-15	1.52E-17	-
naphthalene	2.50E+02	4.66E+02	4.72E-47	7.00E-02	2.20E-44	5.03E-45	1.85E-49
						2.71E-14	8.42E-18

NOTE A: "< 1E-100" means calculated attenuation factor is less than 1E-100

Backward Risk Calculation

Critical Chemical for Backward Risk Calculation: Not Selected

Chemical Name	Target Hazard Quotient <small>(-)</small>	Target Cancer Risk <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Soil Gas Source Concentration <small>ug/m³</small>	Effective Saturated Vapor Concentration <small>ug/m³</small>	Groundwater Source Concentration <small>ug/L</small>	Effective Solubility <small>ug/L</small>
benzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
ethylbenzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
toluene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
xylene (mixed isomers)	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
naphthalene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected

NOTE B: Target indoor air concentrations can be edited on the "Chemical Database" screen

NOTE C: Red value indicates source concentration greater than saturation limit

NOTE D: Backward Risk Calculation not applicable when aerobic depth directly specified

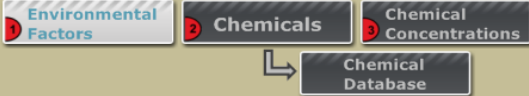
NOTE E: Backward Calculation not completed due to Excel calculation error

MW-16B
Residential

BioVapor Input



Model Input Screens



1. Oxygen Surface Boundary Condition

Slab or Basement Foundation (e.g., Specify Airflow) ▼

2. Indoor Target Criteria

- Do not perform backward Calculation
- Based on Indoor Risk / Hazard Target
- Specified Indoor Air Concentration Target

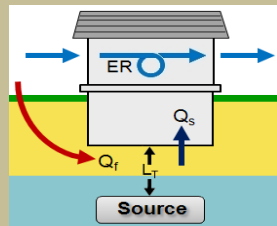
Note: Target indoor air concentrations can be edited on the "Chemical Database" screen

3. Exposure and Risk Factors

Target Hazard Quotient For Individual Chemicals	THQ	1.00	(-)
Target Excess Individual Lifetime Cancer Risk	TR	1.00E-06	(-)
Carcinogen Averaging Time	AT _C	70.00	yrs
Non-carcinogenic Averaging Time	AT _{NC}	26.00	yrs
Body Weight - Adult	BW	70.00	kg
Exposure Duration	ED	26.00	yrs
Exposure Frequency	EF	350.00	days/yr
Indoor Inhalation Rate Exposure Adjustment	CF	1.00	(-)

Legend

- 80.00 Calculated Value
- 80.00 User Input Value
- 80.00 Value Outside Normal Range



4. Building Parameters

Indoor Mixing Height	L _{mix}	366.00	cm
Air Exchange Rate	ER	6.00	1/day
Foundation Thickness	L _{crack}	15.00	cm
Foundation Area	A _b	1060000.00	cm ²
Foundation Crack Fraction	η	3.77E-04	cm ² -cracks/cm ² -total
Total Porosity (Soil-filled Cracks)	θ _{T-crack}	1.00	cm ³ -void/cm ³ -soil
Water Filled Porosity (Soil-filled Cracks)	θ _{w-crack}	0.00	cm ³ -void/cm ³ -soil
Airflow Through Basement Foundation	Q _s	83.00	cm ³ -air/sec
Building Envelope Resistance	L _{mix} * ER	0.03	cm/sec

5. Vadose Zone Parameters

Soil Porosity	θ _{T-soil}	0.39	cm ³ -void/cm ³ -soil
Soil Water Content	θ _{w-soil}	0.20	cm ³ -water/cm ³ -soil
Soil Organic Carbon Fraction	f _{oc}	5.00E-03	g-oc/g-soil
Soil Density - Bulk	ρ _S	1.63	g-soil/cm ³ -soil
Airflow Under Foundation	Q _f	83.00	cm ³ -air/sec
Depth of Aerobic Zone Under Foundation	L _A	-	cm
O ₂ Concentration Under Foundation	CO ₂ -e	-	%
Annual Median Soil Temperature	T	24.00	°C
Baseline Soil Oxygen Respiration Rate	Δ _{base}	Calculated from Foc	9.780E-08 mg-O ₂ / g-soil - sec
Depth to Source (from bottom of foundation)	LT	274.32	cm
Minimum O ₂ Conc. For Aerobic Biodegradation		1.00	%

6. Commands and Options

- Default Values
- Residential
- Commercial / Industrial

Paste

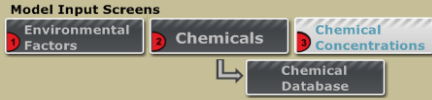
Home

Print

Reset

Next

BioVapor Results



2. Commands and Options

Home

Print

Previous

Next :: Results

1. Ground Water Source Chemical Concentrations

Chemical	ug/L
benzene	1.10E+04
ethylbenzene	1.00E+03
toluene	7.10E+02
xylenes (mixed isomers)	2.00E+03
TPH-GRO (C6-C10)	1.50E+04
naphthalene	2.50E+02

3.00E+04 Total Entered
Hydrocarbon Concentration (ug/L)

Note: The total hydrocarbon concentration should equal the total concentration of all hydrocarbons in the source area

3. Attenuation Factor

0.1

Groundwater to Deep Soil Gas
Attenuation Factor

Model Output Screens

VI Risk
Subsurface Profile
Detailed Results

Commands and Options

Home

Print

Previous

Next

Unprotect

Target Hazard Quotient	Target Risk Level
1	1.00E-06

Forward Risk Calculation

Chemical Name	Groundwater Source Concentration <small>ug/L</small>	Soil Gas Source Concentration <small>ug/m³</small>	Soil Gas to Indoor Air Attenuation Factor <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Predicted Indoor Air Concentration <small>ug/m³-air</small>	Hazard Quotient <small>(-)</small>	Risk Level <small>(-)</small>
benzene	1.10E+04	2.40E+05	8.42E-18	3.10E-01	2.02E-12	6.45E-14	2.05E-17
ethylbenzene	1.00E+03	3.10E+04	1.45E-16	9.70E-01	4.50E-12	4.32E-15	3.99E-18
toluene	7.10E+02	1.87E+04	1.16E-16	5.20E+03	2.17E-12	6.92E-15	-
xylene (mixed isomers)	2.00E+03	4.13E+04	1.08E-19	7.30E+02	4.45E-15	4.27E-17	-
naphthalene	2.50E+02	4.66E+02	9.44E-47	7.00E-02	4.40E-44	1.41E-44	5.38E-49
						7.581E-14	2.45E-17

NOTE A: "< 1E-100" means calculated attenuation factor is less than 1E-100

Backward Risk Calculation

Critical Chemical for Backward Risk Calculation: Not Selected

Chemical Name	Target Hazard Quotient <small>(-)</small>	Target Cancer Risk <small>(-)</small>	Target Indoor Air Concentration <small>ug/m³-air</small>	Soil Gas Source Concentration <small>ug/m³</small>	Effective Saturated Vapor Concentration <small>ug/m³</small>	Groundwater Source Concentration <small>ug/L</small>	Effective Solubility <small>ug/L</small>
benzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
ethylbenzene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
toluene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
xylene (mixed isomers)	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
naphthalene	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected

NOTE B: Target indoor air concentrations can be edited on the "Chemical Database" screen

NOTE C: Red value indicates source concentration greater than saturation limit

NOTE D: Backward Risk Calculation not applicable when aerobic depth directly specified

NOTE E: Backward Calculation not completed due to Excel calculation error

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: 1,2-Dichloroethane

DATA ENTRY SHEET

Results Summary				
Soil Gas Conc. ($\mu\text{g}/\text{m}^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu\text{g}/\text{m}^3$)	Cancer Risk	Noncancer Hazard
2.90E+02	1.7E-04	4.9E-02	1.0E-07	1.6E-03

Reset to

Soil Gas Concentration Data				
ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu\text{g}/\text{m}^3$)	OR:	ENTER Soil gas conc., C_g (ppmv)	Chemical
107062	2.90E+02			1,2-Dichloroethane

MORE
↓

ENTER Depth below grade to bottom of enclosed space floor, L_f (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_s ($^{\circ}\text{C}$)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	182.88	24	SC		

MORE
↓

ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bidg. (Leave blank to calculate) Q_{soil} (L/m)
SC	1.63	0.385	0.197	5

MORE
↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure Time ET (hrs/day)	ENTER Air Exchange Rate ACH (hour^{-1})
70	25	25	250	8 (NEW)	1 (NEW)

NEW=> Commercial

END

CHEMICAL PROPERTIES SHEET

1,2-Dichloroethane

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($\text{atm}\cdot\text{m}^3/\text{mol}$)	Henry's law constant reference temperature, T_R ($^\circ\text{C}$)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B ($^\circ\text{K}$)	Critical temperature, T_C ($^\circ\text{K}$)	Unit risk factor, URF ($\mu\text{g}/\text{m}^3$) ⁻¹	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
8.57E-02	1.10E-05	1.18E-03	25	7,643	356.65	561.00	2.6E-05	7.0E-03	98.96

END

INTERMEDIATE CALCULATIONS SHEET

Scenario: Commercial

Chemical: 1,2-Dichloroethane

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu\text{g}/\text{m}^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
167.88	0.188	0.299	1.78E-09	0.837	1.49E-09	4,000	2.90E+02	6.78E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($\text{atm}\cdot\text{m}^3/\text{mol}$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D_v^{eff} (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	8,368	1.13E-03	4.61E-02	1.80E-04	2.22E-03	167.88

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu\text{g}/\text{m}^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(\text{Pe}^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu\text{g}/\text{m}^3$)
15	2.90E+02	1.25	8.33E+01	2.22E-03	5.00E+03	3.91E+32	1.68E-04	4.88E-02

Unit risk factor, URF ($\mu\text{g}/\text{m}^3$) ⁻¹	Reference conc., RfC (mg/m^3)
2.6E-05	7.0E-03

END

RESULTS SHEET

Scenario: Commercial
Chemical: 1,2-Dichloroethane

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.0E-07	1.6E-03

MESSAGE SUMMARY BELOW:

END

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: 1,2-Dichloroethane

DATA ENTRY SHEET

Results Summary				
Soil Gas Conc. ($\mu\text{g}/\text{m}^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu\text{g}/\text{m}^3$)	Cancer Risk	Noncancer Hazard
2.90E+02	3.4E-04	9.8E-02	9.0E-07	1.3E-02

Reset to

Soil Gas Concentration Data			
ENTER	ENTER	OR	ENTER
Chemical CAS No. (numbers only, no dashes)	Soil gas conc., C_s ($\mu\text{g}/\text{m}^3$)		Soil gas conc., C_s (ppmv)
			Chemical
107062	2.90E+02		1,2-Dichloroethane

MORE
↓

ENTER	ENTER	ENTER	ENTER	OR	ENTER
Depth below grade to bottom of enclosed space floor, L_f (15 or 200 cm)	Soil gas sampling depth below grade, L_s (cm)	Average soil temperature, T_s ($^{\circ}\text{C}$)	Vadose zone SCS soil type (used to estimate soil vapor permeability)		User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	182.88	24	SC		

MORE
↓

ENTER	ENTER	ENTER	ENTER	ENTER
Vadose zone SCS soil type Lookup Soil	Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	Vadose zone soil total porosity, n^V (unitless)	Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SC	1.63	0.385	0.197	5

MORE
↓

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Averaging time for carcinogens, AT_C (yrs)	Averaging time for noncarcinogens, AT_{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour^{-1})
70	26	26	350	24 (NEW)	0.5 (NEW)

NEW=> Residential

END

CHEMICAL PROPERTIES SHEET

1,2-Dichloroethane

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($\text{atm}\cdot\text{m}^3/\text{mol}$)	Henry's law constant reference temperature, T_R ($^\circ\text{C}$)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B ($^\circ\text{K}$)	Critical temperature, T_C ($^\circ\text{K}$)	Unit risk factor, URF ($\mu\text{g}/\text{m}^3$) ⁻¹	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
8.57E-02	1.10E-05	1.18E-03	25	7,643	356.65	561.00	2.6E-05	7.0E-03	98.96

END

INTERMEDIATE CALCULATIONS SHEET

Scenario: Residential
 Chemical: 1,2-Dichloroethane

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu\text{g}/\text{m}^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
167.88	0.188	0.299	1.78E-09	0.837	1.49E-09	4.000	2.90E+02	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm- m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D_v^{eff} (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	8,368	1.13E-03	4.61E-02	1.80E-04	2.22E-03	167.88

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu\text{g}/\text{m}^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(\text{Pe}^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu\text{g}/\text{m}^3$)
15	2.90E+02	1.25	8.33E+01	2.22E-03	5.00E+03	3.91E+32	3.37E-04	9.77E-02

Unit risk factor, URF ($\mu\text{g}/\text{m}^3$) ⁻¹	Reference conc., RfC (mg/m^3)
2.6E-05	7.0E-03

END

RESULTS SHEET

Scenario: Residential
Chemical: 1,2-Dichloroethane

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
9.0E-07	1.3E-02

MESSAGE SUMMARY BELOW:

END