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Telephone: 913 894-4000 www.terranext.net

LEAKING UNDERGROUND STORAGE TANK (LUST) ASSESSMENT
SOIL VAPOR SURVEY REPORT

Sac & Fox Truck Stop
1346 US 75 Highway
Powhatten, Kansas

NW ¼ NW ¼ SW ¼
Section 15, Township 4 South, Range 15 East,
Brown County

Terranext Project Number: 17102679

February 21, 2017

Prepared By:

CHRISTOPHER L. KINN
LICENSED
2/21/17
687
KANSAS
GEOLOGIST

Christopher Kinn, L.G.
Director, Midwest Operations

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Soil Vapor Laboratory Report

SECTION 1.0

1.1 Introduction

Terranext has developed this Soil Vapor Survey Report to present a description of the activities and the soil vapor survey data collected by Terranext at the Sac & Fox Truck Stop located at 1346 US 75 Highway in Powhatten, Kansas (Figure 1).

Terranext was contracted by Total Petroleum Services (TPS) to collect soil vapor survey data at near-source depth (6 feet below ground surface (bgs)) and sub-slab depth (3 feet bgs) at two locations on the south side of the existing building to determine potential vapor intrusion impacts at the Sac & Fox Truck Stop site. The data was collected during field activities completed during January 24th, 2017.

The objective of the soil vapor sampling is to better evaluate the potential vapor intrusion threat from the LUST impacted soil and groundwater to workers in the existing building on-site.

Previous soil vapor survey investigation at the site includes:

- Terranext utilized the EPA's Vapor Intrusion Assessment tool on to initially screen for potential soil vapor inhalation risk, based on groundwater data. Based on the initial screening, there existed the potential for soil vapor intrusion into the existing facility building.

1.2 Soil Vapor Survey Activities

Terranext utilized Razek Environmental located in Louisburg, Kansas to install two sol vapor collecting probes. Terranext requested the utility locate with Kansas One-Call prior to initiating field activities, as well as, contracting a separate utility locator Baker Peterson to better identify on-site utilities. Terranext also conducted a tailgate health and safety meeting with on-site personnel prior to initiating field activities.

Soil vapor samples were collected from two outdoor direct push borings, as depicted in Figure 1. Prior to sampling, a shut-in test was used to check for leaks in the above ground fittings and the sampling line was properly purged prior to sampling.

At each location, the direct push rig drove a 1.5-inch diameter probe to target depths of 3 feet and 6 feet bgs. The tip was then withdrawn slightly at each depth, and the surface sealed. Soil vapor samples were collected in laboratory supplied vacuum canisters in general accordance with KDHE's vapor intrusion guidance and the boreholes were properly abandoned.

Terranext considers the sample collected at approximately 3 feet bgs to be indicative of a sub-slab condition near the existing building and the sample collected at 6 feet bgs to be a near-source sample indicative of the soil vapor concentration from the impacted groundwater.

Soil vapor samples were stored in a cool dark container for transport to the PACE Analytical laboratory to be analyzed for VOCs using EPA Method TO-15. Soil vapor analytical results are presented in Section 3.0.

1.3 Soil Vapor Survey Results

The laboratory results of the soil vapor survey are presented in Table 1. The soil vapor data presented in Table 1 show the data collected at SV1 at 6 feet bgs an order of magnitude higher than the data collected at 3 feet bgs. The data collected at SV2 at 6 feet bgs are generally over twice the magnitude of the data collected at 3 feet bgs.

The Kansas Department of Health and Environment (KDHE) presents only residential indoor air screening values in their September 2015 Tier 2 Risk-Base Summary Table so Terranext has used EPA's May 2016 Vapor Intrusion

Screening Level (VISL) calculator to determine applicable screening values for Table 1.

The VISL calculator is comprised of an MS Excel workbook. It can be used in evaluating whether the vapor intrusion pathway has the potential to pose a human health risk by comparing subsurface or indoor data against recommended screening levels provided in the VISL Calculator. The recommended screening-level concentrations in the spreadsheet are calculated using the recommended approaches in existing EPA guidance for human health risk assessment.

Comparison of the soil vapor data collected in January 2017 to the screening values determined by the EPA VISL calculator (Table 1) show soil vapor values for benzene ethylbenzene, m&p-xylenes, and naphthalene at the site well above their screening values, illustrating the potential for vapor intrusion to impact human health and environment.

Terranext also used VISL calculator to calculate potential indoor air concentration from the sub-slab soil vapor data to see if the calculated risk is greater than the target risk for the chemicals of concern. Terranext used the highest sub-slab vapor data collected in January 2017 and kept all other VISL calculator values as default values. Calculated results show risks exist for benzene ethylbenzene, xylenes, and naphthalene.

1.4 Conclusions / Recommendations

Soil vapor concentrations are well above calculated screening levels indicating potential risk to human health and environment. Based on the soil vapor results, Terranext collected PID readings within the building on February 20, 2017. PID readings were 0.0 within the building at that time. Terranext recommends indoor air monitoring and continued remediation of the impacted soil at the site.

SECTION 2.0

MAPS

This section includes the following figures:

Figure 1 –Site Map

Monitoring Well Location
Soil Vapor Sampling Location

PROJ.# 17102679	PAGE#
SCALE: AS SHOWN	DRAWN BY:
FILE NO.	DESIGNED BY:
DATE:	APPROVED BY:

TerraNext

FIGURE 1
SITE MAP

SAC & FOX TRUCK STOP
1346 US 75 HIGHWAY
POWHATTEN, KANSAS

SECTION 3.0

SOIL VAPOR SAMPLING RESULTS

TABLE 1- SOIL VAPOR ANALYTICAL RESULTS

Sac & Fox Truck Stop
1346 US 75 Highway
Powhatten, Kansas

Soil Vapor ID	Date Sampled	Total Hydrocarbons (µg/m3)	Benzene (µg/m3)	Toluene (µg/m3)	Ethyl benzene (µg/m3)	m&p-Xylenes (µg/m3)	o-Xylenes (µg/m3)	Naphthalene (µg/m3)	MtBE (ug/m3)	Analytical Method
Target Sub-Slab EPA VISL Screening Levels			**52**	**730,000**	**160**	**15,000**	**15,000**	**12**	**1,600**	**TO-15**
SV1 (3')	1/24/17	225,000	**34,300**	4,780	**12,300**	**30,600**	1,440	ND(125)	ND(172)	
SV1 (6')	01/24/17	4,200,000	**489,000**	30,700	**164,000**	**391,000**	11,800	ND(1,560)	ND(2,150)	
SV2 (3')	01/24/17	88,100	**28,500**	9,290	**3,020**	2,020	346	ND(125)	ND(172)	
SV2 (6')	01/24/17	843,000	**235,000**	44,400	**104,000**	**11,200**	1,290	**852**	ND(493)	
SV2 (6') Duplicate	01/24/17	282,000	**107,000**	51,300	**54,000**	7,790	1,110	**224**	ND(169)	

Values in bold exceed screening level values
EPA VISL Screening Levels, May 2016; TR 1E-06, THI 1.0

EPA-OLEM VAPOR INTRUSION ASSESSMENT

Vapor Intrusion Screening Level (VISL) Calculator Version 3.5 (May 2016 TR-L)

The primary objective of the vapor screening is to identify sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. Generally, all properties with a potential consideration of vapor intrusion (e.g., groundwater or soil gas monitoring) for vapor intrusion and gas concentrations fall below screening levels (i.e., VISL's) no further action or study is warranted, so long as the assumed conditions under those levels hold true across the two pathways and the site falls the minimum assumptions of the generic conceptual model underlying the screening levels. In a similar fashion, the results of risk based screening can help the risk focus each identify areas, buildings, and/or chemicals that can be eliminated from further assessment. The generic conceptual model underlying these screening levels is described in OSWER Publication 9200.2-154 (USEPA 2015) "Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air" (EPA 2015, Section 4.1).

Parameter	Symbol	Value	Description
Exposure Scenario	Scenario	Commercial	Select Residential or Commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.0E-06	Enter target risk for carcinogens
Hazard Quotient Limit for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (C)	Tgw	25	Enter average of the expected groundwater temperature in degree celsius (use Celsius for groundwater target concentrations)

CAS		Does the chemical meet the definition for volatility?	Does chemical have sufficient toxicity data?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source?	Target Subsurface Conc. @ TCR = 1E-06 or THQ = 1	Toxicity Basis	Target Soil Gas and Subsurface Soil Conc. @ TCR = 1E-06 or THQ = 1	Target Groundwater Conc. @ TCR = 1E-06 or THQ = 1	Is Target Groundwater Conc. < MCL?	Pure Phase Vapor Conc. @ 25°C	Maximum Groundwater Vapor Conc.	Temperature for Max. Groundwater Vapor Conc.	Lower Explosive Limit*	LEL Source	Inhalation Unit Risk	IUR Source*	Reference Concentration	RfC Source*	Mutagenic Indicator	Target Indoor Air Conc. for Carcinogens @ TCR = 1E-06	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 1
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Yes	Yes	Yes	Yes	[illegible]	NC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Notes:

(1) **Inhalation Pathway Exposure Parameters (RfC):**

Exposure Scenario:

	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E16) Symbol	Selected Value
Averaging time for carcinogens	(yr)	ATc R	70	ATc C	70	ATc	70
Averaging time for non-carcinogens	(yr)	ATnc R	30	ATnc C	25	ATnc	30
Exposure duration	(yr)	ED R	30	ED C	25	ED	30
Exposure frequency	(days/yr)	EF R	350	EF C	250	EF	250
Conversion factor	(unitless)	CF R	24	CF C	8	CF	8

(2) **Source (Subsurface Factors):**

Source Medium of Vapors:

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E16) Symbol	Selected Value
Groundwater						
Soil Gas and Indoor Air Use						

(3) **Formulas**

Cair (target) = RfC/Cu = Cair(c)

Cair(c) = (TCR x BW) x (365 days/yr) x (70 years) / (EF x ED) = (mg/m3) x (1E-3 mg/ug) = (ug/m3) x (1/CF) x (1/B)

Cair(nc) = (THQ x RfC) x (365 days/yr) x (30 years) / (EF x ED) = (mg/m3) x (1E-3 mg/ug) = (ug/m3) x (1/CF) x (1/B)

(4) **Special Case Chemicals**

Process Indicators

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E16) Symbol	Selected Value
Mutagenic Chemicals	MAF1TCR R	1.0E-06	MAF1TCR C	0.8E-06	MAF1TCR	0.8E-06
	MAF2TCR R	1.0E-06	MAF2TCR C	1.0E-06	MAF2TCR	1.0E-06

The particular mode of action (MOA) underlying the carcinogenic mutagenicity is unknown, and default to the MAF of 10 applies.

Mutagenic Chemicals

Note: The current guidance is mutagenic and other mutagenic chemicals, but not a case chemical.

Age Cohort	Exposure Duration (years)	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 9 years	9	3
9 - 16 years	16	3
16 - 30 years	30	1

Mutagenic chemical cancer (MMOA) adjustment factor 10 This factor is used in the calculation for Subsurface chemicals.

See the Supplemental Guidance section 1.1 in the main document.

Notations

NAT = Not sufficiently volatile and/or toxic to pose inhalation risk or sufficient toxicity data to perform the sufficient volatile

C = Carcinogenic

NC = Non-carcinogenic

1 = IRIS - EPA Integrated Risk Information System (IRIS) - Available online at

2 = PPRTV - EPA Provisional Peer Reviewed Toxicity Values (PPRTV) - Available online at

3 = Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) - Available online at

4 = California Environmental Protection Agency Office of Environmental Health Hazard Assessment Toxicologic - Available online at

5 = HEAST - EPA Superfund Health Effects Assessment Summary Tables (HEAST) Database - Available online at

6 = Am ECA - Lower Public Method 3

7 = PPRTV Screening

8 = The Pennsylvania Toxicity - Available online at

9 = Commercial Toxicology Cancer potency factor (CPF) Risk Level Values for Carcinogens Air Water and Health (AWH) - Proper Cancer Chemical Toxicity - Available online at

M = Chemical specific MMOA

Mu = Chemical with a cancer MOA that mutagenic mode of action, indicate a cancer risk factor such, use factor of 10 default

NA = Mutagenic mutagenic mutation for non-cancer endpoint (non-MMOA default)

TCR = Target risk factor and risk assessment Cells for Inhalation Risk (see Exhibit 4b above)

Yellow highlighted indicates the specific parameters that can be added to the site

Blue highlighted indicates Scenario Selection that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA report and agency guidance, which scenario should not be changed

** Cancer assessment and a Non-Cancer assessment. If the calculated or an Hazard Index that is needed for the site to follow and include.

EPA-OLEM VAPOR INTRUSION ASSESSMENT

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.5.1 (May 2016 RSLs)

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration	Calculated Indoor Air Concentration	VI Carcinogenic Risk	VI Hazard
		Csg	Cia	CR	HQ
		(ug/m^3)	(ug/m^3)		
71-43-2	Benzene	3.4E+04	1.03E+03	**6.5E-04**	**7.8E+00**
100-41-4	Ethylbenzene	1.2E+04	3.69E+02	**7.5E-05**	8.4E-02
1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--
91-20-3	Naphthalene	2.2E+02	6.72E+00	**1.9E-05**	5.1E-01
108-88-3	Toluene	9.3E+03	2.79E+02	No IUR	1.3E-02
108-38-3	Xylene, m-		--	--	--
95-47-6	Xylene, o-		--	--	--
106-42-3	Xylene, p-		--	--	--
1330-20-7	Xylenes	3.2E+04	9.61E+02	No IUR	**2.2E+00**

Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
IUR		RfC		
(ug/m^3)$^{-1}$		(mg/m^3)		
7.80E-06	I	3.00E-02	I	
2.50E-06	CA	1.00E+00	I	
2.60E-07	CA	3.00E+00	I	
3.40E-05	CA	3.00E-03	I	
		5.00E+00	I	
		1.00E-01	S	
		1.00E-01	S	
		1.00E-01	S	
		1.00E-01	I	

Notes:

mIURTCE_R_SG	1.00E-06	nIURTCE_C_SG	0.00E+00	mIURTCE_SG	0.00E+00
IURTCE_R_SG	3.10E-06	IURTCE_C_SG	4.10E-06	IURTCE_SG	4.10E-06

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride

Age Cohort	Exposure	Age-dependent adjustment
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 This factor is used in the equations for mutagenic chemicals

Notation:

I = IRIS. EPA Integrated Risk Information System (IRIS). Available online at http://www.epa.gov/iris/subst/index.html

P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at http://hhpprtv.ornl.gov/pprtv.shtml

A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at http://www.atsdr.cdc.gov/mrls/index.html

CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at http://www.oehha.ca.gov/risk/ChemicalDB/index.asp

H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at http://epa-heast.ornl.gov/heast.shtml

S = See RSL User Guide, Section 5

X = PPRTV Appendix

Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above)

VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation)

TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above)

Yellow highlighting indicates site-specific parameters that may be edited by the user.

Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.

Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

Pace Analytical Services, LLC
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Lenexa, KS 66219
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February 09, 2017

Meredith Watson
TERRANEXT
11904 Grandview Road
Grandview, MO 64030

RE: Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Dear Meredith Watson:
Enclosed are the analytical results for sample(s) received by the laboratory on January 25, 2017. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alice Spiller

Alice Spiller
alice.spiller@pacelabs.com
Project Manager

Enclosures

cc: Mr. Christopher Kinn, TERRANEXT

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CERTIFICATIONS

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
525 N 8th Street, Salina, KS 67401
Alaska Certification UST-107
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Virginia/VELAP Certification #: Pace
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

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SAMPLE SUMMARY

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60236723001	SV1-3ft	Air	01/24/17 15:12	01/25/17 16:32
60236723002	SV1-6ft	Air	01/24/17 16:00	01/25/17 16:32
60236723003	SV2-3ft	Air	01/24/17 15:21	01/25/17 16:32
60236723004	SV2-6ft	Air	01/24/17 15:46	01/25/17 16:32
60236723005	SV3-3ft	Air	01/24/17 16:18	01/25/17 16:32

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SAMPLE ANALYTE COUNT

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60236723001	SV1-3ft	TO-15	MJL, NCK	8	PASI-M
60236723002	SV1-6ft	TO-15	MJL, NCK	8	PASI-M
60236723003	SV2-3ft	TO-15	MJL, NCK	8	PASI-M
60236723004	SV2-6ft	TO-15	MJL, NCK	8	PASI-M
60236723005	SV3-3ft	TO-15	MLS, NCK	8	PASI-M

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ANALYTICAL RESULTS

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Sample: SV1-3ft **Lab ID: 60236723001** Collected: 01/24/17 15:12 Received: 01/25/17 16:32 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR	Analytical Method: TO-15							
Benzene	**34300**	ug/m3	122	375.2		02/03/17 20:17	71-43-2	A3
Ethylbenzene	**12300**	ug/m3	330	375.2		02/03/17 20:17	100-41-4	A3
Methyl-tert-butyl ether	ND	ug/m3	172	46.9		02/02/17 19:18	1634-04-4	
Naphthalene	ND	ug/m3	125	46.9		02/02/17 19:18	91-20-3	
THC as Gas	**225000**	ug/m3	4870	46.9		02/02/17 19:18		
Toluene	**4780**	ug/m3	36.1	46.9		02/02/17 19:18	108-88-3	
m&p-Xylene	**30600**	ug/m3	664	375.2		02/03/17 20:17	179601-23-1	A3
o-Xylene	**1440**	ug/m3	41.3	46.9		02/02/17 19:18	95-47-6	

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ANALYTICAL RESULTS

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Sample: SV1-6ft **Lab ID: 60236723002** Collected: 01/24/17 16:00 Received: 01/25/17 16:32 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR	Analytical Method: TO-15							
Benzene	**489000**	ug/m3	3050	9369.6		02/03/17 21:37	71-43-2	A3
Ethylbenzene	**164000**	ug/m3	8250	9369.6		02/03/17 21:37	100-41-4	A3
Methyl-tert-butyl ether	ND	ug/m3	2150	585.6		02/02/17 21:38	1634-04-4	
Naphthalene	ND	ug/m3	1560	585.6		02/02/17 21:38	91-20-3	
THC as Gas	**4200000**	ug/m3	60800	585.6		02/02/17 21:38		
Toluene	**30700**	ug/m3	451	585.6		02/02/17 21:38	108-88-3	
m&p-Xylene	**391000**	ug/m3	16600	9369.6		02/03/17 21:37	179601-23-1	A3
o-Xylene	**11800**	ug/m3	515	585.6		02/02/17 21:38	95-47-6	

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ANALYTICAL RESULTS

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Sample: SV2-3ft **Lab ID: 60236723003** Collected: 01/24/17 15:21 Received: 01/25/17 16:32 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR	Analytical Method: TO-15							
Benzene	**28500**	ug/m3	122	375.2		02/03/17 20:42	71-43-2	A3
Ethylbenzene	**3020**	ug/m3	41.3	46.9		02/02/17 19:46	100-41-4	
Methyl-tert-butyl ether	ND	ug/m3	172	46.9		02/02/17 19:46	1634-04-4	
Naphthalene	ND	ug/m3	125	46.9		02/02/17 19:46	91-20-3	
THC as Gas	**88100**	ug/m3	4870	46.9		02/02/17 19:46		
Toluene	**9290**	ug/m3	289	375.2		02/03/17 20:42	108-88-3	A3
m&p-Xylene	**2020**	ug/m3	83.0	46.9		02/02/17 19:46	179601-23-1	
o-Xylene	**346**	ug/m3	41.3	46.9		02/02/17 19:46	95-47-6	

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ANALYTICAL RESULTS

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Sample: SV2-6ft **Lab ID: 60236723004** Collected: 01/24/17 15:46 Received: 01/25/17 16:32 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR	Analytical Method: TO-15							
Benzene	**235000**	ug/m3	699	2150.4		02/03/17 22:27	71-43-2	A3
Ethylbenzene	**104000**	ug/m3	1890	2150.4		02/03/17 22:27	100-41-4	A3
Methyl-tert-butyl ether	ND	ug/m3	493	134.4		02/02/17 20:42	1634-04-4	
Naphthalene	**852**	ug/m3	358	134.4		02/02/17 20:42	91-20-3	
THC as Gas	**843000**	ug/m3	13900	134.4		02/02/17 20:42		
Toluene	**44400**	ug/m3	1660	2150.4		02/03/17 22:27	108-88-3	A3
m&p-Xylene	**11200**	ug/m3	238	134.4		02/02/17 20:42	179601-23-1	
o-Xylene	**1290**	ug/m3	118	134.4		02/02/17 20:42	95-47-6	

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ANALYTICAL RESULTS

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Sample: SV3-3ft **Lab ID: 60236723005** Collected: 01/24/17 16:18 Received: 01/25/17 16:32 Matrix: Air

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO15 MSV AIR	Analytical Method: TO-15							
Benzene	**107000**	ug/m3	480	1475.7 1		02/06/17 16:25	71-43-2	A3
Ethylbenzene	**54000**	ug/m3	1300	1475.7 1		02/06/17 16:25	100-41-4	A3
Methyl-tert-butyl ether	ND	ug/m3	169	46.12		02/02/17 20:14	1634-04-4	
Naphthalene	**224**	ug/m3	123	46.12		02/02/17 20:14	91-20-3	
THC as Gas	**282000**	ug/m3	4780	46.12		02/02/17 20:14		
Toluene	**51300**	ug/m3	1140	1475.7 1		02/06/17 16:25	108-88-3	A3
m&p-Xylene	**7790**	ug/m3	81.6	46.12		02/02/17 20:14	179601-23-1	
o-Xylene	**1110**	ug/m3	40.6	46.12		02/02/17 20:14	95-47-6	

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QUALITY CONTROL DATA

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

QC Batch: 458432 Analysis Method: TO-15
QC Batch Method: TO-15 Analysis Description: TO15 MSV AIR Low Level
Associated Lab Samples: 60236723001, 60236723002, 60236723003, 60236723004, 60236723005

METHOD BLANK: 2508779 Matrix: Air
Associated Lab Samples: 60236723001, 60236723002, 60236723003, 60236723004, 60236723005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Benzene	ug/m3	ND	0.32	02/02/17 11:39	
Ethylbenzene	ug/m3	ND	0.88	02/02/17 11:39	
m&p-Xylene	ug/m3	ND	1.8	02/02/17 11:39	
Methyl-tert-butyl ether	ug/m3	ND	3.7	02/02/17 11:39	
Naphthalene	ug/m3	ND	2.7	02/02/17 11:39	
o-Xylene	ug/m3	ND	0.88	02/02/17 11:39	
THC as Gas	ug/m3	ND	104	02/02/17 11:39	
Toluene	ug/m3	ND	0.77	02/02/17 11:39	

LABORATORY CONTROL SAMPLE: 2508780

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/m3	32.5	40.4	124	62-141	
Ethylbenzene	ug/m3	44.1	48.2	109	59-149	
m&p-Xylene	ug/m3	88.3	94.5	107	59-146	
Methyl-tert-butyl ether	ug/m3	91.6	109	119	64-135	
Naphthalene	ug/m3	53.3	61.6	116	46-146	
o-Xylene	ug/m3	44.1	47.3	107	54-149	
THC as Gas	ug/m3	5170	5010	97	68-145	
Toluene	ug/m3	38.3	46.2	121	61-138	

SAMPLE DUPLICATE: 2509658

Parameter	Units	60236723002 Result	Dup Result	RPD	Max RPD	Qualifiers
Benzene	ug/m3	488000	485000	1	25	A3
Ethylbenzene	ug/m3	164000	162000	1	25	A3
m&p-Xylene	ug/m3	391000	367000	6	25	A3
Methyl-tert-butyl ether	ug/m3	ND	ND		25	
Naphthalene	ug/m3	ND	1460J		25	
o-Xylene	ug/m3	11800	11800	0	25	
THC as Gas	ug/m3	4200000	4020000	5	25	
Toluene	ug/m3	30700	35000	13	25	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

SAMPLE QUALIFIERS

Sample: 60236723002

[1] This result is reported from a serial dilution.

Sample: 60236723004

[1] This result is reported from a serial dilution.

ANALYTE QUALIFIERS

A3 This result is reported from a serial dilution.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Sac & Fox (AIR)
Pace Project No.: 60236723

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60236723001	**SV1-3ft**	TO-15	458432		
60236723002	**SV1-6ft**	TO-15	458432		
60236723003	**SV2-3ft**	TO-15	458432		
60236723004	**SV2-6ft**	TO-15	458432		
60236723005	**SV3-3ft**	TO-15	458432		

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Sample Condition Upon Receipt

WO# : 60236723

60236723

Client Name: Terranext

Courier: FedEx ☐ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☐ Client ☑ Other ☐

Tracking #: _____ Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☐ No ☐ Seals intact: Yes ☐ No ☑

Packing Material: Bubble Wrap ☑ Bubble Bags ☐ Foam ☑ None ☐ Other ☐

Thermometer Used: CF +1.5 T-266 / CF +0.9 T-239 **Type of Ice:** Wet Blue None

BB 1/26/17

Cooler Temperature (°C): **As-read** AMB **Corr. Factor** CF +1.5 CF +0.9 **Corrected** AMB

Date and initials of person examining contents:

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: Air	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☐Yes ☐No ☑N/A	
Cyanide water sample checks: N/A		
Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☑No ☐N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Alice Date: 1/26/17

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AIR: CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

L0236723

26808

Page: 1 of 1

Section A Required Client Information:
Company: Terranext
Address:
Email To:
Phone: Fax:
Requested Due Date/TAT:

Section B Required Project Information:
Report To:
Copy To:
Purchase Order No.:
Project Name: Sac & Fox
Project Number:

Section C Invoice Information:
Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager/Sales Rep.: Alice Spiller
Pace Profile #:

Program: X UST, Superfund, Emissions, Clean Air Act, Voluntary Clean Up, Dry Clean, RCRA, Other
Location of Sampling by State: KS
Reporting Units: µg/m³, mg/m³, PPBV, PPMV, Other
Report Level: II., III., IV., Other

Valid Media Codes: MEDIA / CODE — Tedlar Bag: TB; 1 Liter Summa Can: 1LC; 6 Liter Summa Can: 6LC; Low Volume Puff: LVP; High Volume Puff: HVP; Other: PM10

ITEM #	*Section D Required Client Information AIR SAMPLE ID (Sample IDs MUST BE UNIQUE)	MEDIA CODE	WO Reading (Client only)	COLLECTED Composite Start Date	Composite Start Time	Composite End Date	Composite End Time	Canister Pressure (Initial Field - psig)	Canister Pressure (Final Field - psig)	Summa Can Number	Flow Control Number	Method: PM10	3C - Fixed Gas (%)	TO-3	TO-3M (Methane)	TO-4 (PCBs)	TO-13 (PAH)	TO-14	TO-15	TO15 Short List*	Pace Lab ID
1	SV1 - 3ft	6LC		1/24/17	1442	1/24/17	1512	28.2	8.2	1575	1250								X	X	001
2	SV1 - 6ft				1530		1600	29.2	8.3	0224	0894										002
3	SV2 - 3ft				1451		1521	27.1	7.1	0081	2821										003
4	SV2 - 6ft				1514		1546	28.1	6.2	1525	1244										004
5	SV3 - 3ft				1548		1615 ~~1548~~ MW	28.0	8.3	0093	2845										005
6																					
7																					
8																					
9																					
10																					
11																					
12																					

Comments:
* BTEX, Naph, MTBE, TPH-GRO

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
MPW / Terranext	1/25/17	1632	[signature] / Pace	1/25/17	1632

SAMPLE CONDITIONS: Temp in °C; Received on Ice Y/N; Custody Sealed Cooler Y/N; Samples Intact Y/N

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Meredith Watson
SIGNATURE of SAMPLER: [signature] DATE Signed (MM / DD / YY): 01/24/17

ORIGINAL

1700 Elm Street SE, Suite 200, Minneapolis, MN 55414 Air Technical Phone: 612.607.6386

1/24/17 Sac & Fox MPW

1255 Collect South Wall sample (PID = 2,598)

1300 Collect East Wall sample (485 ppm)

1345 Temporary soil vapor sampling points installed at 3ft and 6ft at locations SV1 and SV2 south of site building (~4.5 ft from wall). RAZEK offsite. Terranext offsite for additional parts.

1440 Start setting up to collect soil vapor samples using Summa canisters equipped with flow controller (200 mL/min) and an in-line particulate filter.

1630 Soil vapor sampling complete. Offsite. Collected duplicate of SV2-6ft labled SV3-3ft.

Soil Vapor Sample	"Hg to "Hg		6-L Can #	Time sample End
SV1-3'	28.2	8.2	1575	1512
SV1-6'	29.2	8.3	0224	1600
SV2-3'	27.1	7.1	0081	1521
SV2-6'	28.1	6.2	1525	1546
SV2-6' (dup)	28.0	8.3	0093	1618

MPW MPW