



September 21, 2012
04130511.R02

City of Tucson - Environmental Services
P.O. Box 27210
Tucson, AZ 85726-7210

Attn: Mr. Richard Byrd

Subject: Soil-Vapor Extraction Pilot Test
City of Tucson Fire and Police Headquarters
265 South Church Avenue, Tucson, Arizona 85714
Facility ID: 0-005176, LUST No. 3208.01

Cardno ERI
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Scottsdale, AZ 85258
USA

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www.cardnoeri.com

Mr. Byrd:

Cardno ERI is submitting a summary report for a SVE pilot test conducted August 23, 2012. The objective of the pilot test was to evaluate the effectiveness of SVE to facilitate accomplishing petroleum hydrocarbon source removal in the vadose zone and accelerated environmental case closure.

Summary of Field Activities

August 23, 2012.

Cardno ERI personnel and equipment were onsite to conduct a 7.25-hour SVE pilot test. The equipment used for the event included a trailer-mounted 5.0 horsepower electric positive displacement blower with two, 400-pound VPC vessels in series for process stream abatement. A trailer-mounted diesel generator supplied electricity for the blower.

The SVE trailer and generator were positioned near the existing remediation compound. Vacuum was applied to wells 523A, 524A, DIW, and DIE through the existing manifold. Operating conditions of the blower system were monitored with bimetal thermometers, pressure gauges, Magnehelic anemometers, and digital anemometers. An average vacuum of 81 inches water column was maintained during the HIT event. Vapor extraction rates ranged from 75 scfm to 83 scfm with an average of 78 scfm over the 7.25 hours.

The vapor stream was advanced through VPC abatement vessels and monitored for VOC content using a PID. Operating conditions and vapor monitoring results are presented in Table 1.

Influent vapor samples were collected in Tedlar bags and submitted to TestAmerica, a City-approved laboratory for analysis of TPH and BTEX at the beginning, middle, and end of the pilot test. Table 2 summarizes the results

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reported by TestAmerica. Table 3 TPH and BTEX mass removal based on reported concentrations and measured flow rates.

Wells DIE and DIW were monitored for induced vacuum during extraction through wells 523A and 524A to estimate a radius of influence (ROI). Groundwater elevation in vapor extraction wells 523A and 524A measured before and after the pilot test. Table 4 present the induced vacuum and groundwater elevation data.

Results and Discussion

SVE successfully removed approximately 86 pounds (14.3 gallons) of TPH and 0.62 pounds of benzene during the 7.25 hour pilot test. The TPH removal through SVE in this 7.25 hour pilot test exceeded the total estimated removal during the previous 2 years using pump and treat.

A ROI cannot be estimated due to lack of induced vacuum in wells DIE and DIW. The vapor extraction and vacuum monitoring wells we not screened at the same intervals. Varying soil types with depth may have prevented vacuum influence between the wells.

Groundwater elevation in wells 523A and 524A increase approximately 72" and 65", respectively. Assuming the increase was due to applied vacuum, the soils in the areas of the wells are likely fine, restricting vapor flow.

Heterogeneous soils at the site make remedial modeling and predictions difficult. However, based on the success of SVE in the location of the suspected release, efficient source removal will likely be achievable with SVE remediation. Groundwater pump and treat may also be utilized for vadose zone exposure to support SVE, not primary remediation.

Recommendations

Cardno ERI recommends the following:

Installation of a SVE System

A SVE system with catalytic oxidation is recommended. The system can be connected to existing wells through existing process piping. Based on the TPH concentrations reported during the pilot test, GAC will not be a cost effective initial abatement alternative. GAC will be considered when TPH concentrations decrease and become asymptotic.

Equipment costs for catalytic oxidation systems have historically been high, however, a surplus of unused equipment has reduced the cost. The equipment cost reduction, along the existing presence of available three phase power at the equipment compound should result in a cost effective system installation.

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Connection of Well 518A to the System

Manual bailing of up gradient well 518A has been occurring since NAPL appearance in 2010. Connection to the system is recommended to prevent continued petroleum hydrocarbon transport along what is likely a less-permeable soil lens. Significant precautions will be required for the connection to avoid utility damage and disruption to surrounding operations.

Air Sweep Assessment

Wells that are connected to the SVE system and contain NAPL should be evaluated for air sweep. Air sweep may effectively accelerate hydrocarbon volatilization in some wells, at no additional cost to operate and low cost to install.

LPH Bailing

Wells containing LPH and not connected to the SVE system should be manually bailed, in association with other onsite activities.

Remediation System Operations and Maintenance (O&M)

Cardno ERI recommends weekly O&M during the first three months of system operation. System operating conditions will be monitored and adjustment made. Data and notes will be stored onsite and electronically to assist with identifying trends and ease of data reference.

Site visit frequency should be evaluated after three months. Less frequent visits may be possible, based on consistency of system operations.

LPH bailing and O&M events will be coordinated and scheduled, to the greatest extent possible, with other work near the site to avoid travel expenses.

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Please feel free to call me at (480) 813-4526 or email me at matt.tomanek@cardno.com with any questions or comments.

Respectfully submitted,



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Senior Consultant
for Cardno ERI
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Enclosures:

Acronym List

Figure 1: Site Vicinity Map

Figure 2: Generalized Site Plan

Table 1: Pilot Test Operating Conditions

Table 2: Extracted Vapor Analytical Results

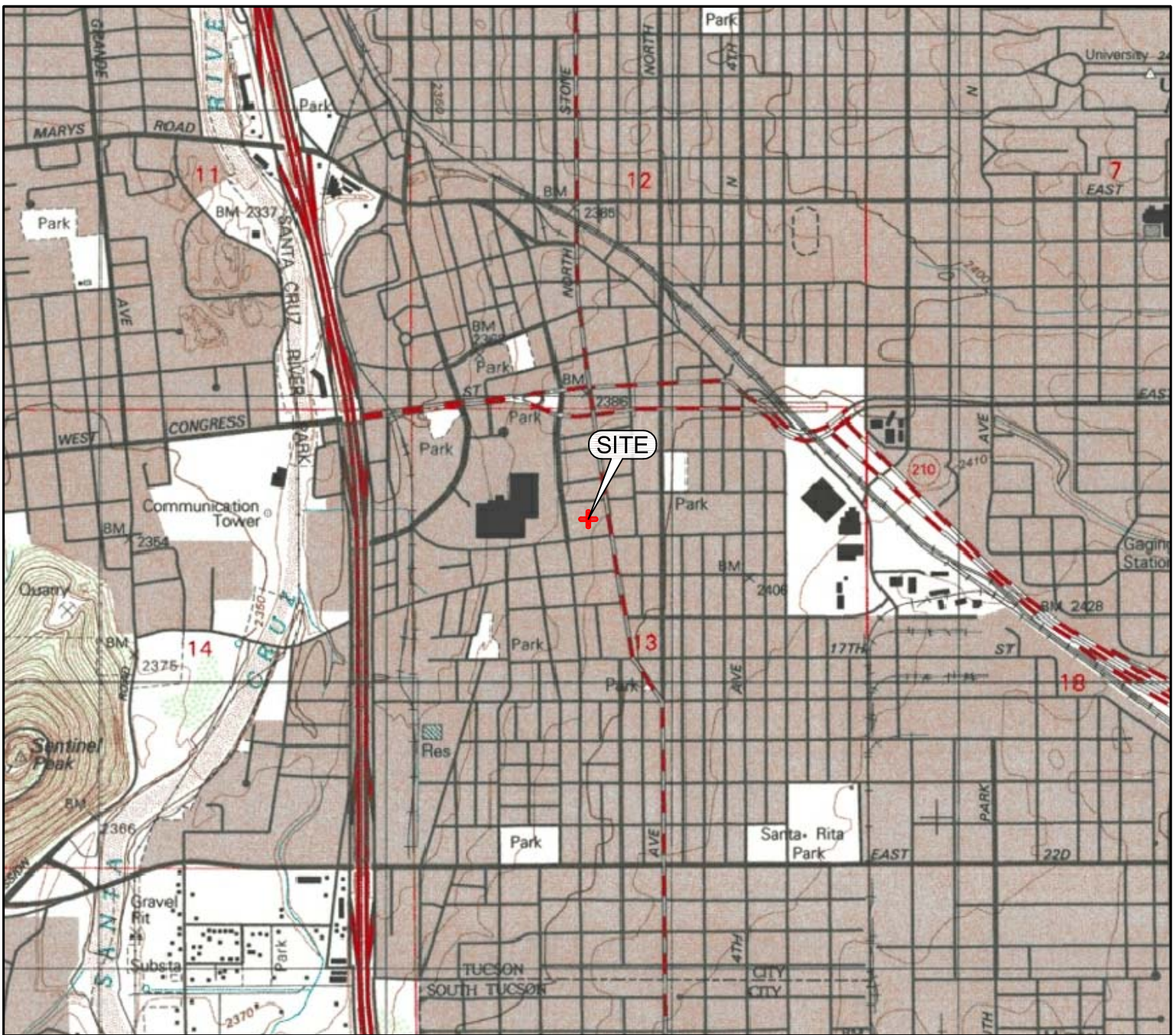
Table 3: Petroleum Hydrocarbon Mass Removal

Table 4: Extraction and Observation Well Data

Appendix A: Laboratory Analytical Reports and Chain-of-Custody Records

ACRONYM LIST

µg/L	Micrograms per liter	NEPA	National Environmental Policy Act
µs	Microsiemens	NGVD	National Geodetic Vertical Datum
1,2-DCA	1,2-dichloroethane	NPDES	National Pollutant Discharge Elimination System
acfm	Actual cubic feet per minute	O&M	Operations and Maintenance
AS	Air sparge	ORP	Oxidation-reduction potential
bgs	Below ground surface	OSHA	Occupational Safety and Health Administration
BTEX	Benzene, toluene, ethylbenzene, and total xylenes	OVA	Organic vapor analyzer
CEQA	California Environmental Quality Act	P&ID	Process & Instrumentation Diagram
cfm	Cubic feet per minute	PAH	Polycyclic aromatic hydrocarbon
COC	Chain of Custody	PCB	Polychlorinated biphenyl
CPT	Cone Penetration (Penetrometer) Test	PCE	Tetrachloroethene or perchloroethylene
DIPE	Di-isopropyl ether	PID	Photo-ionization detector
DO	Dissolved oxygen	PLC	Programmable logic control
DOT	Department of Transportation	POTW	Publicly owned treatment works
DPE	Dual-phase extraction	ppmv	Parts per million by volume
DTW	Depth to water	PQL	Practical quantitation limit
EDB	1,2-dibromoethane	psi	Pounds per square inch
EPA	Environmental Protection Agency	PVC	Polyvinyl chloride
ESL	Environmental screening level	QA/QC	Quality assurance/quality control
ETBE	Ethyl tertiary butyl ether	RBSL	Risk-based screening levels
FID	Flame-ionization detector	RCRA	Resource Conservation and Recovery Act
fpm	Feet per minute	RL	Reporting limit
GAC	Granular activated carbon	scfm	Standard cubic feet per minute
gpd	Gallons per day	SSTL	Site-specific target level
gpm	Gallons per minute	STLC	Soluble threshold limit concentration
GWPTS	Groundwater pump and treat system	SVE	Soil vapor extraction
HVOC	Halogenated volatile organic compound	SVOC	Semivolatile organic compound
J	Estimated value between MDL and PQL (RL)	TAME	Tertiary amyl methyl ether
LEL	Lower explosive limit	TBA	Tertiary butyl alcohol
LPC	Liquid-phase carbon	TCE	Trichloroethene
LRP	Liquid-ring pump	TOC	Top of well casing elevation; datum is msl
LUFT	Leaking underground fuel tank	TOG	Total oil and grease
LUST	Leaking underground storage tank	TPHd	Total petroleum hydrocarbons as diesel
MCL	Maximum contaminant level	TPHg	Total petroleum hydrocarbons as gasoline
MDL	Method detection limit	TPHmo	Total petroleum hydrocarbons as motor oil
mg/kg	Milligrams per kilogram	TPHs	Total petroleum hydrocarbons as stoddard solvent
mg/L	Milligrams per liter	TRPH	Total recoverable petroleum hydrocarbons
mg/m ³	Milligrams per cubic meter	UCL	Upper confidence level
MPE	Multi-phase extraction	USCS	Unified Soil Classification System
MRL	Method reporting limit	USGS	United States Geologic Survey
msl	Mean sea level	UST	Underground storage tank
MTBE	Methyl tertiary butyl ether	VCP	Voluntary Cleanup Program
MTCA	Model Toxics Control Act	VOC	Volatile organic compound
NAI	Natural attenuation indicators	VPC	Vapor-phase carbon
NAPL	Non-aqueous phase liquid		

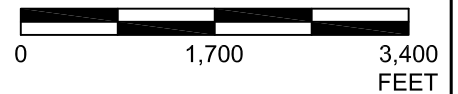


EXPLANATION

SOURCE: Modified from a map provided by USGS 7.5 minute series



APPROXIMATE SCALE



FN 041305ESA_TOPO



SITE VICINITY MAP

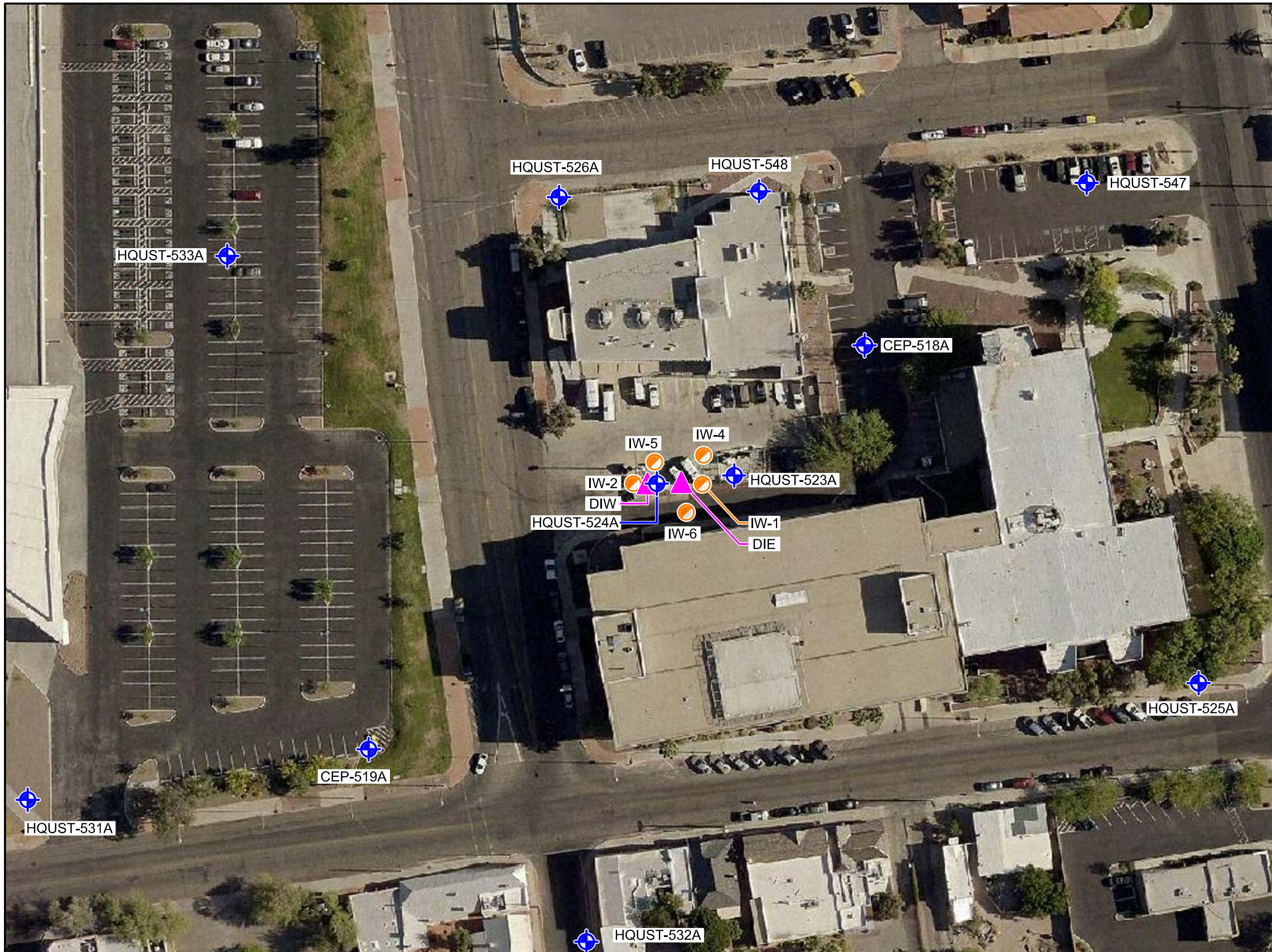
CITY OF TUCSON FIRE & POLICE HEADQUARTERS
 265 South Church Avenue
 Tucson, Arizona

PROJECT NO.

041305

FIGURE

1



LEGEND

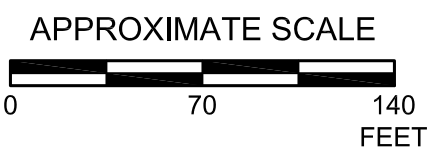
HQUST-533A

Groundwater monitoring well

DIW Soil vapor extraction well

IW-6 SVE/Injection well

SOURCE: Modified from a map provided by Pima County



FN 041305GSP2



GENERALIZED SITE PLAN

CITY OF TUCSON FIRE & POLICE HEADQUARTERS
265 South Church Avenue
Tucson, Arizona

PROJECT NO.

041305

FIGURE

2

TABLE 1
PILOT TEST OPERATING CONDITIONS

265 South Church Avenue

Tucson, Arizona

(Page 1 of 1)

Time	Operation Conditions						
	Extraction Well	VOC (ppmv)	Vacuum (Inches H ₂ O)	Temp (Deg. F)	Velocity (fpm)	Flow Rate (scfm)	Tedlar (Y/N)
10:00	523A, 524A	2,189	81	94	930	78	Y
11:45	523A, 524A	1,365	79	99	1000	83	N
13:00	523A, 524A	1,439	80	91	935	79	Y
15:00	523A, 524A, DIW, DIE	385	82	100	910	75	N
16:00	523A, 524A	362	81	96	930	77	Y
Average	---	1,148	81	96	941	78	---

Notes

--- = not available due to exceedance of LEL monitoring capability

Deg. F = degrees Fahrenheit

fpm = feet per minute

scfm = standard cubic feet per minute

VOC concentrations reported by PID

TABLE 2
EXTRACTED VAPOR ANALYTICAL RESULTS
265 South Church Avenue
Tucson, Arizona
(Page 1 of 1)

Sample ID	Date	Time	Influent (ppmv)					Influent (mg/m ³)				
			B	T	E	X	TPH	B	T	E	X	TPH
V-INF-1	8/23/2012	10:00	<1.6	<2.6	<2.3	8.9	8,200	<5.0	<10	<10	39	33,000
V-INF-2	8/23/2012	13:00	140	43	7.5	33	12,000	440	160	32	140	48,000
V-INF-3	8/23/2012	16:00	130	36	6.4	25	9,100	400	130	28	110	37,000

Notes:

ppmv = part per million by volume

B = Benzene

T = Toluene

E = Ethylbenzene

X = Total Xylenes

TPH = Total petroleum hydrocarbons

TABLE 3
PETROLEUM HYDROCARBON MASS REMOVAL
 265 South Church Avenue
 Tucson, Arizona
 (Page 1 of 1)

Time	Flow (SCFM)	Hydrocarbon Concentration (ppmv)					Lb TPH		Lb Benzene		Lb Toluene		Lb EthylBenzene		Lb Xylenes	
		TPH	B	T	E	X	Average per Hour	Average per Day	Average per Hour	Average per Day	Average per Hour	Average per Day	Average per Hour	Average per Day	Average per Hour	Average per Day
10:00	78	8,200	<1.6	<2.6	<2.3	8.9	9.9	240	1.5E-03	3.6E-02	2.9E-03	6.9E-02	3.0E-03	7.1E-02	1.1E-02	2.7E-01
13:00	79	12,000	140	43	7.5	33	15	350	1.3E-01	3.2E+00	4.8E-02	1.2E+00	9.8E-03	2.3E-01	4.3E-02	1.0E+00
16:00	77	9,100	130	36	6.4	25	11	260	1.2E-01	2.9E+00	3.9E-02	9.4E-01	8.1E-03	1.9E-01	3.2E-02	7.6E-01
Average	78	9800	91	27	5.4	22	12	280	0.086	2.1	0.030	0.72	0.0069	0.17	0.029	0.69

Total Hydrocarbon Removal During Pilot Test (Lb)

TPH	B	T	E	X
86	0.62	0.22	0.050	0.21

TABLE 4
EXTRACTION AND OBSERVATION WELL DATA
 265 South Church Avenue
 Tucson, Arizona
 (Page 1 of 1)

Well	Time	Vacuum (inches H ₂ O)	Applied Vacuum (inches H ₂ O)	Dist. From Vac Well (feet)	Depth to Water (feet below surface)
523A	8:20	---	0	---	64.43
523A	11:00	77	78	---	NT
523A	13:00	79	80	---	NT
523A	13:40	80	80	---	NT
523A	15:50	81	81	---	58.44
524A	8:20	---	0	---	63.59
524A	11:00	78	78	---	NT
524A	13:00	80	80	---	NT
524A	13:40	80	80	---	NT
524A	15:50	81	81	---	58.21
DIE	8:20	---	---	13' 6"	Dry
DIE	11:00	0.0	---	13' 6"	NT
DIE	13:00	0.0	---	13' 6"	NT
DIE	13:40	0.0	---	13' 6"	NT
DIE	15:50	0.0	---	13' 6"	Dry
DIW	8:20	---	---	15' 7"	Dry
DIW	11:00	0	---	15' 7"	NT
DIW	13:00	0	---	15' 7"	NT
DIW	13:40	0	---	15' 7"	NT
---	15:50	---	---	---	---

Notes:

--- = not determined/not applicable/not available

Dist. = Distance

LPH = Liquid Phase Hydrocarbons

NT = Not Tested

APPENDIX A

**LABORATORY ANALYTICAL REPORTS AND
CHAIN-OF-CUSTODY RECORDS**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Center Blvd. Ste 189

Phoenix, AZ 85040

Tel: (602) 437-3340

TestAmerica Job ID: PVH1901

Client Project/Site: COT Fire and Police Headquarters

Client Project Description: TCC / HQUST Air

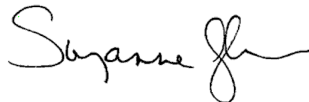
For:

City of Tucson Environmental Services

255 W. Alameda, Sixth floor

Tucson, AZ 85701

Attn: Richard Byrd



Authorized for release by:

9/6/2012 4:36:34 PM

Suzanne Glass

Project Manager

suzanne.glass@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: City of Tucson Environmental Services
Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Qualifiers

GC Volatiles

Qualifier	Qualifier Description
T3	Method not promulgated either by EPA or ADHS.
R9	Sample RPD exceeded the laboratory acceptance limit

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: City of Tucson Environmental Services
Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Job ID: PVH1901

Laboratory: TestAmerica Phoenix

Narrative

SAMPLE RECEIPT: Samples were received intact, at 20 °C, on ice and with chain of custody documentation.

HOLDING TIMES: All samples were analyzed within prescribed holding times and/or in accordance with the TestAmerica Sample Acceptance Policy unless otherwise noted in the report.

PRESERVATION: Samples requiring preservation were verified prior to sample analysis.

QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.

COMMENTS: No significant observations were made.

SUBCONTRACTED: No analyses were subcontracted to an outside laboratory.

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Detection Summary

Client: City of Tucson Environmental Services
 Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Client Sample ID: V-INF-1

Lab Sample ID: PVH1901-01

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Xylenes	39	T3	15		mg/m ³	10		EPA 8015D/8021B	Total
Total Xylenes	8.9	T3	3.4		ppmv	10		EPA 8015D/8021B	Total
Volatile Fuel Hydrocarbons	33000	T3	2000		mg/m ³	10		EPA 8015D/8021B	Total
Volatile Fuel Hydrocarbons	8200	T3	490		ppmv	10		EPA 8015D/8021B	Total

Client Sample ID: V-INF-2

Lab Sample ID: PVH1901-02

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene - RE1	440	T3	10		mg/m ³	20		EPA 8015D/8021B	Total
Benzene - RE1	140	T3	3.1		ppmv	20		EPA 8015D/8021B	Total
Toluene - RE1	160	T3	20		mg/m ³	20		EPA 8015D/8021B	Total
Toluene - RE1	43	T3	5.3		ppmv	20		EPA 8015D/8021B	Total
Ethylbenzene - RE1	32	T3	20		mg/m ³	20		EPA 8015D/8021B	Total
Ethylbenzene - RE1	7.5	T3	4.6		ppmv	20		EPA 8015D/8021B	Total
Total Xylenes - RE1	140	T3	30		mg/m ³	20		EPA 8015D/8021B	Total
Total Xylenes - RE1	33	T3	6.9		ppmv	20		EPA 8015D/8021B	Total
Volatile Fuel Hydrocarbons - RE1	48000	T3	4000		mg/m ³	20		EPA 8015D/8021B	Total
Volatile Fuel Hydrocarbons - RE1	12000	T3	980		ppmv	20		EPA 8015D/8021B	Total

Client Sample ID: V-INF-3

Lab Sample ID: PVH1901-03

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene - RE1	400	T3	10		mg/m ³	20		EPA 8015D/8021B	Total
Benzene - RE1	130	T3	3.1		ppmv	20		EPA 8015D/8021B	Total
Toluene - RE1	130	T3	20		mg/m ³	20		EPA 8015D/8021B	Total
Toluene - RE1	36	T3	5.3		ppmv	20		EPA 8015D/8021B	Total
Ethylbenzene - RE1	28	T3 R9	20		mg/m ³	20		EPA 8015D/8021B	Total
Ethylbenzene - RE1	6.4	T3 R9	4.6		ppmv	20		EPA 8015D/8021B	Total
Total Xylenes - RE1	110	T3 R9	30		mg/m ³	20		EPA 8015D/8021B	Total
Total Xylenes - RE1	25	T3 R9	6.9		ppmv	20		EPA 8015D/8021B	Total
Volatile Fuel Hydrocarbons - RE1	37000	T3	4000		mg/m ³	20		EPA 8015D/8021B	Total
Volatile Fuel Hydrocarbons - RE1	9100	T3	980		ppmv	20		EPA 8015D/8021B	Total

Client Sample Results

Client: City of Tucson Environmental Services
 Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Client Sample ID: V-INF-1

Lab Sample ID: PVH1901-01

Date Collected: 08/23/12 10:00

Matrix: Air

Date Received: 08/24/12 08:47

Sample Container: Tedlar Bag

Method: EPA 8015D/8021B - VOLATILE FUEL HYDROCARBONS WITH BTEX (EPA 5030B/8015D/8021B)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND	T3	5.0		mg/m ³		08/24/12 11:00	08/24/12 11:27	10
Benzene	ND	T3	1.6		ppmv		08/24/12 11:00	08/24/12 11:27	10
Toluene	ND	T3	10		mg/m ³		08/24/12 11:00	08/24/12 11:27	10
Toluene	ND	T3	2.6		ppmv		08/24/12 11:00	08/24/12 11:27	10
Ethylbenzene	ND	T3	10		mg/m ³		08/24/12 11:00	08/24/12 11:27	10
Ethylbenzene	ND	T3	2.3		ppmv		08/24/12 11:00	08/24/12 11:27	10
Total Xylenes	39	T3	15		mg/m ³		08/24/12 11:00	08/24/12 11:27	10
Total Xylenes	8.9	T3	3.4		ppmv		08/24/12 11:00	08/24/12 11:27	10
Volatile Fuel Hydrocarbons	33000	T3	2000		mg/m ³		08/24/12 11:00	08/24/12 11:27	10
Volatile Fuel Hydrocarbons	8200	T3	490		ppmv		08/24/12 11:00	08/24/12 11:27	10

Client Sample ID: V-INF-2

Lab Sample ID: PVH1901-02

Date Collected: 08/23/12 13:00

Matrix: Air

Date Received: 08/24/12 08:47

Method: EPA 8015D/8021B - VOLATILE FUEL HYDROCARBONS WITH BTEX (EPA 5030B/8015D/8021B) - RE1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	440	T3	10		mg/m ³		08/24/12 12:30	08/24/12 13:04	20
Benzene	140	T3	3.1		ppmv		08/24/12 12:30	08/24/12 13:04	20
Toluene	160	T3	20		mg/m ³		08/24/12 12:30	08/24/12 13:04	20
Toluene	43	T3	5.3		ppmv		08/24/12 12:30	08/24/12 13:04	20
Ethylbenzene	32	T3	20		mg/m ³		08/24/12 12:30	08/24/12 13:04	20
Ethylbenzene	7.5	T3	4.6		ppmv		08/24/12 12:30	08/24/12 13:04	20
Total Xylenes	140	T3	30		mg/m ³		08/24/12 12:30	08/24/12 13:04	20
Total Xylenes	33	T3	6.9		ppmv		08/24/12 12:30	08/24/12 13:04	20
Volatile Fuel Hydrocarbons	48000	T3	4000		mg/m ³		08/24/12 12:30	08/24/12 13:04	20
Volatile Fuel Hydrocarbons	12000	T3	980		ppmv		08/24/12 12:30	08/24/12 13:04	20

Client Sample ID: V-INF-3

Lab Sample ID: PVH1901-03

Date Collected: 08/23/12 16:00

Matrix: Air

Date Received: 08/24/12 08:47

Method: EPA 8015D/8021B - VOLATILE FUEL HYDROCARBONS WITH BTEX (EPA 5030B/8015D/8021B) - RE1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	400	T3	10		mg/m ³		08/24/12 13:00	08/24/12 13:34	20
Benzene	130	T3	3.1		ppmv		08/24/12 13:00	08/24/12 13:34	20
Toluene	130	T3	20		mg/m ³		08/24/12 13:00	08/24/12 13:34	20
Toluene	36	T3	5.3		ppmv		08/24/12 13:00	08/24/12 13:34	20
Ethylbenzene	28	T3 R9	20		mg/m ³		08/24/12 13:00	08/24/12 13:34	20
Ethylbenzene	6.4	T3 R9	4.6		ppmv		08/24/12 13:00	08/24/12 13:34	20
Total Xylenes	110	T3 R9	30		mg/m ³		08/24/12 13:00	08/24/12 13:34	20
Total Xylenes	25	T3 R9	6.9		ppmv		08/24/12 13:00	08/24/12 13:34	20
Volatile Fuel Hydrocarbons	37000	T3	4000		mg/m ³		08/24/12 13:00	08/24/12 13:34	20
Volatile Fuel Hydrocarbons	9100	T3	980		ppmv		08/24/12 13:00	08/24/12 13:34	20

QC Sample Results

Client: City of Tucson Environmental Services
 Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Method: EPA 8015D/8021B - VOLATILE FUEL HYDROCARBONS WITH BTEX (EPA 5030B/8015D/8021B)

Lab Sample ID: 12H1072-BLK1
Matrix: Air
Analysis Batch: 12H1072

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 12H1072_P

Analyte	Blank		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Benzene	ND	T3	0.16		ppmv		08/24/12 00:00	08/24/12 10:55	1.00
Toluene	ND	T3	0.26		ppmv		08/24/12 00:00	08/24/12 10:55	1.00
Ethylbenzene	ND	T3	0.23		ppmv		08/24/12 00:00	08/24/12 10:55	1.00
Total Xylenes	ND	T3	0.34		ppmv		08/24/12 00:00	08/24/12 10:55	1.00
Volatile Fuel Hydrocarbons	ND	T3	49		ppmv		08/24/12 00:00	08/24/12 10:55	1.00

Lab Sample ID: 12H1072-BS1
Matrix: Air
Analysis Batch: 12H1072

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 12H1072_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Toluene	5.31	4.95	T3	ppmv		93	76 - 124
Ethylbenzene	4.61	4.39	T3	ppmv		95	76 - 125
Total Xylenes	13.8	13.3	T3	ppmv		96	75 - 126

Lab Sample ID: 12H1072-BS2
Matrix: Air
Analysis Batch: 12H1072

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 12H1072_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits

Lab Sample ID: 12H1072-BSD1
Matrix: Air
Analysis Batch: 12H1072

Client Sample ID: Lab Control Sample Dup
Prep Type: Total
Prep Batch: 12H1072_P

Analyte	Spike Added	LCS Dup Result	LCS Dup Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	
								RPD	Limit
Benzene	6.26	5.82	T3	ppmv		93	73 - 122	1	22
Toluene	5.31	5.03	T3	ppmv		95	76 - 124	2	22
Ethylbenzene	4.61	4.46	T3	ppmv		97	76 - 125	2	23
Total Xylenes	13.8	13.6	T3	ppmv		99	75 - 126	2	22

Lab Sample ID: 12H1072-BSD2
Matrix: Air
Analysis Batch: 12H1072

Client Sample ID: Lab Control Sample Dup
Prep Type: Total
Prep Batch: 12H1072_P

Analyte	Spike Added	LCS Dup Result	LCS Dup Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	
								RPD	Limit
Volatile Fuel Hydrocarbons	122	131	T3	ppmv		107	70 - 130	2	22

Lab Sample ID: 12H1072-DUP1
Matrix: Air
Analysis Batch: 12H1072

Client Sample ID: V-INF-3
Prep Type: Total
Prep Batch: 12H1072_P

Analyte	Sample		Duplicate		Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
Benzene	401	T3	358	T3	mg/m ³		11	20
Benzene	126	T3	112	T3	ppmv		11	20
Toluene	134	T3	113	T3	mg/m ³		17	20
Toluene	35.6	T3	30.0	T3	ppmv		17	20

QC Sample Results

Client: City of Tucson Environmental Services
 Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Method: EPA 8015D/8021B - VOLATILE FUEL HYDROCARBONS WITH BTEX (EPA 5030B/8015D/8021B) (Continued)

Lab Sample ID: 12H1072-DUP1

Matrix: Air

Analysis Batch: 12H1072

Client Sample ID: V-INF-3

Prep Type: Total

Prep Batch: 12H1072_P

Analyte	Sample		Duplicate		Unit	D	RPD	
	Result	Qualifier	Result	Qualifier			RPD	Limit
Ethylbenzene	27.8	T3 R9	21.8	T3 R9	mg/m ³		24	20
Ethylbenzene	6.40	T3 R9	5.02	T3 R9	ppmv		24	20
Total Xylenes	110	T3 R9	82.3	T3 R9	mg/m ³		29	20
Total Xylenes	25.3	T3 R9	19.0	T3 R9	ppmv		29	20
Volatile Fuel Hydrocarbons	37000	T3	33300	T3	mg/m ³		11	20
Volatile Fuel Hydrocarbons	9060	T3	8150	T3	ppmv		11	20

QC Association Summary

Client: City of Tucson Environmental Services
 Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

GC Volatiles

Analysis Batch: 12H1072

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
12H1072-BLK1	Method Blank	Total	Air	EPA 8015D/8021B	12H1072_P
12H1072-BS1	Lab Control Sample	Total	Air	EPA 8015D/8021B	12H1072_P
12H1072-BS2	Lab Control Sample	Total	Air	EPA 8015D/8021B	12H1072_P
12H1072-BSD1	Lab Control Sample Dup	Total	Air	EPA 8015D/8021B	12H1072_P
12H1072-BSD2	Lab Control Sample Dup	Total	Air	EPA 8015D/8021B	12H1072_P
12H1072-DUP1	V-INF-3	Total	Air	EPA 8015D/8021B	12H1072_P
PVH1901-01	V-INF-1	Total	Air	EPA 8015D/8021B	12H1072_P
PVH1901-02 - RE1	V-INF-2	Total	Air	EPA 8015D/8021B	12H1072_P
PVH1901-03 - RE1	V-INF-3	Total	Air	EPA 8015D/8021B	12H1072_P

Prep Batch: 12H1072_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
12H1072-BLK1	Method Blank	Total	Air	EPA 5030 BTEX	
12H1072-BS1	Lab Control Sample	Total	Air	EPA 5030 BTEX	
12H1072-BS2	Lab Control Sample	Total	Air	EPA 5030 BTEX	
12H1072-BSD1	Lab Control Sample Dup	Total	Air	EPA 5030 BTEX	
12H1072-BSD2	Lab Control Sample Dup	Total	Air	EPA 5030 BTEX	
12H1072-DUP1	V-INF-3	Total	Air	EPA 5030 BTEX	
PVH1901-01	V-INF-1	Total	Air	EPA 5030 BTEX	
PVH1901-02 - RE1	V-INF-2	Total	Air	EPA 5030 BTEX	
PVH1901-03 - RE1	V-INF-3	Total	Air	EPA 5030 BTEX	

Lab Chronicle

Client: City of Tucson Environmental Services
 Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Client Sample ID: V-INF-1

Lab Sample ID: PVH1901-01

Date Collected: 08/23/12 10:00

Matrix: Air

Date Received: 08/24/12 08:47

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Prep	EPA 5030 BTEX		1.0	12H1072_P	08/24/12 11:00	J H	TAL PHX
Total	Analysis	EPA 8015D/8021B		10	12H1072	08/24/12 11:27	J H	TAL PHX

Client Sample ID: V-INF-2

Lab Sample ID: PVH1901-02

Date Collected: 08/23/12 13:00

Matrix: Air

Date Received: 08/24/12 08:47

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Prep	EPA 5030 BTEX	RE1	1.0	12H1072_P	08/24/12 12:30	J H	TAL PHX
Total	Analysis	EPA 8015D/8021B	RE1	20	12H1072	08/24/12 13:04	J H	TAL PHX

Client Sample ID: V-INF-3

Lab Sample ID: PVH1901-03

Date Collected: 08/23/12 16:00

Matrix: Air

Date Received: 08/24/12 08:47

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Prep	EPA 5030 BTEX	RE1	1.0	12H1072_P	08/24/12 13:00	J H	TAL PHX
Total	Analysis	EPA 8015D/8021B	RE1	20	12H1072	08/24/12 13:34	J H	TAL PHX

Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Center Blvd. Ste 189, Phoenix, AZ 85040, TEL (602) 437-3340

Certification Summary

Client: City of Tucson Environmental Services
Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Laboratory: TestAmerica Phoenix

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
AIHA - LAP	IHLAP		154268	07-01-13
Arizona	State Program	9	AZ0728	06-09-13
California	NELAC	9	01109CA	11-30-12
Nevada	State Program	9	AZ01030	09-30-12
New York	NELAC	2	11898	04-01-13
Oregon	NELAC	10	AZ100001	03-08-13
USDA	Federal		P330-09-00024	09-14-13

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Method Summary

Client: City of Tucson Environmental Services
Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Method	Method Description	Protocol	Laboratory
EPA 8015D/8021B	VOLATILE FUEL HYDROCARBONS WITH BTEX (EPA 5030B/8015D/8021B)		TAL PHX

Protocol References:

Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Center Blvd. Ste 189, Phoenix, AZ 85040, TEL (602) 437-3340

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Sample Summary

Client: City of Tucson Environmental Services
Project/Site: COT Fire and Police Headquarters

TestAmerica Job ID: PVH1901

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
PVH1901-01	V-INF-1	Air	08/23/12 10:00	08/24/12 08:47
PVH1901-02	V-INF-2	Air	08/23/12 13:00	08/24/12 08:47
PVH1901-03	V-INF-3	Air	08/23/12 16:00	08/24/12 08:47

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TestAmerica

CHAIN OF CUSTODY FORM

TAL-0013-550 (10/10)

THE LEADER IN ENVIRONMENTAL TESTING

Client Name/Address: City of Tucson
260 South Stone Ave, Tucson, AZ

Project Manager: Richard Byrd

Project/PO Number: DOT Fine and Polvere Headquarters

Phone Number: 520-409-8900
Fax Number:

[] Phoenix - 4625 E. Cotton Center Blvd., Suite 189, Phoenix, AZ 85040 (602) 437-3340 FAX (602) 454-9303
 [] Tucson - 1870 W. Prince Road, Suite 59, Tucson, AZ 85705 (520) 807-3801 FAX (520) 807-3803
 [] Las Vegas - 6000 S Eastern Ave., Suite 5E, Las Vegas, NV 89119 (702) 429-1264

Page _____ of _____

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	Analysis Required	Special Instructions
V-INF-1	Air		1	8/23/12	10:00	None	8015 8021 PUH190-01	CC math Tomarek@cordro.com
V-INF-2	↓		1	↓	13:00	↓	02	Ma H Tomarek w/ Cordro.com
V-INF-3	↓		1	↓	16:00	↓	03	Ma H Tomarek w/ Cordro.com
Relinquished By: _____ Date/Time: _____ Received By: _____ Date/Time: _____ Turnaround Time: (Check) _____ same day _____ 72 hours _____ 24 hours _____ 5 days _____ 48 hours _____ normal _____								
Relinquished By: _____ Date/Time: _____ Received in Lab By: _____ Date/Time: _____ Sample Integrity: (Check) _____ intact _____ on ice <u>NO</u>								

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

2012/Ann