LIMITED SITE INVESTIGATION REPORT
FORMER UNION PACIFIC RAILROAD DEPOT
400 NORTH TOOLE AVENUE
TUCSON, ARIZONA
PARCEL NO. 117-06-081D

Submitted To:
City of Tucson Environmental Services
100 North Stone Avenue
2nd Floor
Tucson, Arizona

Submitted By:
AMEC Earth & Environmental
1405 West Auto Drive
Tempe, Arizona

October 10, 2006

AMEC Job No. 6-114-003038

October 10, 2006
AMEC Job No: 6114003038

City of Tucson
Engineering and Technical Support
100 North Stone Avenue, 2nd Floor
Tucson, Arizona 85701

Attn: David Barraza

Re: Limited Site Investigation Report,
Former Union Pacific Railroad Depot,
400 North Toole Avenue
Tucson, Arizona
Parcel No. 117-06-081d

AMEC Earth & Environmental, Inc. is pleased to present this Limited Site Investigation Report for the above-referenced property in Tucson, Arizona. We appreciate the opportunity to serve you on this project. If you have any questions or desire further information, please feel free to contact us at (480) 940-2320.

Respectfully submitted,

AMEC Earth & Environmental, Inc.

Reviewed by:

Michael L. Daniel, R.G.
Hydrogeologist

Julianne Hamilton, P.G.
Client Service Manager

Attachments

G:\Environmental-Development\2006 Projects\6-114-003038 COT UPRR Phase II ESA\Report\FINAL\SITE CHARACTERIZATION REPORT_UPPR (final).docS

AMEC Earth and Environmental, Inc.
1405 West Auto Drive
Tempe, Arizona 85284-1016
Tel: (480) 940-2320
Fax: (480) 785-0970 www.amec.com

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Mike Daniel, R.G.
Project Manager

Julianne M. Hamilton, P.G
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1.0 INTRODUCTION

AMEC Earth and Environmental, Inc. (AMEC) is pleased to present the following report describing the procedures, methodologies and findings of a limited subsurface site investigation performed at the former Union Pacific Railroad Depot at 400 North Toole Avenue (Site) in Tucson, Arizona (Figure 1). The limited investigation was performed following the Scope of Work detailed in the AMEC Proposal PV06-05-17 (May 25, 2006) and Change Order No. 1 (July 27, 2006). The limited investigation was performed to assist the City of Tucson (COT) with evaluating the current extent of soil contamination on the parcel of land and any potential development constraints that may result from that condition. In addition, the COT requested AMEC to conduct a soil vapor survey to evaluate the potential for vapor intrusion into any new development at the Site that may occur as a result of subsurface contamination.

2.0 SITE DESCRIPTION

The Site is located on the southeast corner of North Toole Avenue and 6th Avenue in Tucson, Arizona in the southwest quarter of the northwest quarter of Section 12, Township 14 South, Range 13 East of the Gila and Salt River Baseline and Meridian (Figure 2). The site is located on the western portion of the parcel, identified as parcel number 117-06-081D in Pima County records.

The predominant land use in the surrounding vicinity of the Site is commercial and light industrial. Adjoining properties include bus stations with fueling facilities, dry cleaners, and auto service stations. The nearest residential area is located approximately ½ mile to the northeast of the Site.

3.0 SITE HISTORY

The Site was originally owned and operated by Southern Pacific Transportation Company since the 1880s until it merged with Union Pacific Railroad (UPRR) in 1996. UPRR sold the current Site property to COT in 1998. Amtrak currently operates a passenger terminal adjacent to the Site.

According to information made available to AMEC from public records and interviews with individuals with knowledge of the Site. The Site consisted of the former UPRR Passenger Depot is located on the eastern portion of the parcel and one of two former fueling facilities was located on the western portion of the parcel. The UPRR Depot contained two 10,000 gallon underground storage tanks (USTs) and two refueling facilities. The USTs were used to store #2 fuel oil from 1965 to 1984. The USTs were located east of 4th Avenue and a refueling facility was located near the USTs. The second fueling facility was located at the Site near the northwest corner of the Site near 6th Avenue and the railroad tracks. The second fueling facility was connected to the USTs east of 4th Avenue via a pipeline that ran adjacent to the railroad tracks. The USTs were removed in 1984 and were reported to have leaked (ERM, 2000).

4.0 LOCAL GEOLOGICAL CONDITIONS

The Site lies within the Basin and Range Physiographic Province in Southeastern Arizona. In this area, mountains generally comprised of crystalline rock separate broad alluvial valleys. Mountains represent upthrown fault blocks from which sediments have been eroded and deposited in basins below. In the centers of these basins, depths to bedrock can exceed 11,000 feet. The Site is located in the Upper Santa Cruz Valley Sub-Basin of the Tucson Active Management Area, a groundwater basin established by state statute.

Subsurface geology beneath the Site is representative of that for the Santa Cruz Valley and Tucson area. In the subsurface, sedimentary units that overlies the bedrock in the area of the Site are: surficial alluvial deposits, the Fort Lowell Formation, the Tinja Beds, and the Pantano Formation (Davidson, 1973). The surficial alluvial deposits are comprised mainly of unconsolidated gravel, sand, and silt ranging in thickness from 5 to 100 feet (ERM, 2000). The Fort Lowell Formation is comprised of unconsolidated to moderately consolidated sands and silt ranging in thickness from 300 to 400 feet throughout the basin (Davidson, 1973). The Tinja Beds is comprised of sandstones and conglomerates to siltstones and mudstones with a maximum thickness of up to 5,000 feet in the center of the basin (Davidson, 1973). The Tinja Beds are further subdivided into upper, middle, and lower units. The Pantano Formation is comprised of consolidated sandstones, conglomerates, and mudstones ranging in thickness up to 6,400 feet (Davidson, 1973).

5.0 LOCAL HYDROEGOLOGY

Based on the ERM Remedial Investigation Report, dated December 2000, groundwater at the Site area occurs in two separate zones: a perched zone and a deeper regional aquifer unit (ERM, 2000). Water on the perched aquifer ranges in thickness from 4 to 20 feet and is encountered at a depth of 61 to 86 feet below ground surface (bgs) at the site while the regional aquifer was encountered at a depth of approximately 165 feet bgs (ERM, 2000). The regional aquifer is located within the Fort Lowell Formation

6.0 SUBSURFACE SOIL INVESTIGATION

As part of the overall preparation for development of the Tucson Warehouse District, the COT Environmental Services Department requested AMEC to evaluate the current environmental condition of this parcel of land and any potential development constraints as a result of such. The evaluation was limited to a zone from ground surface to a total depth of 50 feet bgs. COT agreed to accept responsibility for this portion of the vadose zone that as part of the sale agreement with UPRR. Therefore, AMEC assumed the following prior to commencing field sampling:

- Groundwater would not be encountered in any boring drilled to a total depth of 50 feet bgs.

- Based on the type of material stored in the USTs, #2 fuel oil, that laboratory analysis for soil samples could be limited to gasoline, diesel and oil range petroleum hydrocarbons.
- Since vapor intrusion occurs only when volatile organic compounds are present, the soil vapor sample analysis would be limited to testing for the presence of volatile organic compounds.

The results of the evaluation may also provide the data necessary to obtain partial closure of the Site through the Arizona Department of Environmental Quality (ADEQ).

On August 7, 2006, AMEC and its drilling subcontractor, Geomechanics Southwest, Inc., mobilized to the Site. Eight soil borings (SB-1 through SB-8) were drilled at various locations on the Site using a CME-35 hollow-stem auger (HSA) drilling rig (Figure 3). These borings were sampled at 5 feet, and then at 10 foot intervals starting at 10 feet down to 50 feet bgs. The eight borings were spread throughout the entire parcel as shown in Figure 3. The soil generally consisted of silty-sands and silts. Caliche was encountered from approximately 10 to 20 feet bgs in soil boring SB-8. A log of each boring is included in Appendix A.

Soil samples were collected using a 2-inch outer diameter (O.D.) split-barrel sampler equipped with clean, brass sample liners. At each sample interval, the sampler was lowered to the bottom of the bore-hole through the hollow-stem auger and then driven into undisturbed soils using a 140 pound drop hammer. The sampler was retrieved and opened to obtain the sample liner. The samples were field screened using a photoionization detector (PID). Both ends of the bottom-most liner were covered with Teflon® sheets and aluminum foil and secured with plastic end-caps. Each sample was labeled and placed in a cooler maintained at approximately 4^0 C pending delivery under chain-of-custody to Transwest Geochem Laboratories (Transwest), an Arizona Department of Health Services (ADHS) licensed laboratory.

Equipment used during sampling was thoroughly decontaminated prior to use and between each sample to prevent cross contamination. The decontamination procedure for sampling equipment was as follows:

- the use of a Liquinox® detergent and tap water solution wash,
- followed by a tap water rinse, and
- then a final reverse osmosis (RO) filtered water rinse.

All soil samples were analyzed by Transwest for gasoline, diesel and oil range petroleum hydrocarbons in accordance with ADEQ modified Testing Method 8015AZ R1. Selected soil samples (those with the highest PID reading) were also analyzed for polynuclear aromatic hydrocarbons (PAHs) using EPA Test Method 8310. Portions of selected soil samples were submitted to AMEC's geotechnical laboratory for moisture content and bulk density. These parameters were required for modeling the potential for indoor vapor intrusion.

7.0 SUBSURFACE SOIL VAPOR INVESTIGATION

On August 16, 2006, AMEC and its subcontractor Johnson Environmental Technologies mobilized to the Site. Six variable depth soil vapor sampling probes were emplaced at two sample collection points to evaluate the presence of volatile organic compounds in soil vapor at the Site. Sample collection cluster SV-1 was placed near the northwest corner of the property in proximity to former soil boring B-103, which contained the highest concentrations of total petroleum hydrocarbons (TPH) at 15,000 milligrams per kilogram (mg/kg) based an investigation performed by Industrial Compliance, Inc. in 1991. Soil vapor collection cluster SV-2 was placed in the southeast corner of the Site to assess soil vapor on the opposite side of the Site. The locations of these soil vapor sample collection clusters in relation to the AMEC soil boring locations are shown in Figure 3.

The sampling probe borings were drilled by a hammer rig to the desired sampling depth. Soil vapor sampling probes were emplaced at depths of approximately the 5, 10 and 20 feet bgs at each sample collection cluster. A polyvinyl chloride (PVC) vapor probe with a screened interval of either 5 or 10 feet was lowered into the boring and held in place. 10-size silica sand was then tremied into the boring for the filter screen pack. A bentonite grout seal was placed on top of the filter pack to the ground surface.

Soil vapor samples were collected using 6-liter Summa® Canisters. Each Summa® Canister had a dedicated flow controller connected to the sampling port using PVC tubing. The canister was collected the soil vapor sample over an eight-hour time period utilizing a regulator calibrated for that time period. A field blank sample was collected over the same eight hour time period as the other soil vapor samples. The field blank collected a sample of the ambient air at the site. After eight hours, the sample collection was terminated, each canister was labeled with the sample identification information and the time the sampling was stopped. Each sample was placed in a box for delivery under chain-of-custody to Columbia Analytical Services (Columbia), an ADHS licensed laboratory.

All soil vapor samples were analyzed by Columbia Analytical Services, Inc. for VOCs in using Test Method TO-15.

8.0 ANALYTICAL RESULTS

The analytical results indicate that gasoline, diesel, and oil range petroleum hydrocarbons were not detected in the subsurface soil (Table 1). In addition, no PAH constituents were detected in the six soil samples designated for PAH analysis from the Site (Table 2). Copies of the laboratory analytical results are included in Appendix B.

Several volatile organic compounds were detected in each of the soil vapor sample locations and at each sample depth at both locations (Table 3). The volatile organic compounds detected in the subsurface were not detected in a discernable pattern that would indicate an onsite, nearby source. Therefore, the volatile organic constituents detected in the subsurface may be from one of the following sources:

- The constituents detected may have been contaminants in the #2 fuel oil that has leaked into the subsurface and have diffused throughout the subsurface.
- The detected constituents may be the result of off gassing from contaminated groundwater in the perched zone.
- The detected constituents may be result of diffusion through the subsurface from an unidentified offsite source.

The field blank sample contained detectable concentrations of acetone, benzene, toluene, and *m*,*p*-xylenes. The only compound found in both the subsurface and in the field blank is benzene. Therefore, it is likely the compounds detected in the field blank sample are the result of combustion from nearby vehicle and train traffic and are not associated with the volatile organic constituents detected in the subsurface. Copies of the laboratory results are included in Appendix C.

9.0 SOIL VAPOR SCREENING MODEL

In order to evaluate how the existing subsurface contamination may adversely impact indoor air quality in any future development at the Site, AMEC followed the EPA Office of Solid Waste and Emergency Response (OSWER) Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. This guidance outlines a three tiered approach to assessing the risk of vapor intrusion from soil vapor and groundwater contamination:

9.1 Tier 1 – Primary Screening

The primary screening (Tier 1) requires determining if volatile and toxic compounds are present and if inhabited buildings currently, or in the future, could potentially be located near subsurface contaminants. The volatile organic compounds detected in the soil vapor are summarized in Table 3.

9.2 Tier 2 – Secondary Screening

Next, secondary screening (Tier 2) requires comparing the soil vapor concentrations to target concentrations for a given risk factor (for the purposes of this analysis, the most conservative risk factor of 10^{-6} was used). The target concentrations typically reflect reasonable worst-case conditions. Table 3 compares the measured soil vapor concentrations to the OSWER Draft Guidance Tier 2 target concentrations. The following constituents either had measured concentrations or detection limits greater than the Tier 2 target concentrations:

- 1,1,2,2-Tetrachloroethane
- 1,1,2-Trichloroethane
- 1,2-Dibromoethane
- 1,2-Dichloroethane
- Benzene
- Bromodichloromethane
- Chloroform

- Dibromochloromethane
- Tetrachloroethene
- Trichloroethene

9.3 Tier 3 – Site Specific Pathway Assessment

For the constituents that exceeded the Tier 2 target concentrations (listed above), the OSWER Draft Guidance recommends a Tier 3 Site Specific Pathway Assessment. This assessment is performed using a model based on the Johnson & Ettinger (1991) analytical solutions for contaminant partitioning and subsurface vapor transport into buildings.

The model results are based on a number of key assumptions, including:

1. Any future development will not require excavation below 20 feet bgs, which was the maximum depth evaluated in this project.
2. The future structure is modeled as slab-on-grade with a subsurface foundation area of approximately 1140 square feet and a slab thickness of 4 inches.
3. The exposure duration of the building inhabitants to the carcinogenic compounds is assumed to be 30 years for 350 days out of the year.
4. The soil properties are similar to those measured from samples collected at the soil boring and soil vapor sampling locations of this project.

The output of the assessment using a model based on the Johnson & Ettinger (1991) is a predicted indoor air concentration of each compound simulated and a corresponding cancer risk. The complete output from the model for each compound is included in Appendix D.

9.4 Modeled Risk Levels

Currently in the United States, the individual probability of contracting cancer in one's lifetime is 1 in 4. In accordance with ADEQ and USEPA regulations and guidance, the acceptable risk for potential cancer incidence in excess of rate (i.e., the potential excess lifetime cancer risk [PELCR]) is between one in ten-thousand ($1x10^{-4}$) and one in a million ($1x10^{-6}$) (40 C.F.R. 300.430(e)(2)(i)(A)(2), A.A.C. R18-7-206.E). The PELCR does not predict an adverse health effect. Instead, the PELCR is a numerical estimate of the potential risk associated with exposure to a particular environment. Depending on Site conditions, a person exposed to a Site with a calculated PELCR between $1x10^{-4}$ to $1x10^{-6}$ is at no measurably greater risk than a person who is not exposed. For the purposes of this investigation, the most conservative risk level of $1x10^{-6}$ was used to define the risk associated with intrusion of contaminated soil vapor through the building foundation. As Table 4 shows, each compound that was detected from the soil vapor samples has a PELCR less than or equal to a magnitude of $1x10^{-6}$, indicating that there is no measurable carcinogenic risk specifically attributable to the individual constituents in the soil vapor at the property. The total PELCR is $2.2x10^{-6}$, which slightly exceeds this level, but is still well within the range of acceptable risk.

As with any model, the results and interpretations from this assessment have limitations. Conclusions from the model results are limited to the potential for vapor intrusion under *current* site conditions (both in terms of extent of contamination and the disturbance of the soil). Any development at the Site may change the static conditions of the subsurface, thereby changing the conditions used for the modeling and invalidating the modeling results. The results of the modeling are intended to be used for development planning purposes only.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the Site characterization AMEC has made the following conclusions:

- No detectable concentrations of gasoline, diesel, and oil range petroleum hydrocarbons or PAH were found in the soil samples collected during the limited investigation.

- The concentrations of volatile organic compounds detected in soil vapor were very low. It is unlikely these compounds would be detected above their respective method detection limit in a soil sample collected in the proximity of the soil vapor samples. In addition, the volatile organic compounds were not detected in a discernable pattern that would permit the identification of a source, in particular an on-site source. Therefore, AMEC does not recommend collecting additional soil samples for volatile organic compound analysis.

- While there is potential for soil vapor intrusion through the foundation of future developments at the Site, the soil vapor intrusion modeling results indicate that carcinogenic compounds exceeding the Tier 2 target concentrations have PELCRs less than or equal to the lower bound of the range of acceptable risk of 1x10-6, with total PELCR only slightly exceeding this level. These results indicate that there is no measurable carcinogenic risk specifically attributable to the soil vapor concentrations of individual constituents measured at the property and total PELCR is well within the acceptable range.

11.0 REFERENCES

Arizona Administrative Code, A.A.C. R18-7-206.E

Central Arizona Project, 2004, Pima Road Recharge Project

Davidson, 1973, *Geohydrology and Water Resources of the Tucson Basin, Arizona*, USGS Water supply Paper 1939-E

Department of Water Resources, December 1999, Third Management Plan 2000-2010 Tucson Active Management Area

Environmental Resources Management, 2000, Remedial Investigation Report Passenger Depot Site, ADEQ VRP Facility #100149-00, Tucson, AZ

Environmental Resources Management, Inc., March 2004, Corrective Action Plan Passenger Depot Site, Prepared for Union Pacific Rail Road

Houser, Brenda, Peters, Lisa, Esser, Richard P. and Gettings, Mak E. 2004. Stratigraphy and Tectonic History of the Tucson Basin, Pima County, Arizona, based on the Exxon State (32)-1 Well. U.S.G.S. Scientific Investigations Report 2004-5076.

Industrial Compliance, Inc., May 1991, Tucson Railyard Operations Scoping document, southern Pacific Transportation Company, Tucson Railyard, Tucson, Arizona

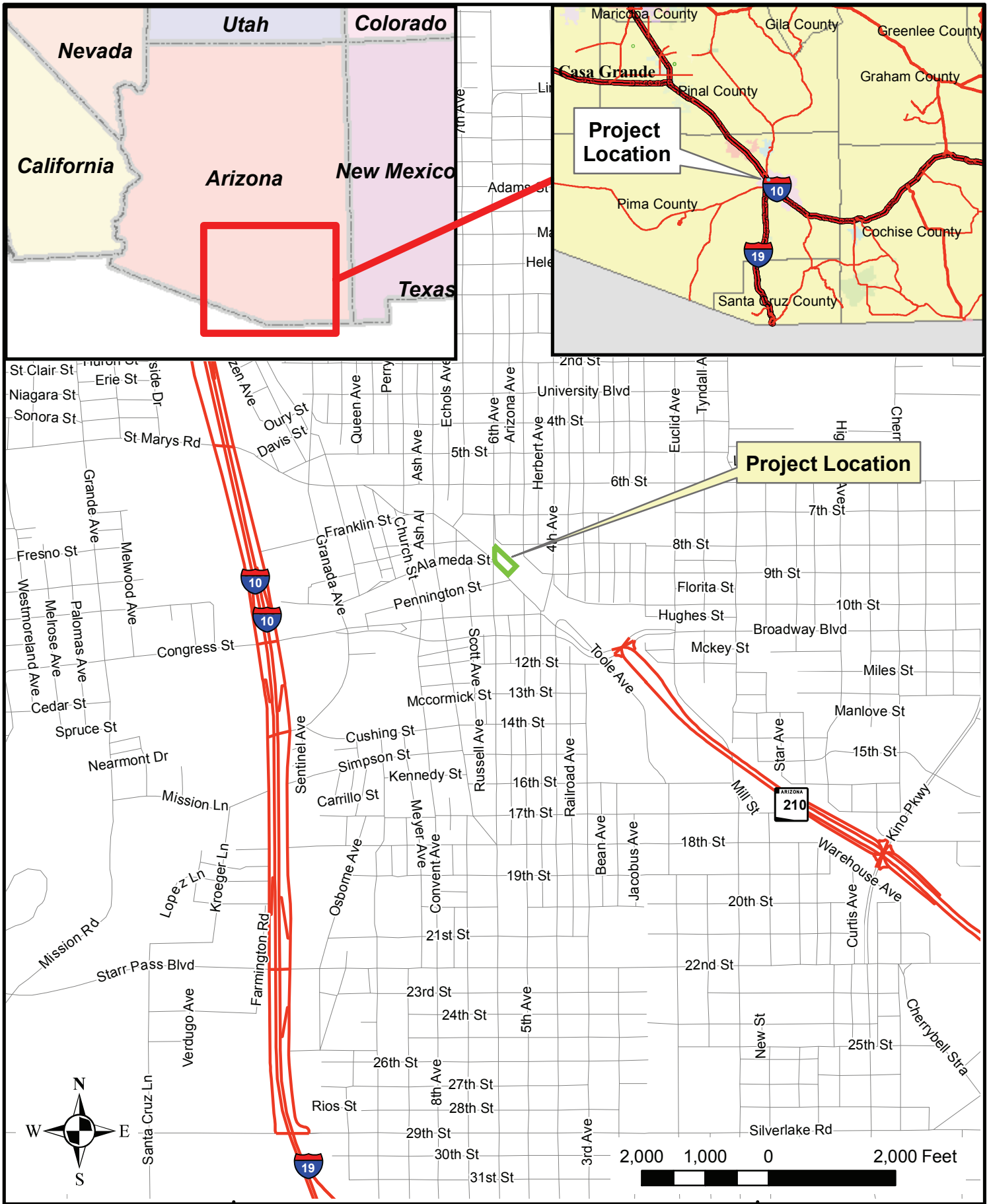
Pima County Assessors Maps, 2004.

US Environmental Protection Agency (USEPA) 40 C.F.R. 300.430, Remedial Investigation/Feasibility Study and Selection of Remedy.

USEPA Office of Solid Waste and Emergency Response (OSWER) Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, 2002.

USEPA, Screening Level Implementation of the Johnson and Ettinger Vapor Intrusion Model (1991) with two variable/uncertain parameters (source depth, moisture content), 2006, www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite_forward.htm

FIGURES



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Environmental Site Investigation
400 North Toole Ave
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VICINITY MAP

FIGURE 1

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Tucson, AZ 85701

SITE MAP

FIGURE **2**

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Tucson, AZ 85701

SAMPLING LOCATIONS

FIGURE **3**

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TABLES

TABLE 1
COMPARISON OF TPH CONCENTRATIONS TO ADEQ SRLs[1]

Sample ID[2]	Sample Date	C6-C10 (GRO)[3] (mg/kg[6])	C10-C22 (DRO)[4] (mg/kg)	C22-C32 (ORO)[5] (mg/kg)	C10-C32 (SRL) (mg/kg)
SB-1-05	08/07/2006	<20	<30	<100	<130
SB-1-10	08/07/2006	<20	<30	<100	<130
SB-1-20	08/07/2006	<20	<30	<100	<130
SB-1-30	08/07/2006	<20	<30	<100	<130
SB-1-40	08/07/2006	<20	<30	<100	<130
SB-1-50	08/07/2006	<20	<30	<100	<130
SB-2-05	08/07/2006	<20	<30	<100	<130
SB-2-10	08/07/2006	<20	<30	<100	<130
SB-2-20	08/07/2006	<20	<30	<100	<130
SB-2-30	08/07/2006	<20	<30	<100	<130
SB-2-40	08/07/2006	<20	<30	<100	<130
SB-2-50	08/07/2006	<20	<30	<100	<130
SB-3-05	08/08/2006	<20	<30	<100	<130
SB-3-10	08/08/2006	<20	<30	<100	<130
SB-3-20	08/08/2006	<20	<30	<100	<130
SB-3-30	08/08/2006	<20	<30	<100	<130
SB-3-40	08/08/2006	<20	<30	<100	<130
SB-3-50	08/08/2006	<20	<30	<100	<130
SB-4-05	08/08/2006	<20	<30	<100	<130
SB-4-10	08/08/2006	<20	<30	<100	<130
SB-4-20	08/08/2006	<20	<30	<100	<130
SB-4-30	08/08/2006	<20	<30	<100	<130
SB-4-40	08/08/2006	<20	<30	<100	<130
SB-4-50	08/08/2006	<20	<30	<100	<130
SB-5-05	08/08/2006	<20	<30	<100	<130
SB-5-10	08/08/2006	<20	<30	<100	<130
SB-5-20	08/08/2006	<20	<30	<100	<130
SB-5-30	08/08/2006	<20	<30	<100	<130
SB-5-40	08/08/2006	<20	<30	<100	<130
SB-5-50	08/08/2006	<20	<30	<100	<130
SB-6-05	08/08/2006	<20	<30	<100	<130
SB-6-10	08/08/2006	<20	<30	<100	<130
SB-6-20	08/08/2006	<20	<30	<100	<130
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SB-6-50	08/08/2006	<20	<30	<100	<130
SB-7-05	08/09/2006	<20	<30	<100	<130
SB-7-10	08/09/2006	<20	<30	<100	<130
SB-7-20	08/09/2006	<20	<30	<100	<130
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SB-8-20	08/09/2006	<20	<30	<100	<130
SB-8-30	08/09/2006	<20	<30	<100	<130
SB-8-40	08/09/2006	<20	<30	<100	<130
SB-8-50	08/09/2006	<20	<30	<100	<130

[1] ADEQ SRL = Arizona Department of Environmental Quality Soil Remediation Level, A.A.C. Title 18, Chapter 7, Article 2
[2] SB-1-20 = Soil Boring - Sample Number - Depth sample collected, in feet below ground surface
[3] GRO = gasoline range organics
[4] DRO =diesel range organics
[5] ORO = oil range organics
[6] mg/kg = milligrams per kilograms

TABLE 2
COMPARISON OF POLYAROMATIC HYDROCARBON CONCENTRATIONS TO ADEQ SRLs[1]

Sample ID[2] **Sample Date** **Compound**	SB-1-50 08/07/2006 (mg/kg[3])	SB-2-40 08/07/2006 (mg/kg)	SB-3-20 08/08/2006 (mg/kg)	SB-4-40 08/08/2006 (mg/kg)	SB-5-05 08/08/2006 (mg/kg)	SB-6-50 08/08/2006 (mg/kg)	SB-7-40 08/09/2006 (mg/kg)	SB-8-30 08/09/2006 (mg/kg)	Residential SRL (mg/kg)
Acenapthene	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	3900
Acenaphthylene	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	NE[4]
Anthracene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	20000
Benz[a]anthracene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	6.10
Benzo[a]pyrene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.61
Benzo[b]fluoranthene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	6.10
Benzo[g,h,i]perylene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	NE
Benzo[k]fluoranthene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	61
Chrysene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	610
Dibenz[a,h]anthracene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.61
Fluoranthene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	2600
Fluorene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	2600
Indeno[1,2,3-cd]pyrene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	6.10
Napthalene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	2600
Phenanthrene	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	NE
Pyrene	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	2000

[1] ADEQ SRL = Arizona Department of Environmental Quality Soil Remediation Level, A.A.C. Title 18, Chapter 7, Article 2
[2] SB-1-20 = Soil Boring - Sample Number - Depth sample collected, in feet below ground surface
[3] mg/kg = milligrams per kilograms
[4] NE = Not Established

TABLE 3
SOIL VAPOR SAMPLE ANALYTICAL RESULTS

Sample ID		SV-1-5[1]	SV-1-10	SV-1-19	SV-1-19D[2]	SV-2-5	SV-2-10	SV-2-15	BKG-081706[3]	Tier 2 Target Concentration[4]
CAS #	**Compound**	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
71-55-6	1,1,1-Trichloroethane	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	22000
79-34-5	**1,1,2,2-Tetrachloroethane**	<1.5	<1.6	<1.6	<1.6	**<1.6**	<1.4	<1.3	<1.6	0.42
79-00-5	**1,1,2-Trichloroethane**	<1.5	<1.6	<1.6	<1.6	**<1.6**	<1.4	<1.3	<1.6	1.5
75-34-3	1,1-Dichloroethane	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	5000
75-35-4	1,1-Dichloroethene	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	2000
106-93-4	**1,2-Dibromoethane**	<1.5	<1.6	<1.6	<1.6	**<1.6**	<1.4	<1.3	<1.6	0.11
95-50-1	1,2-Dichlorobenzene	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	2000
107-06-2	**1,2-Dichloroethane**	<1.5	<1.6	<1.6	<1.6	**<1.6**	<1.4	<1.3	<1.6	0.94
78-87-5	1,2-Dichloropropane	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	40.0
541-73-1	1,3-Dichlorobenzene	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	1100
106-46-7	1,4-Dichlorobenzene	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	8000
78-93-3	2-Butanone	3.9	17.0	3.5	19.0	11.0	6.2	5.2	<1.6	10000
591-78-6	2-Hexanone	<1.5	14.0	<1.6	26.0	<1.6	2.4	1.8	<1.6	NE[5]
108-10-1	4-Methyl-2-pentanone	15.0	16.0	<1.6	47.0	2.0	2.2	4.4	<1.6	800
67-64-1	Acetone	35.0	88.0	49.0	60.0	61.0	39.0	47.0	11.0	3500
71-43-2	**Benzene**	**22.0**	<1.6	<1.6	1.6	4.1	10.0	4.8	1.8	3.1
75-27-4	**Bromodichloromethane**	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	**1.8**	<1.6	1.4
75-25-2	Bromoform	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	22
74-83-9	Bromomethane	1.8	<1.6	2.1	<1.6	<1.6	<1.4	<1.3	<1.6	50
75-15-0	Carbon Disulfide	6.6	10.0	12.0	4.0	100.0	<1.4	4.2	<1.6	7000
56-23-5	Carbon Tetrachloride	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	1.6
108-90-7	Chlorobenzene	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	600
75-00-3	Chloroethane	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	100000
67-66-3	**Chloroform**	1.5	<1.6	<1.6	<1.6	**4.2**	<1.4	2.6	<1.6	1.1
74-87-3	Chloromethane	1.5	<1.6	<1.6	<1.6	2.1	<1.4	1.6	<1.6	24
156-59-2	cis-1,2-Dichloroethene	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	350
10061-01-5	cis-1,3-Dichloropropene	<1.5	<1.6	2.4	<1.6	<1.6	<1.4	<1.3	<1.6	NE
124-48-1	**Dibromochloromethane**	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	1.0
100-41-4	Ethylbenzene	13.0	2.0	<1.6	4.2	<1.6	4.9	2.9	<1.6	22
1634-04-4	Methyl tert-Butyl Ether	<1.5	<1.6	<1.6	3.4	<1.6	<1.4	<1.3	<1.6	30000
75-09-2	Methylene chloride	<1.5	<1.6	2.5	<1.6	<1.6	<1.4	<1.3	<1.6	52
100-42-5	Styrene	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	10000
127-18-4	**Tetrachloroethene**	<1.5	**9.4**	<1.6	7.1	2.7	4.0	1.5	<1.6	8.1
108-88-3	Toluene	75.0	7.6	5.9	13.0	6.1	26.0	20.0	2.9	4000
N/A	Total Xylenes[6]	66.0	11.4	4.3	27.0	9.3	44.0	14.8	1.8	70000
156-60-5	trans-1,2-Dichloroethene	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	700
10061-02-6	trans-1,3-Dichloropropene	<1.5	<1.6	1.9	<1.6	<1.6	<1.4	<1.3	<1.6	NE
79-01-6	**Trichloroethene**	**10.0**	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	0.22
76-13-1	Trichlorotrifluoroethane	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	300000
75-69-4	Trichlorofluoromethane	1.6	<1.6	2.8	<1.6	<1.6	<1.4	<1.3	<1.6	7000
108-05-4	Vinyl Acetate	<1.5	11.0	<1.6	9.5	18.0	7.8	<1.3	<1.6	2000
75-01-4	Vinyl Chloride	<1.5	<1.6	<1.6	<1.6	<1.6	<1.4	<1.3	<1.6	2.8

NOTES:

Compounds highlighted in yellow exceeded the Tier 2 Target Concentration.

Compounds with a detection limit greater than the Tier 2 Target Concentration. The detection limit value was used as the compound concentration in the model.

Compounds detected in the background ambient air sample at the same time as the soil vapor samples.

Bold Bold values were inserted into the model for evaluation.

[1] SV-1-5 = Soil Vapor - Sample Number - Depth sample collected, in feet below ground surface. Samples were simultaneously collected from each depth and sample location over an 8 hour period on August 17, 2006.

[2] Duplicate field sample to SV-1-19D.

[3] Background (ambient air) sample, collected during same eight hour duration as the other soil vapor samples.

[4] OSWER, 2002 Table 2c - Generic Screening Levels and Summary Sheet; conservatively assuming a risk factor of 10^{-6} and an attenation factor of 0.1

[5] NE = Not Established

[6] Total Xylenes is sum of *m*-Xylene, *o*-Xylene and *p*-Xylene

TABLE 4
Predicted Indoor Air Concentrations and Associated
Potential Canser Risk for VOCs Exceeding the Tier 2 Target Concentration

CAS #	Compound	Soil Vapor Concentration ($\mu g/m^3$)	Tier 2 Concentration ($\mu g/m^3$)	Best Estimate Indoor Air Concentration ($\mu g/m^3$)	Potential Excess Lifetime Cancer Risk (PELCR)
79-34-5	1,1,2,2-Tetrachloroethane	<1.6	0.42	0.004665	1.112×10^{-7}
79-00-5	1,1,2-Trichloroethane	<1.6	1.5	0.004842	3.184×10^{-8}
106-93-4	1,2-Dibromoethane	<1.6	0.11	0.002424	2.191×10^{-7}
107-0-62	1,2-Dichloroethane	<1.6	0.94	0.005358	5.724×10^{-8}
71-43-2	Benzene	22	3.1	0.06963	2.232×10^{-7}
75-27-4	Bromodichloromethane	1.8	1.4	0.00121	8.803×10^{-9}
67-66-3	Chloroform	4.2	1.1	0.01406	1.329×10^{-7}
124-48-1	Dibromochloromethane	<1.6	1.0	0.002257	2.226×10^{-8}
127-18-4	Tetrachloroethene	9.4	8.1	0.01745	2.421×10^{-8}
79-01-6	Trichloroethene	10	0.22	0.03041	1.375×10^{-7}

Note: $\mu g/m^3$ - microgram per cubic meter
VOCs - volatile organic compounds

APPENDIX A

BORING LOGS

TEST DRILLING EQUIPMENT AND PROCEDURES

Description of Subsurface Exploration Methods

Auger Boring Drilling through overburden soils is performed with 6 5/8-inch O.D., 3 1/4-inch I.D. hollow stem auger or 4 1/2-inch solid stem continuous flight auger. Carbide insert teeth are normally used on bits so they can penetrate soft rock or very strongly cemented soils. A CME-75 truck-mounted drill rig is used to advance the auger. The drill rigs are powered with six-cylinder Cummins diesel engines capable of delivering about 11.4 kN-m torque to the drill spindle. The spindle is advanced with twin hydraulic rams capable of exerting 90 kN (20,000 pounds) downward force.

Generally, refusal to penetration of the auger is adopted as top of the SGC or “river-run” material or harder bedrock, which require other techniques for penetration. Grab samples or auger cuttings may be taken as necessary. Standard penetration tests or 2.42-inch diameter ring samples are taken in conjunction with the auger borings as needed, with the sampling interval and type being indicated on the boring logs.

Hammer Drill Drilling with the Hammer drill is accomplished with a Drill Systems AP-1000 drill rig advancing a double-walled drive casing with a link-belt 180 diesel pile driving hammer, having a rated energy of 8,100 foot-pounds per blow. Where noted on the boring log, the hammer is equipped with a supercharger which can boost the energy to approximately 12,000 foot-pounds per blow. The supercharger is used only in portions of the boring where blow counts are relatively high. Cuttings are removed with compressed air by a reverse circulation process, and are collected in a cyclone from which grab samples are obtained. The drive casing is either 9-inch O.D. by 6-inch I.D. or 6 5/8-inch O.D. by 4-inch I.D. and employs an expendable bit of slightly larger diameter than the O.D. of the casing. Hammer blows required to advance the drive casing are recorded in 1-foot increments, as noted on the boring logs. Standard penetration tests or 2.42-inch diameter ring samples taken are noted on the boring logs.

Core Boring Rock core samples are retrieved using a CME-75 drill rig, SAITECH GH 3 rig or Burley 2500, 4500 or 4000. The GH 3 is a portable hydraulic core drill. The GH 3 is powered by a Kohler two-cylinder 25-horsepower engine. The hydraulics motor which feeds a two-speed transmission and powers the BW spindle. This unit has a 3-foot stroke and is hand-fed with a 2,000 pound push-pull capability. The GH 3 has the capability of drilling with either B- or N-size core steel using standard or wireline systems. N-size core is the preferred size and it has a nominal O.D. of about 2 inches. The Burley 2500 and 4500 series are portable hydraulic core drills. The 4500 series is capable of a track-mounted or skid-type chassis. The Burley 2500 and 4500 series are powered by 44 and 75 HP power units, respectively, provide up to 2,000 foot-pounds (ft.-lbs.) of torque and in excess of 1,000 revolutions per minute (RPM) of spindle speed. Both rigs are capable of retrieving either N- or H-sized core using wireline systems. The N-size core has a nominal O.D. of about 2 inches and the H-size of about 2.4 inches. The Burley 4000 is a track-mounted core drill.

The CME-75 utilizes a wireline core drilling system that takes N-size cores. Using the NQ wireline system, core is recovered quickly by retrieving the core-laden inner tube through the drill string.

TEST DRILLING EQUIPMENT AND PROCEDURES (Cont.)

Sampling Procedures Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 test procedure. In many cases, 2-inch O.D., 1 3/8-inch I.D. samples are used to obtain the standard penetration resistance. “Undisturbed” samples of firmer soils are often obtained with 3-inch O.D. samples lined with 2.42-inch I.D. brass rings. The driving energy is generally recorded as the number of blows of a 140-pound, 30-inch free fall drop hammer required to advance the samples in 6-inch increments. However, in stratified soils, driving resistance is sometimes recorded in 2- or 3-inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. These values are expressed in blows per 6 inches on the boring logs. "Undisturbed" sampling of softer soils is sometimes performed with thin walled Shelby tubes (ASTM D1587), pitcher samplers, Denison samplers or continuous CME samplers. Where samples of rock are required, they are obtained by NQ diamond core drilling (ASTM D2113). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings. Also, representative samples are obtained from the cuttings from the hammer and Schramm drill rig.

Boring Records Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares the boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487), with appropriate group symbols being shown on the boring logs.

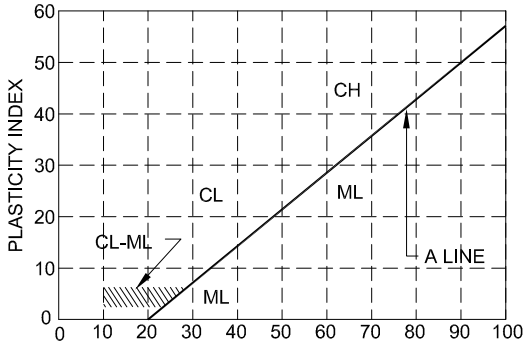
UNIFIED CLASSIFICATION SYSTEM FOR SOILS

Soils are visually classified by the United Soil Classification System on the boring logs presented in this report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see " The Unified Soil Classification System " ASTM Designation: D2487

MAJOR DIVISION				GRAPH SYMBOL	GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	**GRAVELS** (50% or less of coarse fraction passes No. 4 sieve)	**CLEAN GRAVELS** (Less than 5% passes No. 200 sieve)			GW	Well graded gravels, gravel-sized mixtures or sand-gravel-cobble mixture.
					GP	Poorly graded gravels, gravel-sized mixtures or sand-gravel-cobble mixture.
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		GM	Silty gravels, gravel-sand-silt mixture.
			Limits plot below "A" line & hatched zone on plasticity chart		GC	Clayey gravels, gravel-sand-clay mixture.
	SANDS (More than 50% of coarse fraction passes No. 4 sieve)	**CLEAN SANDS** (Less than 5% passes No. 200 sieve)			SW	Well graded sands, gravelly sands.
					SP	Poorly graded sands, gravelly sands.
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		SM	Silty sands, sand-silt mixtures.
			Limits plot below "A" line & hatched zone on plasticity chart		SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	**SILTS** LIMITS PLOT BELOW "A" LINE & HATCH ZONE ON PLASTICITY CHART	**SILTS OF LOW PLASTICITY** (Liquid limit less than 50)			ML	Inorganic silts, clayey silts with slight plasticity.
		SILTS OF HIGH PLASTICITY (Liquid limit more than 50)			MH	Inorganic silts of high plasticity, silty soils, elastic silts.
	CLAYS LIMITS PLOT BELOW "A" LINE & HATCH ZONE ON PLASTICITY CHART	**CLAYS OF LOW PLASTICITY** (Liquid limit less than 50)			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		CLAYS OF HIGH PLASTICITY (Liquid limit more than 50)			CH	Inorganic clays of high plasticity, fat clays, silty and sandy clays of high plasticity.

NOTE: Coarse-grained soils with between 5% to 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone on the plasticity chart to have dual symbol.

PLASTICITY CHART



DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Boulders	Above 300mm (12in.)
Cobbles	300mm to 75mm (12in. to 3in.)
Gravel	75mm (3in.) to No. 4 sieve
Coarse gravel	75mm to 19mm (3in to 3/4in.)
Fine gravel	19mm (3/4in.) to No. 4 sieve
Sand	No. 4 to No. 200
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Fines (silt or clay)	Below No. 200 sieve

TERMINOLOGY USED TO DESCRIBE THE RELATIVE DENSITY, CONSISTENCY OR FIRMNESS OF SOILS

The terminology used on the boring logs to describe the relative density, consistency or firmness of soils relative to the standard penetration resistance is presented below. The standard penetration resistance (N) in blows per foot is obtained by the ASTM D1586 procedure using 2" O.D., 1 3/8" I.D. samplers.

1. **Relative Density.** Terms for description of relative density of cohesionless, uncemented sands and sand-gravel mixtures.

N	Relative Density
0-4	Very loose
5-10	Loose
11-30	Medium dense
31-50	Dense
50+	Very dense

2. **Relative Consistency.** Terms for description of clays which are saturated or near saturation.

N	Relative Consistency	Remarks
0-2	Very soft	Easily penetrated several inches with fist.
3-4	Soft	Easily penetrated several inches with thumb.
5-8	Medium stiff	Can be penetrated several inches with thumb with moderate effort.
9-15	Stiff	Readily indented with thumb, but penetrated only with great effort.
16-30	Very stiff	Readily indented with thumbnail.
30+	Hard	Indented only with difficulty by thumbnail.

3. **Relative Firmness.** Terms for description of partially saturated and/or cemented soils which commonly occur in the Southwest including clays, cemented granular materials, silts and silty and clayey granular soils.

N	Relative Firmness
0-4	Very soft
5-8	Soft
9-15	Moderately firm
16-30	Firm
31-50	Very firm
50+	Hard

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/7/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
0								SM	slightly moist loose	**SILTY SAND,** predominantly coarse grained, angular grains, poorly sorted, no odor, brown
				S	7-4-5		0.2			
5										
				S	11-10-8		0.7	ML	slightly moist stiff	**SANDY SILT,** predominantly medium grained with some coarse grained, well sorted, no odor, brown
10										
15										
				S	23-30-50/5"		0.4	SM	slightly moist dense	**SILTY SAND,** predominantly coarse grained, angular grains, poorly sorted, brown
20										
25										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-1

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/7/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
25										
				S	20-19-26		0.4	SM	slightly moist	**SILTY SAND,** predominantly coarse grained, poorly sorted, angular to subrounded grains, brown
30									medium dense	
35										
				S	20-10-10		0.8	ML	moist stiff	**CLAYEY SILT,** predominantly fine grained, well sorted, some sand grains, brown
40										
45									moist	
								ML		**CLAYEY SILT,** predominantly fine grained, well sorted, brown
				S	12-33-50		0.0		hard	
50										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
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PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/7/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
50										
										Stopped Auger at 49' Stopped Sampler at 50'6"
55										
60										
65										
70										
75										

GROUNDWATER

	DEPTH(ft)	HOUR	DATE
▽		none	
▼			
▽			
▼			

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

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RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
0								ML	dry very stiff	**SANDY SILT,** predominantly fine grained, well sorted, some sand grains, brown
				S	12-23-18		0.6			
5										
				S	4-8-10		0.3	SM	slightly moist loose	**SILTY SAND,** predominantly coarse grained, poorly sorted, angular grains, brown
10										
15										
								ML	slightly moist hard	**SANDY SILT,** predominantly fine grained, medium sorted, brown
				S	55/6"		0.6			
20										
25										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-2

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/7/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
25								ML		**SANDY SILT,** continued
				S	15-24-30		0.7	SM	slightly moist medium dense	**SILTY SAND,** predominantly coarse grained, poorly sorted, brown
30										
35										
				S	21-31-35		2.7	SM	moist dense	**SAND & GRAVEL,** predominantly coarse grained, poorly sorted, brown
40										
45										
									moist	
								SM		**SILTY SAND with some GRAVEL,** poorly sorted, coarse grained, brown
				S	35-38-50		0.3		dense	
50										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-2

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/7/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
50										
										Stopped Auger at 49' Stopped Sampler at 50'6"
55										
60										
65										
70										
75										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-2

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
0								SM	slightly moist very loose	**SILTY SAND,** brown, poorly sorted, predominantly coarse grained, angular to subangular grains
				S	1-1-4		0.4			
5										
				S	12-18-18		0.6	SM	slightly moist medium dense	**SILTY SAND,** brown, poorly sorted, predominantly coarse grained, angular to subangular
10										
15										
				S	20-25-25		0.7	SM	slightly moist medium dense	**SILTY SAND,** mostly sand with gravel, yellow, predominantly coarse grained, poorly sorted
20										
25										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-3

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
25										
				S	20-27-30		0.5	SM	dry medium dense	**SILTY SAND,** predominantly coarse grained, poorly sorted, light brown, angular grains
30										
35										
				S	27-22-7		0.3	SM	dry medium dense	**SILTY SAND,** predominantly coarse grained, poorly sorted, light brown, angular to subangular grains
40										
45										
				S	5-12-25		0.5	ML	moist, very stiff	**SANDY SILT,** predominantly fine grained, brown
50										

GROUNDWATER

	DEPTH(ft)	HOUR	DATE
▽		none	
▼			
▼			
▼			

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-3

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
50										
										Stopped Auger at 49' Stopped Sampler at 50'6"
55										
60										
65										
70										
75										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-3

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
0								SM	slightly moist loose	**SILTY SAND,** brown, predominantly coarse grained, medium sorted, 50% silt, 50% sand
				S	6-7-10		0.3			
5										
				S	13-17-23		0.6	ML	slightly moist very stiff	**SANDY SILT,** brown, predominantly fine grained, well sorted, mostly silt
10										
15										
				S	13-27-35		1.2	ML	slightly moist very stiff	**SANDY SILT,** brown, predominantly fine to medium grained, well sorted
20										
25										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-4

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
25								ML		**SANDY SILT,** continued
				S	22-37-45		0.3	SM	dry dense	**SILTY SAND,** light brown, predominantly coarse grained, poorly sorted, angular to subangular grains
30										
35										
				S	14-22-27		1.2	ML	moist very stiff	**SILT with some SAND,** brown, predominantly fine grained, well sorted
40										
45										
								ML		**SILT,** brown, predominantly fine grained, well sorted, some sand
				S	35-50/3"		0.8		moist, hard	
50										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-4

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
50										
										Stopped Auger at 49' Stopped Sampler at 50'6"
55										
60										
65										
70										
75										

GROUNDWATER

	DEPTH(ft)	HOUR	DATE
▽		none	
▼			
▼			
▼			

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-4

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
0								SM	slightly moist very loose	**SILTY SAND,** brown, predominantly coarse grained, poorly sorted,
				S	4-3-4		0.9			
5										
								SM		**SILTY SAND,** brown, predominantly coarse grained, poorly sorted, angular to subangular grains
				S	3-5-7		0.6		slightly moist very loose	
10										
15										
				S	27-50/6"		0.5	SM	dry dense	**SILTY SAND,** brown coarse grained, poorly sorted, angular to subangular grained
20										
25										

GROUNDWATER

	DEPTH(ft)	HOUR	DATE
▽		none	
▼			
▽			
▼			

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-5

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
25										
				S	14-22-30		0.5	SM	dry medium dense	**SILTY SAND with GRAVEL,** predominantly coarse grained, poorly sorted
30										
35										
				S	25-13-9		0.5	SM	dry medium dense	**SILTY SAND to mostly SILT,** at bottom of split spoon, poorly sorted, some gravel, mostly coarse grained, brown
40										
45										
								SM	dry	**SILTY SAND with some GRAVEL,** predominantly coarse grained, poorly sorted, brown
				S	10-50/6"		0.3		dense	
50										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-5

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
50										Stopped Auger at 49', Stopped Sampler at 50'
55										
60										
65										
70										
75										

GROUNDWATER

	DEPTH(ft)	HOUR	DATE
▽		none	
▼			
▼			
▼			

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-5

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
0								ML	slightly moist soft	**SILT with some SAND,** predominantly fine grained, brown, well sorted
				S	2-4-3		0.4			
5										
				S	9-14-20		0.7	ML	slightly moist stiff	**SANDY SILT,** predominantly fine grained, brown, well sorted
10										
15										
				S	20-22-21		1.0	SM	dry medium dense	**SILTY SAND,** predominantly coarse grained, brown, poorly sorted, subrounded to subangular grains
20										
25										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-6

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/8/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
25										
				S	35-34-50/5"		0.9	SM	dry dense	**SILTY SAND,** predominantly coarse grained, brown, poorly sorted, some gravel, subangular to subrounded grains
30										
35										
				S	21-31-35		0.5	SM	slightly moist dense	**SILTY SAND,** predominantly coarse grained, brown, poorly sorted
40										
45										
				S	35-50/2"		0.7	ML	moist, very stiff	**SANDY SILT,** brown, predominantly fine grained, well sorted Stopped Auger at 49', Sampler refused at 49'7"
50										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-6

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/9/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
0								ML	wet firm	**SANDY SILT,** well sorted, brown, predominantly fine grained
				S	4-6-7		0.3			
5										
				S	7-7-4		0.6	ML	wet stiff	**SILTY SAND,** well sorted, brown, predominantly fine grained
10										
15										
				S	30-50/5"		0.3	SM	dry dense	**SILTY SAND,** predominantly coarse grained, poorly sorted, brown, subangular to subrounded grains
20										
25										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-7

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/9/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
25								SM		**SILTY SAND,** continued
				S	37-50/6"		0.9	SP	dry dense	**SAND with some GRAVEL,** predominantly coarse grained, brown, rounded to subrounded, gravel is granitic
30										
35										
				S	16-6-9		0.9	SM-ML	moist stiff	**SANDY SILT transition from SAND TO SILT,** poorly sorted becoming well sorted, predominantly fine grained, brown
40										
45									dry	**Mostly SAND,** poorly sorted, predominantly coarse grained, brown
				S	21-50/6"		0.7	SM	dense	Stopped Auger at 49', Sampler refused at 50'
50										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-7

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/9/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
0								SM	dry very dense	**SILTY SAND,** brown, predominantly coarse grained, poorly sorted, subrounded to subangular gravel
				S	3-3-3		0.9			
5										
				S	50/6"		0.8	ML	dry hard	**SILT,** fine grained, brown, well sorted
10										
15										
				S	17-50/6"		0.5		dry	**CALICHE,** white, fine grained, with lime cemented
20										
25										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-8

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/9/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
25										**CALICHE,** continued
				S	13-20-40		1.6	SM	dry medium dense	**SILTY SAND,** predominantly coarse grained, poorly sorted, brown
30										
35										
				S	19-30-42		0.9	SM	dry dense	**SILTY SAND,** predominantly coarse grained with some gravel, brown, poorly sorted
40										
45										
				S	17-23-31		0.9		dry medium dense	**SANDY SILT,** brown, poorly sorted, predominantly fine grained
50										

GROUNDWATER

	DEPTH(ft)	HOUR	DATE
▽		none	
▼			
▼			
▼			

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-8

PROJECT City of Tucson Former UPRR Depot
Soil Investigation

JOB NO. 6-114-003038 **DATE** 8/9/06

LOCATION 400 North Toole Ave Tucson, Arizona

RIG TYPE CME-35
BORING TYPE Hollow Stem Auger
SURFACE ELEV.
DATUM

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Blow Count (S) Per 6-inches (U) Per 12-inches	Dry Density lbs. per Cubic ft.	PID Meter Readings (PPM)	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
50										
										Stopped Auger at 49' Stopped Sampler at 50'6"
55										
60										
65										
70										
75										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
	none	

SAMPLE TYPE
A - Drill cuttings
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - Thin Walled Shelby tube sample
P - Pressuremeter Test
NR - No Recovery

LOG OF TEST BORING NO. SB-8

APPENDIX B

SOIL SAMPLE LABORATORY REPORTS AND CHAIN OF CUSTODY FORMS

APPENDIX C

SOIL VAPOR SAMPLE LABORATORY REPORTS AND CHAIN OF CUSTODY

APPENDIX D

SOIL VAPOR INTRUSION MODEL RESULTS

APPENDIX E

PHOTOLOG

SUBSURFACE SITE INVESTIGATION
City of Tucson
400 N Toole Avenue – Tucson, Arizona

PHOTOGRAPHIC LOG

Photograph No. 1

View towards east of the project Site.

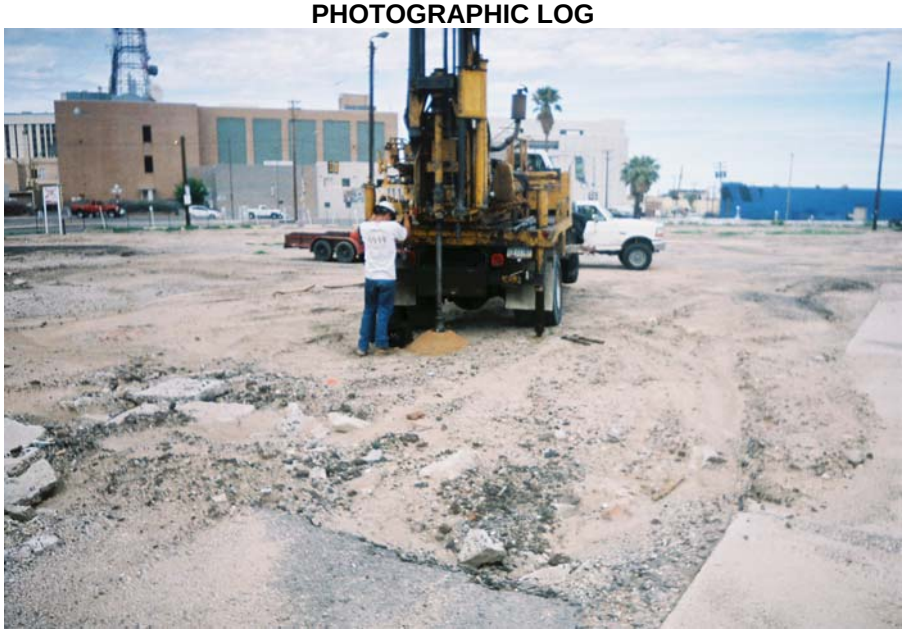
Photograph No. 2

View of the Site looking northwest towards 6th Ave.

AMEC Job No. **6-114-003038**	**Reviewed By:** **Justin Boreson**	**Prepared By:** **James K. Roche**	amec

SUBSURFACE SITE INVESTIGATION
City of Tucson
400 N Toole Avenue – Tucson, Arizona

PHOTOGRAPHIC LOG



Photograph No. 3

Geomechanics drilling to 5 feet bgs on SB-1 location.

Photograph No. 4

Drilling down to 10 foot sampling interval at SV-1.

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Photograph No. 5

Attempting to hammer to 20 foot sampling interval at SV-2. Because of caliche, a sampling depth of 15 feet bgs was used instead of 20 feet bgs

Photograph No. 6

Photo of 6-Liter SUMMA canisters placed in boxes while collecting soil vapor samples at SV-1

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Photograph No. 7

Photo of SV-2 with SUMMA canisters placed in boxes while collecting soil vapor samples.

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