

## MEMORANDUM

**Date:** August 16, 2011

**AMEC Project No.:** 1420112023

**To:** Richard Olm  
Senior Environmental Engineer  
Arizona Department of Environmental Quality  
Waste Programs Permits Section

**From:** R. Jay Vanlandingham, RG, AMEC Sr. Project Manager  
Julianne M. Hamilton, RG, AMEC Client Service Manager

**Re: Revised Interim Summary Technical Memorandum  
Cave Creek Landfill  
Phoenix, Arizona**

This memorandum is intended to summarize the points of discussion between the Arizona Department of Environmental Quality (ADEQ) and Maricopa County (County) to determine the additional activities that will meet the objectives of characterizing the site and to develop and implement a Remedial Action Plan. The following status report summarizes work performed to date as compared to the work plan entitled *Addendum to Cave Creek Landfill Groundwater Characterization Work Plan*, ADEQ Consent Order No. S-102-5, dated May 11, 2009 (Work Plan). This report includes the results of discussion between ADEQ and the County held on June 28, 2011. This report documents work performed pursuant to the Consent Order between the County and ADEQ, ADEQ Identification Number 30604, Docket No. S-2-10, dated January 19, 2010.

### 1.0 SUMMARY OF WORK PLAN TASKS

The Work Plan (AMEC 2009a) describes an approach to further characterize the lateral and downgradient extent of trichloroethene (TCE) in groundwater below the site, which includes the following activities:

- Vertical water quality profiling of groundwater in MW-2
- Adjustment of pump settings in groundwater monitoring wells PW, MW-2 and MW-3
- Lateral plume definition by test boreholes and installation of new monitoring wells
- Downgradient plume definition by test boreholes and installation of new monitoring wells

### 1.1 Vertical Profile of Groundwater in MW-2

A vertical profile of groundwater in MW-2 was collected on June 9, 2009. The samples were collected using passive diffusion bags. Concentrations observed in the passive diffusion bag samples decrease with depth, suggesting that the TCE in groundwater is near the surface and

not migrating downward at MW-2 at this time (AMEC 2009b). The results of those samples are summarized in Table 1.

**Table 1 – Vertical Profile of TCE in MW-2, Cave Creek Landfill**

Depth (feet)	TCE ( $\mu\text{g/L}$ )
695	190/150 (duplicate)
715	170
735	99

Note:  $\mu\text{g/L}$  = micrograms per liter

## 1.2 Adjustment of Pump Settings in PW, MW-2 and MW-3

As described in the Work Plan and with ADEQ's concurrence regarding final placement (ADEQ 2009) the pumps in PW, MW-2 and MW-3 were lowered on June 26, 2009. Pumps were lowered due to falling water levels over time. Adjusted pump settings are shown in Table 2.

**Table 2 – Adjusted Pump Settings, Cave Creek Landfill**

Well ID	Actual Top of Pump (feet btoc)	March 2009 Depth to Water (feet btoc)	Existing Pump Depth Below Water Table (feet)	Planned Pump Setting Activity	New Depth Below Water Table (feet)
PW	750	708.2	42	Remove 15-foot section (at surface)	21
MW-2	693	690.2	3	Add 1-foot-by- 21-foot section to avoid running pump dry in the upcoming months	24
MW-3*	777	699.9	77	Remove 3-foot-by- 21-foot sections and add 10-foot section (assumes well has all 21-foot lengths)	24

Note: btoc = below top of casing

## 1.3 Lateral Plume Definition

Lateral plume definition south of the new landfill, to the MCL concentration of 5 micrograms per liter ( $\mu\text{g/L}$ ), was completed with the installation of monitor wells MW-4 (TB-5) and MW-5 (TB-4). Well locations and their associated concentrations are shown on Figure 1. Boring logs for MW-4 (TB-5) and MW-5 (TB-4) are included as attachments to this memorandum.

## 1.4 Downgradient Plume Definition

The downgradient plume definition south of the new landfill, to the MCL concentration of 5  $\mu\text{g/L}$ , was completed with the installation of monitor well MW-6 (TB-2). The well location and its associated concentrations are shown on Figure 1. Boring logs for MW-6 (TB-2) are attached to this memorandum.

## 2.0 OTHER WORK PERFORMED

In addition to completing the work as described in the Work Plan, the County:

- Continues to sample landfill gas from perimeter wells
- Continues to conduct groundwater sampling
- Installed and sampled deep soil vapor monitor well TSSV-1
- Prepared a soil vapor extraction (SVE) work plan
- Completed a one-day SVE test

## 2.1 Soil Vapor Monitor Well TSSV-1

In January 2010 the County installed a multidepth deep-soil-vapor monitor well (TSSV-1) in the northeastern corner of the new transfer station at the Cave Creek Landfill (AMEC 2010). TSSV-1 has three screened intervals as shown on Table 3. Sampling for nonmethane volatile organic compounds (VOCs) was conducted on February 23, 2010, and results are summarized in Table 3.

**Table 3 – Soil Vapor Concentrations in TSSV-1 Cave Creek Landfill**

Screened Interval (feet bgs)	Soil Vapor Concentrations				
	Total VOCs (µg/L)	TCE (µg/L)	CH <sub>4</sub> (µg/L)	O <sub>2</sub> (%)	CO <sub>2</sub> (%)
150-200	280	130	0.013	16	2.4
350-400	315	200	0.0092	9.2	9.6
550-600	423	77	1	5.3	14

Notes: bgs = below ground surface, µg/L = micrograms per liter

## 2.2 Groundwater Sampling

Groundwater sampling is currently quarterly as approved by ADEQ in a letter dated May 19, 2010. However, the collection of water level measurements is continuing on a monthly basis. Groundwater elevations of PW, MW-2 MW-3, MW-4, MW-5 and MW-6 are used to calculate groundwater flow direction and magnitude. The concentrations of TCE in groundwater demonstrate that TCE is present above the maximum contaminant level (MCL) of 5 µg/L south of the new landfill. Water level elevations demonstrate a relatively flat flow direction that trends generally south to southeast. A summary of the historical groundwater quality monitoring since 2005, specifically focused on TCE concentrations, has been provided in Table 4 (AMEC 2011b). A summary of the previous 12-month water levels with gradient and flow direction are presented in Table 5 (AMEC 2011a).

**Table 4 –Summary of Groundwater Quality Monitoring for the Cave Creek Landfill**

Date	Groundwater Sampling Results –TCE (µg/L)						
	PW	MW-1	MW-2	MW-3	MW-4 (TB-5)	MW-5 (TB-4)	MW-6 (TB-2)
10/20/2005	11	15	ND	NA	NA	NA	NA
10/27/2005	7.8	13	ND	NA	NA	NA	NA
11/10/2005	4.8	16	ND	NA	NA	NA	NA
12/8/2005	15	15	ND	NA	NA	NA	NA
1/12/2006	16	17	ND	NA	NA	NA	NA
2/10/2006	44	17	ND	NA	NA	NA	NA
3/10/2006	20	21	ND	NA	NA	NA	NA
4/13/2006	15	20	ND	NA	NA	NA	NA
5/9/2006	10	24	ND	NA	NA	NA	NA
6/20/2006	11	29	ND	NA	NA	NA	NA
7/13/2006	15	29	ND	NA	NA	NA	NA
8/16/2006	12	29	ND	NA	NA	NA	NA
9/19/2006	3	11	ND	NA	NA	NA	NA
10/13/2006	1.5	9.4	ND	NA	NA	NA	NA
11/13/2006	12	40	ND	NA	NA	NA	NA
12/13/2006	22	3	ND	NA	NA	NA	NA
1/18/2007	13	59	ND	NA	NA	NA	NA
2/21/2007	12	63	5.9	NA	NA	NA	NA
3/20/2007	10	66	7.2	NA	NA	NA	NA
4/16/2007	11	59	8.7	NA	NA	NA	NA
5/22/2007	11	57	12	NA	NA	NA	NA
6/12/2007	9.4	57	15	NA	NA	NA	NA
7/18/2007	8.8	55	18	NA	NA	NA	NA
9/18/2007	1.9	NA	32	NA	NA	NA	NA
10/24/2007	8.6	NA	39	NA	NA	NA	NA
11/16/2007	18	NA	16	NA	NA	NA	NA
12/19/2007	2.5	NA	65	NA	NA	NA	NA
1/12/2008	3.5	NA	66	NA	NA	NA	NA
2/20/2008	18	NA	48	ND	NA	NA	NA
3/12/2008	1.5	NA	130	ND	NA	NA	NA
4/16/2008	1.3	NA	120	ND	NA	NA	NA
5/20/2008	10	NA	120	ND	NA	NA	NA
6/16/2008	1.3	NA	150	ND	NA	NA	NA
7/18/2008	43	NA	190	ND	NA	NA	NA
8/13/2008	53	NA	190	ND	NA	NA	NA
9/15/2008	69	NA	140	ND	NA	NA	NA

Date	Groundwater Sampling Results –TCE (µg/L)						
	PW	MW-1	MW-2	MW-3	MW-4 (TB-5)	MW-5 (TB-4)	MW-6 (TB-2)
10/16/2008	83	NA	190	ND	NA	NA	NA
11/14/2008	70	NA	150	ND	NA	NA	NA
12/12/2008	76	NA	240	ND	NA	NA	NA
1/13/2009	110	NA	320	ND	NA	NA	NA
2/12/2009	85	NA	270	ND	NA	NA	NA
3/12/2009	85	NA	280	ND	NA	NA	NA
4/10/2009	110	NA	330	ND	NA	NA	NA
5/12/2009	76	NA	290	ND	NA	NA	NA
7/15/2009	2.9	NA	380	ND	NA	NA	NA
8/14/2009	6.3	NA	390	ND	NA	NA	NA
9/17/2009	3.8	NA	400	0.85	NA	NA	NA
10/15/2009	3.1	NA	430	ND	NA	NA	NA
11/12/2009	3.9	NA	340	ND	NA	NA	NA
12/11/2009	8	NA	410	0.79	NA	NA	NA
1/13/2010	9.3	NA	400	ND	NA	NA	NA
2/17/2010	9.5	NA	410	ND	NA	NA	NA
3/10/2010	12	NA	340	0.52	NA	NA	NA
4/16/2010	42	NA	450	ND	NA	NA	NA
6/16/2010	5.2	NA	420	1.4	NA	NA	NA
9/13/2010	38.3	NA	428	0.66	NA	NA	NA
11/16/2010 <sup>a</sup>	21.2	NA	412	0.74	5.21	NA	NA
11/24/2010 <sup>a</sup>	24.2	NA	264	1.59	5.31	NA	NA
3/8/2011	30.5	NA	215 <sup>b</sup>	0.88	5.87	ND	NA
3/30/2011 <sup>b</sup>	NS	NA	303 <sup>b</sup>	NS	NS	NS	NA
5/26/2011	39.6	NA	315	1.01	4.65	ND	0.910

## Notes:

- a. Fourth quarter 2010 groundwater sampling was conducted on November 16, and groundwater was resampled on November 24, 2010, at site monitor wells due to potential cross contamination in monitor well MW-4 from MW-2.
- b. Monitor well MW-2 was resampled on March 30, 2011, to confirm the reported TCE result for March 8, 2011.

NA = not available: Well was either not installed, out of service or not scheduled for sampling.

ND = nondetect: The TCE concentration was not detected above the laboratory detection limit of 0.50 µg/L.

NS = not sampled

µg/L = micrograms per liter

**Table 5 – 12-Month Summary of Elevation Data for the Cave Creek Landfill**

Date	Groundwater Elevation (ft amsl)						Flow Direction (azimuth)	Gradient (feet/foot)
	PW	MW-2	MW-3	MW-4 (TB-5)	MW-5 (TB-4)	MW-6 (TB-2)		
5/20/2010	1171.64	1163.63	1164.18	NA	NA	NA	165.2	0.0029
6/16/2010	1171.64	1163.88	1164.13	NA	NA	NA	158.6	0.0029
7/20/2010	1171.74	1163.28	1163.98	NA	NA	NA	167.9	0.0030
8/13/2010	1171.74	1163.33	1164.08	NA	NA	NA	169.1	0.0030
9/13/2010	1171.64	1163.53	1163.83	NA	NA	NA	159.4	0.0030
10/15/2010	1171.88	1163.28	1163.99	NA	NA	NA	167.8	0.0030
11/16/2010 <sup>1</sup>	1171.83	1163.19	1164.11	NA	NA	NA	170.6	0.0030
12/16/2010	1171.79	1163.28	1164.58	1162.55	NA	NA	180.4	0.0029
1/11/2011	1171.77	1163.08	1163.98	1162.39	1162.02	NA	174.4	0.0030
2/15/2011	1171.80	1163.17	1165.03	1162.95	1162.60	NA	180	0.0028
3/8/2011	1171.74	1163.23	1164.13	1162.55	1162.03	NA	178	0.0029
4/30/2011	1171.79	1163.33	1164.28	1162.70	1162.20	NA	176.2	0.0029
5/26/2011	1171.70	1163.38	1164.18	1162.65	1162.15	1164.81	270	0.0018

**Notes:**

All reported groundwater elevations reflect the survey conducted by the Maricopa County Registered Land Surveyor on June 7, 2011.

NA = not applicable; well was not installed

NM = not measured

ft amsl = feet above mean sea level

**2.3 Soil Vapor Extraction Work Plan**

The County has submitted a SVE work plan that calls for conducting a one-day SVE test followed by an extended SVE pilot test. The objective of the SVE work plan is to evaluate whether sustained concentrations of compounds of concern exist in soil vapor in the vicinity of the TSSV-1 and PW wells. Secondary objectives of the test are to 1) estimate relative distance from TSSV-1 and PW to the source area(s), 2) estimate pneumatic conductivity of the soils at various depths, 3) estimate the radius of influence and travel times, 4) evaluate persistence of the soil vapor concentrations at various depths, and 5) estimate a mass removal rate for the compounds of concern. The one-day SVE test is intended to collect information for designing the extended SVE test. As of the date of this memorandum, the one-day SVE test has been completed, but the extended SVE pilot test has not yet been completed. Discussion of the extended SVE test has been deferred to Section 3.4 because it is not yet complete and is considered part of planned work.

**2.4 One-Day Preliminary SVE Pilot Test**

The one-day preliminary SVE pilot test was completed in June 2010. The results of the test confirmed that the general design for the extended SVE pilot test will include three 2,000-pound

vapor-granular activated carbon (VGAC) vessels and a 500 standard-cubic-feet-per-minute (scfm) blower.

### 3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the data collected to date and discussion with ADEQ:

- The TCE in the groundwater south of the new landfill is defined to the 5 µg/L MCL; therefore, no additional monitor wells are necessary south of the new landfill at this time. The plume does not appear to extend under homes to the south and east of the landfill at this time.
- The TCE in the groundwater south of the old landfill is not defined to the 5 µg/L MCL, therefore the County proposes characterizing groundwater downgradient of the old landfill. The County will submit a letter work plan to install a well down gradient of the old landfill.
- The long-term groundwater quality and gradient trends remain under evaluation and ongoing groundwater sampling is necessary and will be continued on a quarterly schedule.
- Implementation of the extended SVE pilot test should be undertaken at the earliest possible opportunity. The County will submit a response to comments on the Final SVE Work Plan.
- VOC analyses of landfill gas have been requested by ADEQ; therefore, the County will collect additional information relative to VOCs from landfill gas during the extended SVE pilot test.
- Quarterly Landfill gas monitoring is ongoing.
- Monthly groundwater level monitoring is ongoing.

### 4.0 REFERENCES

Arizona Department of Environmental Quality (ADEQ). 2009. Email correspondence from Michael N. Prigge to Misael Cabrera, Subject: Pump Depth Setting at CCL, at 4:59 p.m. June 25.

AMEC Earth & Environmental (AMEC). 2009a. *Addendum to Cave Creek Landfill Groundwater Characterization Work Plan*. Prepared for Maricopa County Solid Waste Management Department. May 11.

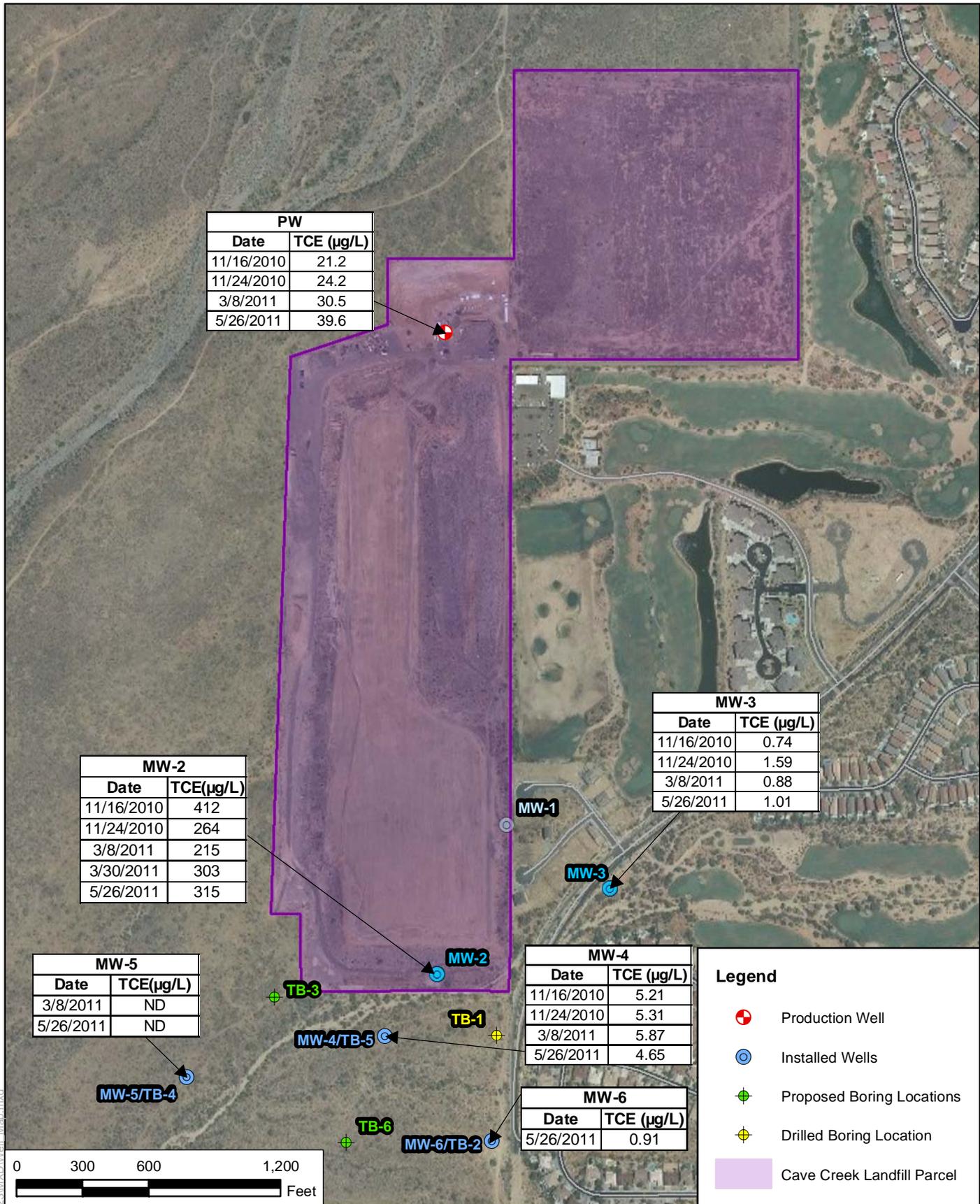
AMEC 2009b. Email correspondence from Misael Cabrera to Michael N. Prigge, Subject: Pump Depth Setting at CCL, 4:59 p.m. June 24.

AMEC. 2010. *Extended Soil Vapor Extraction Pilot Test Work Plan, Cave Creek Landfill*. Prepared for Maricopa County Solid Waste Management Department. June 24.

AMEC. 2011a. *Draft Cave Creek Landfill Status Report, May 2011*. Prepared for Maricopa County Solid Waste Management Department. June 10.

AMEC, 2011b. Excel spreadsheet (CCLGWElevations\_New.xls). Accessed June 16, 2011.

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PW	
Date	TCE (µg/L)
11/16/2010	21.2
11/24/2010	24.2
3/8/2011	30.5
5/26/2011	39.6

MW-2	
Date	TCE(µg/L)
11/16/2010	412
11/24/2010	264
3/8/2011	215
3/30/2011	303
5/26/2011	315

MW-3	
Date	TCE (µg/L)
11/16/2010	0.74
11/24/2010	1.59
3/8/2011	0.88
5/26/2011	1.01

MW-5	
Date	TCE(µg/L)
3/8/2011	ND
5/26/2011	ND

MW-4	
Date	TCE (µg/L)
11/16/2010	5.21
11/24/2010	5.31
3/8/2011	5.87
5/26/2011	4.65

MW-6	
Date	TCE (µg/L)
5/26/2011	0.91

- Legend**
- Production Well
  - Installed Wells
  - Proposed Boring Locations
  - Drilled Boring Location
  - Cave Creek Landfill Parcel



Job No. 14-2011-2023  
 PM: JV  
 Date: 6/14/2011  
 Scale: 1" = 600'



Cave Creek Landfill

Well Map

FIGURE 1



Path: X:\BProjects\1420112023\MXD\Well\_Map.mxd

The map shown here has been created with all due and reasonable care and is strictly for use with AMEC Project Number 14-2011-2023. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. AMEC assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-2-10 to 11-6-10

**LOCATION** SE of Landfill (moved 45' WSW)

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
0	1.4			A		SW-SM	note: adding water for dust control from 0 to 20'	<b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b> , few fines, some fine to coarse grained, angular to subangular gravel, mostly medium to coarse grained, subangular sand, nonplastic, dark gray to black  note: slight increase in coarse grained gravel below 10'
5	0.6							
10	1.8							
15								
20	2.4							
20	2.4			A		SW	note: adding hydrogel to water to stabilize borehole from 20' to 640'	<b>WELL GRADED SAND WITH GRAVEL</b> , some to mostly fine to coarse grained, angular to subangular gravel, mostly medium to coarse grained, subangular sand, nonplastic, dark red to black
25								
30								
35								
40	1.7							
45								
50								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10

SAMPLE TYPE  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1

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**BORING TYPE** 5 1/2" O.D. Pilot  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION	
50				A		SW		<b>WELL GRADED SAND WITH GRAVEL,</b> continued	
55									
60						A			
65									
70						A			
75									
80	0.4					A			note: dark red, green, & black below approximately 80'
85	0.8								
90	0.8					A		SW-SM	<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine to coarse grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, black  note: decrease in gravel & increase in fines below approximately 95'
95	1.0								
100									

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10
▼		
▼		
▼		

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
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**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION	
150	0.8			A		SW		<b>WELL GRADED SAND WITH GRAVEL,</b> continued  note: slight decrease in coarse grained gravel below approximately 155'	
155	0.6								
160	0.6					A			
165	0.8								
170	0.8					A			note: gray to dark gray below approximately 170'
175	1.0								
180	1.0					A		SW-SM	<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, subangular to angular sand, nonplastic, dark green to black
185	0.4								
190	0.6					A			
195	0.6							SM	
200									

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1

**PROJECT** Cave Creek Landfill  
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**LOCATION** SE of Landfill (moved 45' WSW)

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary

**BORING TYPE** 5 1/2" O.D. Pilot

**SURFACE ELEV.**

**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
200				A		SM		<b>SILTY SAND WITH GRAVEL</b> , continued
205	0.8					SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b> , few fines, little to some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark green to dark gray
210	1.0			A				
215	0.8					SW-SM		
220	0.6			A				
225	1.0							note: decrease in gravel & dark green to black below 224'
230	0.8			A				
235	0.8							
240	0.4			A				
245	1.0							
250								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1



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**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary

**BORING TYPE** 5 1/2" O.D. Pilot

**SURFACE ELEV.** \_\_\_\_\_

**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	
									VISUAL CLASSIFICATION	
300	1.2			A				SW	<b>WELL GRADED SAND WITH GRAVEL,</b> continued	
305	1.0								<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	
310	1.2			A					<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	
315	0.8								<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	
320	1.0			A					<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	
325	0.8							SW-SM	<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	
330	1.0			A					<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	
335	1.2								<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	
340	1.0			A					<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	
345	0.8								<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	
350									<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few fines, some fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray	

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10

SAMPLE TYPE  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1



**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-2-10 to 11-6-10

**LOCATION** SE of Landfill (moved 45' WSW)

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary

**BORING TYPE** 5 1/2" O.D. Pilot

**SURFACE ELEV.** \_\_\_\_\_

**DATUM** Ground Surface

Depth in Feet	Drill Rate Min/ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
400	1.2			A		SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b> , few fines, little fine grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray
405	1.2							
410	1.0							
415	1.6							
420								
425								
430								
435								
440								
445								
420				A		SW		<b>WELL GRADED SAND WITH GRAVEL</b> , trace fines, some to mostly fine to coarse grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray
425	0.6							
430	0.8							
435	0.6							
440	1.0							
445	0.8							
450								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10
▼		
▼		
▼		

SAMPLE TYPE  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-2-10 to 11-6-10

**LOCATION** SE of Landfill (moved 45' WSW)

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary

**BORING TYPE** 5 1/2" O.D. Pilot

**SURFACE ELEV.** \_\_\_\_\_

**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION	
450	0.8			A		SW		<b>WELL GRADED SAND WITH GRAVEL,</b> continued	
455	1.0								
460	1.2			A				note: reddish-brown to dark gray from 460' to 470'	
465	1.0								
470	0.9			A					
475									
480	1.4			A				note: decrease in gravel from 480' to 490'	
485	0.8								
490	0.9			A					
495									
500							note: changing to 5 1/2" tricone bit at 500'		

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10
▼		
▼		
▼		

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-2-10 to 11-6-10

**LOCATION** SE of Landfill (moved 45' WSW)

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary

**BORING TYPE** 5 1/2" O.D. Pilot

**SURFACE ELEV.** \_\_\_\_\_

**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	
							VISUAL CLASSIFICATION	
500	1.2			A		SW	<b>WELL GRADED SAND WITH GRAVEL</b> , continued  note: dark gray to black from 504' to 520'	
505	0.9							
510				A				
515	1.4						<b>WELL GRADED SAND WITH GRAVEL</b> , some to mostly fine to coarse grained, angular to subangular gravel, mostly medium to coarse grained, angular to subangular sand, nonplastic, dark gray to black	
520				A		SW		
525	2.4							
530	1.4			A		GW	<b>WELL GRADED GRAVEL WITH SAND</b> , some to mostly medium to coarse grained, angular to subangular sand, mostly fine to coarse grained, angular to subangular gravel, nonplastic, dark gray to black  note: rig chatter from 538' to 540'; possible cobbles & boulders present	
535	1.7							
	2.0							
540	1.4			A				
545	2.2							
550								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-2-10 to 11-6-10

**LOCATION** SE of Landfill (moved 45' WSW)

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION	
550	1.0			A		GW	<p>note: had to trip out of borehole; drill pipes were tightening up at 558'</p> <p>note: rig chatter, possible cobbles &amp; boulders present from 564' to 570'</p> <p>note: increase in medium to coarse grained, angular to subangular sand below 570'; possible poorly graded sand with gravel</p> <p>note: tripping out borehole to loosen drill pipe at 585'</p>	<b>WELL GRADED GRAVEL WITH SAND</b> , continued	
555									
560	1.6								
565	1.4								
570	1.8								
575	3.3								
580	1.2								
585									
590									
595									
600	0.5					GW		<b>WELL GRADED GRAVEL WITH SAND</b>	
600									

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-2-10 to 11-6-10

**LOCATION** SE of Landfill (moved 45' WSW)

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary

**BORING TYPE** 5 1/2" O.D. Pilot

**SURFACE ELEV.** \_\_\_\_\_

**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
600	1.2			A		GW	note: tripping out of borehole to loosen drill pipe at 618'	<b>WELL GRADED GRAVEL WITH SAND</b> , some medium to coarse grained, angular to subangular sand, mostly fine to coarse grained, angular to subangular gravel, nonplastic, dark gray
605	0.8							
610	1.1							
615								
620	1.4							
625	1.0							
630	0.8							
635	2.3							
640	1.3							
645								
650							note: stopped drilling with mud from 640' to 718' for clean water sample	note: rig chatter, possible cobbles & boulders present from 635' to 638'
								note: rig chatter, possible cobbles & boulders present from 645' to 650'

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10
▼		
▼		
▼		

SAMPLE TYPE  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-2-10 to 11-6-10

**LOCATION** SE of Landfill (moved 45' WSW)

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary

**BORING TYPE** 5 1/2" O.D. Pilot

**SURFACE ELEV.**

**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
650	0.8			A		GW		<b>WELL GRADED GRAVEL WITH SAND,</b> continued
655								
660				A				
665						GW-GM		<b>WELL GRADED GRAVEL WITH SILT &amp; SAND,</b> few silt, some medium to coarse grained, subangular to angular sand, mostly fine to coarse grained, angular to subangular gravel, nonplastic, gray  note: increase in fines from 665' to 680'
670				A				
675								
680				A		GP		<b>POORLY GRADED GRAVEL WITH SAND,</b> trace silt, little to some fine to coarse grained, subangular to angular sand, mostly fine grained, subangular to angular gravel, nonplastic, grayish-brown  note: decrease in fines below 680'
685								
690				A				
∇ 695								note: collected ground water sample: TB1-718-110610 at 12:30 on 11-6-10
700				A				

GROUNDWATER

DEPTH(ft)	HOUR	DATE
∇ 695.00	0930	11-6-10
∇		
∇		
∇		

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-2-10 to 11-6-10

**LOCATION** SE of Landfill (moved 45' WSW)

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot  
**SURFACE ELEV.**  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
							700	
705						GP-GM	<b>POORLY GRADED GRAVEL WITH SILT &amp; SAND,</b> trace cobbles, few silt, little fine to coarse grained, subangular to angular sand, mostly fine grained, subangular to angular gravel, nonplastic, grayish-brown  note: rig chatter, possible boulders present below 708'	
710				A				
715								
720							Total Depth = 718' Stopped 5 1/2" percussion hammer at 500' Drilled 5 1/2" tricone from 500' to 718' Stopped 5 1/2" tricone at 718'	
725								
730								
735								
740								
745								
750								

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.00	0930	11-6-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-1

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
							0	
5								
10				A				
15								
20				A			note: 14" conductor casing installed using 20" drill bit from 0 to 20'	note: increase in coarse gravel at 20', possible GP
25								
30				A				note: black, red & green at 30'
35								
40				A				note: increase in gravel, possible GP from 40' to 50'
45								
50								note: increase in medium grained sand at 50'

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
									50	
55										
60				A						note: increase in coarse grained gravel at 60'
65										
70				A						note: increase in medium to coarse grained sand at 70'
75										
80				A						
85										
90				A						
95										
100										note: increase in coarse grained gravel at 100'

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	
							VISUAL CLASSIFICATION	
100				A		SW		<b>WELL GRADED SAND WITH GRAVEL,</b> continued
105								
110				A		SW		<b>WELL GRADED SAND,</b> mostly medium to coarse grained sand, angular to subangular, nonplastic, black, green & tan
115								
120				A		GP		<b>POORLY GRADED GRAVEL WITH SAND,</b> little coarse grained sand, mostly coarse grained gravel, angular to subangular, black, green and red
125								
130				A		SW		<b>WELL GRADED SAND,</b> trace silt, trace fine grained gravel, angular to subangular, mostly medium to coarse grained sand, black, green, red & tan
135								
140				A				
145								
150								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2



**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
									200	
205										
210				A						
215										
220				A						
225										
230				A						
235										
240				A						
245										
250										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
250				A		SW		<b>WELL GRADED SAND</b> , trace fines, mostly medium to coarse grained sand, angular to subangular, nonplastic, tan, green & orange
255								
260				A		SW-SM		<b>WELL GRADED SAND WITH SILT</b> , few silt, mostly medium to coarse grained sand, angular to subangular, nonplastic, brown, black, tan, orange & green
265								
270				A				
275								
280				A				
285								
290				A				note: trace gravel at 290'
295								
300								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
							300	
305								
310				A			note: few fine grained gravel at 310'	
315								
320				A			note: increase in fines at 320'	
325								
330				A			note: decrease in fines at 330'	
335						SW		<b>WELL GRADED SAND</b> , trace fines, mostly medium to coarse grained sand, angular to subangular, nonplastic, brown, black & orange
340				A				
345								
350								

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11
▽		
▽		
▽		

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	
							VISUAL CLASSIFICATION	
350				A		SW-SM		<b>WELL GRADED SAND WITH SILT</b> , few silt, mostly medium to coarse grained sand, subangular to angular, nonplastic, brown
355								
360				A		SW		<b>WELL GRADED SAND</b> , trace fines, mostly medium to coarse grained sand, angular to subangular, nonplastic, brown
365								
370				A		SW-SM		<b>WELL GRADED SAND WITH SILT</b> , few silt, mostly medium to coarse grained sand, angular to subangular, nonplastic, brown
375								
380				A				note: increase in coarse grained sand at 380'
385								
390				A		SW		<b>WELL GRADED SAND</b> , trace fines, mostly medium to coarse grained sand, angular to subangular, nonplastic, black, brown, green & orange
395								
400								

**GROUNDWATER**

DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS			
							VISUAL CLASSIFICATION			
400				A		SW		<b>WELL GRADED SAND</b> , continued		
405										
410						A				
415										
420						A				
425										
430						A				note: increased in fines at 430'
435										
440						A		SW		<b>WELL GRADED SAND WITH GRAVEL</b> , few fine grained gravel, angular to subangular, mostly medium to coarse grained sand, nonplastic, black, brown, green & orange
445										
450										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

SAMPLE TYPE  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
									450	
455										
460				A						
465										
470				A				SW	<b>WELL GRADED SAND,</b> trace fine grained gravel & fine sand, mostly medium to coarse grained sand, angular to subangular, nonplastic, black, brown, green & orange	
475										
480				A						
485										
490				A						
495										
500										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

SAMPLE TYPE  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
500				A				SW		<b>WELL GRADED SAND</b> , continued
505										
510				A						
515										
520				A						
525										
530				A						
535										
540				A						note: decrease in fine grained sand at 540'
545										
550										note: increase in fine grained sand at 550'

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS		
						VISUAL CLASSIFICATION		
550			A		SW	<b>WELL GRADED SAND</b> , continued		
555								
560				A				
565								
570				A				
575								
580				A				SM
585								
590				A				
595								
600								

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
600				A		SM		<b>SILTY SAND WITH GRAVEL</b> , continued
605								
610				A				
615								
620				A				
625								note: caving below 625'
630				A				note: increase in coarse grained gravel & trace cobbles from 630' to 640'
635								
640				A				note: added back side mud between 620' to 660'
645								
650								

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11
▽		
▽		
▽		

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
650			A		SM		<b>SILTY SAND WITH GRAVEL</b> , continued
655							
660			A				note: hole caving without use of water, very dusty in cyclone; observed silty sand with gravels, light brown to brown
665						note: at 665' tried to drill dry per work plan, but had to add water for dust control measures; used mud during over reaming through entire borehole	note: increasing gravels below ~660' to ~675'
670			A				
675							
680			A				
685							
690			A				
695							
700							

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
700				A		SM		<b>SILTY SAND WITH GRAVEL</b> , continued
705								
710				A				
715								
720				A				
725								
						SP-SM		<b>POORLY GRADED SAND WITH SILT</b> , few silt, mostly fine grained sand, subangular to angular, nonplastic, grayish brown to light brown
730				A				
735								
740				A				note: increasing grain sizes below ~745'
745						SM		<b>SILTY SAND WITH GRAVEL</b> , little to some fine gravel, subangular to angular, some to mostly fine to coarse grained sand, subangular to angular, nonplastic, grayish-brown
750								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 4-1-11 to 4-30-11

**LOCATION** \_\_\_\_\_

**RIG TYPE** VERSA Drill SN-1097  
**BORING TYPE** 5 1/2" O.D. Pilot; 11 5/8" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** \_\_\_\_\_

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
						750	
755							
760			A				
765					SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b> , few silt, little to some fine grained gravel, subangular to angular, some to mostly fine to coarse grained sand, subangular to angular, nonplastic, grayish brown
770							
775							
780						Total depth = 776'11" Stopped 5 1/2" O.D. pilot hole at 720' Stopped 11 5/8" tricone at 777'	
785						note: downhole geophysics conducted by Southwest Exploration on 5-1-11	
790							
795							
800							

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
695.80	11:22	4-7-11

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-2

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
							0	1.0
10			A			GW-GM		<b>WELL GRADED GRAVEL WITH SILT &amp; SAND</b> , few silt, little to some fine to coarse grained, subangular to angular sand, some to mostly fine to coarse grained, subangular to angular gravel, nonplastic, brown  note: decrease fines below 9'
20	1.0		A			GP		<b>POORLY GRADED GRAVEL WITH SAND</b> , little to some coarse grained, subangular sand, some to mostly coarse grained, subangular to subrounded gravel, nonplastic, dark gray  note: boulders up to 16" in diameter & cobbles present
40	1.2		A				note: switch to stratex to drive down temporary casing to 44'; switch back to downhole hammer at 40'	note: heavy rig chatter during 12 1/4" tricone over reaming from 40' to 42'

GROUNDWATER

DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

SAMPLE TYPE  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.**  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION	
50				A		GP		<b>POORLY GRADED GRAVEL WITH SAND</b> , continued	
55								note: heavy rig chatter during 12 1/4" tricone over reaming from 55' to 58'	
60					A				
65	1.0								
70					A				
75							GW	note: increase in fines below 75'	<b>WELL GRADED GRAVEL WITH SAND</b> , trace silt, little to some fine to coarse grained, subangular to angular sand, some to mostly fine to coarse grained, subangular to angular gravel, nonplastic, brown to grayish-brown
80					A			moist	note: cobbles present
85	0.8							note: adding hydrogel to water to stabilize borehole from 80' to 640'; in pilot hole; using mud during over reaming	
90					A				note: decrease in coarse grains below 95'
95							SW-SM	note: actual deviation measured = 0.5° at 95'	<b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b> , few silt, little to some fine grained, subangular to angular gravel, some to mostly fine to coarse grained, subangular to angular sand, nonplastic, brown
100									

GROUNDWATER

DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.**  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification		Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
100	0.7			A			SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> continued
105									
110				A					
115							GP		<b>POORLY GRADED GRAVEL WITH SAND,</b> trace silt & cobbles, little to some fine to coarse grained, angular to subangular sand, some to mostly fine grained, subangular to angular gravel, uncemented, nonplastic, grayish-brown
120				A					
125									
130				A					
135									
140				A			SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few silt, little to some fine grained, subangular to angular gravel, some to mostly fine to coarse grained, subangular to angular sand, nonplastic, grayish-brown
145									
150									

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
150				A		SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> continued
155								
160				A				
165								
170				A				
175								
180				A				
185								
190				A				
195								
200						GW		<b>WELL GRADED GRAVEL WITH SAND,</b> little to some fine to coarse grained, subangular to angular sand, some to mostly fine to coarse grained, subangular to angular gravel, nonplastic, grayish-brown  note: cobbles present  note: actual deviation measured = 1.1° at 195'  note: decrease in fines & increase in coarse grains below ~185'

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	
							VISUAL CLASSIFICATION	
200	0.7		A	A		GW	<b>WELL GRADED GRAVEL WITH SAND,</b> continued	
205								
210								
215								
220								
225								
230								
235								
240								
245								
250	0.6		A	A		SM	<b>SILTY SAND WITH GRAVEL,</b> little to some fine grained, subangular to angular gravel, little to some silt, some to mostly fine to coarse grained, subangular to angular sand, nonplastic, brown	
240								
245								
250								
250								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10      **LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.**  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
250				A		SM		<b>SILTY SAND WITH GRAVEL</b> , continued note: decrease in fines & increase in coarse grains below 255'
255						GP		<b>POORLY GRADED GRAVEL WITH SAND</b> , little to mostly fine to coarse grained, subangular to angular sand, some to mostly fine grained, subangular to angular gravel, nonplastic, brown to grayish-brown
260	0.6			A		SM		note: cobbles present
265								<b>SILTY SAND WITH GRAVEL</b> , little to some silt, little to some fine grained, subangular to angular gravel, some to mostly fine to coarse grained, subangular to angular sand, nonplastic, light brown
270				A				note: decrease in fines below 270'
275						GP	note: lost water/mud circulation at 275' during 12 1/4" over reaming	<b>POORLY GRADED GRAVEL WITH SAND</b> , little to some fine to coarse grained, subangular to angular sand, some to mostly fine grained, subangular to angular gravel, nonplastic, gray note: cobbles present
280	0.5			A		SM		<b>SILTY SAND WITH GRAVEL</b> , little to some silt, little to some fine grained, subangular to angular gravel, some to mostly fine to coarse grained, subangular to angular sand, nonplastic, light brown to brown
285								
290				A				
295								note: heavy rig chatter during 12 1/4" tricone over reaming at 300'
300								note: actual deviation measured = 0.2° at 300'

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	
									VISUAL CLASSIFICATION	
300	0.6			A				SM	<b>SILTY SAND WITH GRAVEL</b> , continued	
305									note: heavy rig chatter during 12 1/4" tricone over reaming at 305'	
310								GW	<b>WELL GRADED GRAVEL WITH SAND</b> , trace silt, little to some fine to coarse grained, subangular to angular sand, some to mostly fine to coarse grained, subangular to angular gravel, nonplastic, light brown to grayish-brown	
315				A					note: cobbles present	
320	0.7			A						
325										
330				A					note: reddish-brown fines at 330'	
335										
340	0.6			A						
345										
350									note: slight rig chatter during 12 1/4" tricone over reaming at 348'	

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10
▼		
▼		
▼		

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION			
350			A			GW		<b>WELL GRADED GRAVEL WITH SAND</b> , continued  note: silty sand lense at 355'			
355											
360	0.5										note: slight to moderate rig chatter during 12 1/4" tricone over reaming at 360'
365											note: decrease in fines from 365' to 370'
370			A			SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b> , little to some fine grained, subangular to angular gravel, some to mostly fine to coarse grained, subangular to subrounded sand, nonplastic, brown			
375											
380	0.4										note: decrease in fines, color change to grayish-brown, increase in gravel below 385'
385			A			SW		<b>WELL GRADED SAND WITH GRAVEL</b> , little to mostly fine grained, subangular to angular gravel, some to mostly fine to coarse grained, subangular to angular sand, nonplastic, grayish-brown to gray to dark gray			
390											note: heavy rig chatter during 12 1/4" tricone over reaming at 392'
395											
400											note: slight rig chatter during 12 1/4" tricone over reaming at 398'

GROUNDWATER

DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

SAMPLE TYPE  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	
									VISUAL CLASSIFICATION	
400	0.5			A				SW	<p><b>WELL GRADED SAND WITH GRAVEL,</b> continued</p> <p>note: moderate to heavy rig chatter during 12 1/4" tricone over reaming at 400'</p> <p>note: lost water/mud circulation during 12 1/4" over reaming, an estimated 300 gals, at 410'</p> <p>note: silts below 425', color change back to brownish-gray</p>	
405										
410				A						
415										
420	0.5			A						
425								SW-SM		
430				A						
435										
440	0.6			A						
445										
450										

**GROUNDWATER**

DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
450				A		SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> continued
455								
460				A		SM		<b>SILTY SAND WITH GRAVEL,</b> little to some silt, little to some fine grained, subangular to angular gravel, some to mostly fine to coarse grained, subangular to angular sand, nonplastic, brown  note: decrease in fines below 465'
465								
470				A		SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> few silt, little to some fine grained, subangular to angular gravel, some to mostly fine to coarse grained, subangular to angular sand, nonplastic, grayish-brown  note: moderate to heavy rig chatter during 12 1/4" tricone over reaming at 473'
475								
480				A				
485								
490				A				note: moderate rig chatter during 12 1/4" tricone over reaming at 490'
495								
500								

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10
▼		
▼		
▼		

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	
									VISUAL CLASSIFICATION	
500				A				SW-SM	<b>WELL GRADED SAND WITH SILT &amp; GRAVEL,</b> continued  note: moderate to heavy rig chatter during 12 1/4" tricone over reaming at 508'  note: lost water/mud circulation during 12 1/4" over reaming at 525'	
505										
510					A					
515										
520					A					
525										
530					A					
535										
540					A					
545										
550										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

SAMPLE TYPE  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.**  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
550				A		SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b> , continued
555								
560				A				
565								note: slight rig chatter during 12 1/4" tricone over reaming at 565'
570				A		GW		<b>WELL GRADED GRAVEL WITH SAND</b> , trace silt, little to some fine to coarse grained, subangular to angular sand, some to mostly fine to coarse grained, subangular to angular gravel, nonplastic, grayish-brown
575								
580				A				
585								
590				A				note: increase in fines below 595'
595						SM		<b>SILTY SAND WITH GRAVEL</b> , little to some silt, little to some fine to coarse grained, subangular to angular gravel, some to mostly fine to coarse grained, subangular to angular sand, nonplastic, brown
600								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
							600	
605							note: lost water/mud circulation during 12 1/4" over reaming, an estimated 600 to 700 gals, at 600'	
610				A				
615								
620	0.5			A				
625						GW	note: decrease in fines below 625'	<b>WELL GRADED GRAVEL WITH SAND</b> , trace silt, little to some fine to coarse grained, subangular to angular sand, some to mostly fine to coarse grained, subangular to angular gravel, nonplastic, gray to dark gray  note: cobbles present
630				A				
635								
640	0.7			A				
645							note: not adding hydrogel for clean water sample from 640' to 700' in pilot hole; using mud during over reaming	
650								

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4



**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
700				A		GW	note: using mud during over reaming from 700' to 767'	<b>WELL GRADED GRAVEL WITH SAND</b> , continued
705						SM		<b>SILTY SAND</b> , little silt, little fine grained sand, mostly medium to coarse grained, angular to subangular sand, brown to black  note: possibly few clay with low to medium plasticity
710				A				
715	12.8							note: increase in coarse grained sand below 715'
720	6.6			A				
725	7.8							note: increase in medium grained sand & increase in silt below 725'
730	7.8			A				
735	5.0							
740	6.8			A				
745	5.0 5.8							
750								

**GROUNDWATER**

DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 11-10-10 to 12-10-10

**LOCATION** 50' from stake, SWC of landfill

**RIG TYPE** T-3 Atlas CopCo  
**BORING TYPE** 5 1/2" O.D. Pilot; 12 1/4" O.D. Tricone Bit  
**SURFACE ELEV.** \_\_\_\_\_  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
						750	4.3
755					SM		<b>SILTY SAND</b> , little silt, little to some medium to coarse grained sand, some to mostly fine grained sand, brown to black
760	5.8						note: possible few clay with low to medium plasticity
765	6.5						
770							Total Depth = 767' Stopped 5 1/2" percussion hammer at 700' Stopped 12 1/4" tricone at 767'
775							note: downhole geophysics conducted by Southwest Exploration on 12-10-10
780							
785							
790							
795							
800							

**GROUNDWATER**

DEPTH(ft)	HOUR	DATE
681.40	0850	11-17-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-4

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION		
							0			
5										
10										
15										
20										
25										
30										
35										
40						SW-SM				
45										
50										
								<p><b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b>, few silt, little to some fine to coarse grained, subangular to subrounded gravel, mostly fine to coarse grained, subangular to subrounded sand, nonplastic, brown to dark brown</p> <p>note: becoming poorly graded below 45'</p>		

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION		
									50			
55												
60												
65								GW-GM	<b>WELL GRADED GRAVEL WITH SILT &amp; SAND, trace cobbles &amp; boulders, few silt, few to little medium to coarse grained, subangular to subrounded sand, mostly fine to coarse grained, subangular to subrounded gravel, nonplastic, brown</b>  note: actual deviation measured = 0.5° at 70'			
70												
75												
80												
85												
90												
95												
100												

GROUNDWATER

DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
100						GW-GM		<b>WELL GRADED GRAVEL WITH SILT &amp; SAND,</b> continued
105								
110								
115								
120								
125						ML		<b>SANDY SILT WITH GRAVEL,</b> little fine to coarse grained, subangular to subrounded gravel, some fine to coarse grained, subangular to subrounded sand, weakly cemented, nonplastic, brown to light brown
130								
135						GW-GM		<b>WELL GRADED GRAVEL WITH SILT &amp; SAND,</b> trace cobbles, few silt, few to little medium to coarse grained, subangular to subrounded sand, mostly fine to coarse grained, subangular to subrounded gravel, nonplastic, brown to grayish-brown
140								
145								
150								

GROUNDWATER

DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
150								GW-GM		<b>WELL GRADED GRAVEL WITH SILT &amp; SAND,</b> continued
155										
160										
165										
170										note: actual deviation measured = 0.5° at 168'
175										
180										note: increase in fines below 180'
185								SM		<b>SILTY SAND WITH GRAVEL,</b> trace cobbles, little fine to coarse grained, subangular to subrounded gravel, mostly fine to coarse grained, subangular to subrounded sand, nonplastic, brown
190									note: adding hydrogel to water to stabilize borehole from 180' to 320' in pilot hole; using mud during over reaming	
195										
200										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
									200	
205										
210										
215										
220									note: hard drilling from 218' to 225'	
225									note: possible cobbles & boulders present, heavy rig chatter during over reaming with 9 7/8" tricone bit at 218'	
230									note: possible cobbles & boulders present, heavy rig chatter during over reaming with 9 7/8" tricone bit at 225'	
235									note: actual deviation measured = 0.6° at 230'	
240								SW-SM	note: increase in coarse grained material below 235'	<b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b> , trace cobbles, few silt, little to some fine grained, subangular to subrounded gravel, mostly fine to coarse grained, subangular to subrounded sand, nonplastic, brown
245									note: actual deviation measured = 0.7° at 240'	
250									note: actual deviation measured = 0.5° at 248'	

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
▽ 686.15	10:38	9-24-10
▼		
▼		
▼		

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
									250	
255										
260										
265										
270										
275										
280										
285										
290										
295								SM	<p><b>SILTY SAND WITH GRAVEL,</b> little to some fine grained, subangular to subrounded gravel, mostly fine to coarse grained, subangular to subrounded sand, nonplastic, brown</p> <p>note: possible cobbles &amp; boulders present, heavy rig chatter during over reaming with 9 7/8" tricone bit from 299' to 300'</p>	
300										

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
300								SM		<b>SILTY SAND WITH GRAVEL</b> , continued
305										
310										
315										
320										
325								GM		<b>SILTY GRAVEL WITH SAND</b> , trace cobbles, little silt, little to some fine to coarse grained, subangular to subrounded sand, some fine to coarse grained, subangular to subrounded gravel, nonplastic, brown to grayish-brown
330									note: stopped adding water & hydrogel from 320' to 360' in pilot hole; using mud during over reaming	note: increase in gravel from 325' to 335'
335										
340								SM		<b>SILTY SAND WITH GRAVEL</b> , little to some fine grained, subangular to subrounded gravel, mostly fine to coarse grained, subangular to subrounded sand, nonplastic, light brown to grayish-brown
345										note: increase in silt at 340'
350										

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
350								SM		<b>SILTY SAND WITH GRAVEL</b> , continued
355										
360										
365									note: adding hydrogel to water to stabilize borehole from 360' to 640' in pilot hole; using mud during over reaming	
370										note: actual deviation measured = 0.7° at 368'
375										note: possible cobbles & boulders present, heavy rig chatter during over reaming with 9 7/8" tricone bit at 375'
380										
385										
390										
395										
400										

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
400								SM		<b>SILTY SAND WITH GRAVEL</b> , continued
405										
410										
415										
420										
425								SW-SM		<b>WELL GRADED SAND WITH SILT &amp; GRAVEL</b> , trace cobbles, few silt, some fine to coarse grained, angular to subangular gravel, mostly fine to coarse grained, angular to subangular sand, nonplastic, brown to grayish-brown  note: black to grayish-brown, gravel and/or cobbles below 425'  note: actual deviation measured = 1.1° at 428'  note: actual deviation measured = 0.9° at 430'
430										
435										
440										
445										
450										

**GROUNDWATER**

DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
						450	
455							
460							
465							
470							
475					SM	<p><b>SILTY SAND WITH GRAVEL,</b> trace cobbles, little to some fine grained, subangular to angular gravel, mostly fine to coarse grained, subangular to subrounded sand, nonplastic, brown</p>	
480							
485							
490							
495					GP-GM	<p><b>POORLY GRADED GRAVEL WITH SILT &amp; SAND</b></p>	
500							

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
▽ 686.15	10:38	9-24-10
▼		
▼		
▼		

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

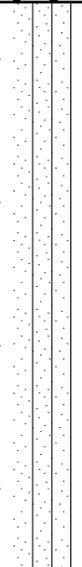
**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
									500	
505										
510										
515										
520								SM	<p><b>SILTY SAND WITH GRAVEL</b>, trace cobbles, little fine grained, subangular to angular gravel, little coarse grained, subangular to subrounded sand, mostly fine to medium grained sand, nonplastic, yellowish-brown</p> <p>note: brown below 530'</p> <p>note: actual deviation measured = 1.3° at 530'</p> <p>note: decrease in silt below 535'</p>	
525										
530										
535										
540								GP-GM	<p><b>POORLY GRADED GRAVEL WITH SILT &amp; SAND</b>, few silt, little to some fine to coarse grained, subangular to subrounded sand, mostly fine grained, subangular to angular gravel, nonplastic, brown</p>	
545										
550										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5



**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
600						SM		<b>SILTY SAND WITH GRAVEL</b> , continued
605								
610								
615								
620								
625						GP-GM		<b>POORLY GRADED GRAVEL WITH SILT &amp; SAND</b> , trace cobbles, few silt, little to some fine to coarse grained, subangular to subrounded sand, mostly fine grained, subangular to angular gravel, nonplastic, brown to grayish-brown  note: actual deviation measured = 2.7° at 630'
630								
635								
640							note: adding hydrogel in pilot hole from 640' to 700' for clean water sample; using mud during over reaming	
645	1.75							note: increase in silt below 645'
650						SM		<b>SILTY SAND WITH GRAVEL</b>

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
▽ 686.15	10:38	9-24-10
▼		
▼		
▼		

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
650								SM		<b>SILTY SAND WITH GRAVEL</b> , trace cobbles, little to some fine to coarse grained, subangular to angular gravel, mostly fine to coarse grained, subangular to subrounded sand, nonplastic, brown
655	1.75									
660									note: drilling dry from 660' to 675' in pilot hole; using mud during over reaming	
665	1.5									
670									note: drilling started rattling; adding water from 675' to 700' in pilot hole; using mud during over reaming	note: yellowish-brown color from 660' to 670' note: actual deviation measured = 2.8° at 670'
675	1.5									note: increase in silt from 675' to 685'
680										
685	1.8									note: collected groundwater sample TB5-700-092410 at 12:40 on 9-24-10
690										
695	1.8									note: possible cobbles & boulders present below 695', color change to grayish-brown, decrease in fines
700										

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification	Unified Soil Classification or Rock Unit	REMARKS	
							VISUAL CLASSIFICATION	
700	12.8		A			SW	note: using mud during over reaming from 700' to 768'	<b>WELL GRADED SAND WITH GRAVEL</b> , some to mostly coarse grained, subangular to angular gravel, mostly medium to coarse grained, subangular sand, nonplastic, dark gray to gray
705	7.7							
	1.1							
710	8.4							
715	9.4							
720	9.2							
725	9.0							
	13.0							
730								
735	7.2							
740	7.0							
745	6.7							
750								

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
 Continuous Soil Core Examined  
 Samples Consist of 2 - 8oz Glass Jars  
 1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5

**PROJECT** Cave Creek Landfill  
Groundwater Investigation

**JOB NO.** 14-2010-2022      **DATE** 9-21-10 to 10-22-10

**LOCATION** South of Landfill

**RIG TYPE** T-3 Atlas CopCo Reverse Air Rotary  
**BORING TYPE** 5 1/2" O.D. Pilot; 9 7/8" O.D. Tricone Bit;  
**SURFACE ELEV.** 12 1/4" O.D. Tricone Bit  
**DATUM** Ground Surface

Depth in Feet	Drill Rate Min./ft.	Graphical Log	Sample	Sample Type	Sample Identification			Unified Soil Classification or Rock Unit	REMARKS	VISUAL CLASSIFICATION
									750	
755	7.4									
760	5.8		A							
765	6.0									
770									Total depth = 768' Stopped 5 1/2" percussion hammer at 460' Drilled 5 1/2" tricone from 460' to 700' Stopped 9 7/8" tricone at 480' Stopped 12 1/4" tricone at 768'  note: downhole geophysics conducted by Southwest Exploration on 10-23-10	
775										
780										
785										
790										
795										
800										

GROUNDWATER

DEPTH(ft)	HOUR	DATE
686.15	10:38	9-24-10

**SAMPLE TYPE**  
Continuous Soil Core Examined  
Samples Consist of 2 - 8oz Glass Jars  
1 - 40ml Amber VOA - Methonal Extraction

**LOG OF TEST BORING NO.** TB-5