

51025



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RECEIVED

May 18, 2016

MAY 20 2016

SITE ASSESSMENT,
REMEDICATION &
REVITALIZATION

Ms. Addie Walker
South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management
State Remediation Section
2600 Bull Street
Columbia, South Carolina 29201

**Re: Summary of Well Installation and Sampling Efforts
Former Shakespeare Composite Structures Site
Newberry County
Voluntary Cleanup Contract 14-6271-RP
Site ID # 51025**

Dear Ms. Walker:

Between February 18 and April 18, 2016, AECOM Technical Services, Inc. (AECOM), performed well installation and sampling efforts as part of an ongoing investigation at the Shakespeare Composite Structures Site (the Site). In the August 2015 Site Investigation Work Plan (SIWP) Addendum, AECOM proposed the installation of an additional deep bedrock well on the former Shakespeare manufacturing facility property (the plant) along with intermediate wells on the properties to the north (Dickert Property) and the south (Shealy Property) of the plant. As a follow-up to recommendations in the SIWP Addendum, the SCDHEC requested installation of an additional bedrock well on the Shealy property as part of this investigative effort. The intent of this brief report is to summarize the results of the well installation and sampling efforts.

Well Installation

Four wells were installed during this portion of the investigation. The wells included one shallow well (MW-25), one intermediate well (MW24I) and one bedrock well (SDW-2) on the Shealy property, and one deep bedrock well (MW-9D) on the plant site. Each well was installed using rotosonic drilling techniques in accordance with the procedures referenced in Section 3.2.1 of the SIWP Addendum. Soil boring logs generated during well boring advancement and well construction logs documenting well construction details for each of these new wells are included in **Attachment A** of this letter report.

Shallow Wells

Shallow well MW-25 was installed downgradient from temporary well TMW-114. TMW-114 was installed and sampled in December 2015. As indicated in the March 8, 2016 Quarterly Progress Report, analytical

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results for the confirmatory sample collected from TMW-114 indicated the presence of trichloroethylene (TCE) at 66 micrograms per liter (ug/L), which is above the primary drinking water standard (maximum contaminant level – MCL) of 5 ug/L. As a result, Philips opted to install an additional shallow well (MW-25) downgradient (southwest) of temporary well TMW-114 to attempt to achieve horizontal plume definition in this direction. MW-25 was installed to a depth of approximately 29 feet below land surface (BLS); the groundwater sample collected from this well had a reported TCE concentration of 0.9 ug/L, which is below the 5 ug/L MCL; therefore, delineation in this direction has been completed. The location of MW-25 is depicted on **Figure 1**.

Intermediate Wells

As indicated in the SIWP Addendum, at least one intermediate zone well was planned for the Shealy property. MW-24I was installed to the southeast of MW24 (shallow well) on February 17, 2016. Based on the depths of intermediate wells advanced in other portions of the Site, it was anticipated that the depth of this well would range between 40 and 65 feet BLS. However, MW-24I was installed to a depth of approximately 39 feet BLS. This well is constructed into the top of competent granitic bedrock, which was encountered at approximately 31 feet BLS at this location. The location of MW-24I is depicted on **Figure 2**.

Bedrock Wells

Two bedrock wells were installed at the Site during this portion of the investigation. SDW-2 was installed on the Shealy property, approximately 450 feet northeast of existing well SDW-1. MW-9D was installed on the plant, to the south of well cluster MW9/9I. **Figure 3** depicts the locations of the bedrock wells installed at the Site to date.

Each well was installed as Type III, double-cased well in accordance with SC Well Standards and Regulations R.61-71. This entailed advancement of a pilot-boring through overburden materials and saprolite to the top of competent bedrock. At SDW-2 competent metamorphosed granitic gneiss was encountered at approximately 43 feet BLS. A six-inch diameter polyvinyl chloride (PVC) surface casing was installed in the pilot boring and sealed in place using a cement grout. The well boring was then advanced into the underlying bedrock using a rotasonic coring device. The well boring was advanced to a total depth of approximately 89 feet, which is greater than 40 feet into the bedrock. Due to difficult coring conditions, recovery of reliable bedrock cores was limited in this boring, making it difficult to clearly identify fracture zones that may produce a sufficient quantity of groundwater for sampling. The well was installed to a total depth of 89 feet BLS.

Bedrock well MW-9D was installed south of the main axis of a high concentration groundwater plume area at the plant. The intent of this well was to assess if elevated CVOC concentrations had migrated into deeper bedrock near the area of highest concentrations in shallow groundwater. The pilot boring for MW-9D was advanced to a depth of 130 feet; which is far greater than originally anticipated due to greater thickness of the saprolite and weathered bedrock overlying competent granitic bedrock beneath this portion of the Site.

Soil boring logs and well construction diagrams for SDW-2 and MW-9D detail the lithology encountered at these locations and summarize the construction of these wells. Copies of each are included in **Attachment A**.

Well Development and Sampling

Following installation of the wells, AECOM personnel performed development and sampling in accordance with procedures described in the SIWP Addendum. Development included surging and over-

pumping using a submersible pump while measuring water quality parameters including pH, specific conductivity, temperature and turbidity. Wells MW24I and MW25 were developed the week of February 22, 2016. Wells SDW-2 and MW-9D were developed during the week of April 18, 2016. Development was performed until water quality parameters stabilized in accordance with procedures described in the SIWP Addendum. Development efforts were documented on well development forms generated for each well copies of which are included in **Attachment B**.

Once well development efforts were completed, AECOM personnel implemented groundwater sampling efforts. These efforts were performed in accordance with procedures described in Section 3.2.2 of the SIWP Addendum. Purging efforts were documented on groundwater sampling forms.

Monitoring wells MW24I and MW25 were sampled the week of February 22, 2016; and monitoring wells SDW-2 and MW-9D were sampled during the week of April 25, 2016. Copies of the groundwater sampling forms for each well are also included in **Attachment B**.

Sample Analysis and Results

AECOM contracted Shealy Environmental Services, Inc. (Shealy) to perform analysis on the samples collected from the four monitoring wells (MW24I, MW25, SDW-2, MW-9D) installed during this phase of work. The groundwater samples were analyzed for Target Compound List- Volatile Organic Compounds (TCL-VOCs) using EPA SW-846 Method 8260b. Copies of the analytical reports for these samples are included in **Attachment C**.

Analytical results for the samples collected during this phase of work are summarized on the attached **Table 1**. **Table 2** summarizes qualifiers assigned to data, if necessary, following validation of the laboratory analytical reports by AECOM. Included in **Table 1** are the results for samples collected from temporary wells installed on the Shealy property prior to this phase of work. This data was included to provide additional perspective regarding distribution of impact(s) to groundwater on the Shealy property. **Table 1** includes results for temporary shallow wells TMW111 and TMW114, permanent shallow wells MW23 and MW24, and bedrock well SDW-1. The locations of these wells are depicted on the attached figures.

As shown on **Table 1**, the primary contaminant of concern at the Site, TCE, was detected at elevated concentrations in two groundwater samples, shallow temporary well TMW-114 (66 micrograms per liter – ug/L) and bedrock well sample SDW-1 (16 ug/L), both of which were collected from the Shealy property. TCE was detected at concentrations below the MCL in MW23 (0.34 ug/L), MW-24I (1.8 ug/L), and MW25 (0.9 ug/L), each collected from the Shealy property. The Site related CVOCs were not detected in the sample collected from the new bedrock well installed on the Shealy property (SDW-2). TCE was detected at 3.1 ug/L in the sample from the deep bedrock well installed on the plant – MW-9D.

Other organic compounds (i.e. acetone, chloroform), not related to the site specific CVOCs were detected at low concentrations in several of the samples collected from these locations. Based on their low concentrations, it is suspected that these detections are related to laboratory artifact.

Contaminant Distribution

Review of the analytical results from the recent phase of investigation indicates that the horizontal extent of TCE in shallow groundwater has generally been defined in all directions at the Site. **Figure 1** is a TCE isoconcentration map depicting the most recent CVOC concentrations in TMW and/or permanent shallow wells.

Figure 2 shows the distribution of TCE in the intermediate zone. As shown on this figure, it appears that the extent of elevated TCE concentrations in the intermediate zone has also been defined to the east, and south. Data from the new intermediate well, MW24I, confirms that the extent of impact in this interval has also been defined to the west and southwest.

Data from previous sampling efforts has defined the extent of elevated TCE to the east (MW2D) and to the northwest (RDW-2). **Figure 3** depicts the distribution of TCE in bedrock wells. Based on concentrations detected in the sample from new well SDW-2, the extent of TCE in bedrock wells has also been defined to the west.

Analytical results for the most recent sampling event in SDW-1 indicates TCE is present above the MCL (5 ug/L) at 16 ug/L. This is slightly higher than the concentration detected during its initial sampling in December 2014 (8 ug/L).

Analytical results for the deep on-site bedrock well MW-9D, indicates TCE was not detected above its MCL. This appears to indicate the vertical extent of elevated TCE values in the deeper bedrock has been delineated beneath the plant.

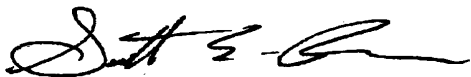
Conclusions

Results of the latest phase of investigative efforts have delineated the extent of elevated TCE impact in multiple depth zones to the west of the Site. The vertical extent of impact beneath the plant has also been delineated. Slightly elevated concentrations of TCE are still evident in bedrock to the southwest of the Site; however, AECOM and Philips do not recommend additional investigative efforts beyond SDW-1 at this time.

Due to difficulties accessing proposed drilling locations on the Dickert property (north of the plant); the intermediate well proposed for this property was not installed during this phase of work. Philips and AECOM are negotiating with the property owner to modify paths to allow future access for drilling and sampling efforts. SCDHEC will be notified of the approval for these developing plans and schedule for future drilling on this property.

Should you have any questions regarding the information included in this letter report, please contact me at (803) 254-4400 at your convenience.

Sincerely,



Scott E. Ross, P.G.
Senior Project Manager

cc: Ms. Dianne Murphy – Philips

TABLES

Table 1
Summary of Volatile Organic Compounds in Groundwater
Shakespeare Composite Structures Facility
Newberry, South Carolina

Sample ID Laboratory ID Date Collected	USEPA MCL	TMW-111 QL17089-001 12/14/15	TMW-114 QL17089-002 12/15/15	MW 9D RD26033-001 04/25/16	MW 9D - DUP RD26033-002 04/25/16	MW-23 RA13091-003 01/13/16	MW-23 RB24001-001 2/23/2016	MW-24 RA13091-002 01/13/16	MW24I RC03069-001 3/3/2016	MW-25 RB26034-001 2/26/2016	SDW-1 RA13091-001 01/13/16	SDW 2 RD26033-003 04/26/16
Volatile Organic Compounds by USEPA Method 8260B (µg/L)												
1,1,1-Trichloroethane	200	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,1,2,2-Tetrachloroethane	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloro-1,2,2-Trifluoroethane	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,1,2-Trichloroethane	5	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethane	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene	7	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,2,4-Trichlorobenzene	70	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,2-Dibromo-3-chloropropane (DBCP)	0.2	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,2-Dibromoethane (EDB)	0.05	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,2-Dichlorobenzene	600	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,2-Dichloroethane	5	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,2-Dichloropropane	5	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,3-Dichlorobenzene	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
1,4-Dichlorobenzene	75	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
2-Butanone (MEK)	NS	< 10	< 10	< 10	< 10	< 10	< 10 //y	< 10	< 10	< 10	< 10	2.3 J//
2-Hexanone	NS	< 10	< 10	< 10	< 10	< 10	< 10 //y	< 10	< 10	< 10	< 10	0.59 J//
4-Methyl-2-pentanone	NS	< 10	< 10	< 10	< 10	< 10	< 10 //y	< 10	< 10	< 10	< 10	0.92 J//
Acetone	NS	< 20	< 20	2.4 J//	1.9 J//	< 20	< 20 //y	< 20	< 20	< 20	< 20	11 J//
Benzene	5	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Bromodichloromethane	80 ¹	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Bromoform	80 ¹	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Bromomethane (Methyl bromide)	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Carbon disulfide	NS	< 5	< 5	< 5	< 5	1.1 J//	< 5 //y	< 5	< 5	< 5	< 5	< 5
Carbon tetrachloride	5	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	100	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Chloroethane	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Chloroform	80 ¹	< 5	< 5	2 J//	1.9 J//	< 5	< 5 //y	< 5	2.1 J//	4 J//	< 5	5.7 J//
Chloromethane (Methyl chloride)	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	0.37 J//
cis-1,2-Dichloroethene	70	< 5	3.2 J//	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	0.96 J//	< 5
cis-1,3-Dichloropropene	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Cyclohexane	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane	80 ¹	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Dichlorodifluoromethane	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Isopropylbenzene	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Methyl acetate	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Methyl tertiary butyl ether (MTBE)	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Methylcyclohexane	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Methylene chloride	5	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	1.8 J//
Styrene	100	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene	5	< 5	0.4 J//	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Toluene	1000	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	27
trans-1,2-Dichloroethene	100	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
trans-1,3-Dichloropropene	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Trichloroethene	5	< 5	66	3.1 J//	3.1 J//	0.95 J//	0.34 J//y	< 5	1.8 J//	0.9 J//	16	< 5
Trichlorofluoromethane	NS	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5
Vinyl chloride	2	< 2	< 2	< 2	< 2	< 2	< 2 //y	< 2	< 2	< 2	< 2	< 2
Xylenes (total)	10000	< 5	< 5	< 5	< 5	< 5	< 5 //y	< 5	< 5	< 5	< 5	< 5

Notes:

¹ - 1998 Final Rule for Disinfectants and Disinfection By-Products: The total for trihalomethanes is 80 µg/L.

MCL - Maximum Contaminant Level (USEPA, April 2012)

NS - No Standard

USEPA - United States Environmental Protection Agency

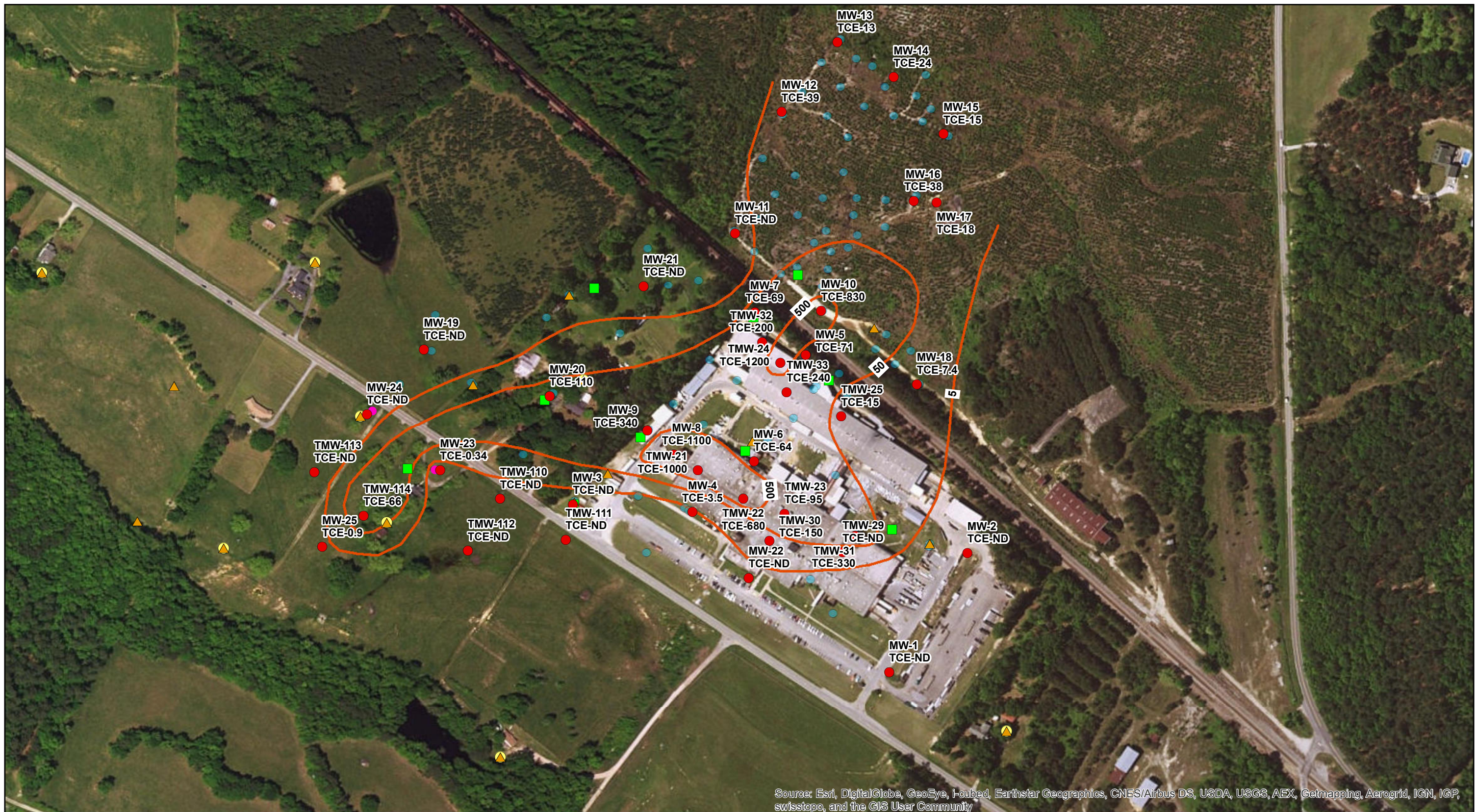
Bold font and shading indicates the analyte was detected.

Bold outline indicates an exceedance of the USEPA MCL.

**Table 2
Added Data Qualifiers
Shakespeare
Newberry, South Carolina**

<u>Modifier</u>	<u>Description</u>
<	Indicates not detected at the reporting limit indicated.
“/”	Separates the laboratory added data qualifiers from the validation data qualifiers. The laboratory added data qualifiers precede the first “/”. The result qualifiers follow the first “/”, and the analysis qualifiers follow the second “/”. The result qualifiers are a product of the data validation process, and the analysis qualifier defines the type of QC excursion.
Laboratory Data Qualifiers	
<u>Qualifier</u>	<u>Description</u>
J	Estimated result less than the practical quantitation limit and greater than or equal to the method detection limit.
Result Data Qualifiers	
<u>Qualifier</u>	<u>Description</u>
No Result Data Qualifiers were added as a result of the validation process.	
Analysis Data Qualifiers	
<u>Qualifier</u>	<u>Description</u>
y	Cooler temperature greater than 4 degrees Celsius but less than 10 degrees Celsius.

FIGURES



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- Shallow Well
- Intermediate Well
- ▲ Bedrock Well
- Water Supply Well
- Existing Shallow Zone Monitoring Well
- Abandoned Temporary Wells
- TCE Isoconcentration Contour (ug/L)

TCE-15: Trichloroethene concentration 15 ug/L.
 ND: Non detected.
 NS: Not sampled.

N
 W — ○ — E
 S

0 300 600 900

Feet

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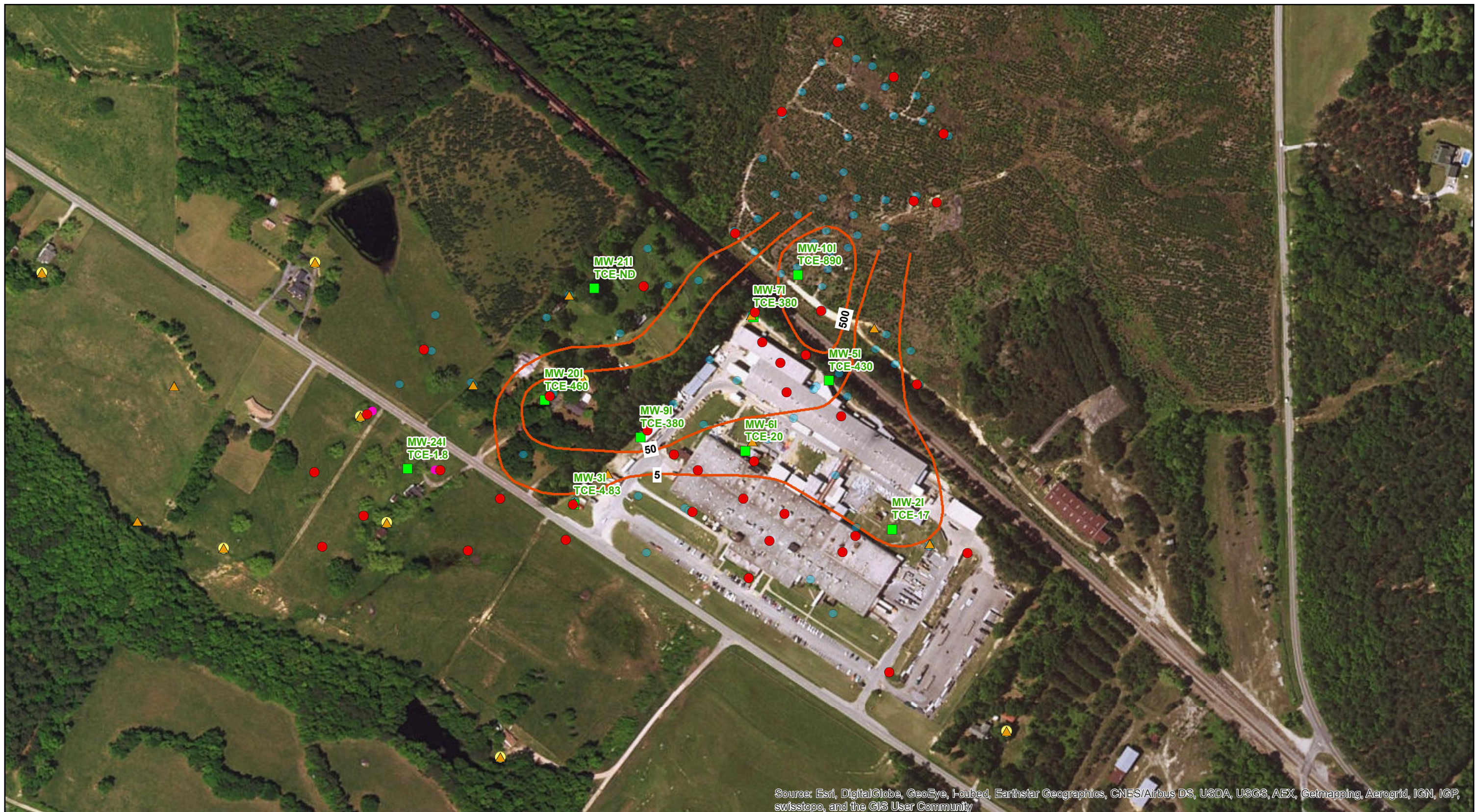
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Figure 1: TCE Isoconcentration in Shallow Zone

Shakespeare Composition Structures
 Newberry, South Carolina

Project No.: 60328308; Prepared by: JC; Date: 5/17/2016.



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- Shallow Well
- Intermediate Well
- ▲ Bedrock Well
- Water Supply Well
- Existing Shallow Zone Monitoring Well
- Abandoned Temporary Wells
- TCE Isoconcentration Contour (ug/L)

TCE-17: Trichloroethene concentration 17 ug/L.
 ND: Non detected.

0 300 600 900

Feet

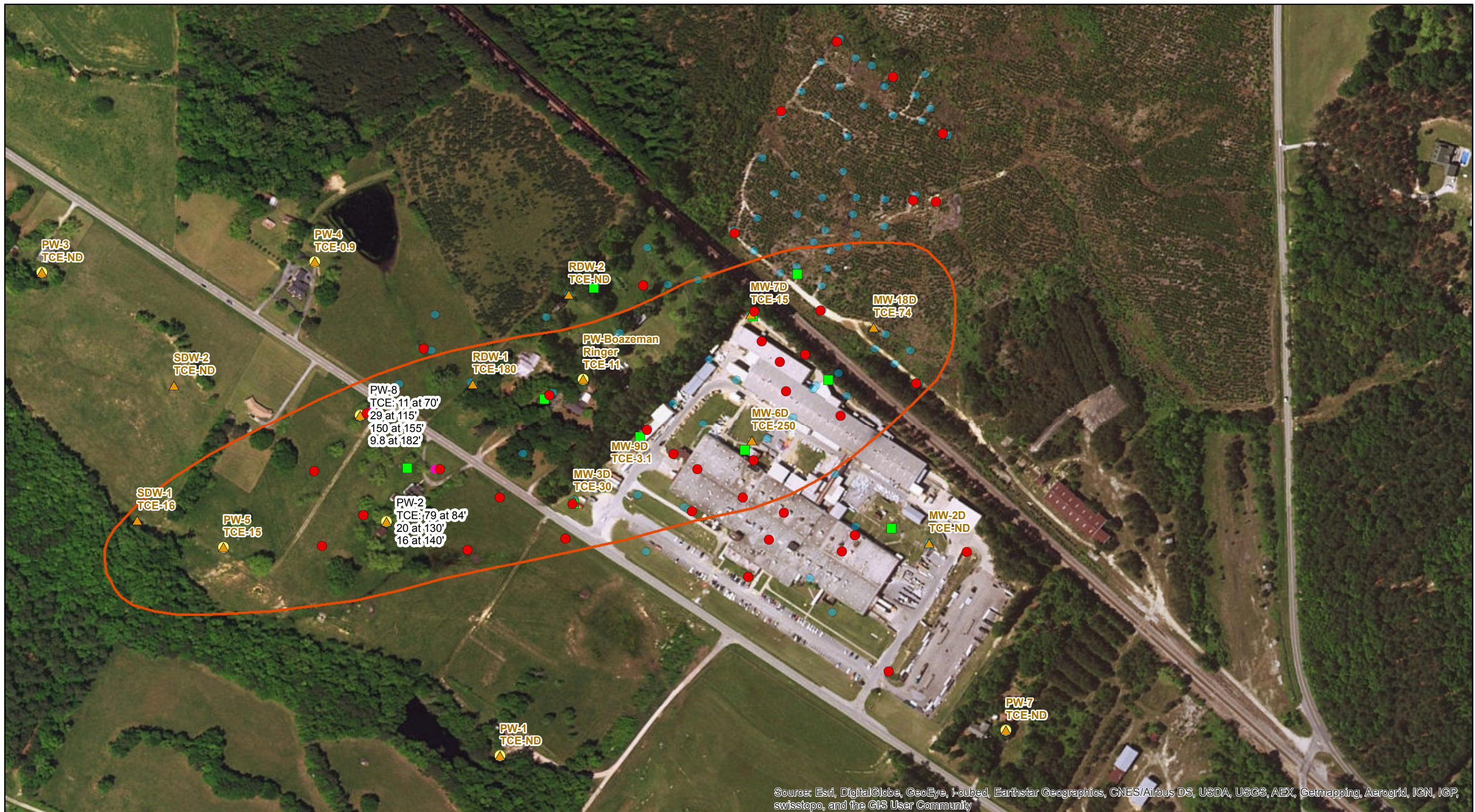
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Figure 2: TCE Isoconcentration in Intermediate Zone

Shakespeare Composition Structures
 Newberry, South Carolina

Project No.: 60328308; Prepared by: JC; Date: 5/17/2016.



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- Shallow Well
- Intermediate Well
- ▲ Bedrock Well
- Water Supply Well
- Existing Shallow Zone Monitoring Well
- Abandoned Temporary Wells
- TCE Isoconcentration contour (ug/L)

TCE-15: Trichloroethene concentration 15 ug/L.
 ND: Non detected.

0 300 600 900

Feet

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Figure 3: TCE Isoconcentration in Bedrock Wells

Shakespeare Composition Structures
 Newberry, South Carolina

Project No.: 60328308; Prepared by: JC; Date: 5/17/2016.

ATTACHMENT A

SOIL BORING LOGS AND WELL CONSTRUCTION DIAGRAMS



Soil Boring Log

BORING NO. MW24I
 PAGE 1 OF 2

PROJECT: Shakespeare
 CLIENT: Philips
 CONTRACTOR: Cascade
 EQUIPMENT: Rotasonic

PROJECT NO: 60328307
 LOCATION: _____
 ELEVATION: _____
 NORTHING: _____
 EASTING: _____
 DATE START: 2/17/16
 DATE FINISH: 2/19/2016
 DRILLER: _____
 OVERSIGHT: S. Ross

GROUNDWATER			DRILLING INFORMATION					
DATE	HRS	WATER	METHOD		CASING		TEMP / PERM	
			HOLE DIA.		CASING DIA.		CASING TYPE	
			DEPTH		CASING DEPTH		GROUT TYPE	
			SAMPLING		HAMMER WT		HAMMER FALL	

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS	
					SOIL CLASSIFICATION:	USCS
					Topsoil	
					<u>SILTY SAND (SM)</u> Yellowish red, mostly fine sand, some silt, trace fine to trace clay (quartz boulder between 2-3')	
5.0					<u>Lean Clay (CL)</u> Brown to reddish brown, mostly clay, some silt, little fine sand, moist	
					<u>SILT (MH)</u> Reddish yellow, to pale brown, mostly silt, few to trace of sand, trace clay	
10.0					similar to above except moist, reddish brown, few clay	
					similar to above except reddish yellow, few to trace clay	
15.0					<u>SILTY SAND (SM)</u> moist, med dense, pale brown to brownish yellow to pale yellow (mottled) mostly silt, some fine to of sand, trace clay	
					similar to above	
20.0					similar to above except alternating layers of pale yellow to pale brown, few clay, trace of mica	

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.	DESCRIPTIONS	NOTES
0-4	VERY LOOSE	0-2	VERY SOFT	SS SPLIT SPOON	MOSTLY 50-100%	WD WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST SHELBY TUBE	SOME 30-45%	NE NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G GRAB SAMPLE	LITTLE 15-25%	UR NOT READ
31-50	DENSE	9-15	STIFF	MC MACRO-CORE	FEW 5-10%	NR NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF		TRACE <5%	
		31+	HARD			



Soil Boring Log

BORING NO. 01W241

PAGE 2 OF 2

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
20.0					<p><u>SILTY SAND (SM)</u> fine moist to wet, med dense, mostly med sand, some silt, trace clay</p> <p><u>POORLY GRADED SAND (SP)</u> med moist, med dense, pale brown to pale yellow, mostly med sand, few silt,</p> <p>similar to above</p> <p>similar to above except trace med to cs gravel</p>
25.0					
30.0					<p><u>SILT WITH SAND (MH)</u> Dense, moist, mostly gray to brownish gray, mostly silt, little med sand, trace</p> <p>-----</p> <p><u>Granite</u> Gray, hard, slight weathering, fine grained gte, Feldspar, hornblende</p> <p>Fracture zone @ 34.5</p> <p>Fracture zone @ 36.0</p> <p>Fractures @ 37.5, 38, 39</p>
35.0					
40.0					<p>TD = 39'</p>
45.0					

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.	DESCRIPTIONS	NOTES
0-4	VERY LOOSE	0-2	VERY SOFT	SS SPLIT SPOON	MOSTLY 50-100%	WD WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST SHELBY TUBE	SOME 30-45%	NE NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G GRAB SAMPLE	LITTLE 15-25%	UR NOT READ
31-50	DENSE	9-15	STIFF	MC MACRO-CORE	FEW 5-10%	NR NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF		TRACE <5%	
		31+	HARD			



Soil Boring Log

BORING NO. MW05
 PAGE 1 OF 1

PROJECT: Shalespear - Newberry
 CLIENT: Philya
 CONTRACTOR: Code
 EQUIPMENT: Mini-Sonic

PROJECT NO: 6028308
 LOCATION: _____
 ELEVATION: _____
 NORTHING: _____
 EASTING: _____
 DATE START: 2/26/16
 DATE FINISH: 2/26/16
 DRILLER: _____
 OVERSIGHT: S. Glass

GROUNDWATER			DRILLING INFORMATION						
DATE	HRS	WATER	METHOD		CASING		TEMP / PERM		
			HOLE DIA.		CASING DIA.		CASING TYPE		
			DEPTH		CASING DEPTH		GROUT TYPE		
			SAMPLING		HAMMER WT		HAMMER FALL		

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS	
					SOIL CLASSIFICATION:	USCS
5.0					<p><u>Silty SAND (SM)</u> Med dense, moist, mostly silt, some med to fine sand, trace clay similar to above except yellowish brown</p> <p>similar to above</p> <p>similar to above</p>	
10.0					<p><u>Silty SAND (SM)</u> Med dense, moist, pale brown to yellow, mostly silt, some fine sand, few clay (trace fine to silty granitic fabric)</p>	
15.0					<p><u>Silty SAND (SM)</u> Med dense, moist to wet, mostly silt, some med to med sand,</p> <p>similar to above</p> <p>similar to above</p>	
20.0					<p>similar to above</p>	

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.	DESCRIPTIONS	NOTES
0-4	VERY LOOSE	0-2	VERY SOFT	SS SPLIT SPOON	MOSTLY 50-100%	WD WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST SHELBY TUBE	SOME 30-45%	NE NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G GRAB SAMPLE	LITTLE 15-25%	UR NOT READ
31-50	DENSE	9-15	STIFF	MC MACRO-CORE	FEW 5-10%	NR NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF		TRACE <5%	
		31+	HARD			



Soil Boring Log

BORING NO. MM19D
PAGE 1 OF 6

PROJECT: Shakespeare - Newberry
CLIENT: Phillips
CONTRACTOR: Chicoade
EQUIPMENT: Rotasonic

PROJECT NO: 60328308
LOCATION: _____
ELEVATION: _____
NORTHING: _____
EASTING: _____
DATE START: 3/18/2016
DATE FINISH: 4/14/2016
DRILLER: Roy
OVERSIGHT: S. Orosy

GROUNDWATER			DRILLING INFORMATION						
DATE	HRS	WATER	METHOD		CASING	<u>ORC</u>	TEMP / PERM	<u>low</u>	
			HOLE DIA.		CASING DIA.	<u>6"</u>	CASING TYPE		
			DEPTH		CASING DEPTH	<u>130'</u>	GROUT TYPE		
			SAMPLING		HAMMER WT		HAMMER FALL		

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS	
					SOIL CLASSIFICATION:	USCS
				<u>Hand Auger</u>	<u>Top soil</u>	
					<u>Fill - CLAYEY SAND (SC)</u> <u>Med dense, dry, yellowish red, mostly fine sand, few clay, few silt</u>	
5.0	<u>0.4</u>				<u>SILT WITH SAND (SM) SILTY/CLAYEY SAND (SM/SC)</u> <u>med dense, moist, light brown to brown to reddish brown</u> <u>fine light brown to mostly fine sand, some silt, few clay</u>	
	<u>0.1</u>				<u>similar to do SILTY SAND (SM)</u> <u>med dense, moist, olive gray to olive brown mostly med to fine sand, some silt, trace organics</u>	
10.0	<u>0.4</u>				<u>CLAYEY SAND (SC)</u> <u>Med dense, moist, olive brown to grayish brown, mostly fine sand, some clay, few silt</u>	
	<u>2.6</u>					
	<u>1.9</u>					
	<u>1.9</u>				<u>SILTY CLAY (OL-CL)</u> <u>med stiff, moist, light brown to reddish brown to gray, (mottled) mostly silt, few clay, few fine sand</u>	
15.0	<u>1.3</u>					
	<u>1.9</u>				<u>SILTY SAND (SM)</u> <u>Med dense, moist, reddish brown to yellowish brown mostly fine sand, some silt</u> <u>similar to above except pale yellow to light gray to reddish brown, increasing clay</u>	
20.0						

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.	DESCRIPTIONS	NOTES
0-4	VERY LOOSE	0-2	VERY SOFT	SS SPLIT SPOON	MOSTLY 50-100%	WD WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST SHELBY TUBE	SOME 30-45%	NE NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G GRAB SAMPLE	LITTLE 15-25%	UR NOT READ
31-50	DENSE	9-15	STIFF	MC MACRO-CORE	FEW 5-10%	NR NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF		TRACE <5%	
		31+	HARD			



Soil Boring Log

BORING NO. NW 90
 PAGE 2 OF 4

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
20.0	2.3				<u>SILTY SAND (SM)</u> Dense, moist, alternating layers of light gray to pale brown, mostly Fine sand, some silt (colored layers vary in thickness from 1mm to 10mm)
	2.9				
	0.7				similar to above
25.0					similar to above
	0.8				<u>POORLY GRADED SAND WITH SILT (SP-SM)</u> Med dense, moist, pale reddish brown, mostly med to fine sand, few silt
	4.1				
					similar to above
30.0					
	4.6				similar to above
	3.9				
35.0	2.2				<u>SILTY SAND (SM)</u> Dense, dry, pale brown to pale yellow, mostly med sand some silt, (very hard drilling)
	1.4				
					similar to
40.0	14.2				<u>SILTY SAND (SM)</u> Dense, moist, gray to grayish brown, mostly med to fine sand, some silt, trace clay
	1.1				
					similar to above except reddish yellow to yellowish brown
45.0	7.7				<u>SILTY SAND (SM)</u> Dense, dry, gray to olive brown, mostly fine sand, some silt, trace clay
	2.9				

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.	DESCRIPTIONS	NOTES
0-4	VERY LOOSE	0-2	VERY SOFT	SS SPLIT SPOON	MOSTLY 50-100%	WD WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST SHELBY TUBE	SOME 30-45%	NE NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G GRAB SAMPLE	LITTLE 15-25%	UR NOT READ
31-50	DENSE	9-15	STIFF	MC MACRO-CORE	FEW 5-10%	NR NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF		TRACE <5%	
		31+	HARD			

DEPTH IN FEET	ORGANIC VAPOR SCREENING (PPM)	SAMPLER BLOWS PER 6 INCHES	SAMPLE NUMBER	SAMPLE DEPTH RANGE	FIELD CLASSIFICATION AND REMARKS
45.0	0.1				<u>POORLY GRADED SAND WITH SILT (SP-SM)</u> Dense, dry, light brown to yellowish brown, mostly fine sand, some silt, trace clay (formation crumbles or gets pulverized by core barrel).
	2.3				
	0.8				
	0.4				
50.0					<u>SILTY SAND (SM)</u> Moist, med dense, olive brown to gray, mostly SM-F sand, some silt, little clay,
	1.1				
	1.9				<u>POORLY GRADED SAND WITH SILT (SP-SM)</u> Dense, dry, reddish yellow to yellowish brown, mostly SM-F sand, some silt, trace clay
	3.3				
55.0	0.6				<u>SILTY SAND (SM)</u> Moist, med dense, olive brown, mostly med to fine sand, some silt, little clay
	2.9				
	0.8				<u>POORLY GRADED SAND WITH SILT (SP-SM)</u> Dense, dry, yellowish brown to pale brown, mostly med to fine sand, little silt, trace clay, trace mica
	2.4				(relict granitic structure w/ weathered gtz, feldspar and mica in bottom part of core)
	0.7				<u>CLAYEY SAND (SC)</u> Moist, med stiff, olive brown to etc , mostly med to fine sand, little clay, little silt
	0.6				
60.0	1.1				<u>POORLY GRADED SAND WITH SILT (SP-SM)</u> Dense, dry, pale brown to yellowish brown to white, mostly med to fine sand, some silt, trace clay, trace mica, (relict weathered granitic structure)
	1.7				
	1.2				
	1.4				
	3.2				
	0.4				
65.0					similar to above
	0.8				
					similar to above
	1.4				
					similar to above
70.0	1.7				

BLOWS/FT.	DENSITY	BLOWS/FT.	CONSISTENCY	SAMPLER ID.	DESCRIPTIONS	NOTES
0-4	VERY LOOSE	0-2	VERY SOFT	SS SPLIT SPOON	MOSTLY 50-100%	WD WHILE DRILLING
5-10	LOOSE	3-4	SOFT	ST SHELBY TUBE	SOME 30-45%	NE NOT ENCOUNTERED
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF	G GRAB SAMPLE	LITTLE 15-25%	UR NOT READ
31-50	DENSE	9-15	STIFF	MC MACRO-CORE	FEW 5-10%	NR NO RECOVERY
50+	VERY DENSE	16-30	VERY STIFF		TRACE <5%	
		31+	HARD			