



TETRA TECH

# Preliminary Geotechnical Investigation

**Nine Mile Run – Phase III  
Commercial and Ober Street  
Allegheny County  
Pittsburgh, Pennsylvania**

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## **1.0 INTRODUCTION**

Tetra Tech, Inc. (Tetra Tech) was retained by the Summerset Land Development Associates (Summerset) to perform a Preliminary Geotechnical Investigation for the Nine Mile Run – Phase III property located at Commercial and Ober Street, Pittsburgh, Allegheny County, Pennsylvania (Site).

The Site is currently owned by the Urban Redevelopment Authority of Pittsburgh (URA). In the near future the parcels are planned to be purchased by Summerset to continue development of the Summerset at Frick Park housing community. Tetra Tech is currently working with the URA and the Northside Industrial Development Company (NSIDC) to perform a Phase II Environmental Assessment (ESA), designed to assess the nature and extent of environmental impacts to the property. During the performance of the Phase II ESA field investigation it was determined that additional geotechnical data would be collected to aid in the future development plans of the Site. These data were subsequently collected, and are discussed below.

### **1.1 Purpose of the Report**

The purpose of the report was to collect geotechnical data to help aid in the future development plans of the Site. Because preliminary site development plans for the site are not available, and the resulting cut and fill quantities are not identified, the objective of this report was expanded to define general subsurface conditions through drilling and laboratory analyses.

### **1.2 Scope of Services**

The Phase II ESA and subsurface investigation field activities included the following:

- Completion of twenty-one borings to collect geotechnical soil samples for laboratory analyses.
- Submittal of samples to a qualified laboratory for geotechnical analysis.
- Survey all soil boring locations and elevations.
- Completion of Preliminary Geotechnical Report.

## **2.0 DESCRIPTION OF PROPERTY**

### **2.1 Site Description**

The Site is located along Commercial and Ober Street in Pittsburgh, Allegheny County, Pennsylvania (Figure 1). It is situated in a residential area and is primarily undeveloped. The Site is bordered to the north by Interstate 376 and Frick Park; to the south by a set of railroad tracks and the Monongahela River; to the west by Nine Mile Run, and a residential development (Phase I and II of Summerset Development); and to the east by residential properties.

The Phase III of development consists of two parcels (129-J-150 and 129-F-001), which are currently owned by the URA. The two parcels total 72.31 acres. Summerset intends to purchase the parcels from the URA in the near future.

The Site is located on the 1993 USGS 7.5 minute Pittsburgh East Quadrangle topographic map. Coordinates for the center of Site are approximately 40.4198 (40° 25' 11.3") north latitude and 79.9099 (79° 54' 35.6") west longitude. According to the 1993USGS topographic map, the Site ranges in elevation from approximately 750 feet above mean sea level (MSL) to 925 feet MSL.

### **2.2 Current Use of the Property and Improvements on the Site**

The Site is mainly undeveloped with the exception of a hiking/biking trail, a small access road, a power line right-of-way owned by Duquesne Light, a 16-inch high density polyethylene (HDPE) water line owned by the Pittsburgh Water and Sewer Authority (PWSA), and 24-inch sewer line which is also owned by PWSA. Figure 2 shows the locations of the existing improvements on-Site.

### **2.3 Current Uses of Adjoining Properties**

The land to the east and west are mainly residential. To the north is land that is part of Frick Park, owned by the City of Pittsburgh, and Interstate 376. To the south are railroad tracks and the Monongahela River.

## **3.0 GEOTECHNICAL EVALUATION**

### **3.1 Geotechnical Investigation Activities**

When it was determined that during the Phase II ESA field investigation that additional geotechnical data would be collected to aid in the future development plans of the Site, several soil borings and laboratory geotechnical testing of surface and subsurface soils were added to the project scope. The following describes the activities and results of the preliminary geotechnical investigation.

### **3.2 Soil Boring Installation**

A total of twenty-one soil borings (SB-1 through SB-20, and SB-15A) were drilled from September 24, 2012 to October 5, 2012 by Terra Testing, Inc. of Washington, Pennsylvania. All borings were drilled under the direct supervision of Tetra Tech personnel. The locations of the borings are shown on Figure 2. All borings were logged and the boring logs are included in Appendix A.

The borings were drilled using a Diedrich D-50 track mounted rig. Either 3 ¼ or 4 ¼ hollow stem augers (HSA) were used to advance the borings. Standard penetration tests (ASTW D-1586) were conducted continually to the end depth of each boring, with the exception of SB-9 and SB-17 that were performed on 5-foot centers. A 2-inch O.D. split-barrel sampler was advanced by using a 140-pound hammer with a 30-inch drop to perform the penetration tests. Upon refusal (bedrock) a 10-foot continuous rock core was obtained from SB-1, SB-11, and SB-14 using NQ wireline drill tooling. Once bedrock was encountered in SB-9, SB-15A, SB-16, SB-17, SB-18, SB-19, and SB-20, the borings were advanced using a 4-inch air-hammer until groundwater was encountered for the purpose of installing monitoring wells as part of the environmental investigation.

The borings ranged in depth from 8 feet below ground surface (bgs) in SB-2 to 113 feet bgs in SB-15A/MW-1. Soil borings SB-5 (72' bgs), SB-6 (80' bgs) and SB-15 (76 feet bgs) were terminated prior to encountering bedrock due to the inability of the boring to penetrate to the anticipated depth ("auger refusal"). Also several borings in the slag were moved slightly from their original location by a few feet due to subsurface obstructions. Most likely these obstructions were dense areas of slag.

Each boring was backfilled to the surface with drill cuttings. If the drill cuttings were not enough to backfill the boring, then bentonite chips were used to complete the backfilling.

A photo log of each of the boring locations is included in Appendix B.

### **3.3 Surveying**

The borings and monitoring well elevations (ground surface and top of casing), and locations were surveyed on October 5, 2012 under supervision of a Tetra Tech professional surveyor licensed in the Commonwealth of Pennsylvania.

### 3.4 Site Geology

The geology at the Site can be divided into two distinct areas. Areas with slag (fill areas) and areas without slag fill (undisturbed areas). These areas are described in the sections below.

#### 3.4.1 Slag Fill Areas

The slag ranged in thickness from 1.5 feet in thickness in boring SB-20 to greater than 80 feet in boring SB-6. Generally the slag overlies a 2 to 7-foot thick layer of brown/red silty clay, that overlies either a brown or red shale. The field description of the slag was, "Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles, boulders and bricks, moist, medium dense to very dense". Figure 3 depicts the depth of slag in each boring and shows the estimated lateral extent of the slag fill, and Figure 4 depicts the depth to bedrock in each boring.

Boring SB-12 is included in lateral extend of slag fill area, since slag was found from 14 to 18 feet bgs. The area around SB-12 is different than other fill areas on the Site, since there is a red/brown silty clay that overlies the slag. Also in SB-16 from 40 to 42 feet bgs, a void was encountered. The origin of the void is unknown and could possibly be either a void in the fill material, or an old abandoned pipe (possibly an old sewer pipe).

#### 3.4.2 Undisturbed Areas

The undisturbed areas of the Site generally were covered by 4 to 12 inches of topsoil. The topsoil was underlain by a red/brown silty clay. The silty clay ranged in thicknesses from 1.5 feet to 7.5 feet thick below the topsoil. The silty clay can be generally described as dry to moist and medium stiff to very stiff. Rock cores were taken from SB-1, SB-11, and SB-14, and the rock generally consisted of a brown shale overlain by a gray shale. Both the brown and gray shale were extremely to moderately broken and had a 0% rock quality designation (RQD), even though the core recovery was 100%. Figure 4 depicts the depth to bedrock in each boring.

Four geologic cross sections were created for the Site. Figure 5 shows the location of each cross section and Figures 6 through 9 depict the graphically presentation of each.

All boring logs are included in Appendix A.

### 3.5 Laboratory Testing

Laboratory testing was conducted on selected samples. The following summarizes the type of analysis, number of samples for each, and ASTM Method used for laboratory testing:

Analysis	Number of Samples	ASTM Method
Atterberg Limits	10	ASTM D 4318
Sieve Analysis	10	ASTM D 422
Classification	10	ASTM D 2487
Specific Gravity	2	ASTM D 854
Steel Slag Swell	2	PTM 130
Standard Proctor	4	ASTM D 698
Direct Shear Test	2	ASTM D 3080

All samples were submitted to Geotechnics, Inc. of East Pittsburgh, Pennsylvania for analysis. Results of the laboratory testing are summarized in Table 1 and are included in Appendix C. A more specific discussion of the results is included in Section 3.6 below.

### **3.6 Evaluation of Subsurface Conditions**

Field observations and laboratory testing revealed that all slag samples are non-plastic. The largest component (30% to 70%) consists of gravel size particles (greater than 4.75 mm), and a relatively small fraction of the slag consists of minus 200 particles (3% to 14%). In general the maximum particle size was less than one inch. This confirms previous reports stating that the material on Phase III was processed prior to placement at its current location. The specific gravity of slag is relatively high at 3.13 (compared to typical values between 2.5 and 2.7 for soils). This results in higher potential compaction densities. Since this material is composed of coarser particles (generally  $D_{10}$  of 0.1 mm for disturbed or possibly crushed samples during SPT sampling/auguring), the slag is relatively free draining, with high permeability.

Contrary to slag, the soils encountered at the site are plastic, with minimum plasticity index (P.I.) of 11 and max P.I. of 26. The soil passing No. 200 size ranges from 32% to 94%. This material is likely to have coefficient of permeability of  $10^{-5}$  cm/s or less, depending on the level of compaction and other factors. The specific gravity of the soil is 2.72.

Two tests were performed using Pennsylvania Test Method 130 (PTM No. 130) to evaluate the potential expansion of steel slag. The tests revealed percent swell of 0.07 and 0.24 percent for two slag samples. This represents low potential swell classification of slag (i.e less than 0.5 percent).

It is estimated that the first ten feet of rock in borings SB-1 and SB-14 will be easily rippable. The rock encountered in boring SB-11 may not be easily rippable since the core samples appear to be unweathered (despite the apparent fracturing, and zero RQD). It appears that the area in which SB-11 is located has been previously graded for the installation of the former radio towers at the Site. Due to the previous removal of material, the rock from the SB-11 may require blasting.

### **3.7 Water Level Measurements**

Groundwater level measurements were taken upon the completion of each boring. No groundwater was encountered in the borings that were terminated in unconsolidated material. The only groundwater encountered was in the monitoring wells installed as part of the environmental investigation. Depth-to-water measurements were collected from these wells on October 9 and November 5, 2012 prior to conducting the groundwater sampling events. The groundwater elevations recorded in these two events ranged from 746.06 feet bgs in MW-1 (10-9-2012) to 882.18 in MW-4 (11-5-2012). Table 1 includes all the groundwater elevations.

## 4.0 RECOMMENDATIONS

### 4.1 Recommendations

Based on field observations, laboratory testing, preliminary analysis and generally accepted engineering practice, the following recommendations are applicable.

- **Compaction:** It is our understating that the slag cannot be removed from the site; however, it can be excavated and re-placed within the site. In this situation, the slag should be compacted to 90 percent of maximum dry density and up to 3% below optimum moisture content (ASTM D 698). The area should be graded to provide positive slopes and avoid any surface water infiltration to minimize any swell potential. If significant swell potential exists, and water accumulation or infiltration remains a possibility, the percent compaction must be lowered and foundations/slopes designed accordingly. All soils should be compacted to minimum 90 percent of maximum dry density (ASTM D698) and at 0 to 3 percent below optimum moisture content.

Prior to replacement of any slag or soil, all subgrades should be compacted by proof-rolling with minimum 4 passes of 10-ton vibratory roller, since the water table is relatively deep and soils/slag are relatively dry, all settlement due to compaction is likely to be “immediate”.

- **Slopes:** No grading plans are available at this time; however, it is possible that slopes may have to be constructed either with slag or soil. For the purpose of slope stability analysis, it is recommended that a cohesion value (c) of 300 psf and an internal angle of friction ( $\phi$ ) of  $32^\circ$  be used for compacted on-site soil with a unit weight of 118 pcf. For slag, a c-value of 0 psf and  $\phi$  -value of  $32^\circ$  may be used with a unit weight of 142 pcf.

Based on the preliminary analysis, for dry or slightly saturated conditions, a 2.5H:1V slope will be stable (F.S. $\geq$ 1.5) for both compacted soil slopes and compacted slag slopes for slope heights of up to 50 feet. For any slopes greater than 25 in height, mid-slope benches should be provided every vertical 25 feet.

- **Bearing Capacity for foundations:** For bearing capacity and foundation design of structures, the  $\phi$ -value of  $32^\circ$  may be used for both compacted slag and native soil. Additionally a c-value of 300 psf may be used for compacted native soil. The unit weights of slag and soil may be conservatively assumed to be 135 pcf and 110 pcf respectively. All foundations should be at least 3 feet below ground surface. Also, the surface water should be draining away from the foundation. A minimum factor of safety of 3 is required for all shallow foundation.
- **Settlement Potential:** The water table is relatively deep and soil/slag is either relatively dry or only partially saturated. The saturated moisture content for soil is 21% to 23% which is higher than the in-situ moisture content. Similarly, the saturated moisture content for slag is 12% to 15%, which is higher than in-situ moisture content. These values indicate the presence of only partially saturated soils. In addition, the moisture content is likely to be less than the in-situ moisture content at the time of placement. This means that most of the settlement is expected to take place during compaction effort, and only minor settlement will be realized after the application of foundation loads.
- **Retaining Structures:** For the purpose of calculating lateral earth pressures, the parameters provided above for slopes should be utilized. The interface strength parameters between

concrete/steel sheets and soil/slag may be assumed at half the values of those shown above for slopes.

- Roadways: A CBR Value of 5 may be used for the purpose of road design unless a more specific comprehensive lab testing is conducted on the subgrade soil.
- Slag Fill Areas: The slag was found to have low swelling potential. Even with high to very high inherent swelling potential, the effect of swelling may be minimized by placing slag at the highest practical moisture content, and by using non-swelling soil in the outer portions of the slag fill. Even 2.5 feet (required depth of cover for this project) of soil surcharge over a swelling material substantially reduces the amount of expansion potential. The water should be diverted away from the slopes and shallow foundations, especially where slag exists. In the event water cannot be kept away (for example sediment or detention pond embankment built with slag or swelling soil), the design should consider compacting soil to lower than 90 percent compaction at higher moisture content.

The Site is under a Consent Order and Agreement (COA) between the Pennsylvania Department of Environmental Protection (PADEP), the URA, and Summerset. The COA was originally executed on July 14, 2000. The COA has been amended twice: once on August 24, 2000 and again on July 27, 2011. Key items from the COA that are pertaining to the preliminary geotechnical investigation are:

- The removal of slag from the Site is prohibited.
- A placement of final cover of clean soil over the slag is required prior to occupancy or public use. The approved final cover as defined in the COA is either a base of twenty-four inches of acceptable clean soil over the slag and at least six inches of landscape quality topsoil over the clean soil, or an approved mixture of four parts slag, four parts soil, and one part organic matter spread to a depth of two feet overlain with 6 inches of landscape quality soil.
- The removal of final cover from the Site as defined in the COA is prohibited.
- The consumptive use of groundwater for any purpose is prohibited.

The last amendment dated July 27, 2011 is included as Appendix D for reference.

## **4.2 Limitations and Exceptions**

The information presented in this report is based on professional opinions from field reconnaissance, visual observations and field/lab testing at the site. This study was not intended to be a definitive investigation of geotechnical or potential environmental concerns at the site. The scope of services for this investigation was limited and should be construed as a typical representation of site conditions. Soil properties and characteristics may change significantly between the test locations. This study was undertaken and completed in accordance with the professional standards and generally accepted practices at the time of preparation. Opinions and recommendations presented in this report apply to the site conditions existing at the time of the investigation and those reasonably foreseeable. They do not necessarily apply to site changes for which Tetra Tech is not aware, nor had the opportunity to evaluate.

## TABLES

**Table 1  
Geotechnical Laboratory Results  
Nine Mile Run - Phase III  
Pittsburgh, PA**

Boring ID	Depth (feet bgs)	Sample Type	Water Content ASTM D 2216	Atterberg Limits ASTM D 4318			Wash Sieve ASTM D 422			Direct Shear Data ASTM D 3080		Specific Gravity ASTM D 854	Proctor Tests ASTM D 698		Slag Swell PT 130	Description	
			(%)	L.L. %	P.L. %	P.I. %	% Gravel	% Sand	% Silt/Clay	$\phi$ (degrees)	Cohesion, c (psf)	@ 20° C	Optimum Moisture (%)	Optimum Density (pcf)	Percent Swell (%)	USCS Symbol	USCS Classification
SB-2	2-4	Jar/Bag	22.2	44	20	24	5.81	19.55	74.64	31.7	336	2.72	21.0	104.6**	NA	CL	Brown Lean Clay with Sand
SB-6	0-10	Bucket	12.1	Non-Plastic Material			44.63	45.64	9.73	31.9*	488*	NA	NA	NA	NA	SW-SM	Dark Brown Well-Graded Sand with Silt and Gravel (SLAG)
SB-7	0-10	Bucket	NA	Non-Plastic Material			36.78	51.04	12.18	NA	NA	NA	11.8	142.3	0.24	SM	Dark Brown Silty Clay with Gravel (SLAG)
SB-8	5-15	Bucket	12.2	Non-Plastic Material			31.03	55.22	13.77	NA	NA	NA	14.2	132.7	0.07	SM	Dark Brown Silty Sand with Gravel (SLAG)
SB-10	8-10	Jar	NA	Non-Plastic Material			48.61	43.64	7.75	NA	NA	NA	NA	NA	NA	GW-GC	Dark Brown Well Graded Gravel with Clay and Sand (SLAG)
SB-12	6-8	Jar	16.5	39	22	17	0.00	7.73	92.27	NA	NA	NA	NA	NA	NA	CL	Reddish Brown Lean Clay
SB-14	0-5	Bucket	13.5	47	21	26	0.16	5.78	94.06	NA	NA	NA	17.8	108.8	NA	CL	Reddish Brown Lean Clay
SB-15	16-18	Jar	NA	Non-Plastic Material			32.4	60.71	6.89	NA	NA	3.13	NA	NA	NA	SW-SM	Dark Brown Well Sorted Sand with Silt and Gravel (SLAG)
SB-16	14-16	Jar	NA	Non-Plastic Material			70.94	25.85	3.21	NA	NA	NA	NA	NA	NA	GP	Dark Brown Poorly Graded Gravel with Sand (SLAG)
SB-19	2-4	Jar	NA	26	15	11	4.18	64.31	31.51	NA	NA	NA	NA	NA	NA	SC	Brown Clayey Sand

NA = Not Analyzed

L.L. = Liquid Limit

P.L. = Plastic Limit

P.I. = Plasticity Index

psf = pounds per square foot

pcf = pounds per cubic foot

USCS = Unified Soil Classification System

bgs = Below Ground Surface

\* = Direct Shear Value was a composite sample from SB-6, 7, & 8

\*\*= One Point Test

**Table 2**  
**Groundwater Elevations**  
**Nine Mile Run - Phase III**  
**Pittsburgh, PA**

Location	Top of PVC/Pipe Elevation <sup>(1)</sup>	Depth to Water <sup>(2)</sup>	Groundwater Elevation <sup>(1)</sup>	Depth to Water <sup>(2)</sup>	Groundwater Elevation <sup>(1)</sup>
		(ft)		(ft)	
		9-Oct-12		5-Nov-12	
MW-1	844.49	98.47	746.02	96.06	748.43
MW-2	872.03	47.02	825.01	44.12	827.91
MW-3	809.46	70.91	738.55	70.23	739.23
MW-4	906.22	26.95	879.27	24.04	882.18
MW-5	922.12	52.40	869.72	49.43	872.69
MW-6	922.26	50.35	871.91	48.23	874.03
MW-7	854.19	50.00	804.19	45.34	808.85

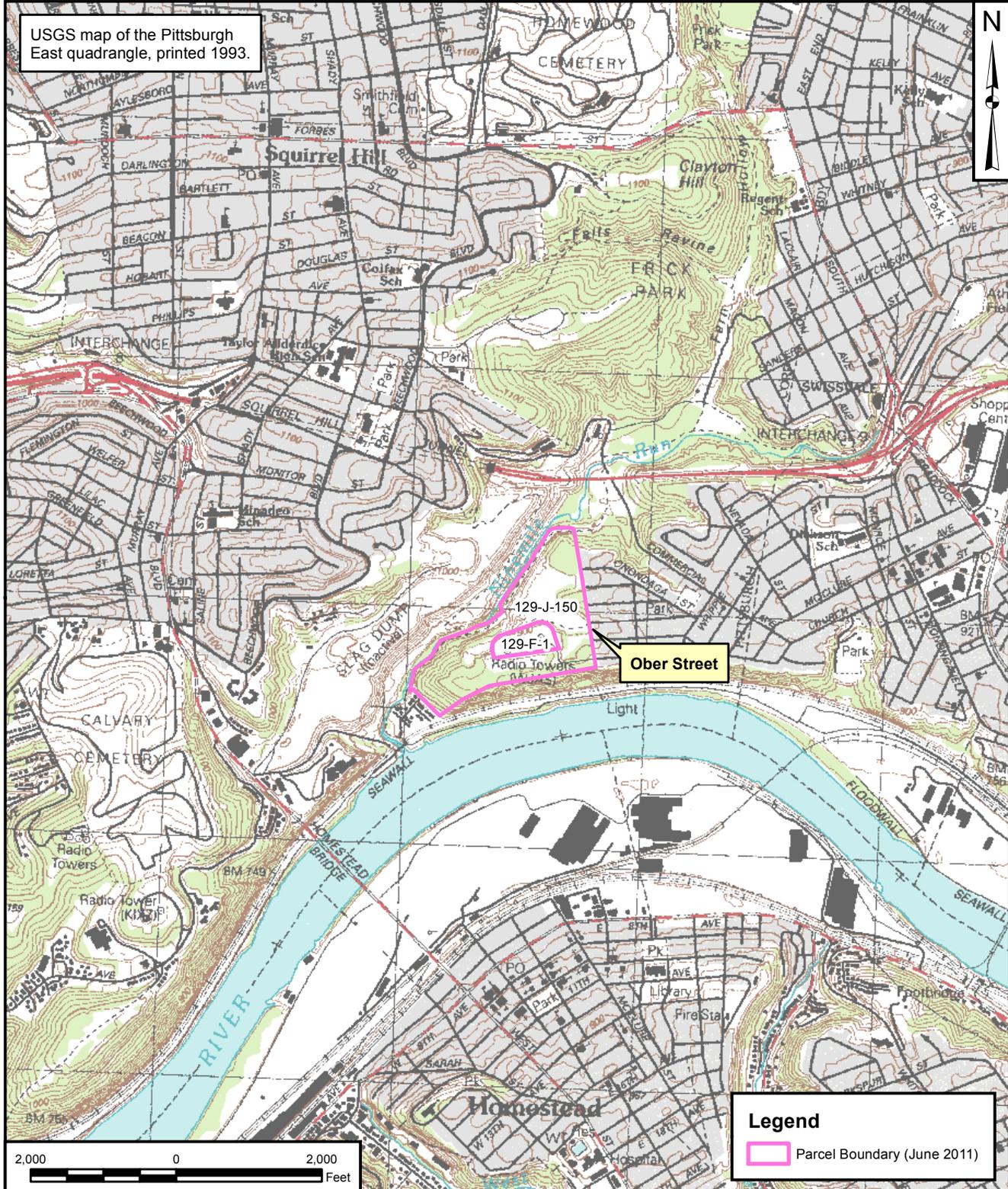
Notes:

1 - Feet MSL

2- Below Top of Casing

## FIGURES

USGS map of the Pittsburgh East quadrangle, printed 1993.



**Legend**  
Parcel Boundary (June 2011)



SITE LOCATION MAP  
NINE MILE RUN - PHASE 3  
PITTSBURGH, PENNSYLVANIA

DRAWN BY: J. ENGLISH 10/27/11  
CHECKED BY: J. AGLIO 12/03/12  
APPROVED BY:  
CONTRACT NUMBER: 112C03820

FIGURE NUMBER	REV
1	0

Aerial photograph from ESRI Bing Maps Aerial map service  
 © 2010 Microsoft Corporation and its data suppliers.



**Legend**

- Monitoring Well and Soil Boring Location
- Soil Boring Location
- Approx Location 24" Sewer Line
- Approx Location Overhead Power Line
- Parcel Boundary (June 2011)





**SAMPLE LOCATION MAP  
 NINE MILE RUN - PHASE 3  
 PITTSBURGH, PENNSYLVANIA**

DRAWN BY: S. PAXTON 10/15/12 CHECKED BY: J. AGLIO 12/03/12 APPROVED BY:	FIGURE NUMBER 2
CONTRACT NUMBER: 112C03820	REVISION 0

Aerial photograph from ESRI Bing Maps Aerial map service  
 © 2010 Microsoft Corporation and its data suppliers.



**Legend**

- Monitoring Well and Soil Boring Location
- Soil Boring Location
- Estimated Area of Slag
- Parcel Boundary (June 2011)

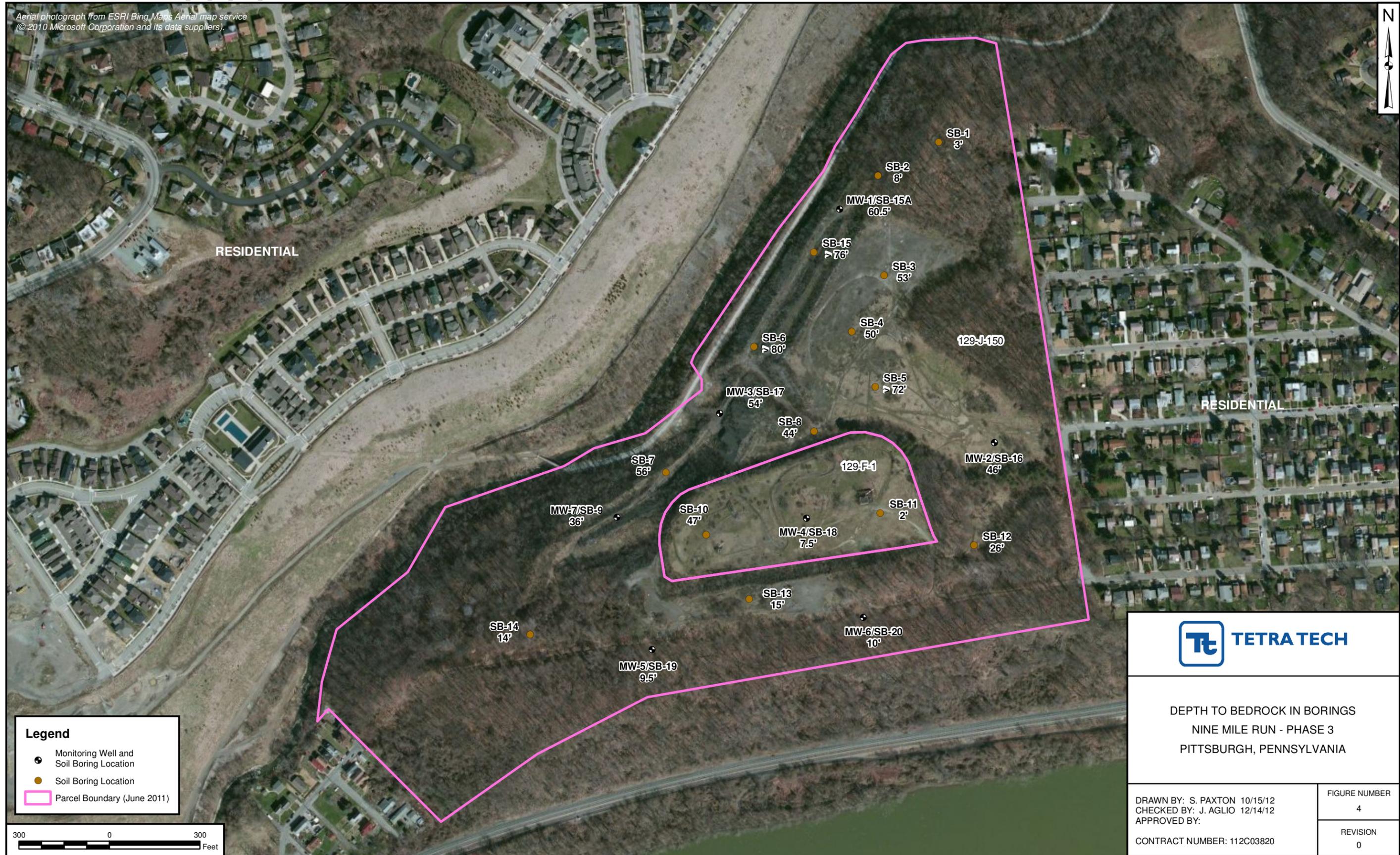




THICKNESS OF SLAG IN BORINGS  
 NINE MILE RUN - PHASE 3  
 PITTSBURGH, PENNSYLVANIA

DRAWN BY: S. PAXTON 10/15/12 CHECKED BY: J. AGLIO 12/14/12 APPROVED BY:	FIGURE NUMBER 3
CONTRACT NUMBER: 112C03820	REVISION 0

Aerial photograph from ESRI Bing Maps Aerial map service  
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RESIDENTIAL

RESIDENTIAL

SB-1  
3'

SB-2  
8'

MW-1/SB-15A  
60.5'

SB-15  
>76'

SB-3  
53'

129-J-150

SB-4  
50'

MW-3/SB-17  
54'

SB-5  
>72'

SB-8  
44'

MW-2/SB-16  
46'

129-F-1

SB-7  
56'

MW-7/SB-9  
36'

SB-10  
47'

MW-4/SB-18  
7.5'

SB-11  
2'

SB-12  
26'

SB-14  
14'

SB-13  
15'

MW-6/SB-20  
10'

MW-5/SB-19  
9.5'

**Legend**

- Monitoring Well and Soil Boring Location
- Soil Boring Location
- Parcel Boundary (June 2011)



DEPTH TO BEDROCK IN BORINGS  
 NINE MILE RUN - PHASE 3  
 PITTSBURGH, PENNSYLVANIA

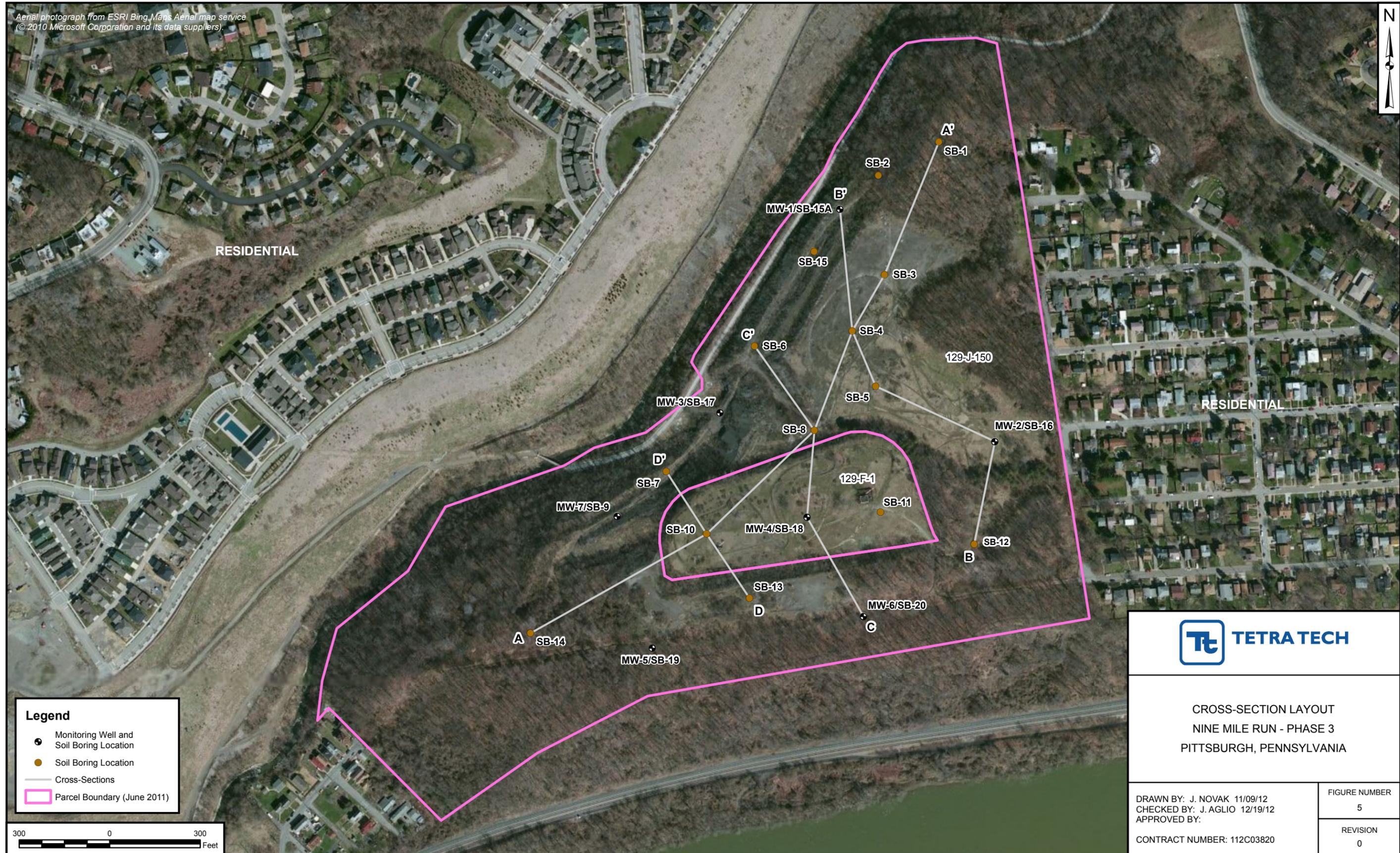
DRAWN BY: S. PAXTON 10/15/12  
 CHECKED BY: J. AGLIO 12/14/12  
 APPROVED BY:

CONTRACT NUMBER: 112C03820

FIGURE NUMBER  
4

REVISION  
0

Aerial photograph from ESRI Bing Maps Aerial map service  
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**Legend**

- Monitoring Well and Soil Boring Location
- Soil Boring Location
- Cross-Sections
- Parcel Boundary (June 2011)



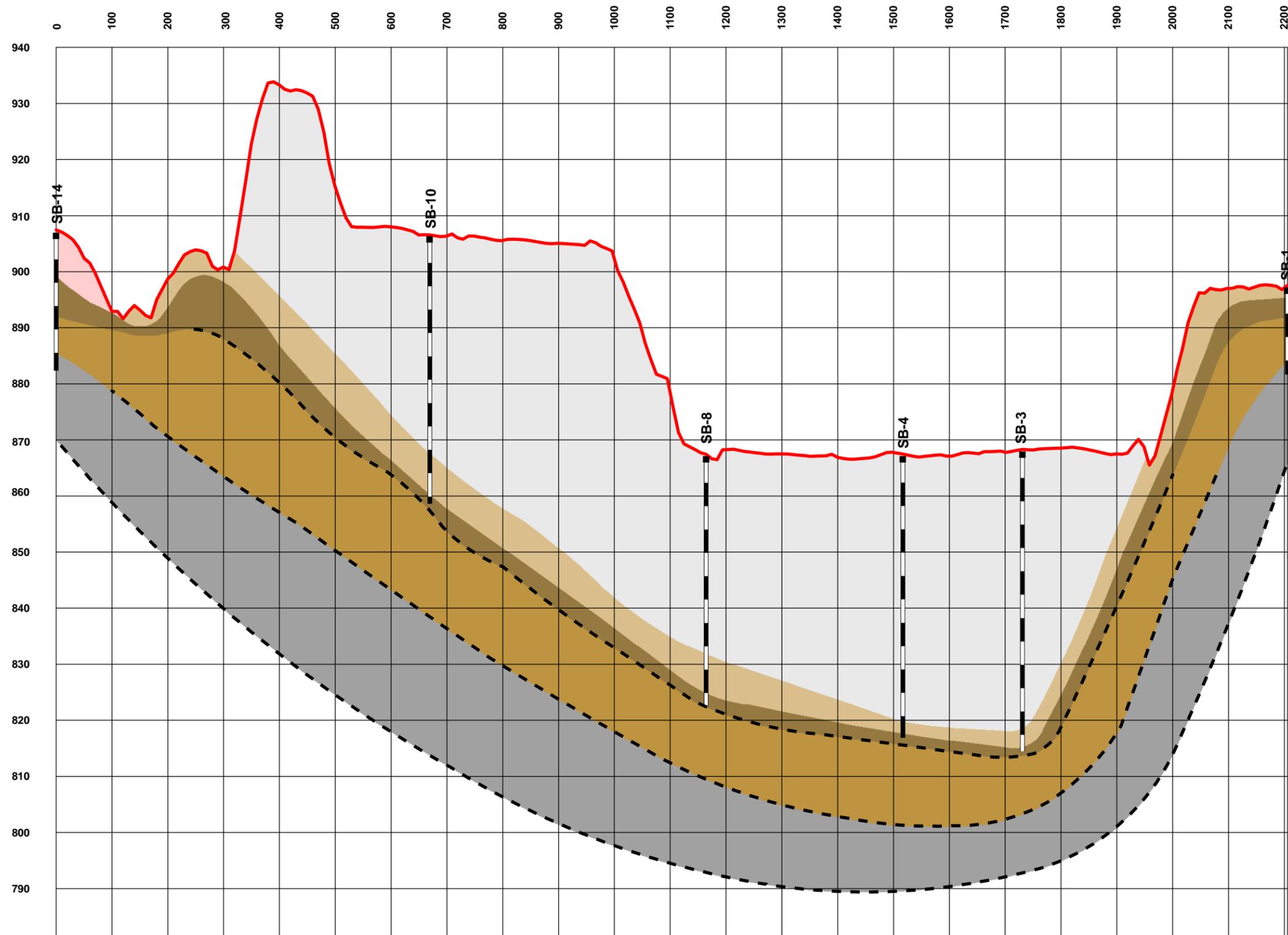
CROSS-SECTION LAYOUT  
 NINE MILE RUN - PHASE 3  
 PITTSBURGH, PENNSYLVANIA

DRAWN BY: J. NOVAK 11/09/12  
 CHECKED BY: J. AGLIO 12/19/12  
 APPROVED BY:

CONTRACT NUMBER: 112C03820

FIGURE NUMBER  
5

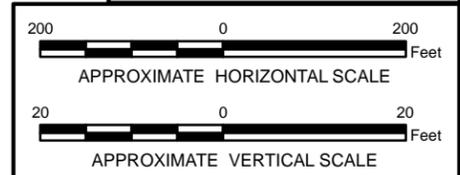
REVISION  
0



Note:  
The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions could exist.

**Legend**

- Boring
- Elevation Profile
- SLAG
- RED SILTY CLAY
- BROWN SILTY CLAY
- BROWN WEATHERED SHALE
- BROWN SHALE
- GRAY SHALE
- Inferred Stratigraphic Boundary

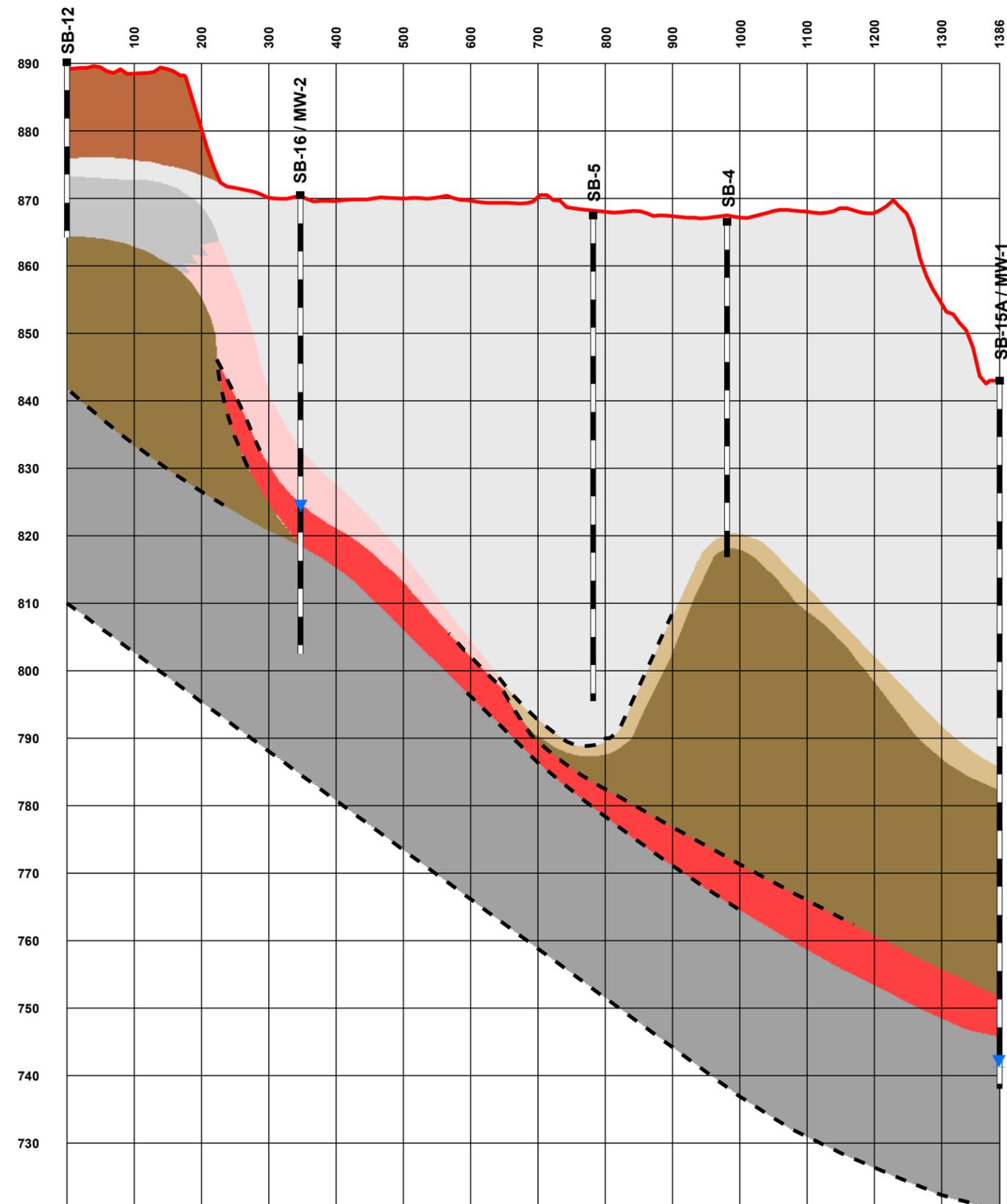


CROSS-SECTION A-A'  
NINE MILE RUN - PHASE 3  
PITTSBURGH, PENNSYLVANIA

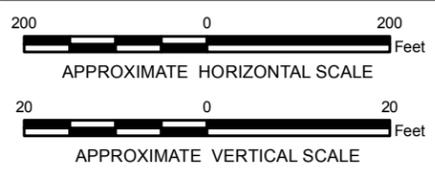
DRAWN BY: S. PAXTON 11/20/12  
CHECKED BY: J. AGLIO 12/07/12  
APPROVED BY:

CONTRACT NUMBER: 112C03820

FIGURE NUMBER	6
REVISION	0



- Legend**
- Boring
  - Elevation Profile
  - Inferred Stratigraphic Boundary
  - SLAG
  - RED/BROWN SILTY CLAY
  - GRAY SILTY CLAY
  - RED SILTY CLAY
  - BROWN SILTY CLAY
  - BROWN SHALE
  - RED SHALE
  - GRAY SHALE
  - Water Level



- Notes:
- 1) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions could exist.
  - 2) Groundwater elevations shown are from 10/09/2012.



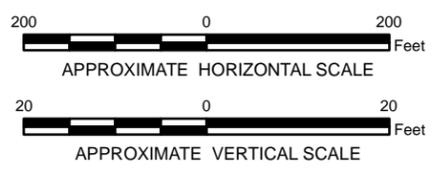
CROSS-SECTION B-B'  
NINE MILE RUN - PHASE 3  
PITTSBURGH, PENNSYLVANIA

DRAWN BY: S. PAXTON 11/20/12  
CHECKED BY: J. AGLIO 12/12/12  
APPROVED BY:  
CONTRACT NUMBER: 112C03820

FIGURE NUMBER	7
REVISION	0



- Legend**
- Boring
  - Elevation Profile
  - SLAG
  - BROWN SILTY CLAY
  - RED/BROWN SILTY CLAY
  - RED WEATHERED SHALE
  - RED SHALE
  - BROWN SHALE
  - GRAY SHALE
  - BLACK CARBONACEOUS SHALE
  - Inferred Stratigraphic Boundary
  - Water Level



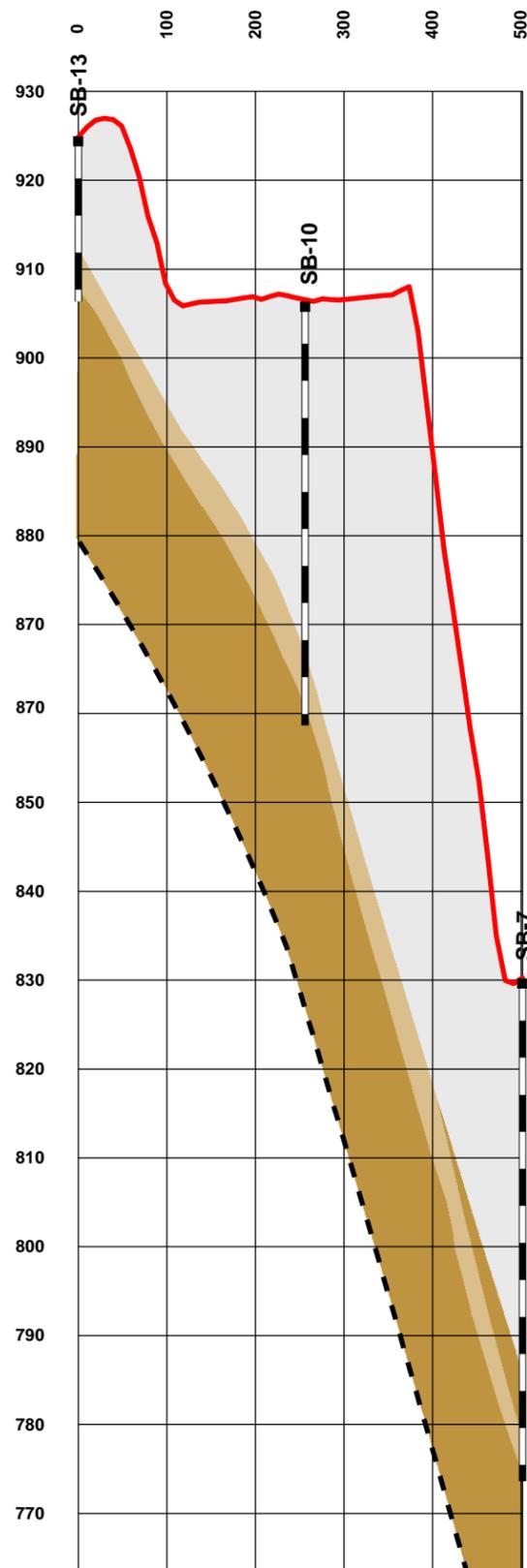
- Notes:
- 1) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions could exist.
  - 2) Groundwater elevations shown are from 10/09/2012.



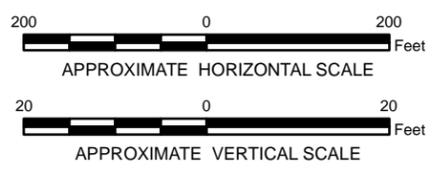
CROSS-SECTION C-C'  
NINE MILE RUN - PHASE 3  
PITTSBURGH, PENNSYLVANIA

DRAWN BY: S. PAXTON 11/20/12  
CHECKED BY: J. AGLIO 12/10/12  
APPROVED BY:  
CONTRACT NUMBER: 112C03820

FIGURE NUMBER
8
REVISION
0



- Legend**
- Boring
  - Elevation Profile
  - SLAG
  - BROWN SILTY CLAY
  - BROWN SHALE
  - Inferred Stratigraphic Boundary



Note:  
The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions could exist.



CROSS-SECTION D-D'  
NINE MILE RUN - PHASE 3  
PITTSBURGH, PENNSYLVANIA

DRAWN BY: S. PAXTON 11/20/12  
CHECKED BY: J. AGLIO 12/10/12  
APPROVED BY:  
CONTRACT NUMBER: 112C03820

FIGURE NUMBER	9
REVISION	0

**APPENDIX A**  
**BORING LOGS**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

## Boring ID: SB-1

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Topsoil					
0		Brown Silty Clay, moist, stiff	SS-1	SS	3-3 5-13	2.0/2.0	0.0
2		Brown decomposed to weathered Shale, dry	SS-2	SS	10-25 23-30	2.0/2.0	0.0
4			SS-3	SS	29 50 over 4	0.9/0.9	0.0
6		Brown Shale, extremely to moderately broken, soft to medium hard, 0% RQD	RC-1	NQ	NA	5.0/5.0	NA
12			RC-2	NQ	NA	5.0/5.0	NA
14		Gray Shale, moderately broken, medium hard, 0% RQD					
16							
18							
20							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/NQ Core

**Hole Size:** 6"  
**Ground Elevation:** 896.68  
**Water Level:** No Water Encountered

**Drill Date:** 9/25/12  
**Sheet** 1 of 1



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-2**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Topsoil					
0		Brown Silty Clay, dry, medium stiff	SS-1	SS	3-5 9-13	2.0/2.0	0.0
2		Red/Brown Silty Clay, with some shale frags, moist, stiff	SS-2	SS	10-10 9-8	2.0/2.0	0.0
4		Brown Silty Clay, dry, stiff	SS-3	SS	9-11 10-12	2.0/2.0	0.0
6		Brown Silty Clay, dry, stiff	SS-4	SS	14-20 24-45	2.0/2.0	0.0
8		Brown weathered Shale, dry					
10							
12							
14							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 851.13  
**Water Level:** No Water Encountered

**Drill Date:** 9/25/2012  
**Sheet** 1 of 1



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-3**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense	SS-1	SS	50 over 3	0.3/0.3	0.0
2			SS-2	SS	9-8 8-10	1.4/2.0	0.0
4			SS-3	SS	50 over 3	0.3/0.3	0.0
6			SS-4	SS	33 50 over 2	0.7/0.7	0.0
8			SS-5	SS	14-26 31-22	1.4/2.0	0.0
10			SS-6	SS	12-17 12-10	1.8/23.0	0.0
12			SS-7	SS	50 over 3	0.3/0.3	0.0
14			SS-8	SS	30-24 28-31	1.8/2.0	0.0
16			SS-9	SS	12-22 24-15	2.0/2.0	0.0
18			SS-10	SS	10-8 10-16	1.4/2.0	0.0
20			SS-11	SS	19-16 22-12	1.6/2.0	0.0
22			SS-12	SS	15-10 9-12	1.9/2.0	0.0
24			SS-13	SS	17-16 17-4	1.3/2.0	0.0
26			SS-14	SS	50 over 2	0.2/0.2	0.0
28							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 867.40  
**Water Level:** No Water Encountered

**Drill Date:** 9/27-28/12  
**Sheet 1 of 2**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Boring ID: SB-3**

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
30	10		SS-15	SS	17-19 21-23	1.7/2.0	0.0
32			SS-16	SS	23-12 12-12	2.0/2.0	0.0
34			SS-17	SS	13-14 14-17	1.6/2.0	0.0
36			SS-18	SS	10-15 13-10	2.0/2.0	0.0
38			SS-19	SS	14-13 19-24	2.0/2.0	0.0
40			SS-20	SS	15-20 22-17	1.3/2.0	0.0
42			SS-21	SS	8-17 30-20	2.0/2.0	0.0
44			SS-22	SS	17-10 8-14	1.8/2.0	0.0
46			SS-23	SS	10-5 7-3	1.7/2.0	0.0
48			SS-24	SS	14-14 12-10	1.9/2.0	0.0
50	16	Brown/Red Silty Clay, moist, medium stiff to stiff	SS-25	SS	14-11 9-16	1.8/2.0	0.0
52		Brown weathered Shale, dry	SS-26	SS	20-14 17-21	2.0/2.0	0.0
54			SS-27	SS	36 5 over 4	0.9/0.9	0.0
56							

**Drilling Company:** Terra Testing

**Drill Rig:** D-50

**Drill Method:** HSA

**Hole Size:** 6"

**Ground Elevation:** 867.40

**Water Level:** No Water Encountered

**Drill Date:** 9/27-28/12

**Sheet 2 of 2**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-4**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense	SS-1	SS	30-35 28-19	2.0/2.0	0.0
2			SS-2	SS	12-13 15-12	1.0/2.0	0.0
4			SS-3	SS	12-14 13-11	2.0/2.0	0.0
6			SS-4	SS	9-16 12-17	1.7/2.0	0.0
8			SS-5	SS	11-14 12-15	1.7/2.0	0.0
10			SS-6	SS	11-12 12-8	1.7/2.0	0.0
12			SS-7	SS	4-7 6-9	1.0/2.0	0.0
14			SS-8	SS	50 over 1	0.1/0.1	0.0
16			SS-9	SS	19-16 16-12	2.0/2.0	0.0
18			SS-10	SS	3-10 15-11	1.5/2.0	0.0
20			SS-11	SS	12-16 16-14	1.7/2.0	0.0
22			SS-12	SS	10-13 10-12	1.5/2.0	0.0
24			SS-13	SS	10-14 12-10	1.7/2.0	0.0
26			SS-14	SS	50 over 4	0.4/0.4	0.0
28							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 867.40  
**Water Level:** No Water Encountered

**Drill Date:** 9/27-28/12  
**Sheet 1 of 2**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-4**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
30	10		SS-15	SS	35-9 7-7	1.0/2.0	0.0
32			SS-16	SS	6-7 2-9	1.0/2.0	0.0
34			SS-17	SS	50 over 2	0.2/0.2	0.0
36			SS-18	SS	16-14 14-16	1.0/2.0	0.0
38			SS-19	SS	5-19 22-17	1.0/2.0	0.0
40			SS-20	SS	13-14 13-9	1.7/2.0	0.0
42			SS-21	SS	12-28 22-17	1.7/2.0	0.0
44			SS-22	SS	14-12 19-17	1.7/2.0	0.0
46			SS-23	SS	11-18 17-12	1.9/2.0	0.0
48			14	Red/Brown Silty Clay with some shale frags, moist, medium stiff to stiff	SS-24	SS	20-43 28-6
50	Brown weathered Shale, dry	SS-25		SS	10-20-22 50 over 2	1.7/1.7	0.0
52	16						
54							
56							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 867.40  
**Water Level:** No Water Encountered

**Drill Date:** 9/27-28/12  
**Sheet** 2 of 2



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-5**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense  Auger refusal at 72'	SS-1	SS	50 over 3	0.0/0.3	0.0
2			SS-2	SS	10-21 25-16	2.0/2.0	0.0
4			SS-3	SS	9-9 10-9	2.0/2.0	0.0
6			SS-4	SS	15-14 19-16	2.0/2.0	0.0
8			SS-5	SS	7-9 24-29	1.5/2.0	0.0
10			SS-6	SS	15-17 16-17	1.6/2.0	0.0
12			SS-7	SS	21-20 16-17	0.5/2.0	0.0
14			SS-8	SS	13-13 14-16	1.6/2.0	0.0
16			SS-9	SS	14-18 14-8	0.6/2.0	0.0
18			SS-10	SS	2-3 8-7	1.2/2.0	0.0
20			SS-11	SS	9-9 12-15	1.4/2.0	0.0
22			SS-12	SS	20-22 19-18	1.5/2.0	0.0
24			SS-13	SS	9-19 12-14	0.7/2.0	0.0
26							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 867.49  
**Water Level:** No Water Encountered

**Drill Date:** 9/26/12  
**Sheet 1 of 3**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-5**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
28	9	[Symbol]	SS-14	SS	14-10 9-7	1.0/2.0	0.0
30			SS-15	SS	6-7 14-17	1.0/2.0	0.0
32			SS-16	SS	21-27 13-10	1.0/2.0	0.0
34			SS-17	SS	50 over 4	0.4/2.0	0.0
36			SS-18	SS	21-17 9-10	2.0/2.0	0.0
38			SS-19	SS	14-15 16-26	0.8/2.0	0.0
40			SS-20	SS	20-30 37-32	2.0/2.0	0.0
42			SS-21	SS	25-38 36-38	1.0/2.0	0.0
44			SS-22	SS	21-15 14-16	2.0/2.0	0.0
46			SS-23	SS	18-18 15-17	1.4/2.0	0.0
48			SS-24	SS	19-30 22-37	2.0/2.0	0.0
50			SS-25	SS	15-21 28-20	2.0/2.0	0.0
52			SS-26	SS	17-14 8-5	1.0/2.0	0.0

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 867.49  
**Water Level:** No Water Encountered

**Drill Date:** 9/26/12  
**Sheet 2 of 3**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-5**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
54	17		SS-27	SS	14-15 17-10	1.4/2.0	0.0
56			SS-28	SS	11-11 9-11	2.0/2.0	0.0
58			SS-29	SS	11-11 8-7	2.0/2.0	0.0
60			SS-30	SS	14-21 15-21	1.6/2.0	0.0
62			SS-31	SS	17 50 over 3	0.8/0.8	0.0
64			SS-32	SS	14-19 21-24	2.0/2.0	0.0
66			SS-33	SS	21-24 17-24	1.8/2.0	0.0
68			SS-34	SS	17-13 19-24	2.0/2.0	0.0
70			SS-35	SS	15-17 15-19	1.4/2.0	0.0
72			SS-36	SS	21-24 23-21	1.7/2.0	0.0
74	23						
76							
78							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 867.49  
**Water Level:** No Water Encountered

**Drill Date:** 9/26/12  
**Sheet** 3 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-6**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense  Auger refusal at 80'	SS-1	SS	50 over 3	0.3/0.3	0.0
2			SS-2	SS	12-12 12-12	1.9/2.0	0.0
4			SS-3	SS	4-12 12-10	1.4/2.0	0.0
6			SS-4	SS	10-14 14-15	1.7/2.0	0.0
8			SS-5	SS	15-26 50 over 2	1.0/1.2	0.0
10			SS-6	SS	11-10 15-19	0.5/2.0	0.0
12			SS-7	SS	9-12 10-11	1.9/2.0	0.0
14			SS-8	SS	11 50 over 4	0.8/0.9	0.0
16			SS-9	SS	17-26-34 50 over 1	1.5/1.6	0.0
18			SS-10	SS	9-8 6-12	1.8/2.0	0.0
20			SS-11	SS	9-13 15-18	2.0/2.0	0.0
22			SS-12	SS	17-16 24-21	2.0/2.0	0.0
24			SS-13	SS	19-22 25-22	2.0/2.0	0.0
26			SS-14	SS	14-15 24-15	2.0/2.0	0.0
28							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 830.20  
**Water Level:** No Water Encountered

**Drill Date:** 9/28 & 10/1/2012  
**Sheet 1 of 3**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-6**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
30			SS-15	SS	4-16 24-33	2.0/2.0	0.0
32			SS-16	SS	25-20 33-32	1.0/2.0	0.0
34			SS-17	SS	15-22 24-18	2.0/2.0	0.0
36			SS-18	SS	16-20 19-24	2.0/2.0	0.0
38			SS-19	SS	25-19 12-9	2.0/2.0	0.0
40			SS-20	SS	8-16-14 50 over 2	1.5/1.7	0.0
42			SS-21	SS	20-9 12-8	1.6/2.0	0.0
44			SS-22	SS	6-9 12-8	0.4/2.0	0.0
46			SS-23	SS	50 over 2	0.2/0.2	0.0
48			SS-24	SS	14-13 19-15	1.8/2.0	0.0
50			SS-25	SS	11-19 11-26	1.8/2.0	0.0
52			SS-26	SS	8-11-30 50 over 4	1.9/1.9	0.0
54			SS-27	SS	11-13 9-10	1.7/2.00	0.0
56			SS-28	SS	6-8 7-9	2.0/2.0	0.0

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 830.20  
**Water Level:** No Water Encountered

**Drill Date:** 9/28 & 10/1/2012  
**Sheet 2 of 3**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-6**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
58	19		SS-29	SS	14-20 50 over 3	1.2/1.3	0.0
60			SS-30	SS	12-21 19-10	1.4/2.0	0.0
62			SS-31	SS	4-3 7-10	2.0/2.0	0.0
64			SS-32	SS	10-12 14-10	1.7/2.0	0.0
66			SS-33	SS	10-9 11-11	2.0/2.0	0.0
68			SS-34	SS	12-13 8-10	1.8/2.0	0.0
70			SS-35	SS	4-10 6-5	1.9/2.0	0.0
72			SS-36	SS	3-2 3-4	2.0/2.0	0.0
74			SS-37	SS	4-3 6-5	1.7/2.0	0.0
76			SS-38	SS	9-7 6-7	2.0/2.0	0.0
78	23		SS-39	SS	8-7 5-7	2.0/2.0	0.0
80			SS-40	SS	9-11 11-18	1.5/2.0	0.0
82	25						
84							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 830.20  
**Water Level:** No Water Encountered

**Drill Date:** 9/28 & 10/1/2012  
**Sheet** 3 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-7**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense	SS-1	SS	2-10 16-34	2.0/2.0	0.0
2			SS-2	SS	50 over 4	0.1/0.4	0.0
4			SS-3	SS	20-25 16-18	2.0/2.0	0.0
6			SS-4	SS	13-17 16-14	2.0/2.0	0.0
8			SS-5	SS	15-10 11-12	2.0/2.0	0.0
10			SS-6	SS	28-16 14-19	2.0/2.0	0.0
12			SS-7	SS	14-20 19-21	2.0/2.0	0.0
14			SS-8	SS	12-14 11-6	2.0/2.0	0.0
16			SS-9	SS	12-14 16-16	2.0/2.0	0.0
18			SS-10	SS	15-8 12-15	2.0/2.0	0.0
20			SS-11	SS	21-18 21-11	2.0/2.0	0.0
22			SS-12	SS	11-14 16-15	2.0/2.0	0.0
24			SS-13	SS	9-8 4-9	2.0/2.0	0.0
26			SS-14	SS	10-11 14-18	1.5/2.0	0.0
28							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 829.58  
**Water Level:** No Water Encountered

**Drill Date:** 10/1-2/2012  
**Sheet** 1 of 2



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Boring ID: SB-7**

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID	
30	10		SS-15	SS	10-14 16-11	1.0/2.0	0.0	
32			SS-16	SS	50 over 2	0.2/0.2	0.0	
34			SS-17	SS	11-15 19-17	2.0/2.0	0.0	
36			SS-18	SS	17-18 21-16	1.7/2.0	0.0	
38			SS-19	SS	11-21 14-19	1.8/2.0	0.0	
40			SS-20	SS	50 over 3	0.3/0.3	0.0	
42			SS-21	SS	28-28 35-30	1.8/2.0	0.0	
44			SS-22	Blue Slag, granular, moist, medium dense	SS	12-10 12-9	1.8/2.0	0.0
46			SS-23	Brown Silty Clay, with some shale frags, moist, stiff to very stiff	SS	10-11 12-9	1.4/2.0	0.0
48			SS-24		SS	10-9 12-18	1.9/2.0	0.0
50	SS-25	SS	3-6 9-12		2.0/2.0	0.0		
52	SS-26	SS	10-10 11-12		2.0/2.0	0.0		
54	16	Red weathered Shale, dry	SS-27	SS	10-11 17-12	2.0/2.0	0.0	
56			SS-28	SS	12-10 24-50	2.0/2.0	0.0	

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 829.58  
**Water Level:** No Water Encountered

**Drill Date:** 10/1-2/2012  
**Sheet 2 of 2**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-8**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense	SS-1	SS	50 over 3	0.2/0.3	0.0
2			SS-2	SS	21-13 7-7	1.2/2.0	0.0
4			SS-3	SS	14-8 9-12	0.5/2.0	0.0
6			SS-4	SS	11-16 39-31	1.5/2.0	0.0
8			SS-5	SS	17-27-29 50 over 3	1.3/1.7	0.0
10			SS-6	SS	41-21 22-24	1.0/2.0	0.0
12			SS-7	SS	14-12 14-12	1.4/2.0	0.0
14			SS-8	SS	14-12 14-12	1.4/2.0	0.0
16			SS-9	SS	12-9-7 50 over 4	0.7/2.0	0.0
18			SS-10	SS	13-11 10-11	1.4/2.0	0.0
20			SS-11	SS	5-5 16-9	1.6/2.0	0.0
22			SS-12	SS	3-5 6-9	2.0/2.0	0.0
24							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 866.53  
**Water Level:** No Water Encountered

**Drill Date:** 9/27/2012  
**Sheet** 1 of 2



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Boring ID: SB-8**

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
26	[Dotted pattern]		SS-13	SS	18-9 14-16	2.0/2.0	0.0
28			SS-14	SS	14-19 24-11	1.6/2.0	0.0
30			SS-15	SS	14-10 8-17	1.4/2.0	0.0
32			SS-16	SS	11-18 10-12	2.0/2.0	0.0
34			SS-17	SS	6-9 17-19	2.0/2.0	0.0
36			SS-18	SS	12-14 17-19	2.0/2.0	0.0
38			SS-19	SS	8-9 11-10	1.8/2.0	0.0
40			SS-20	SS	10-10 11-12	2.0/2.0	0.0
42	[Diagonal hatching]	Red Silty Clay, dry, stiff to very stiff	SS-21	SS	12-19 19-27	2.0/2.0	0.0
44			SS-22	SS	12-27 34-48	2.0/2.0	0.0
46	[Horizontal hatching]	Red weathered Shale, dry					
48							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 866.53  
**Water Level:** No Water Encountered

**Drill Date:** 9/27/2012  
**Sheet** 2 of 2



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-9/MW-7**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Geologist:** Jon Aglio

**Location:** Pittsburgh, PA

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
-3		Ground Surface						<p>Bentonite Seal</p> <p>2" PVC Riser</p>
1		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense	SS-1	SS	10-11 9-11	2.0/2.0	0.0	
3								
5			SS-2	SS	16-18 11-24	1.6/2.0	0.0	
7								
9			SS-3	SS	10-11 10-9	1.9/2.0	0.0	
11								
13								
15			SS-4	SS	11-12 15-16	1.7/2.0	0.0	
17								
19								

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 852.22  
**Well Elevation:** 854.19

**Drill Date:** 10/5/2012  
**Sheet:** 1 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-9/MW-7**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
21	7		SS-5	SS	8-10 19-14	1.6/2.0	0.0	
23								
25			SS-6	SS	10-9 11-10	1.6/2.0	0.0	
27								
29	9	Brown, trace red, Silty Clay, moist, medium stiff	SS-7	SS	3-3 2-2	1.5/2.0	0.0	
31								
33								
35	11	Brown weathered Shale, dry	SS-8	SS	5-16-22 50 over 4	1.6/1.9	0.0	
37		Brown Shale, dry						
39		Gray Limestone, dry						
41								

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 852.22  
**Well Elevation:** 854.19

**Drill Date:** 10/5/2012  
**Sheet:** 2 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-9/MW-7**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details	
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID		
43	14	Brown Shale, water at 52'	AH-1	AH	NA	NA	NA		
45									
47									
49									
51									
53									16
55									
57									
59									
61									18
63									

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 852.22  
**Well Elevation:** 854.19

**Drill Date:** 10/5/2012  
**Sheet:** 3 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-10**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense	SS-1	SS	8-37 22-24	2.0/2.0	0.0
2			SS-2	SS	45-47 39-20	2.0/2.0	0.0
4			SS-3	SS	50 over 2	0.2/0.2	0.0
6			SS-4	SS	15-16 18-15	1.2/2.0	0.0
8			SS-5	SS	26-25 31-28	1.8/2.0	0.0
10			SS-6	SS	50 over 1	0.0/0.1	0.0
12			SS-7	SS	50 over 2	0.2/0.2	0.0
14			SS-8	SS	22-21 15-19	1.4/2.0	0.0
16			SS-9	SS	50 over 5	0.5/0.5	0.0
18			SS-10	SS	12-14 15-16	2.0/2.0	0.0
20			SS-11	SS	20-39 20-28	2.0/2.0	0.0
22			SS-12	SS	50 over 1	0.0/0.1	0.0
24							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 905.73  
**Water Level:** No Water Encountered

**Drill Date:** 9/24-25/2012  
**Sheet** 1 of 2



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-10**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID		
26	9		SS-13	SS	24-30 36-23	1.6/2.0	0.0		
28			SS-14	SS	50 over 4	1.6/2.0	0.0		
30			SS-15	SS	16-20 12-10	0.2/0.4	0.0		
32			SS-16	SS	14-20 14-6	0.3/2.0	0.0		
34			SS-17	SS	15-10 8-6	2.0/2.0	0.0		
36			SS-18	SS	13-13 8-8	0.0/2.0	0.0		
38			SS-19	SS	12-16 19-29	2.0/2.0	0.0		
40			11	Brown Silty Clay, with some shale frags, dry to moist, stiff to very stiff	SS-20	SS	18-20 22-22	2.0/2.00	0.0
42					SS-21	SS	11-17 25-26	2.0/2.0	0.0
44	SS-22	SS			8-18 22-26	2.0/2.0	0.0		
46	SS-23	SS			15-18 32-22	2.0/2.0	0.0		
48	SS-24	SS			38-59 50 over 1	1.1/1.1	0.0		
		Brown weathered Shale, dry							
<b>Drilling Company:</b> Terra Testing <b>Hole Size:</b> 6" <b>Drill Date:</b> 9/24-25/2012 <b>Drill Rig:</b> D-50 <b>Ground Elevation:</b> 905.73 <b>Sheet 2 of 2</b> <b>Drill Method:</b> HSA <b>Water Level:</b> No Water Encountered									



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-11**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Brown decomposed to weathered Shale, dry	SS-1	SS	4-31 49-57	2.0/2.0	0.0
2		Brown Shale, extremely to moderately broken, soft to medium hard, 0% RQD	SS-2	Auger	NA	NA	NA
4							
6			RC-1	NQ	NA	3.0/3.0	NA
8							
10		Gray/Brown Shale, moderately broken, medium hard to hard, 0% RQD	RC-2	NQ	NA	5.0/5.0	NA
12							
14							
16							
18							
20							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/NQ Core

**Hole Size:** 6"  
**Ground Elevation:** 901.15  
**Water Level:** No Water Encountered

**Drill Date:** 9/25/12  
**Sheet** 1 of 1



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

## Boring ID: SB-12

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Topsoil					
0 - 14		Red/Brown Silty Clay, with shale frags (fill), moist, medium stiff	SS-1	SS	2-3 3-4	2.0/2.0	0.0
2			SS-2	SS	5-5 6-8	2.0/2.0	0.0
4			SS-3	SS	3-4 4-3	1.8/2.0	0.0
6			SS-4	SS	4-4 4-5	2.0/2.0	0.0
8			SS-5	SS	3-4 4-4	1.9/2.0	0.0
10			SS-6	SS	2-3 8-8	2.0/2.0	0.0
12			SS-7	SS	4-8 7-6	2.0/2.0	0.0
14			SS-8	SS	17-21 15-16	1.6/2.0	0.0
16		Black/Gray Slag, moist, medium dense	SS-9	SS	14-19 11-10	0.4/2.0	0.0
18			SS-10	SS	3-3 3-4	2.0/2.0	0.0
20		Gray Silty Clay, with sandstone and shale frags, moist, medium stiff	SS-11	SS	5-7 8-10	2.0/2.0	0.0
22		Gray Silty Clay, moist, medium stiff to stiff	SS-12	SS	10-10 14-13	2.0/2.0	0.0
24			SS-13	SS	12-14 15-28	2.0/2.0	0.0
26		Brown decomposed Shale, dry					

**Drilling Company:** Terra Testing

**Drill Rig:** D-50

**Drill Method:** HSA

**Hole Size:** 6"

**Ground Elevation:** 890.19

**Water Level:** No Water Encountered

**Drill Date:** 10/4/2012

**Sheet 1 of 1**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-13**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0	[Stippled pattern]	Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders moist, medium dense to dense	SS-1	SS	50 over 3	2.0/2.0	0.0
2			SS-2	SS	15-16 11-12	2.0/2.0	0.0
4			SS-3	SS	10-10 8-11	2.0/2.0	0.0
6			SS-4	SS	13-12 17-12	2.0/2.0	0.0
8			SS-5	SS	50 over 4	0.4/2.0	0.0
10			SS-6	SS	20-17 3-2	2.0/2.0	0.0
12	[Diagonal hatching]	Brown Silty Clay, moist, medium stiff	SS-7	SS	10-9 8-6	2.0/2.0	0.0
14			SS-8	SS	8-7 12-13	2.0/2.0	0.0
16	[Horizontal hatching]	Brown weathered Shale, dry	SS-9	SS	11-18 30-47	2.0/2.0	0.0
18							
20							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 924.36  
**Water Level:** No Water Encountered

**Drill Date:** 10/1/2012  
**Sheet 1 of 1**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-14**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Topsoil					
0		Red Silty Clay, moist, stiff to very stiff	SS-1	SS	1-3 5-6	2.0/2.0	0.0
2			SS-2	SS	7-7 11-10	2.0/2.0	0.0
4			SS-3	SS	13-14 17-19	2.0/2.0	0.0
6			SS-4	SS	10-12 16-20	2.0/2.0	0.0
8		Brown decomposed to weathered Shale, dry	SS-5	SS	12-20 21-18	2.0/2.0	0.0
10			SS-6	SS	11-18 17-28	2.0/2.0	0.0
12			SS-7	SS	30-42 50 over 2	1.2/1.2	0.0
14		Brown Shale, extremely to moderately broken, soft to medium hard, 0% RQD	SS-8	Auger	NA	NA	NA
16			RC-1	NQ	NA	1.0/1.0	NA
18			RC-2	NQ	NA	4.0/4.0	NA
20							
22		Gray Shale, moderately broken, medium hard, 0% RQD	RC-3	NQ	NA	4.0/4.0	NA
24							

**Drilling Company:** Terra Testing

**Drill Rig:** D-50

**Drill Method:** HSA/NQ Core

**Hole Size:** 6"

**Ground Elevation:** 906.37

**Water Level:** No Water Encountered

**Drill Date:** 10/2/2012

**Sheet 1 of 1**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-15**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
0		Ground Surface					
0		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense  Auger refusal at 76'	SS-1	SS	20 50 over 2	0.6/0.6	0.0
2			SS-2	SS	10-25 16-17	2.0/2.0	0.0
4			SS-3	SS	32-24 12-11	2.0/2.0	0.0
6			SS-4	SS	15-17 17-20	1.0/2.0	0.0
8			SS-5	SS	8-12 12-20	1.0/2.0	0.0
10			SS-6	SS	50 over 0	0.0/0.0	0.0
12			SS-7	SS	17-16 15-13	1.0/2.0	0.0
14			SS-8	SS	12-13 13-16	1.7/2.0	0.0
16			SS-9	SS	8-9 8-7	2.0/2.0	0.0
18			SS-10	SS	8-5 6-7	2.0/2.0	0.0
20			SS-11	SS	8-9 10-23	1.0/2.0	0.0
22			SS-12	SS	50 over 4	0.4/0.4	0.0
24			SS-13	SS	50 over 5	0.5/0.5	0.0
26			SS-14	SS	8-12 13-14	0.9/2.0	0.0
28							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 836.11  
**Water Level:** No Water Encountered

**Drill Date:** 10/1-2/2012  
**Sheet 1 of 3**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-15**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID	
30			SS-15	SS	3-4 3-4	0.1/2.0	0.0	
32			SS-16	SS	4-4 7-3	0.1/2.0	0.0	
34		10		SS-17	SS	4-3 50 over 4	1.0/1.4	0.0
36				SS-18	SS	50 over 5	0.5/0.5	0.0
38				SS-19	SS	12-22 25-18	2.0/2.0	0.0
40		12		SS-20	SS	10-31 24-20	2.0/2.0	0.0
42				SS-21	SS	10-21 15-16	2.0/2.0	0.0
44				SS-22	SS	17-24 34-15	1.5/2.0	0.0
46		14		SS-23	SS	12-9 10-11	1.0/2.0	0.0
48				SS-24	SS	50 over 3	0.3/0.3	0.0
50				SS-25	SS	10-14 12-15	2.0/2.0	0.0
52		16		SS-26	SS	15-7 8-5	1.0/2.0	0.0
54				SS-27	SS	5-7 8-9	1.0/2.0	0.0
56				SS-28	SS	12-16 9-9	2.0/2.0	0.0

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 836.11  
**Water Level:** No Water Encountered

**Drill Date:** 10/1-2/2012  
**Sheet 2 of 3**



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Boring ID: SB-15**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID
58	19		SS-29	SS	9-10 6-5	1.0/2.0	0.0
60			SS-30	SS	12-10 7-6	2.0/2.0	0.0
62			SS-31	SS	1-2 1-2	0.0/0.0	0.0
64			SS-32	SS	3-3 6-7	2.0/2.0	0.0
66			SS-33	SS	6-21 22-15	2.0/2.0	0.0
68			SS-34	SS	5-5 5-5	1.7/2.0	0.0
70			SS-35	SS	1-1 7-10	1.0/2.0	0.0
72			SS-36	SS	6-5 6-3	2.0/2.0	0.0
74			SS-37	SS	2-7 7-6	1.7/2.0	0.0
76			SS-38	SS	10-23 42-15	2.0/2.0	0.0
78	23						
80							
82							
84	25						

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA

**Hole Size:** 6"  
**Ground Elevation:** 836.11  
**Water Level:** No Water Encountered

**Drill Date:** 10/1-2/2012  
**Sheet** 3 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-15A/MW-1**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details	
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID		
-3									
-1		Ground Surface							
1		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense							
3									
5									
7			2						
9									
11									
13			4						
15									
17									
19									
21			6		SS-1	Auger	NA	NA	NA
23									

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 842.73  
**Well Elevation:** 844.49

**Drill Date:** 10/4/2012  
**Sheet:** 1 of 5



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-15A/MW-1**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				Well Completion Details		
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery		PID/FID	
25									
27									
29		9							
31									
33									
35									
37		11							
39									
41				SS-2	SS	24-16 17-9	1.7/2.0		0.0
43		13							
45									
47				SS-3	Auger	NA	NA		NA
49									

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 842.73  
**Well Elevation:** 844.49

**Drill Date:** 10/4/2012  
**Sheet:** 2 of 5



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-15A/MW-1**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
51	16		SS-4	SS	10-10 14-16	0.0/2.0	0.0	
53								
55	18	Brown Silty Clay, mosit, medium stiff	SS-5	Auger	NA	NA	NA	
57								
59	20	Brown weathered Shale, dry	SS-6	SS	50 over 5	0.5/0.5	0.0	
61								
63	22	Brown Shale, dry						
65								
67								
69								
71								
73								
75								

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 842.73  
**Well Elevation:** 844.49

**Drill Date:** 10/4/2012  
**Sheet:** 3 of 5



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-15A/MW-1**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
77	24							
79								
81	26		AH-1	AH	NA	NA	NA	
83								
85								
87								
89	28	Red Shale, dry						
91								
93	30	Gray Shale, water @ 103'						
95								
97								
99								
101								

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 842.73  
**Well Elevation:** 844.49

**Drill Date:** 10/4/2012  
**Sheet:** 4 of 5



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-15A/MW-1**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE				Well Completion Details	
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery		PID/FID
103								<p>Sand Pack</p> <p>2" PVC Screen 0.010</p>
105	32							
107								
109								
111	34							
113								
115								
117	36							
119								
121								
123								
125	38							
127								

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 842.73  
**Well Elevation:** 844.49

**Drill Date:** 10/4/2012  
**Sheet:** 5 of 5



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-16/MW-2**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
-3								<p>The diagram shows a vertical well completion. On the left, a hatched area represents the bentonite seal. On the right, a vertical line represents the 2-inch PVC riser. The well casing is shown as a vertical tube extending from the ground surface down to the bottom of the well.</p>
-1		Ground Surface						
1		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense	SS-1	SS	3 50 over 1	0.6/0.6	0.0	
3			SS-2	SS	12-22 28-28	1.0/2.0	0.0	
5			SS-3	SS	14-20 18-19	2.0/2.0	0.0	
7	2		SS-4	SS	18-13 14-20	0.2/2.0	0.0	
9			SS-5	SS	14-16 20-28	1.5/2.0	0.0	
11			SS-6	SS	50 over 1	0.0/0.1	0.0	
13	4		SS-7	SS	14-18 19-18	1.5/2.0	0.0	
15			SS-8	SS	16-18 20-22	2.0/2.0	0.0	
17			SS-9	SS	1-8 10-9	1.0/2.0	0.0	
19	6		SS-10	SS	3-10 5-15	0.0/2.0	0.0	
21			SS-11	SS	8 50 over 1	0.4/0.6	0.0	
23			SS-12	SS	10-28 50 over 5	2.0/2.0	0.0	
<b>Drilling Company:</b> Terra Testing <b>Drill Rig:</b> D-50 <b>Drill Method:</b> HSA/AH			<b>Hole Size:</b> 8"/4" <b>Ground Elevation:</b> 869.73 <b>Well Elevation:</b> 872.03			<b>Drill Date:</b> 9/26-27/2012 <b>Sheet:</b> 1 of 3		



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-16/MW-2**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
25	9		SS-12		50 over 5			
27			SS-13	SS	50 over 2	0.2/0.2	0.0	
29			SS-14	SS	18-28 20-22	-28/20-	0.0	
31			SS-15	SS	30-38 28-19	-38/28-	0.0	
33			SS-16	SS	8-11 19-22	11/19-2	0.0	
35			SS-17	SS	27-27 29-22	-26/29-	0.0	
37			SS-18	SS	20-48 21-11	1.0/2.0	0.0	
39			SS-19	SS	7-6 6-6	1.0/2.0	0.0	
41			11	Red Silty Clay with shale fragments, mosit, medium stiff to stiff	SS-20	SS	2-5 5-4	1.0/2.0
43	SS-21	SS			5-10 15-10	1.5/2.0	0.0	
45	SS-22	SS			WOR	0.0/2.0	0.0	
47	13	2' Void (Possible old pipe)						
49		Red Silty Clay with shale fragments, mosit, medium stiff to stiff	SS-23	SS	10-16-42 50 over 4	1.9/1.9	0.0	
		Red weathered Shale, dry						
		Red Shale, dry						

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8"/4"  
**Ground Elevation:** 869.73  
**Well Elevation:** 872.03

**Drill Date:** 9/26-27/2012  
**Sheet:** 2 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-16/MW-2**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
51	16	Gray Shale, water at 57.5'	AH-1	AH	NA	NA	NA	<p>Sand Pack</p> <p>2' PVC Screen 0.010</p>
53								
55	18							
57								
59	20							
61								
63	22							
65								
67								
69								
71								
73								
75								

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 869.73  
**Well Elevation:** 872.03

**Drill Date:** 9/26-27/2012  
**Sheet:** 3 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-17/MW-3**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details	
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID		
-3								<p>Bentonite Seal</p> <p>2" PVC Riser</p>	
-1		Ground Surface							
1		Gray/Black Slag, mainly granular to coarse grained (<1") with some large cobbles and boulders and bricks, moist, medium dense to very dense	SS-1	SS	3-12-12 50 over 3	1.0/1.8	0.0		
3									
5				SS-2	SS	50 over 2	0.2/0.2		0.0
7									
9				SS-3	SS	50 over 4	0.4/0.4		0.0
11									
13									
15			SS-4	SS	22-28 29-23	0.4/2.0	0.0		
17									
19									
21			SS-5	SS	17-22-28 50 over 3	1.8/1.8	0.0		
23									

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 807.96  
**Well Elevation:** 809.46

**Drill Date:** 10/5/2012  
**Sheet:** 1 of 4



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-17/MW-3**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details	
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID		
25			SS-6	SS	9-10 12-23	2.0/2.0	0.0		
27									
29		9		SS-7	SS	49-10 10-38	2.0/2.0		0.0
31									
33									
35		11		SS-8	SS	3-7 2-4	2.0/2.0		0.0
37									
39				SS-9	SS	3-7 8-5	2.0/2.0		0.0
41									
43		13		SS-10	SS	10-14 13-19	2.0/2.0		0.0
45									
47									
49									

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 807.96  
**Well Elevation:** 809.46

**Drill Date:** 10/5/2012  
**Sheet:** 2 of 4



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-17/MW-3**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
51	16	Brown Silty Clay, moist, medium stiff to stiff	SS-11	SS	22-23 17-10	0.5/2.0	0.0	<p>Sand Pack</p> <p>2" PVC Screen 0.010</p>
53		Brown weathered Shale, dry						
55		Brown Shale, dry	SS-12	SS	50 over 3	0.3/0.3	0.0	
57								
59	18							
61								
63								
65	20							
67								
69			AH-1	SS	NA	NA	NA	
71	22	Red Shale, water at 75'						
73								
75								

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 807.96  
**Well Elevation:** 809.46

**Drill Date:** 10/5/2012  
**Sheet:** 3 of 4



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-17/MW-3**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
77	24	Gray Shale, wet						
79								
81								
83								
85	26							
87								
89								
91	28							
93								
95								
97								
99	30							
101								

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 807.96  
**Well Elevation:** 809.46

**Drill Date:** 10/5/2012  
**Sheet:** 4 of 4



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-18/MW-4**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
-3								<p>Bentonite Seal</p> <p>2" PVC Riser</p>
-1		Ground Surface						
1	[Diagonal Hatching]	Brown Silty Clay with shale fragments, moist, stiff to very stiff	SS-1	SS	3-12 15-16	2.0/2.0	0.0	
3	[Diagonal Hatching]		SS-2	SS	17-18 42-44	2.0/2.0	0.0	
5	[Diagonal Hatching]		SS-3	SS	10-16 20-26	2.0/2.0	0.0	
7	[Horizontal Hatching]	Brown weathered Shale, dry	SS-4	SS	24-30 50 over 3	1.3/1.3	0.0	
9	[Horizontal Hatching]	Brown Shale, dry						
11	[Horizontal Hatching]		SS-5	Auger	NA	NA	NA	
13	[Horizontal Hatching]							
15	[Horizontal Hatching]							
17	[Horizontal Hatching]							
19	[Horizontal Hatching]							
21	[Horizontal Hatching]							
<b>Drilling Company:</b> Terra Testing			<b>Hole Size:</b> 8" / 4"			<b>Drill Date:</b> 9/25/2012		
<b>Drill Rig:</b> D-50			<b>Ground Elevation:</b> 903.79			<b>Sheet:</b> 1 of 2		
<b>Drill Method:</b> HSA/AH			<b>Well Elevation:</b> 906.22					



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-18/MW-4**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Shannon Hill

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
23	[Symbol: Dotted pattern]	Gray Shale, water at 32'	AH-1	AH	NA	NA	NA	<p>Sand Pack</p> <p>2" PVC Screen 0.010</p>
25								
27								
29								
31								
33	10							
35								
37								
39	12							
41								
43								
45								
<b>Drilling Company:</b> Terra Testing			<b>Hole Size:</b> 8" / 4"			<b>Drill Date:</b> 9/25/2012		
<b>Drill Rig:</b> D-50			<b>Ground Elevation:</b> 903.79			<b>Sheet:</b> 2 of 2		
<b>Drill Method:</b> HSA/AH			<b>Well Elevation:</b> 906.22					



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-19/MW-5**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
-3								
-1		Ground Surface						
1		Topsoil						
1		Brown Silty Clay with shale fragments, moist, stiff to very stiff	SS-1	SS	1-1 11-10	2.0/2.0	0.0	
3			SS-2	SS	9-12 10-11	2.0/2.0	0.0	
5			SS-3	SS	9-12 14-18	2.0/2.0	0.0	
7	2		SS-4	SS	15-18 23-34	2.0/2.0	0.0	
9		Red weathered Shale, dry	SS-5	SS	32-36 50 over 2	1.2/1.2	0.0	
11		Red Shale, dry						
13	4							
15								
17		Brown/Gray Shale, dry						
19	6							
21								

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 919.79  
**Well Elevation:** 922.12

**Drill Date:** 10/3/2012  
**Sheet:** 1 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-19/MW-5**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details	
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID		
23	[Hatched Pattern]	Gray/Brown Shale, dry	AH-1	AH	NA	NA	NA	[Hatched Pattern]	[Hatched Pattern]
25									
27									
29									
31									
33									
35									
37									
39									
41									
43									
45									

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 919.79  
**Well Elevation:** 922.12

**Drill Date:** 10/3/2012  
**Sheet:** 2 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-19/MW-5**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details								
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID									
47	15							<p>Sand Pack</p> <p>2" PVC Screen 0.010</p>								
49																
51																
53																
55																
57									17	Black carbonaceous Shale, water at 58'						
59																
61									19	Gray Shale, wet						
63																
65																
67									21							
69																
<b>Drilling Company:</b> Terra Testing									<b>Hole Size:</b> 8" / 4"			<b>Drill Date:</b> 10/3/2012				
<b>Drill Rig:</b> D-50									<b>Ground Elevation:</b> 919.79			<b>Sheet:</b> 3 of 3				
<b>Drill Method:</b> HSA/AH									<b>Well Elevation:</b> 922.12							



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-20/MW-6**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
-3		Ground Surface						<p>Bentonite Seal</p> <p>2" PVC Riser</p>
1		Topsoil						
		Black Slag, moist, medium dense	SS-1	SS	2-20 10-11	2.0/2.0	0.0	
		Brown Silty Clay, moist, medium stiff						
3		Red Silty Clay, moist, stiff to very stiff	SS-2	SS	6-10 12-11	2.0/2.0	0.0	
5			SS-3	SS	11-10 14-17	2.0/2.0	0.0	
7	2	Red decomposed/weathered Shale, dry	SS-4	SS	13-15 15-13	2.0/2.0	0.0	
9		Red weathered Shale, dry	SS-5	SS	8-19 30-44	2.0/2.0	0.0	
11		Red Shale, dry						
13	4	Brown Shale, dry						
15								
17								
19	6							
21								
<b>Drilling Company:</b> Terra Testing			<b>Hole Size:</b> 8"4"			<b>Drill Date:</b> 10/4/2012		
<b>Drill Rig:</b> D-50			<b>Ground Elevation:</b> 920.28			<b>Sheet:</b> 1 of 3		
<b>Drill Method:</b> HSA/AH			<b>Well Elevation:</b> 922.26					



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-20/MW-6**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details	
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID		
23	8	Gray Shale, dry	AH-1	AH	NA	NA	NA		
25									
27									
29									
31									
33									10
35									
37									
39									12
41									
43									
45									

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8"¼"  
**Ground Elevation:** 920.28  
**Well Elevation:** 922.26

**Drill Date:** 10/4/2012  
**Sheet:** 2 of 3



**Tetra Tech, Inc.**  
661 Andersen Drive  
Pittsburgh, PA 15220

**Well ID: SB-20/MW-6**

**Project No.:** 112G03820

**Project:** Nine Mile Run - Phase III

**Client:** NSIDC

**Location:** Pittsburgh, PA

**Geologist:** Jon Aglio

**Project Manager:** Ray Orloski

SUBSURFACE PROFILE			SAMPLE					Well Completion Details
Depth	Symbol	Description	Sample ID	Sample Type	SPT Blow Counts	Recovery	PID/FID	
47	15							<p>Sand Pack</p> <p>2" PVC Screen 0.010</p>
49								
51								
53	17	Black carbonaceous Shale, water at 54'						
55		Gray Shale, wet						
57								
59								
61	19	Red Shale, wet						
63								
65								
67								
69	21							

**Drilling Company:** Terra Testing  
**Drill Rig:** D-50  
**Drill Method:** HSA/AH

**Hole Size:** 8" / 4"  
**Ground Elevation:** 920.28  
**Well Elevation:** 922.26

**Drill Date:** 10/4/2012  
**Sheet:** 3 of 3

**APPENDIX B**  
**SITE PHOTO LOG**



**Description: SB-1 Facing West**



**Description: SB-2 Facing North**



**Description: SB-3 Facing East**



**Description: SB-4 Facing West**



**Description: SB-5 Facing South**



**Description: SB-6 Facing East**



**Description: SB-7 Facing North**



**Description: SB-8 Facing Northeast**



**Description: SB-9/MW-7 Facing Southeast**



**Description: SB-10 Facing North**



**Description: SB-11 Facing Northeast**



**Description: SB-12 Facing North**



**Description: SB-13 Facing North**



**Description: SB-14 Facing Northwest**



**Description: SB-15 Facing West**



**Description: SB-15A/MW-1 Facing West**



**Description: SB-16/MW-2 Facing South**



**Description: SB-17/MW-3 Facing West**



**Description: SB-18/MW-4 Facing West**



**Description: SB-19/MW-5 Facing Southeast**



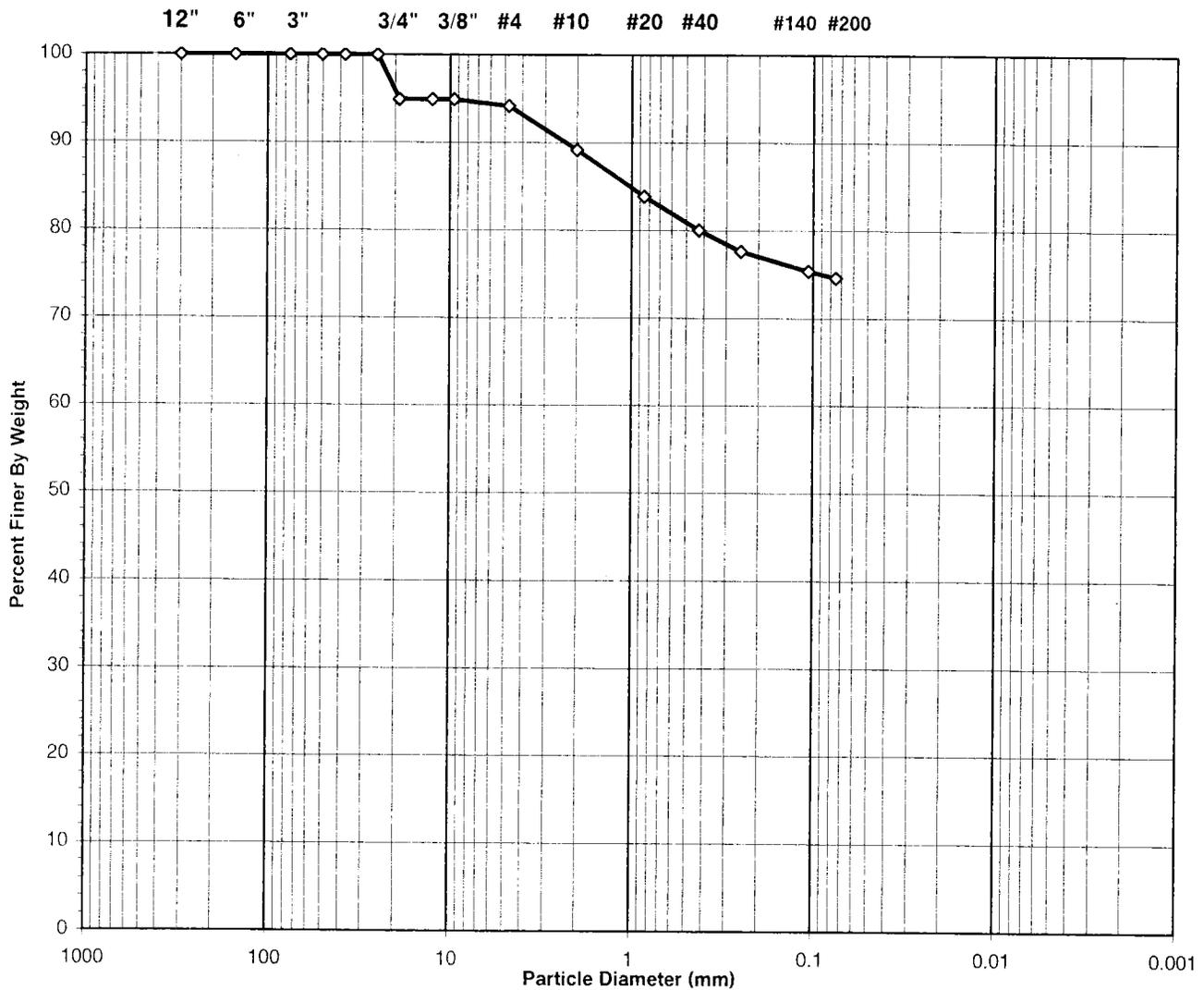
**Description: SB-20/MW-6 Facing  
Southwest**

**APPENDIX C**  
**GEOTECHNICAL LAB REPORTS**

**SIEVE ANALYSIS**  
ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-2
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-1
Lab ID	2012-528-01-05	Soil Color	<b>BROWN</b>

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



**USCS Symbol**      **CL, TESTED**

**USCS Classification**    **LEAN CLAY WITH SAND**

Tested By    BK      Date    11/15/12    Checked By    *BK*      Date    11-29-12

### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-2
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-1
Lab ID	2012-528-01-05	Soil Color	<b>BROWN</b>

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	1452	Tare No.	NA
Wgt. Tare + Wet Specimen (gm)	545.60	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	475.41	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	145.20	Weight of Tare (gm)	NA
Weight of Water (gm)	70.19	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	330.21	Weight of Dry Soil (gm)	NA
<b>Moisture Content (%)</b>	<b>21.3</b>	<b>Moisture Content (%)</b>	<b>NA</b>

Wet Weight - 3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	330.21
Dry Weight - 3/4" Sample (gm)	67.0	Weight of minus #200 material (gm)	246.46
Wet Weight + 3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	83.75
Dry Weight + 3/4" Sample (gm)	16.76		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	<b>100.00</b>
6"	150	0.00	0.00	0.00	100.00	<b>100.00</b>
3"	75	0.00	0.00	0.00	100.00	<b>100.00</b>
2"	50	0.00	0.00	0.00	100.00	<b>100.00</b>
1 1/2"	37.5	0.00	0.00	0.00	100.00	<b>100.00</b>
1"	25.0	0.00	0.00	0.00	100.00	<b>100.00</b>
3/4"	19.0	16.76	5.08	5.08	94.92	<b>94.92</b>
1/2"	12.50	0.00	0.00	5.08	94.92	<b>94.92</b>
3/8"	9.50	0.00	0.00	5.08	94.92	<b>94.92</b>
#4	4.75	2.42	0.73	5.81	94.19	<b>94.19</b>
#10	2.00	16.65	5.04	10.85	89.15	<b>89.15</b>
#20	0.850	17.51	5.30	16.15	83.85	<b>83.85</b>
#40	0.425	12.57	3.81	19.96	80.04	<b>80.04</b>
#60	0.250	7.99	2.42	22.38	77.62	<b>77.62</b>
#140	0.106	7.38	2.23	24.61	75.39	<b>75.39</b>
#200	0.075	2.47	0.75	25.36	74.64	<b>74.64</b>
Pan	-	246.46	74.64	100.00	-	-

Tested By **BK** Date **11/15/12** Checked By **KC** Date **11-29-12**

### ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89 (SOP - S4A)

Client	TETRA TECH	Boring No.	SB-2
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-1
Lab ID	2012-528-01-05	Soil Description	<b>BROWN LEAN CLAY</b>

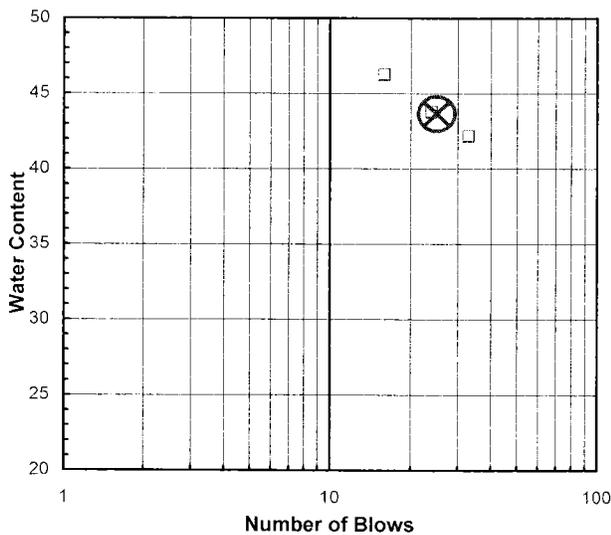
*Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.* (Minus No. 40 sieve material, Airdried)

Liquid Limit Test	1	2	3	M U L T I P O I N T
Tare Number	396	397	2289	
Wt. of Tare & WS (gm)	39.16	38.79	40.49	
Wt. of Tare & DS (gm)	32.37	32.19	34.54	
Wt. of Tare (gm)	17.68	17.11	20.43	
Wt. of Water (gm)	6.8	6.6	6.0	
Wt. of DS (gm)	14.7	15.1	14.1	
<b>Moisture Content (%)</b>	<b>46.2</b>	<b>43.8</b>	<b>42.2</b>	
<b>Number of Blows</b>	<b>16</b>	<b>24</b>	<b>33</b>	

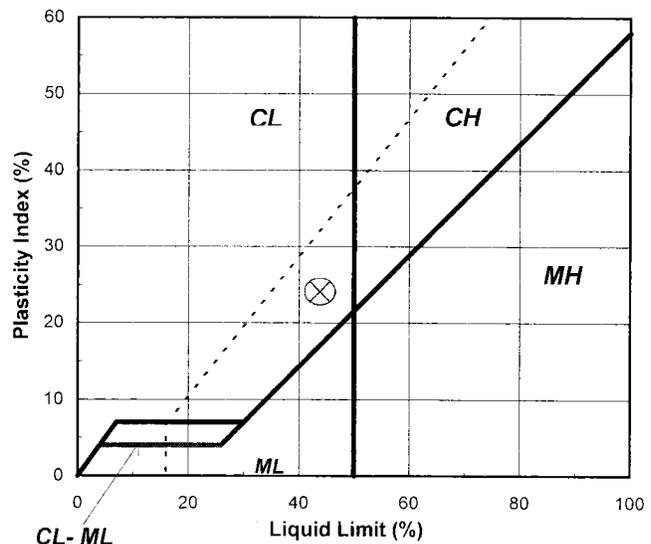
Plastic Limit Test	1	2	Range	Test Results
Tare Number	339	305		<b>Liquid Limit (%)</b> <b>44</b>
Wt. of Tare & WS (gm)	25.91	25.59		<b>Plastic Limit (%)</b> <b>20</b>
Wt. of Tare & DS (gm)	24.87	24.48		<b>Plasticity Index (%)</b> <b>24</b>
Wt. of Tare (gm)	19.64	19.13		<b>USCS Symbol</b> <b>CL</b>
Wt. of Water (gm)	1.0	1.1		
Wt. of DS (gm)	5.2	5.4		
<b>Moisture Content (%)</b>	<b>19.9</b>	<b>20.7</b>	<b>-0.9</b>	

*Note: The acceptable range of the two Moisture contents is  $\pm 2.6$*

Flow Curve



Plasticity Chart



Tested By BK      Date 11/19/12      Checked By KC      Date 11-29-12

page 1 of 1      DCN:      CT-S4B      DATE:      12/20/06      REVISION:      3



**MOISTURE-DENSITY RELATIONSHIP  
ONE POINT TEST**

*ASTM D698-07 or D1557-09 (Modified)*

Client	TETRA TECH	Boring No.	SB-2
Client Reference	Nine Mile Run Phase III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-1
Lab ID	2012-528-01-05	Test Type	STANDARD
Visual Description	BROWN CLAY		

**MOLD**

Mold ID No.	<b>G</b>	606
Weight of Mold (gm)		4172
Volume of Mold(cc)		943

**SPECIMEN**

Wt. of Mold & WS (gm)	6084
Wt. of Mold (gm)	4172
Wt. of WS	1912
Mold Volume (cc)	943

**MOISTURE/DENSITY**

Tare Number	1131A
Wt. of Tare & WS (gm)	335.74
Wt. of Tare & DS (gm)	291.98
Wt. of Tare (gm)	84.02
Wt. of Water (gm)	43.76
Wt. of DS (gm)	207.96
Wet Density (gm/cc)	2.03
Wet Density (pcf)	126.6
<b>Moisture Content (%)</b>	<b>21.0</b>
<b>Dry Density (pcf)</b>	<b>104.6</b>

Tested By PC Date 11/13/12 Checked By KC Date 11-14-12

**DIRECT SHEAR**  
ASTM D 3080-04 (SOP-S21)

Client	TETRA TECH NUS	Boring No.	SB-2
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-1
Lab ID	2012-528-01-05	Visual Description	BROWN CLAY (-#4MATERIAL)

**Sample Conditions:** REMOLDED, INUNDATED AND DOUBLE DRAINED

Maximum Shear Stress (psi)		Normal Stress (psi)
5.42	(1)	5
8.59	(2)	10
14.69	(3)	20

Overall Regression Analysis

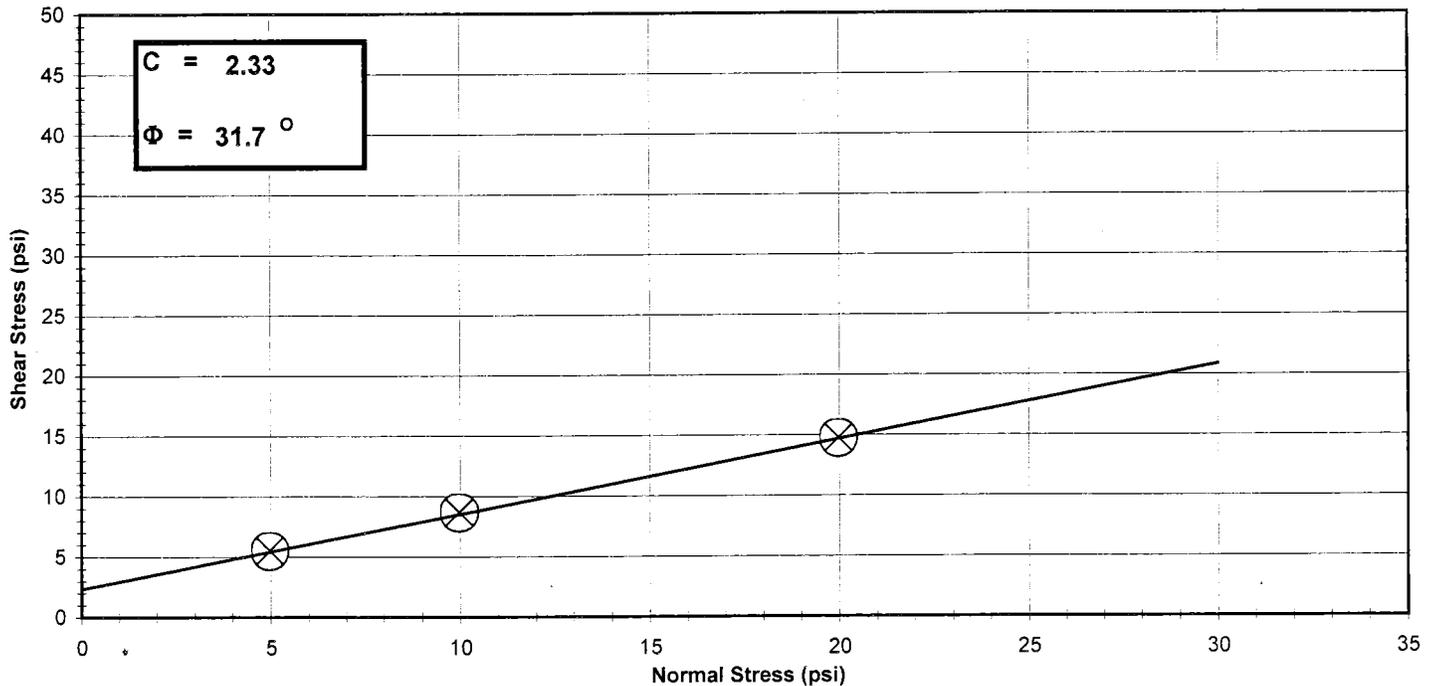
Slope = 0.62  
**C = 2.37**  
**Φ = 31.7 degrees**

Selected Points	Shear Stress (psi)	Normal Stress (psi)
1	5.42	5
3	14.69	20

Selected Points Regression

Slope = 0.62  
**C = 2.33**  
**Φ = 31.7 degrees**

**SHEAR STRESS vs. NORMAL STRESS**



Note: Graph not to scale

Tested By TM Date 11/21/12 Approved By RJG Date 11-21-12

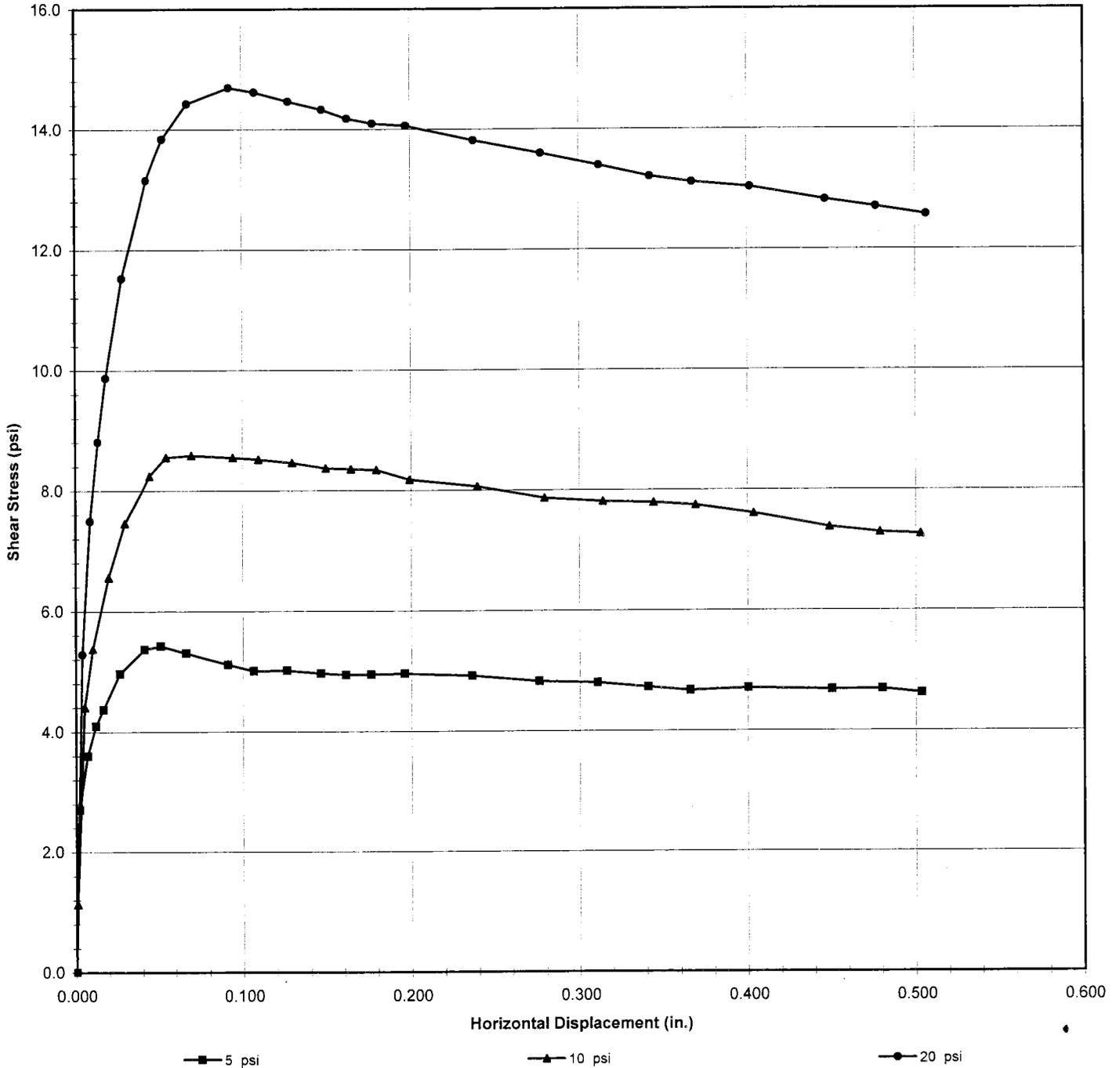
**DIRECT SHEAR**  
ASTM D 3080-04 (SOP-S21)



Client	TETRA TECH NUS	Boring No.	SB-2
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-1
Lab ID	2012-528-01-05	Visual Description	BROWN CLAY (-#4MATERIAL)

**Sample Conditions:** REMOLDED, INUNDATED AND DOUBLE DRAINED

**SHEAR STRESS vs. HORIZONTAL DISPLACEMENT**



Tested By TM Date 11/21/12 Approved By RJO Date 11-21-12

**DIRECT SHEAR**  
ASTM D 3080-04 (SOP-S21)



Client	TETRA TECH NUS	Boring No.	SB-2
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-1
Lab ID	2012-528-01-05	Visual Description	BROWN CLAY (-#4MATERIAL)

**Sample Conditions:** REMOLDED, INUNDATED AND DOUBLE DRAINED

<b>Machine ID #</b>	<b>G1092</b>	<b>SHEAR BOX DATA</b>	
Wt. of Wet Specimen & Ring(gm)	620.15	Specific Gravity (Assumed)	2.70
Weight of Ring (gm)	456.36	Volume of Solids(cc)	49.9
Weight of Wet Specimen (gm)	163.79	Initial Consolidation Dial Reading (in.)	0.0
Initial Specimen Height (in)	1	Final Consolidation Dial Reading (in.)	0.0059
Specimen Diameter (in)	2.5	Corrected Final Cons. Reading (in.)	0.0054
Wet Density (pcf)	127.1	Void Ratio Before Consolidation	0.613
<b>Dry Density (pcf)</b>	<b>104.5</b>	<b>Void Ratio After Consolidation</b>	<b>0.605</b>

<b>Moisture Content</b>	<u>Before Test</u>	<u>After Test</u>	<u>Testing Parameters</u>	
Tare ID	2538	2547	Normal Stress(psi)	<b>5</b>
Wt. Wet Soil & Tare (gm)	98.90	171.14	Strain Rate(in/min)	0.00144
Wt. Dry Soil & Tare (gm)	82.48	140.96	Machine Deflection (in.)	0.0004
Wt. Tare (gm)	6.71	6.61		
Wt. of Water (gm)	16.42	30.18		
Wt. of Dry Soil (gm)	75.77	134.35		
<b>Moisture Content (%)</b>	<b>21.7</b>	<b>22.5</b>		

Horizontal Displacement (in)	Shear Force (lbs)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr,(-)decr (in)	Shear To Normal Ratio
0.000	0.0	<b>0.00</b>	0.0000	0.0000	0.00
0.002	13.3	<b>2.70</b>	-0.0004	0.0004	0.54
0.007	17.7	<b>3.60</b>	-0.0003	0.0003	0.72
0.012	20.1	<b>4.09</b>	-0.0003	0.0003	0.82
0.016	21.4	<b>4.37</b>	-0.0004	0.0004	0.87
0.026	24.4	<b>4.97</b>	-0.0006	0.0006	0.99
0.041	26.3	<b>5.37</b>	-0.0008	0.0008	1.07
0.051	26.6	<b>5.42</b>	-0.0011	0.0011	1.08
0.066	26.0	<b>5.30</b>	-0.0014	0.0014	1.06
0.091	25.1	<b>5.12</b>	-0.0018	0.0018	1.02
0.106	24.6	<b>5.01</b>	-0.0020	0.0020	1.00
0.126	24.6	<b>5.02</b>	-0.0022	0.0022	1.00
0.146	24.4	<b>4.96</b>	-0.0024	0.0024	0.99
0.161	24.3	<b>4.94</b>	-0.0026	0.0026	0.99
0.176	24.3	<b>4.94</b>	-0.0027	0.0027	0.99
0.196	24.3	<b>4.96</b>	-0.0028	0.0028	0.99
0.236	24.1	<b>4.92</b>	-0.0032	0.0032	0.98
0.276	23.7	<b>4.83</b>	-0.0035	0.0035	0.97
0.310	23.6	<b>4.80</b>	-0.0037	0.0037	0.96
0.341	23.2	<b>4.72</b>	-0.0039	0.0039	0.94
0.366	22.9	<b>4.67</b>	-0.0042	0.0042	0.93
0.400	23.1	<b>4.70</b>	-0.0042	0.0042	0.94
0.450	23.0	<b>4.68</b>	-0.0044	0.0044	0.94
0.480	23.0	<b>4.69</b>	-0.0046	0.0046	0.94
0.503	22.7	<b>4.62</b>	-0.0047	0.0047	0.92

Tested By TM Date 11/19/12 Input Checked By GU Date 11-21-12

**DIRECT SHEAR**  
ASTM D 3080-04 (SOP-S21)

Client	TETRA TECH NUS	Boring No.	SB-2
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-1
Lab ID	2012-528-01-05	Visual Description	BROWN CLAY (-#4MATERIAL)

**Sample Conditions:** REMOLDED, INUNDATED AND DOUBLE DRAINED

<b>Machine ID #</b>	<b>G1092</b>	<b>SHEAR BOX DATA</b>	
Wt. of Wet Specimen & Ring (gm)	620.19	Specific Gravity (Assumed)	2.70
Weight of Ring (gm)	456.37	Volume of Solids(cc)	49.9
Weight of Wet Specimen (gm)	163.82	Initial Consolidation Dial Reading (in.)	0.0
Initial Specimen Height (in)	1	Final Consolidation Dial Reading (in.)	0.0108
Specimen Diameter (in)	2.5	Corrected Final Cons. Reading (in.)	0.0101
Wet Density (pcf)	127.1	Void Ratio Before Consolidation	0.611
<b>Dry Density (pcf)</b>	<b>104.6</b>	<b>Void Ratio After Consolidation</b>	<b>0.595</b>

<b>Moisture Content</b>	<u>Before Test</u>	<u>After Test</u>	<u>Testing Parameters</u>	
Tare ID	72	2600	Normal Stress(psi)	<b>10</b>
Wt. Wet Soil & Tare (gm)	73.26	170.40	Strain Rate(in/min)	0.00144
Wt. Dry Soil & Tare (gm)	61.48	141.11	Machine Deflection (in.)	0.0007
Wt. Tare (gm)	6.78	6.63		
Wt. of Water (gm)	11.78	29.29		
Wt. of Dry Soil (gm)	54.7	134.48		
<b>Moisture Content (%)</b>	<b>21.5</b>	<b>21.8</b>		

Horizontal Displacement (in)	Shear Force (lbs)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr,(-)decr (in)	Shear To Normal Ratio
0.000	0.0	<b>0.00</b>	0.0000	0.0000	0.00
0.001	5.5	<b>1.13</b>	0.0000	0.0000	0.11
0.005	21.6	<b>4.40</b>	0.0006	-0.0006	0.44
0.010	26.4	<b>5.37</b>	0.0012	-0.0012	0.54
0.020	32.2	<b>6.56</b>	0.0017	-0.0017	0.66
0.030	36.6	<b>7.46</b>	0.0019	-0.0019	0.75
0.045	40.4	<b>8.24</b>	0.0019	-0.0019	0.82
0.054	42.0	<b>8.55</b>	0.0019	-0.0019	0.86
0.070	42.1	<b>8.59</b>	0.0018	-0.0018	0.86
0.094	42.0	<b>8.55</b>	0.0017	-0.0017	0.85
0.110	41.8	<b>8.52</b>	0.0016	-0.0016	0.85
0.130	41.5	<b>8.46</b>	0.0014	-0.0014	0.85
0.149	41.1	<b>8.37</b>	0.0012	-0.0012	0.84
0.164	41.0	<b>8.36</b>	0.0011	-0.0011	0.84
0.179	40.9	<b>8.34</b>	0.0009	-0.0009	0.83
0.199	40.2	<b>8.18</b>	0.0004	-0.0004	0.82
0.239	39.6	<b>8.06</b>	0.0000	0.0000	0.81
0.279	38.6	<b>7.87</b>	-0.0003	0.0003	0.79
0.314	38.3	<b>7.81</b>	-0.0005	0.0005	0.78
0.344	38.2	<b>7.79</b>	-0.0007	0.0007	0.78
0.369	38.0	<b>7.74</b>	-0.0008	0.0008	0.77
0.404	37.3	<b>7.61</b>	-0.0009	0.0009	0.76
0.449	36.2	<b>7.38</b>	-0.0013	0.0013	0.74
0.479	35.8	<b>7.29</b>	-0.0010	0.0010	0.73
0.503	35.6	<b>7.26</b>	-0.0010	0.0010	0.73

Tested By TM Date 11/20/12 Input Checked By GU Date 11-21-12

**DIRECT SHEAR**  
ASTM D 3080-04 (SOP-S21)

Client	TETRA TECH NUS	Boring No.	SB-2
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-1
Lab ID	2012-528-01-05	Visual Description	BROWN CLAY (-#4MATERIAL)

Sample Conditions: REMOLDED, INUNDATED AND DOUBLE DRAINED

<b>Machine ID #</b>	<b>G1092</b>	<b>SHEAR BOX DATA</b>	
Wt. of Wet Specimen & Ring(gm)	620.22	Specific Gravity (Assumed)	2.70
Weight of Ring (gm)	456.45	Volume of Solids(cc)	49.8
Weight of Wet Specimen (gm)	163.77	Initial Consolidation Dial Reading (in.)	0.0
Initial Specimen Height (in)	1	Final Consolidation Dial Reading (in.)	0.0256
Specimen Diameter (in)	2.5	Corrected Final Cons. Reading (in.)	0.0244
Wet Density (pcf)	127.1	Void Ratio Before Consolidation	0.615
<b>Dry Density (pcf)</b>	<b>104.4</b>	<b>Void Ratio After Consolidation</b>	<b>0.575</b>

<b>Moisture Content</b>	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	2525	2551	Normal Stress(psi)	<b>20</b>
Wt. Wet Soil & Tare (gm)	86.49	169.61	Strain Rate(in/min)	0.00144
Wt. Dry Soil & Tare (gm)	72.54	140.87	Machine Deflection (in.)	0.0012
Wt. Tare (gm)	8.38	6.55		
Wt. of Water (gm)	13.95	28.74		
Wt. of Dry Soil (gm)	64.16	134.32		
<b>Moisture Content (%)</b>	<b>21.7</b>	<b>21.4</b>		

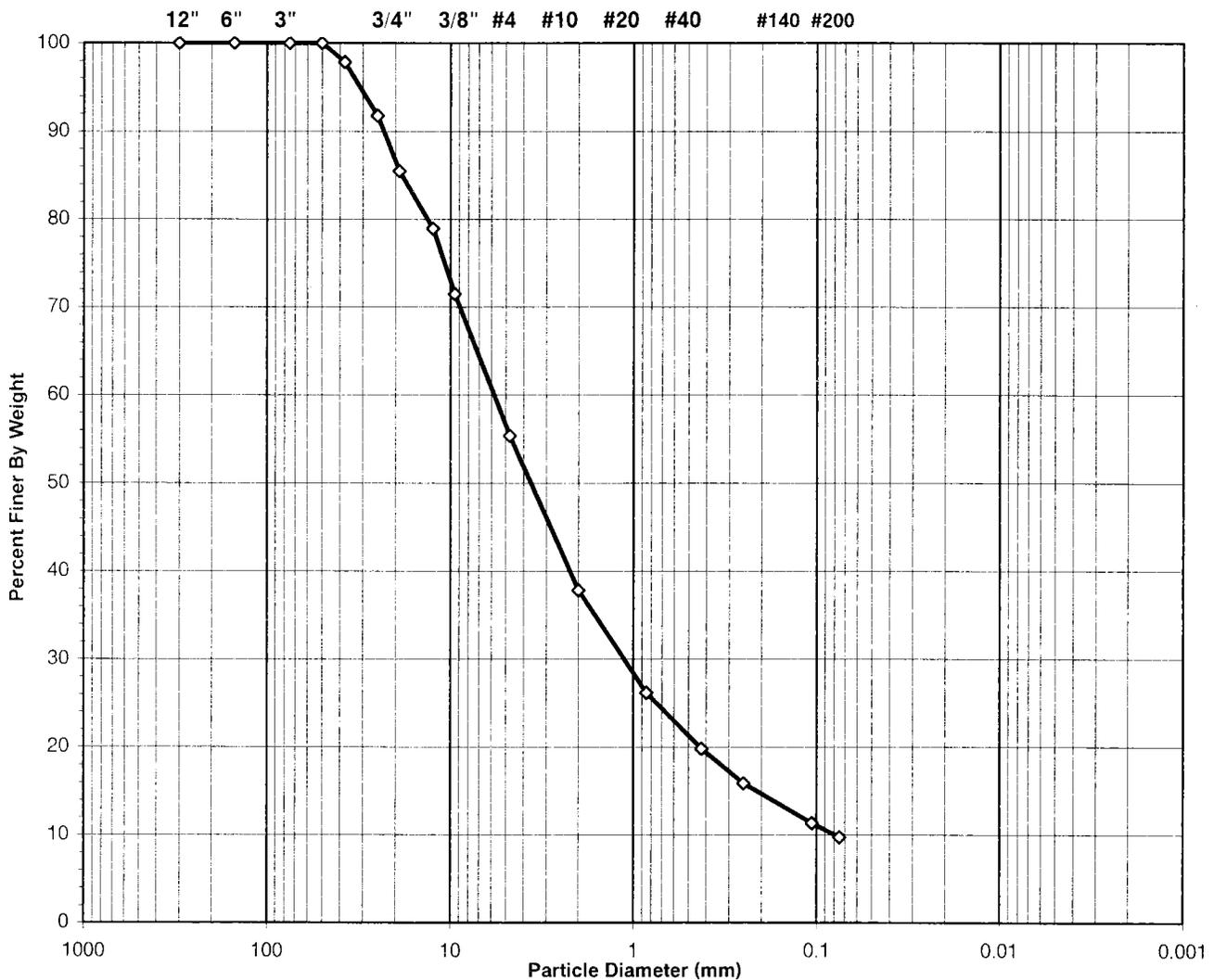
Horizontal Displacement (in)	Shear Force (lbs)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr,(-)decr (in)	Shear To Normal Ratio
0.000	0.0	<b>0.00</b>	0.0000	0.0000	0.00
0.004	25.9	<b>5.28</b>	0.0005	-0.0005	0.26
0.009	36.8	<b>7.49</b>	0.0013	-0.0013	0.37
0.013	43.2	<b>8.81</b>	0.0022	-0.0022	0.44
0.018	48.5	<b>9.87</b>	0.0028	-0.0028	0.49
0.028	56.6	<b>11.52</b>	0.0029	-0.0029	0.58
0.043	64.6	<b>13.15</b>	0.0029	-0.0029	0.66
0.053	67.9	<b>13.84</b>	0.0026	-0.0026	0.69
0.068	70.8	<b>14.43</b>	0.0024	-0.0024	0.72
0.093	72.1	<b>14.69</b>	0.0015	-0.0015	0.73
0.108	71.8	<b>14.62</b>	0.0010	-0.0010	0.73
0.128	71.0	<b>14.46</b>	0.0008	-0.0008	0.72
0.148	70.3	<b>14.33</b>	0.0008	-0.0008	0.72
0.163	69.6	<b>14.18</b>	0.0004	-0.0004	0.71
0.178	69.2	<b>14.10</b>	-0.0001	0.0001	0.70
0.197	69.0	<b>14.06</b>	-0.0002	0.0002	0.70
0.238	67.8	<b>13.81</b>	-0.0013	0.0013	0.69
0.277	66.7	<b>13.60</b>	-0.0020	0.0020	0.68
0.312	65.8	<b>13.40</b>	-0.0026	0.0026	0.67
0.342	64.9	<b>13.21</b>	-0.0029	0.0029	0.66
0.367	64.4	<b>13.11</b>	-0.0031	0.0031	0.66
0.402	64.0	<b>13.03</b>	-0.0032	0.0032	0.65
0.447	62.9	<b>12.82</b>	-0.0035	0.0035	0.64
0.477	62.3	<b>12.70</b>	-0.0037	0.0037	0.64
0.507	61.7	<b>12.57</b>	-0.0051	0.0051	0.63

Tested By *TM* Date *11/16/12* Input Checked By *GU* Date *11-21-12*

**SIEVE ANALYSIS**  
ASTM D 422-63 (2007)/AASHTO T88-00 SOP-S3

Client	TETRA TECH	Boring No.	SB-6
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-04	Soil Color	<b>DARK BROWN</b>

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



<b>USCS Symbol</b>	<b>SW-SM, TESTED</b>	<b>D60 =</b>	<b>5.79</b>	<b>CC =</b>	<b>2.75</b>
	<b>(NON-PLASTIC FINES)</b>				
<b>USCS Classification</b>	<b>WELL-GRADED SAND WITH SILT AND GRAVEL</b>	<b>D30 =</b>	<b>1.13</b>	<b>CU =</b>	<b>72.86</b>
		<b>D10 =</b>	<b>0.08</b>		

Tested By **BK** Date **11/15/12** Checked By **KC** Date **11-29-12**

### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)/AASHTO T88-00 SOP-S3

Client	TETRA TECH	Boring No.	SB-6
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-04	Soil Color	<b>DARK BROWN</b>

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	16	Tare No.	579
Wgt. Tare + Wet Specimen (gm)	1588.70	Wgt. Tare + Wet Specimen (gm)	607.90
Wgt. Tare + Dry Specimen (gm)	1411.21	Wgt. Tare + Dry Specimen (gm)	581.06
Weight of Tare (gm)	201.01	Weight of Tare (gm)	83.19
Weight of Water (gm)	177.49	Weight of Water (gm)	26.84
Weight of Dry Soil (gm)	1210.20	Weight of Dry Soil (gm)	497.87
<b>Moisture Content (%)</b>	<b>14.7</b>	<b>Moisture Content (%)</b>	<b>5.4</b>

Wet Weight -3/4" Sample (gm)	25234	Weight of the Dry Specimen (gm)	1210.20
Dry Weight - 3/4" Sample (gm)	22006.5	Weight of minus #200 material (gm)	137.76
Wet Weight +3/4" Sample (gm)	3941.00	Weight of plus #200 material (gm)	1072.44
Dry Weight + 3/4" Sample (gm)	3739.41		
Total Dry Weight Sample (gm)	25745.9	<b>J - Factor (Percent Finer than 3/4")</b>	<b>0.8548</b>

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	<b>100.00</b>
6"	150	0.00	0.00	0.00	100.00	<b>100.00</b>
3"	75	0.00	0.00	0.00	100.00	<b>100.00</b>
2"	50	0.00 (*)	0.00	0.00	100.00	<b>100.00</b>
1 1/2"	37.5	591.00	2.18	2.18	97.82	<b>97.82</b>
1"	25	1645.00	6.06	8.24	91.76	<b>91.76</b>
3/4"	19	1705.00	6.28	14.52	85.48	<b>85.48</b>
1/2"	12.5	92.73	7.66	7.66	92.34	<b>78.93</b>
3/8"	9.5	105.06	8.68	16.34	83.66	<b>71.51</b>
#4	4.75	228.41	18.87	35.22	64.78	<b>55.37</b>
#10	2	248.62	20.54	55.76	44.24	<b>37.81</b>
#20	0.85	164.94 (**)	13.63	69.39	30.61	<b>26.16</b>
#40	0.425	90.23	7.46	76.85	23.15	<b>19.79</b>
#60	0.25	55.51	4.59	81.43	18.57	<b>15.87</b>
#140	0.106	64.41	5.32	86.76	13.24	<b>11.32</b>
#200	0.075	22.53	1.86	88.62	11.38	<b>9.73</b>
Pan	-	137.76	11.38	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
 (\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Specimen

Tested By BK Date 11/15/12 Checked By *KC* Date 11-29-12

**ATTERBERG LIMIT**  
ASTM D 4318-00 (SOP - S4)

Client	TETRA TECH	Boring No.	SB-6
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-04	Visual	<b>DARK BROWN SILT</b> ( Minus No. 40 sieve material, Airdried)

**NON - PLASTIC  
MATERIAL**

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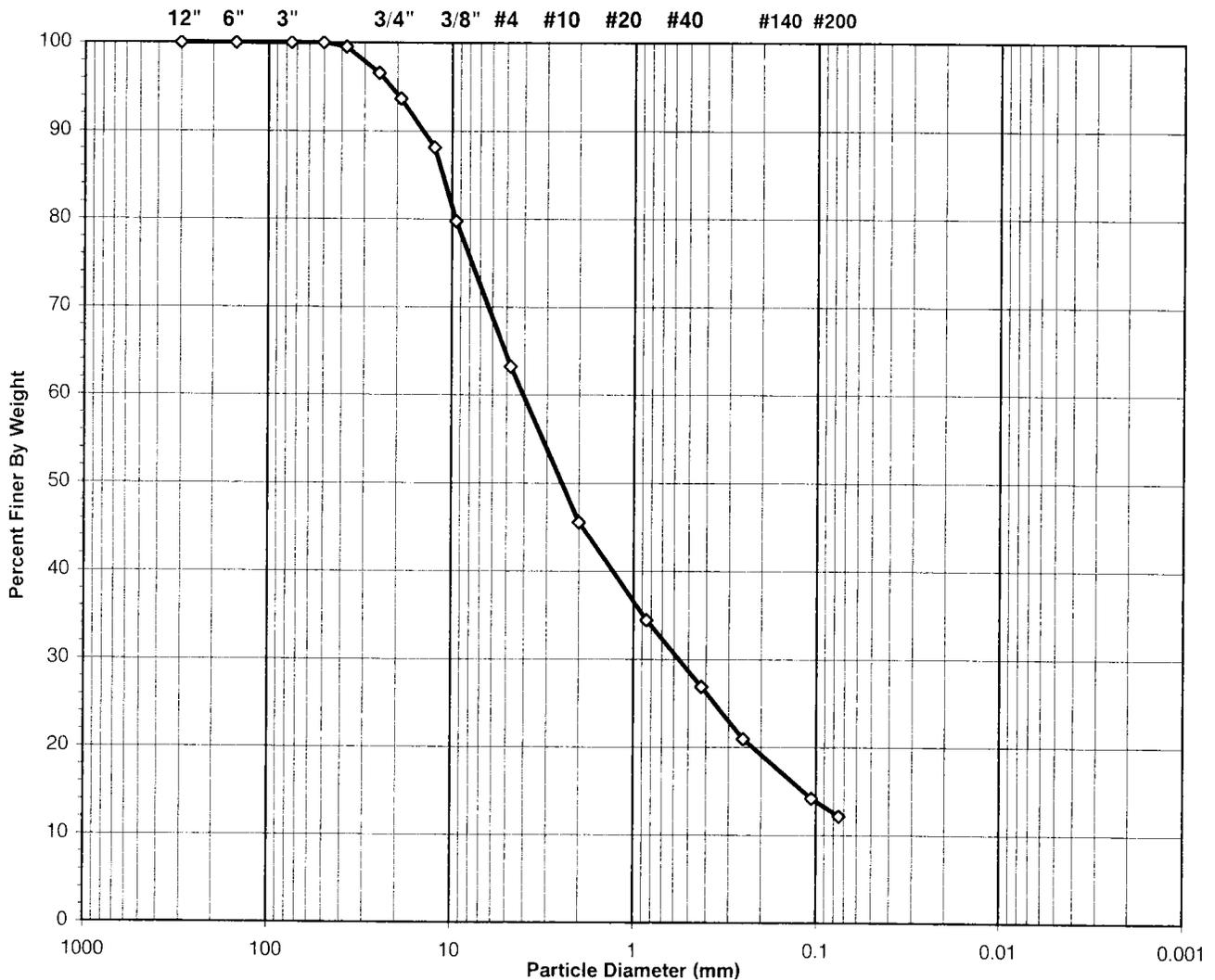
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page 1 of 1 DCN: CT-S4C DATE: 7-11-97 REVISION : 2 C:\Users\Geojack\Documents\PRINT Q (LOCAL)\[A868.XLS]Sheet1

**SIEVE ANALYSIS**  
ASTM D 422-63 (2007)/AASHTO T88-00 SOP-S3

Client	TETRA TECH	Boring No.	SB-7
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-03	Soil Color	<b>DARK BROWN</b>

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



**USCS Symbol** *SM, TESTED*  
*(NON-PLASTIC FINES)*  
**USCS Classification** *SILTY SAND WITH GRAVEL*

Tested By BK Date 11/15/12 Checked By KC Date 11-29-12

### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)/AASHTO T88-00 SOP-S3

Client	TETRA TECH	Boring No.	SB-7
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-03	Soil Color	<b>DARK BROWN</b>

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	516	Tare No.	872
Wgt. Tare + Wet Specimen (gm)	1276.40	Wgt. Tare + Wet Specimen (gm)	461.00
Wgt. Tare + Dry Specimen (gm)	1178.89	Wgt. Tare + Dry Specimen (gm)	452.44
Weight of Tare (gm)	92.52	Weight of Tare (gm)	110.56
Weight of Water (gm)	97.51	Weight of Water (gm)	8.56
Weight of Dry Soil (gm)	1086.37	Weight of Dry Soil (gm)	341.88
<b>Moisture Content (%)</b>	<b>9.0</b>	<b>Moisture Content (%)</b>	<b>2.5</b>

Wet Weight -3/4" Sample (gm)	23922	Weight of the Dry Specimen (gm)	1086.37
Dry Weight - 3/4" Sample (gm)	21951.7	Weight of minus #200 material (gm)	141.25
Wet Weight +3/4" Sample (gm)	1517.00	Weight of plus #200 material (gm)	945.12
Dry Weight + 3/4" Sample (gm)	1479.95		
Total Dry Weight Sample (gm)	23431.6	<b>J - Factor (Percent Finer than 3/4")</b>	<b>0.9368</b>

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	<b>100.00</b>
6"	150	0.00	0.00	0.00	100.00	<b>100.00</b>
3"	75	0.00	0.00	0.00	100.00	<b>100.00</b>
2"	50	0.00	(*)	0.00	100.00	<b>100.00</b>
1 1/2"	37.5	111.00	0.46	0.46	99.54	<b>99.54</b>
1"	25	711.00	2.96	3.42	96.58	<b>96.58</b>
3/4"	19	695.00	2.89	6.32	93.68	<b>93.68</b>
1/2"	12.5	64.34	5.92	5.92	94.08	<b>88.14</b>
3/8"	9.5	96.93	8.92	14.84	85.16	<b>79.78</b>
#4	4.75	191.94	17.67	32.51	67.49	<b>63.22</b>
#10	2	205.11	18.88	51.39	48.61	<b>45.54</b>
#20	0.85	128.42	(**)	63.21	36.79	<b>34.46</b>
#40	0.425	87.97	8.10	71.31	28.69	<b>26.88</b>
#60	0.25	68.69	6.32	77.63	22.37	<b>20.95</b>
#140	0.106	78.60	7.24	84.87	15.13	<b>14.17</b>
#200	0.075	23.12	2.13	87.00	13.00	<b>12.18</b>
Pan	-	141.25	13.00	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Specimen

Tested By BK Date 11/15/12 Checked By *KC* Date 11-29-12



**ATTERBERG LIMIT**  
ASTM D 4318-00 (SOP - S4)

Client	TETRA TECH	Boring No.	SB-7
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-03	Visual	<b>DARK BROWN SILT</b> ( Minus No. 40 sieve material, Airdried)

**NON - PLASTIC  
MATERIAL**

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Tested By TO Date 11/21/12 Checked By KC Date 11-29-12  
page 1 of 1 DCN: CT-S4C DATE: 7-11-97 REVISION: 2 C:\Users\Geojack\Documents\PRINT Q (LOCAL)\A867.XLS\Sheet1

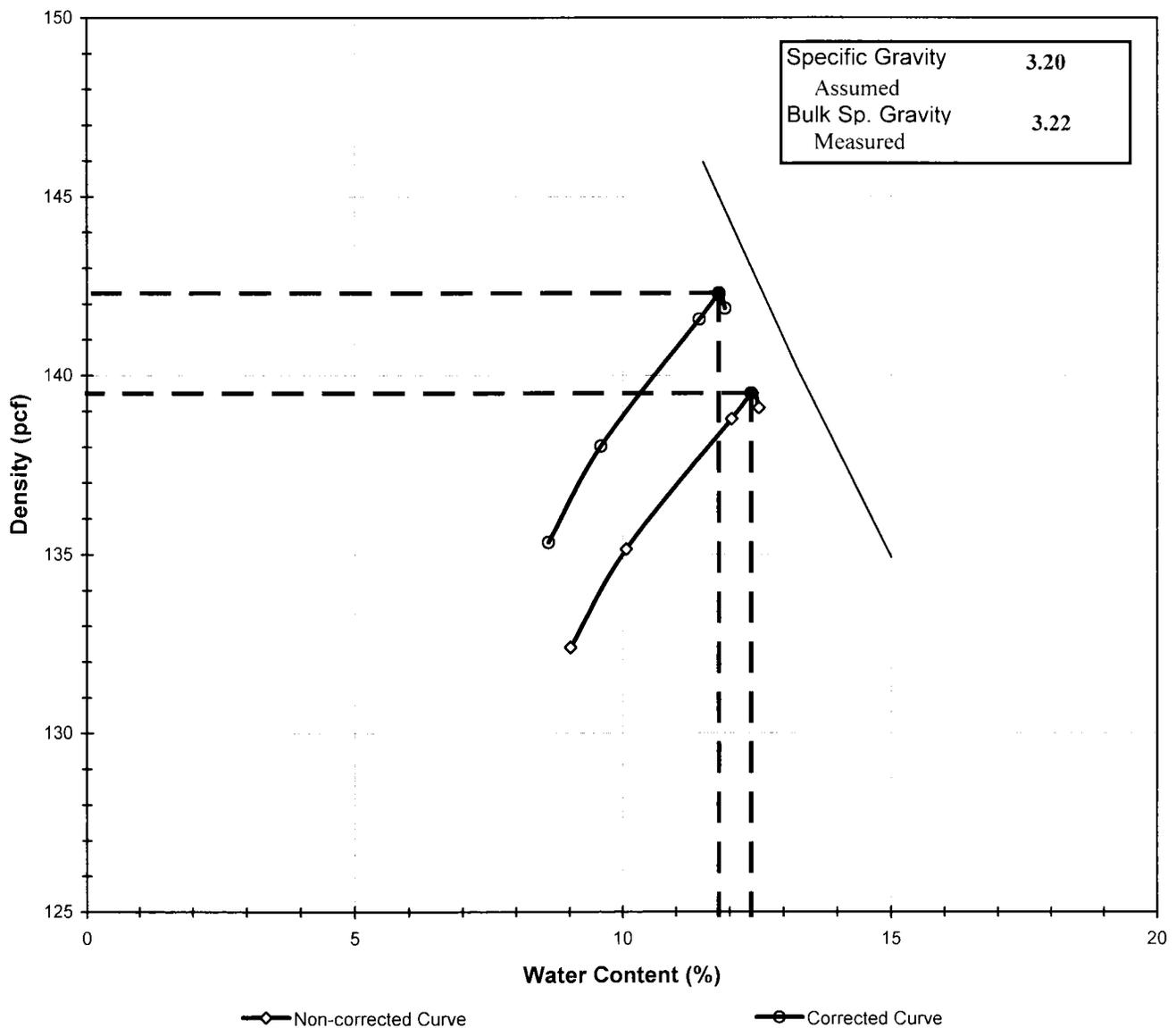
**MOISTURE - DENSITY RELATIONSHIP  
(Corrected for Oversize Particles)**

ASTM D 4718, D 698-91 (SOP-S12,S39)

Client	TETRA TECH	Boring No.	SB-7
Client Reference	NINE MILE RUN PHASE III C112G03820	Depth (ft)	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-03	Test Method	STANDARD

Visual Description      DARK BROWN CLAYEY SAND WITH ROCK FRAGMENTS

<b>Optimum Water Content</b>	<b>12.4</b>	<b>Corrected Water Content</b>	<b>11.8</b>
<b>Maximum Dry Density</b>	<b>139.5</b>	<b>Corrected Dry Density</b>	<b>142.3</b>



Tested By MF      Date 11/19/12      Checked By XC      Date 11-20-12

**MOISTURE - DENSITY RELATIONSHIP**  
**(Corrected for Oversize Particles)**

ASTM D 4718, D 698-91 (SOP-S12, S39)

Client	TETRA TECH	Boring No.	SB-7
Client Reference	NINE MILE RUN PHASE III C112G03820	Depth (ft)	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-03		

Visual Description      DARK BROWN CLAYEY SAND WITH ROCK FRAGMENTS

Total Weight of the Sample (gm)	25439
As Received Water Content(%)	NA
Assumed Specific Gravity(gm/cc)	3.20

TestType	STANDARD	
Rammer Weight (lbs)	5.5	
Rammer Drop (in)	12	
Rammer Type	Mechanical	
Machine ID	G	441
Mold ID	G	1390
Mold diameter	6"	
Weight of the Mold	6461	
Volume Of the Mold	2139	

Percent Retained on 3/4" (Dry)	6.30
Percent Retained on 3/8" (Dry)	NA
Percent Retained on #4 (Dry)	NA
Oversize Material	Not included
Procedure Used	C

**Mold/Specimen**

Point No.	1	2	3	4	5
Wt. of Mold & WS (gm)	11409	11560	11791	11837	11827
Wt. of Mold (gm)	6461	6461	6461	6461	6461
Wt. of WS	4948	5099	5330	5376	5366
Mold Volume (cc)	2139	2139	2139	2139	2139

**Moisture Content/Density**

Tare Number	579	590	1122	878	581
Wt. of Tare & WS (gm)	456.80	517.20	470.50	559.20	660.30
Wt. of Tare & DS (gm)	425.90	477.40	429.00	509.60	596.00
Wt. of Tare (gm)	83.18	82.01	84.26	110.43	83.39
Wt. of Water (gm)	30.90	39.80	41.50	49.60	64.30
Wt. of DS (gm)	342.72	395.39	344.74	399.17	512.61

Wet Density (gm/cc)	2.31	2.38	2.49	2.51	2.51
Wet Density (pcf)	144.3	148.8	155.5	156.8	156.5
<b>Moisture Content (%)</b>	<b>9.0</b>	<b>10.1</b>	<b>12.0</b>	<b>12.4</b>	<b>12.5</b>
<b>Dry Density (pcf)</b>	<b>132.4</b>	<b>135.1</b>	<b>138.8</b>	<b>139.5</b>	<b>139.1</b>

**Zero Air Voids**

<b>Moisture Content (%)</b>	11.5	13.2	15.0
<b>Dry Unit Weight (pcf)</b>	146.0	140.3	134.9

**Calculated Oversize Corrected Moisture & Density**

<b>Moisture Content (%)</b>	<b>8.6</b>	<b>9.6</b>	<b>11.4</b>	<b>11.8</b>	<b>11.9</b>
<b>Dry Density (pcf)</b>	<b>135.3</b>	<b>138.0</b>	<b>141.6</b>	<b>142.3</b>	<b>141.9</b>

Tested By    MF      Date    11/19/12    Checked By    KC      Date    11-26-12

**Correction of Unit Weight and Water Content for Soils Containing Oversize Particles  
by Specific Gravity**  
ASTM D4718-87

Client	TETRA TECH	Boring No.	SB-7
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-03		

Visual Description: DARK BROWN CLAYEY SAND WITH ROCK FRAGMENTS

Total dry weight of sample 23431.6

COARSE PORTION		FINE PORTION	
Total wet wt. of +3/4" portion	1517.0 (gm)	Total wet wt. of -3/4" portion	23922.0
Total dry wt. of +3/4" portion	1479.95 (gm)	Total dry wt. of -3/4" portion	21951.67
% +3/4" by dry weight	6.3	% -3/4" by dry weight	93.68

MOISTURE CONTENT OF +3/4" PORTION

Tare Number	872
Wt. of Tare & WS (gm)	461.00
Wt. of Tare & DS (gm)	452.44
Wt. of Tare (gm)	110.56
Wt. of Water (gm)	8.56
Wt. of DS (gm)	341.88

MOISTURE CONTENT OF -3/4" PORTION

Tare Number	516
Wt. of Tare & WS (gm)	1276.40
Wt. of Tare & DS (gm)	1178.89
Wt. of Tare (gm)	92.52
Wt. of Water (gm)	97.51
Wt. of DS (gm)	1086.37

<b>Water Content (%)</b>	2.50	8.98
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**SPECIFIC GRAVITY DETERMINATION**

Weight of Basket in Air (gm)	1033
Weight of Saturated Surface Dried Sample + Basket in Air (gm)	2126
Weight of Saturated Surface Dried Sample in Air (gm)	1093
Weight of Basket in Water (gm)	895
Weight of Saturated Sample + Basket in Water (gm)	1655
Weight of Saturated Sample in Water (gm)	760
Tare No.	708
Weight of Tare and Dried Sample (gm)	1171.7
Weight of Tare (gm)	98.19
Weight of Dried Soil (gm)	1073.5

**Bulk Specific Gravity( +3/4" ) 3.22**

Tested By JP Date 11/14/12 Checked By KC Date 11-16-12

DCN: DS-S33  
 DATE: 11/14/96  
 REVISION: 1

**ONE DIMENSIONAL SWELL**  
 PTM 130

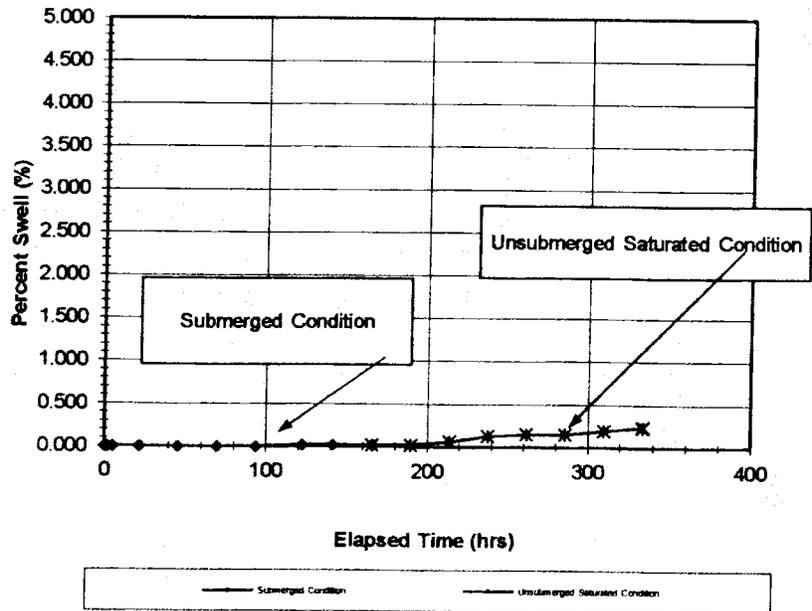
Client	TETRA TECH NUS, INC,	Boring No.	SB-7
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth	0-10
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-03	Visual Description	DARK BROWN CLAYEY SAND WITH ROCK FRAGMENTS

Dial Reading (div)	Percent Swell (%)	Elapsed Time (hrs)	Test Type Surcharge (lbs)	STD 10	S. Height 1 div (in)	4.58
280	0.00	0				0.001
280	0.00	0.1				
280	0.00	0.3				
280	0.00	0.5				
280	0.00	2.0				
280	0.00	5.0				
280	0.00	21.5				
280	0.00	45.5				
280	0.00	69.5				
280	0.00	93.5				
281	0.02	122.5				
281	0.02	141.5				
281	0.02	165.5 (*)				
281	0.02	189.5				
283	0.07	213.5				
286	0.13	237.5				
287	0.15	261.5				
287	0.15	285.5				
289	0.20	309.5				
291	0.24	333.5				

	Initial	Final
Wt. of Mold & WS (gm)	12373	12366
Wt. of Mold (gm)	7151	7151
Wt. of WS	5222	5215
Mold Volume (cc)	2124	2127
Wet Density (gm/cc)	2.46	2.45
Wet Density (pcf)	153.4	153.0
Tare Number	610	203
Wt. of Tare & WS (gm)	373.02	582.80
Wt. of Tare & DS (gm)	342.69	531.60
Wt. of Tare (gm)	83.18	98.91
Wt. of Water (gm)	30.33	51.20
Wt. of DS (gm)	259.51	432.69
Water Content (%)	11.7	11.8
Dry Density (pcf)	137.4	136.8

(\*) Sample was removed from the submerged condition after the 165.5 hour reading.

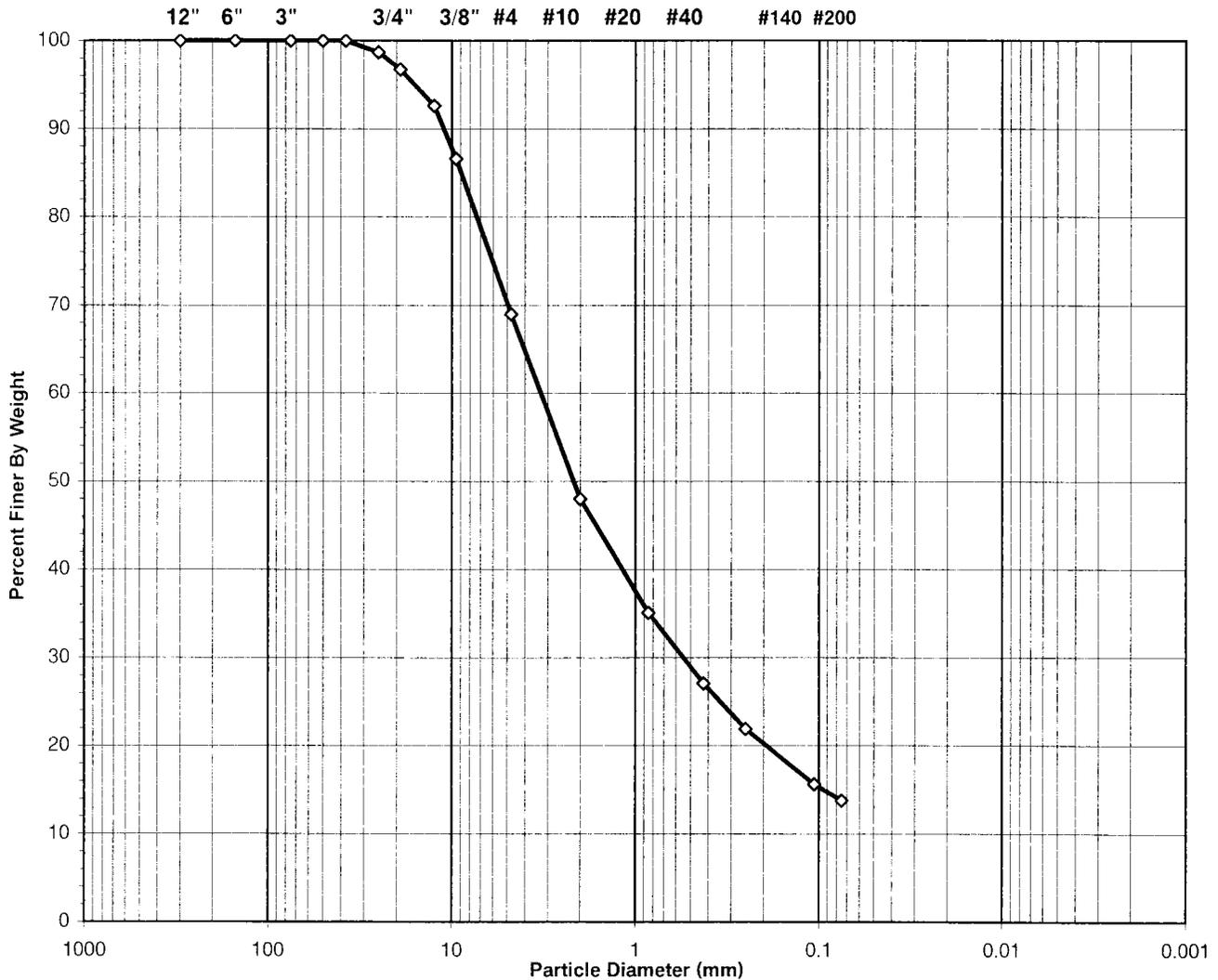


Tested By BB Date 11/27/12 Checked By TB Date 12/12/12

**SIEVE ANALYSIS**  
ASTM D 422-63 (2007)/AASHTO T88-00 SOP-S3

Client	TETRA TECH	Boring No.	SB-8
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	5-15
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-02	Soil Color	<b>DARK BROWN</b>

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



**USCS Symbol** *SM, TESTED*  
*(NON-PLASTIC FINES)*  
**USCS Classification** *SILTY SAND WITH GRAVEL*

Tested By BK Date 11/15/12 Checked By *KC* Date *11-29-12*  
page 1 of 2 DCN: CT-S3A DATE 10-03-07 REVISION 4 C:\Users\Geojack\Documents\PRINT Q (LOCAL)\[A874.XLS]Sheet1

### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)/AASHTO T88-00 SOP-S3

Client	TETRA TECH	Boring No.	SB-8
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	5-15
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-02	Soil Color	<b>DARK BROWN</b>

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	45	Tare No.	892
Wgt. Tare + Wet Specimen (gm)	1412.00	Wgt. Tare + Wet Specimen (gm)	882.50
Wgt. Tare + Dry Specimen (gm)	1272.47	Wgt. Tare + Dry Specimen (gm)	856.35
Weight of Tare (gm)	203.41	Weight of Tare (gm)	109.81
Weight of Water (gm)	139.53	Weight of Water (gm)	26.15
Weight of Dry Soil (gm)	1069.06	Weight of Dry Soil (gm)	746.54
<b>Moisture Content (%)</b>	<b>13.1</b>	<b>Moisture Content (%)</b>	<b>3.5</b>

Wet Weight -3/4" Sample (gm)	26425	Weight of the Dry Specimen (gm)	1069.06
Dry Weight - 3/4" Sample (gm)	23374.3	Weight of minus #200 material (gm)	152.20
Wet Weight +3/4" Sample (gm)	817.00	Weight of plus #200 material (gm)	916.86
Dry Weight + 3/4" Sample (gm)	789.35		
Total Dry Weight Sample (gm)	24163.6	<b>J - Factor (Percent Finer than 3/4")</b>	<b>0.9673</b>

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	<b>100.00</b>
6"	150	0.00	0.00	0.00	100.00	<b>100.00</b>
3"	75	0.00	0.00	0.00	100.00	<b>100.00</b>
2"	50	0.00	0.00 (*)	0.00	100.00	<b>100.00</b>
1 1/2"	37.5	0.00	0.00	0.00	100.00	<b>100.00</b>
1"	25	328.00	1.31	1.31	98.69	<b>98.69</b>
3/4"	19	489.00	1.96	3.27	96.73	<b>96.73</b>
1/2"	12.5	45.47	4.25	4.25	95.75	<b>92.62</b>
3/8"	9.5	66.68	6.24	10.49	89.51	<b>86.59</b>
#4	4.75	194.69	18.21	28.70	71.30	<b>68.97</b>
#10	2	231.86	21.69	50.39	49.61	<b>47.99</b>
#20	0.85	142.38	13.32 (**)	63.71	36.29	<b>35.11</b>
#40	0.425	88.77	8.30	72.01	27.99	<b>27.07</b>
#60	0.25	57.49	5.38	77.39	22.61	<b>21.87</b>
#140	0.106	68.83	6.44	83.83	16.17	<b>15.64</b>
#200	0.075	20.69	1.94	85.76	14.24	<b>13.77</b>
Pan	-	152.20	14.24	100.00	-	-

**Notes :** (\*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample  
(\*\*) The - 3/4" sieve analysis is based on the Weight of the Dry Specimen

Tested By **BK** Date **11/15/12** Checked By **KC** Date **11-29-12**

**ATTERBERG LIMIT**  
ASTM D 4318-00 (SOP - S4)

Client	TETRA TECH	Boring No.	SB-8
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	5-15
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-02	Visual	<b>DARK BROWN SILT</b> ( Minus No. 40 sieve material, Airdried)

**NON - PLASTIC  
MATERIAL**

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Tested By *TO* Date *11/21/12* Checked By *KC* Date *11-29-12*  
page 1 of 1 DCN: CT-S4C DATE: 7-11-97 REVISION : 2 C:\Users\Geojack\Documents\PRINT Q (LOCAL)\[A866.XLS]Sheet1

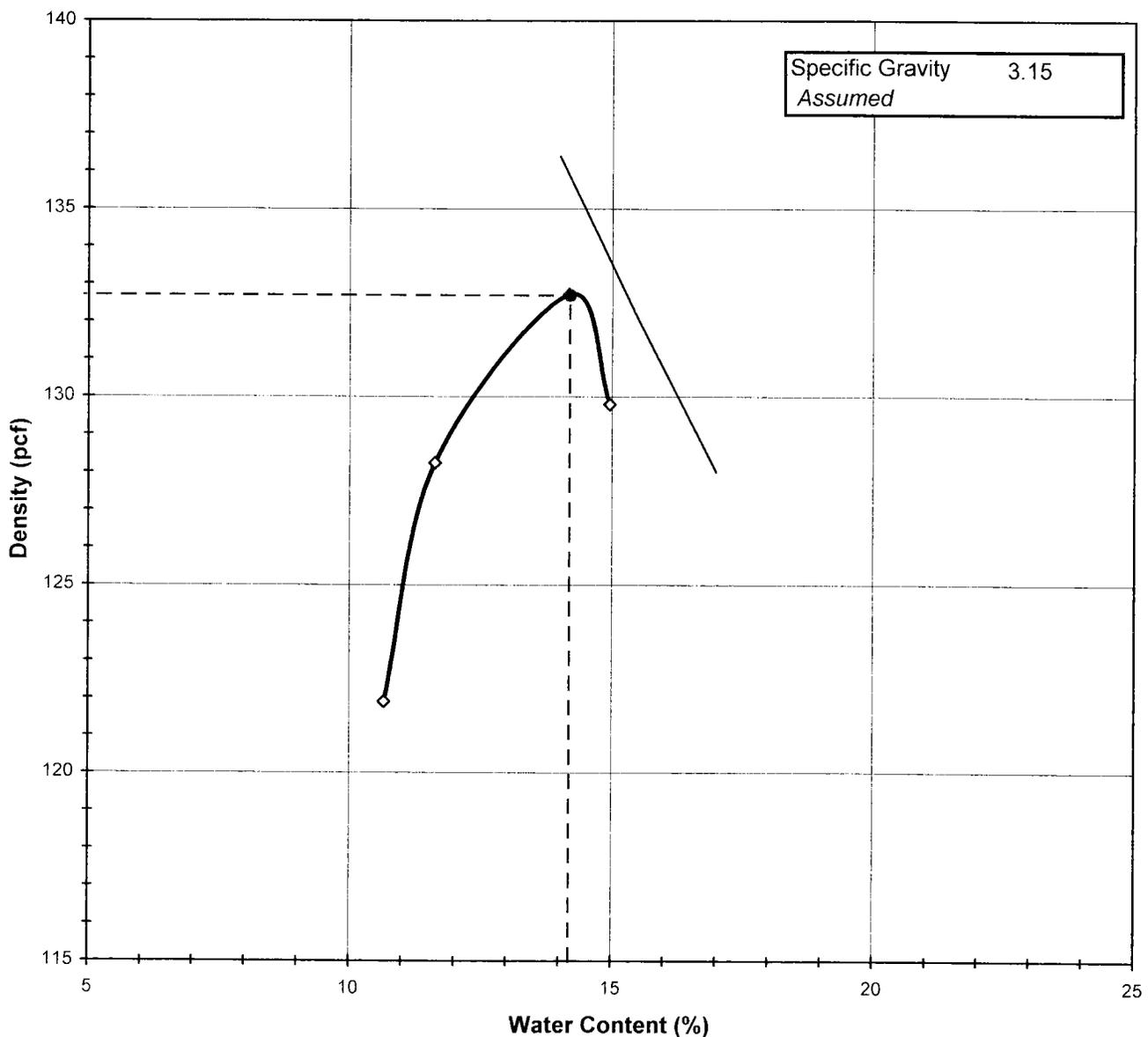
**MOISTURE DENSITY RELATIONSHIP**

ASTM D698-12 SOP-S12

Client	TETRA TECH	Boring No.	SB-8
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	5-15
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-02	Test Method	<b>STANDARD</b>

Visual Description      DARK BROWN SAND, GRAVEL AND ROCK FRAGMENTS

**Optimum Water Content                      14.2**  
**Maximum Dry Density                         132.7**



Tested By MF      Date 11/19/12      Checked By *RL*      Date 11-26-12

## MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12 SOP-S12

Client	TETRA TECH	Boring No.	SB-8
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	5-15
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-02		

Visual Description      DARK BROWN SAND, GRAVEL AND ROCK FRAGMENTS

Total Weight of the Sample (gm)	NA
As Received Water Content(%)	NA
Assumed Specific Gravity	3.15
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	C

TestType	<b>STANDARD</b>	
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type	MECHANICAL	
Machine ID	G	441
Mold ID	G	1390
Mold diameter		4"
Weight of the Mold		6461
Volume of the Mold(cc)		2139

### Mold / Specimen

Point No.	1	2	3	4
Wt. of Mold & WS (gm)	11085	11368	11656	11576
Wt. of Mold (gm)	6461	6461	6461	6461
Wt. of WS	4624	4907	5195	5115
Mold Volume (cc)	2139	2139	2139	2139

### Moisture Content / Density

Tare Number	892	1460	537	1131A
Wt. of Tare & WS (gm)	479.30	470.70	456.80	485.20
Wt. of Tare & DS (gm)	443.70	430.30	410.30	433.00
Wt. of Tare (gm)	109.79	82.64	82.42	84.12
Wt. of Water (gm)	35.60	40.40	46.50	52.20
Wt. of DS (gm)	333.91	347.66	327.88	348.88

Wet Density (gm/cc)	2.16	2.29	2.43	2.39
Wet Density (pcf)	134.9	143.1	151.6	149.2
<b>Moisture Content (%)</b>	<b>10.7</b>	<b>11.6</b>	<b>14.2</b>	<b>15.0</b>
<b>Dry Density (pcf)</b>	<b>121.9</b>	<b>128.2</b>	<b>132.7</b>	<b>129.8</b>

### Zero Air Voids

<b>Moisture Content (%)</b>	14.0	15.5	17.0
<b>Dry Unit Weight (pcf)</b>	136.4	132.1	128.0

Tested By MF      Date 11/19/12      Checked By hl      Date 11-26-12

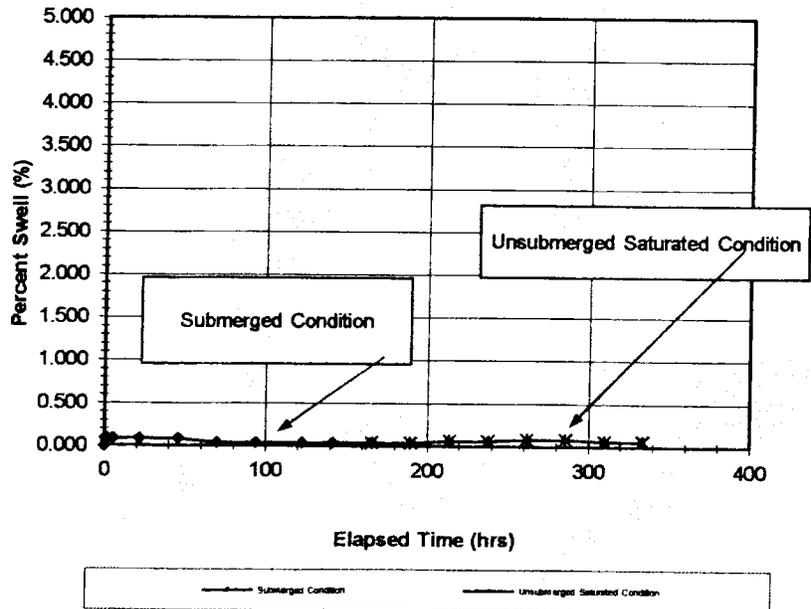
DCN: DS-S33  
DATE: 11/14/96  
REVISION: 1

**ONE DIMENSIONAL SWELL**  
PTM 130

Client	TETRA TECH NUS, INC,	Boring No.	SB-8
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth	5-15
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-02	Visual Description	DARK BROWN SAND WITH GRAVEL AND ROCK FRAGEMENTS

Dial Reading (div)	Percent Swell (%)	Elapsed Time (hrs)	Test Type Surcharge (lbs)	STD 10	S. Height 1 div (in)	4.58	0.001
251	0.00	0	Wt. of Mold & WS (gm)		Initial		Final
251	0.00	0.1	Wt. of Mold (gm)		12321		12236
255	0.09	0.3	Wt. of WS		7192		7192
255	0.09	0.5	Mold Volume (cc)		5129		5044
255	0.09	2.0	Wet Density (gm/cc)		2124		2126
255	0.09	5.0	Wet Density (pcf)		2.41		2.37
255	0.09	21.5			150.7		148.1
255	0.09	45.5	Tare Number		567		Z10
253	0.04	69.5	Wt. of Tare & WS (gm)		374.77		754.20
253	0.04	93.5	Wt. of Tare & DS (gm)		337.14		678.43
253	0.04	122.5	Wt. of Tare (gm)		84.52		85.53
253	0.04	141.5	Wt. of Water (gm)		37.63		75.77
253	0.04	165.5 (*)	Wt. of DS (gm)		252.62		592.90
253	0.04	189.5					
254	0.07	213.5	Water Content (%)		14.9		12.8
254	0.07	237.5	Dry Density (pcf)		131.1		131.3
255	0.09	261.5					
255	0.09	285.5					
254	0.07	309.5					
254	0.07	333.5					

(\*) Sample was removed from the submerged condition after the 165.5 hour reading.



Tested By **BB** Date **11/27/12** Checked By **DB** Date **12/12/12**

DIRECT SHEAR TEST RESULTS  
ASTM D 3080 \*Modified



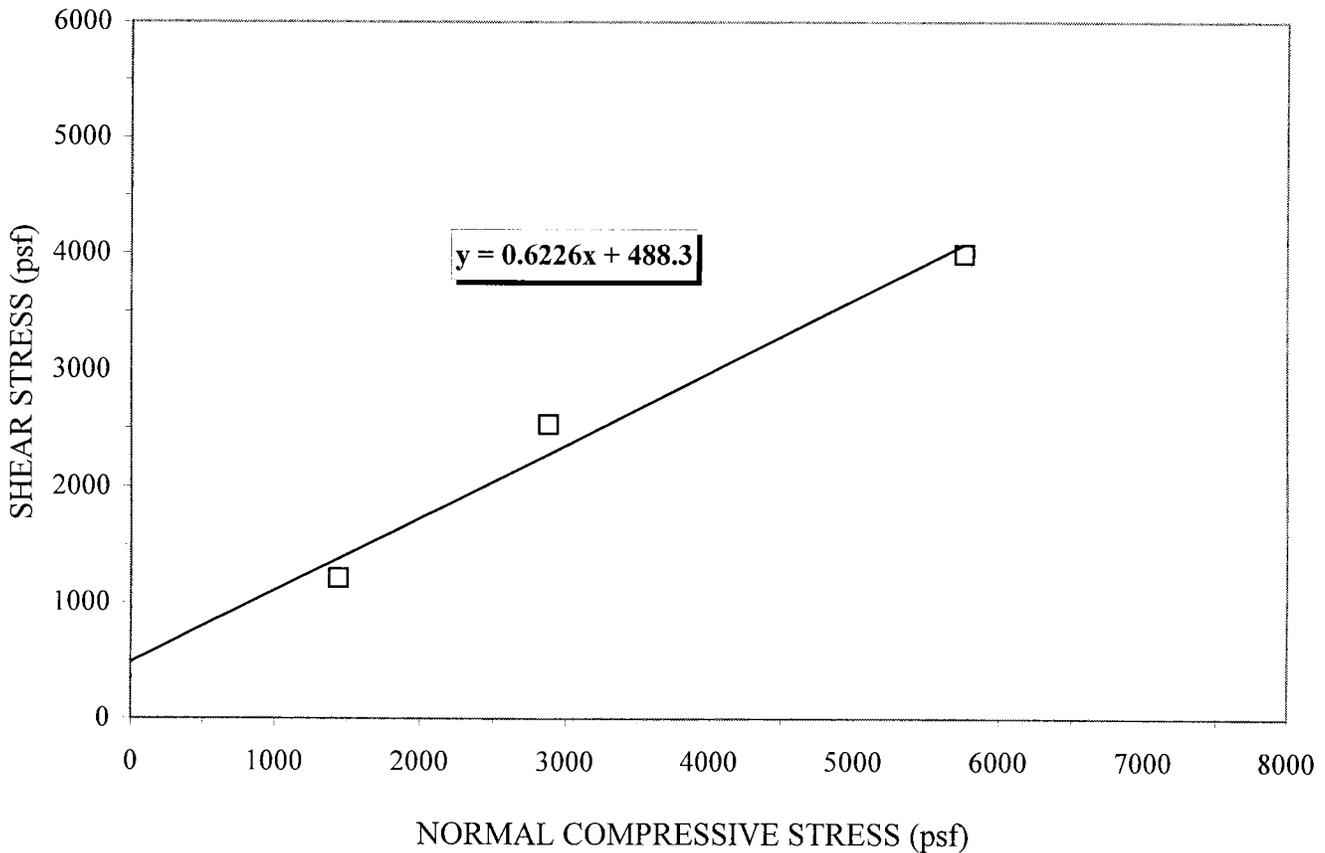
CLIENT : Tetra Tech NUS  
CLIENT PROJECT : Nine Mile Run Phase III 112G03820  
PROJECT NO. : L12146-01  
LAB I. D. NO.: SB-6,7&8 Composite Soil Sample (2012-528-01-02,03&04)

INTERFACE : 12" Direct Shear of Composite Soil Sample  
@ 132.5 pcf & 12.4 % M.C.

PEAK SHEAR

FRICITION ANGLE (deg) :  $\Phi = 31.9$   
COEFFICIENT OF FRICTION : = 0.623  
COHESION [Calculated] (psf): c = 488

- NOTES:
- 1.) Specimens were composed of soil sample passing 0.75 inch sieve and placed in the shear box to a thickness of 4 inches
  - 2.) Soil placement based upon 95% maximum dry density & optimum moisture content.
  - 3.) The specimen was loaded, inundated with water and seated for 1 hour under test load prior to shearing.
  - 4.) The specimens were sheared at a displacement rate of 0.04 in./min.
  - 5.) The peak friction angle was calculated using linear regression on the three data points.
  - 6.) The specimen for the 2880psf load point contained previously sheared material.



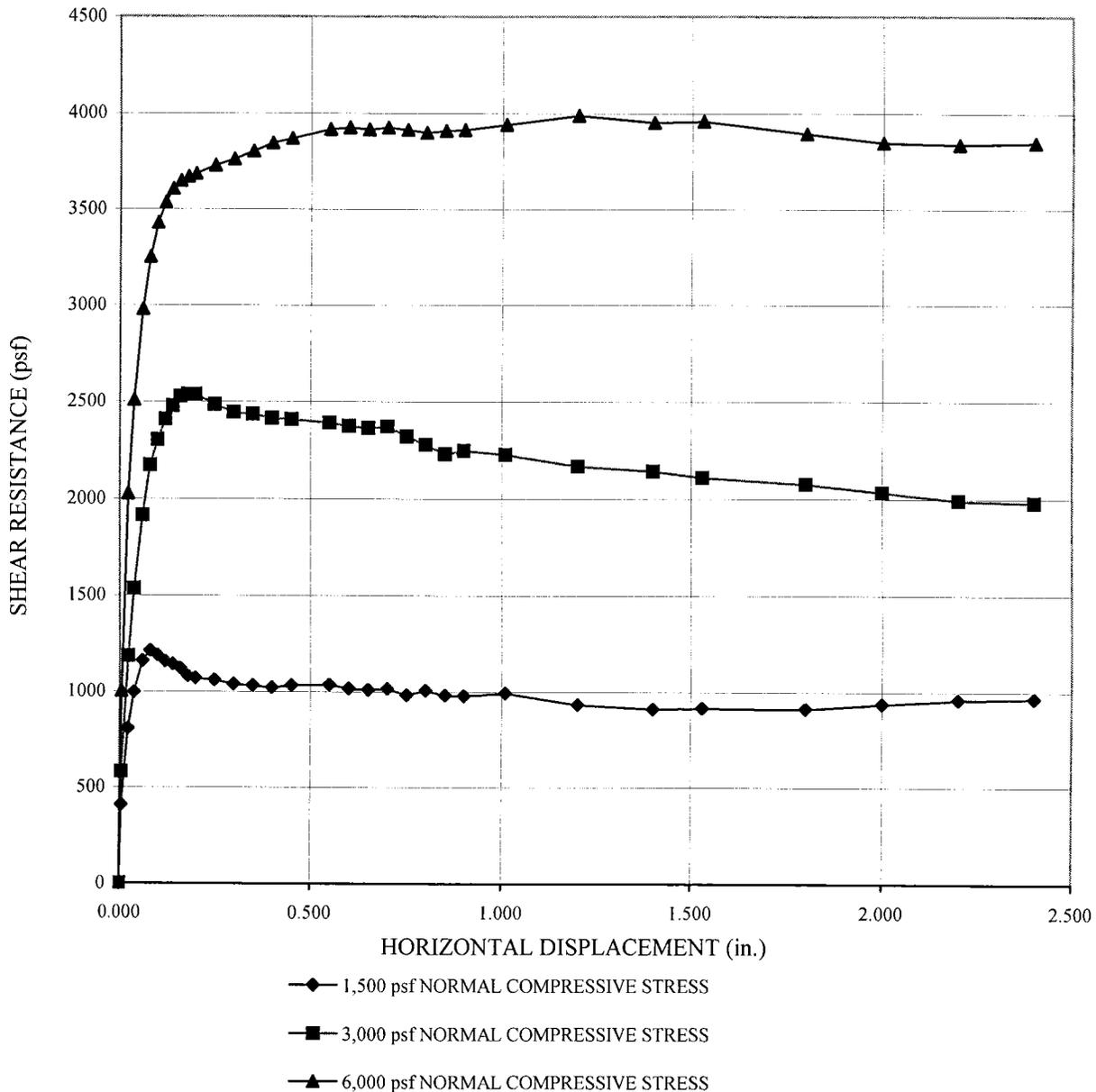
DIRECT SHEAR TEST RESULTS  
 ASTM D 3080 \*Modified



CLIENT : Tetra Tech NUS  
 CLIENT PROJECT : Nine Mile Run Phase III 112G03820  
 PROJECT NO. : L12146-01  
 LAB I. D. NO. : SB-6,7&8 Composite Soil Sample (2012-528-01-02,03&04)

INTERFACE : 12" Direct Shear of Composite Soil Sample  
 @ 132.5 pcf & 12.4 % M.C.

SHEAR RESISTANCE VS HORIZONTAL DISPLACEMENT



**DIRECT SHEAR TEST RESULTS**  
**ASTM D 3080 \*Modified**



CLIENT : Tetra Tech NUS  
 CLIENT PROJECT : Nine Mile Run Phase III 112G03820  
 PROJECT NO. : L12146-01  
 LAB I. D. NO.S: SB-6,7&8 Composite Soil Sample (2012-528-01-02,03&04)

**INTERFACE : 12" Direct Shear of Composite Soil Sample**  
**@ 132.5 pcf & 12.4 % M.C.**

STRAIN RATE ( in / min ) : 0.04  
 PLACEMENT CONDITION: Inundated

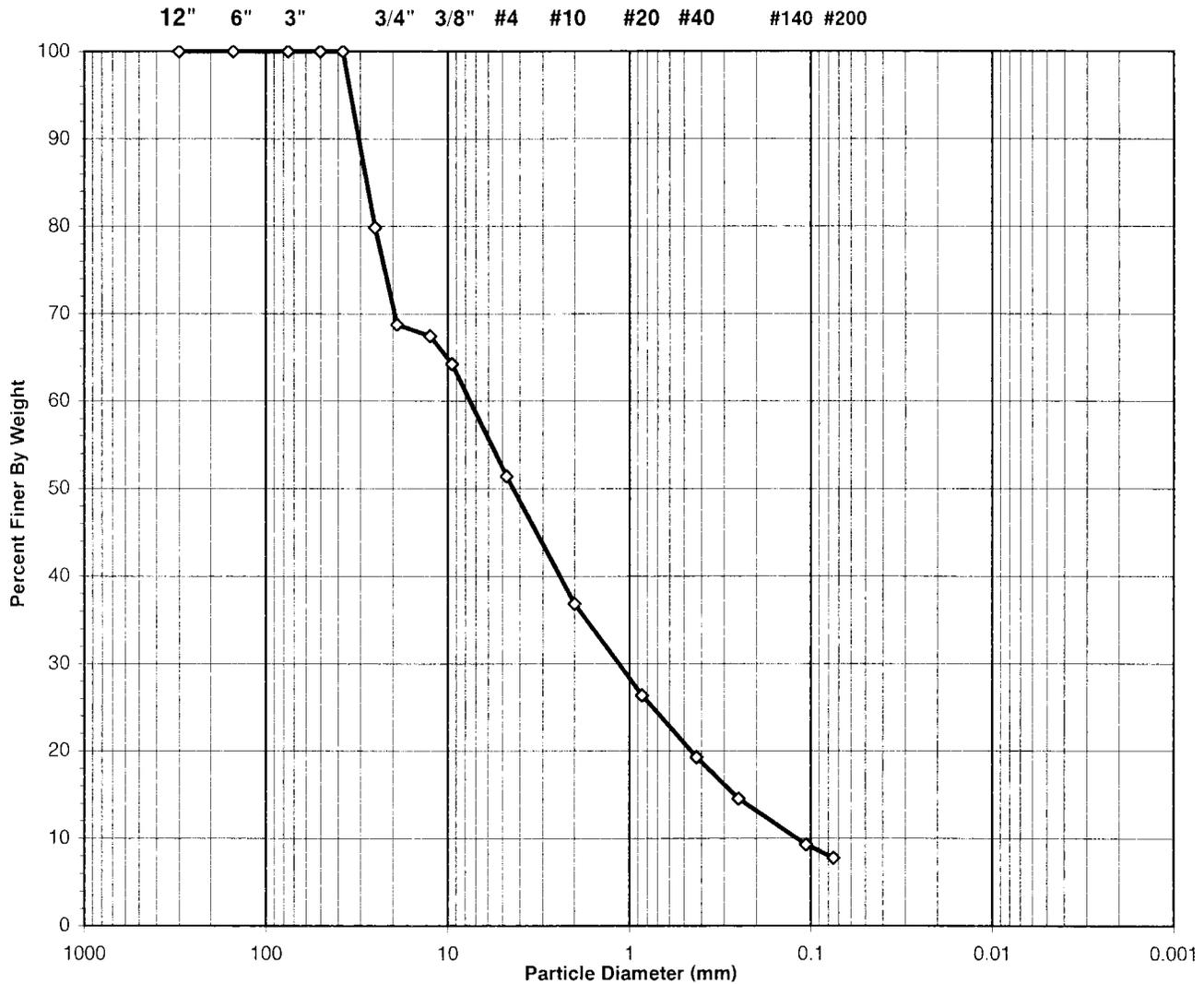
DIRECT SHEAR UNIT: Geotest 2  
 NORMAL LOAD: Hydraulic Cylinders

NORMAL LOAD (psf)			NORMAL LOAD (psf)			NORMAL LOAD (psf)		
1440			2880			5760		
NORMAL LOAD (psi)			NORMAL LOAD (psi)			NORMAL LOAD (psi)		
10.0			20.0			40.0		
PEAK SHEAR STRESS (psf)			PEAK SHEAR STRESS (psf)			PEAK SHEAR STRESS (psf)		
1214			2538			3989		
PEAK SECANT ANGLE (deg)			PEAK SECANT ANGLE (deg)			PEAK SECANT ANGLE (deg)		
40.1			41.4			34.7		
HORIZONTAL			HORIZONTAL			HORIZONTAL		
DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)	DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)	DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)
0.000	0	0	0.000	0	0	0.000	0	0
0.005	409	409	0.005	582	582	0.005	1004	1004
0.023	808	808	0.023	1186	1186	0.023	2028	2028
0.038	997	997	0.038	1536	1536	0.038	2509	2509
0.060	1161	1161	0.060	1915	1915	0.060	2980	2980
0.080	1214	1214	0.080	2174	2174	0.080	3252	3252
0.100	1189	1189	0.100	2304	2304	0.100	3430	3430
0.120	1157	1157	0.120	2410	2410	0.120	3538	3538
0.140	1143	1143	0.140	2478	2478	0.140	3606	3606
0.160	1122	1122	0.160	2527	2527	0.160	3649	3649
0.180	1082	1082	0.180	2538	2538	0.180	3670	3670
0.200	1072	1072	0.200	2538	2538	0.200	3685	3685
0.250	1060	1060	0.250	2486	2486	0.250	3729	3729
0.300	1040	1040	0.300	2445	2445	0.300	3761	3761
0.350	1032	1032	0.350	2436	2436	0.350	3803	3803
0.400	1022	1022	0.400	2415	2415	0.400	3846	3846
0.450	1034	1034	0.450	2409	2409	0.450	3870	3870
0.550	1037	1037	0.550	2392	2392	0.550	3917	3917
0.600	1017	1017	0.600	2376	2376	0.600	3927	3927
0.650	1010	1010	0.650	2364	2364	0.650	3916	3916
0.700	1016	1016	0.700	2373	2373	0.700	3926	3926
0.750	984	984	0.750	2322	2322	0.750	3914	3914
0.800	1007	1007	0.800	2279	2279	0.800	3899	3899
0.850	982	982	0.850	2232	2232	0.850	3911	3911
0.900	979	979	0.900	2250	2250	0.900	3915	3915
1.010	993	993	1.010	2229	2229	1.010	3941	3941
1.200	935	935	1.200	2169	2169	1.200	3989	3989
1.400	912	912	1.400	2143	2143	1.400	3954	3954
1.530	916	916	1.530	2112	2112	1.530	3960	3960
1.800	913	913	1.800	2077	2077	1.800	3895	3895
2.000	937	937	2.000	2034	2034	2.000	3849	3849
2.200	960	960	2.200	1992	1992	2.200	3840	3840
2.400	965	965	2.400	1981	1981	2.400	3848	3848

**SIEVE ANALYSIS**  
ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-10
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	8-10
Project No.	2012-528-01	Sample No.	SS-5
Lab ID	2012-528-01-10	Soil Color	<b>DARK BROWN</b>

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



**USCS Symbol**      **GW-GC, TESTED**      **D60 = 7.56**      **CC = 1.45**

**USCS Classification**      **WELL-GRADED GRAVEL WITH CLAY AND SAND**      **D30 = 1.14**      **CU = 63.33**

**D10 = 0.12**

Tested By **BK**      Date **11/28/12**      Checked By **KC**      Date **11-29-12**

### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-10
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	8-10
Project No.	2012-528-01	Sample No.	SS-5
Lab ID	2012-528-01-10	Soil Color	<b>DARK BROWN</b>

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	1427	Tare No.	NA
Wgt. Tare + Wet Specimen (gm)	464.20	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	442.96	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	145.70	Weight of Tare (gm)	NA
Weight of Water (gm)	21.24	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	297.26	Weight of Dry Soil (gm)	NA
<b>Moisture Content (%)</b>	<b>7.1</b>	<b>Moisture Content (%)</b>	<b>NA</b>

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	297.26
Dry Weight - 3/4" Sample (gm)	181.3	Weight of minus #200 material (gm)	23.04
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	274.22
Dry Weight + 3/4" Sample (gm)	92.97		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	59.93	20.16	20.16	79.84	79.84
3/4"	19.0	33.04	11.11	31.28	68.72	68.72
1/2"	12.50	3.85	1.30	32.57	67.43	67.43
3/8"	9.50	9.54	3.21	35.78	64.22	64.22
#4	4.75	38.15	12.83	48.61	51.39	51.39
#10	2.00	43.28	14.56	63.17	36.83	36.83
#20	0.850	31.12	10.47	73.64	26.36	26.36
#40	0.425	21.14	7.11	80.75	19.25	19.25
#60	0.250	14.07	4.73	85.49	14.51	14.51
#140	0.106	15.58	5.24	90.73	9.27	9.27
#200	0.075	4.52	1.52	92.25	7.75	7.75
Pan	-	23.04	7.75	100.00	-	-

Tested By BK Date 11/28/12 Checked By *KC* Date 11-29-12

**ATTERBERG LIMIT**  
ASTM D 4318-00 (SOP - S4)

Client	TETRA TECH	Boring No.	SB-10
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	8-10
Project No.	2012-528-01	Sample No.	SS-5
Lab ID	2012-528-01-10	Visual	<b>DARK BROWN SILT</b> ( Minus No. 40 sieve material, Airdried)

**NON - PLASTIC  
MATERIAL**

Tested By TO Date 11/21/12 Checked By KC Date 11-29-12

### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-12
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	6-8
Project No.	2012-528-01	Sample No.	SS-4
Lab ID	2012-528-01-07	Soil Color	<b>REDDISH BROWN</b>

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	1454	Tare No.	NA
Wgt. Tare + Wet Specimen (gm)	276.06	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	276.06	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	144.96	Weight of Tare (gm)	NA
Weight of Water (gm)	0.00	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	131.10	Weight of Dry Soil (gm)	NA
<b>Moisture Content (%)</b>	<b>0.0</b>	<b>Moisture Content (%)</b>	<b>NA</b>

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	131.10
Dry Weight - 3/4" Sample (gm)	10.1	Weight of minus #200 material (gm)	120.96
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	10.14
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	0.00	0.00	0.00	100.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00	100.00
1/2"	12.50	0.00	0.00	0.00	100.00	100.00
3/8"	9.50	0.00	0.00	0.00	100.00	100.00
#4	4.75	0.00	0.00	0.00	100.00	100.00
#10	2.00	0.07	0.05	0.05	99.95	99.95
#20	0.850	1.80	1.37	1.43	98.57	98.57
#40	0.425	3.32	2.53	3.96	96.04	96.04
#60	0.250	2.15	1.64	5.60	94.40	94.40
#140	0.106	2.10	1.60	7.20	92.80	92.80
#200	0.075	0.70	0.53	7.73	92.27	92.27
Pan	-	120.96	92.27	100.00	-	-

Tested By BK Date 11/28/12 Checked By *KC* Date 11-29-12

### ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89 (SOP - S4A)

Client	TETRA TECH	Boring No.	SB-12
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	6-8
Project No.	2012-528-01	Sample No.	SS-4
Lab ID	2012-528-01-07	Soil Description	<b>REDDISH BROWN LEAN CLAY</b>

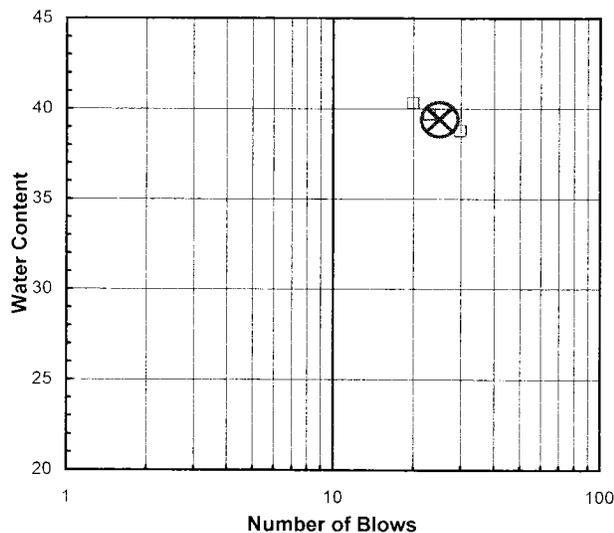
*Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

Liquid Limit Test	1	2	3	
Tare Number	360	365	393	<b>M</b>
Wt. of Tare & WS (gm)	33.50	30.43	39.02	<b>U</b>
Wt. of Tare & DS (gm)	28.78	25.75	32.56	<b>L</b>
Wt. of Tare (gm)	16.60	13.96	16.53	<b>T</b>
Wt. of Water (gm)	4.7	4.7	6.5	<b>I</b>
Wt. of DS (gm)	12.2	11.8	16.0	<b>P</b>
				<b>O</b>
				<b>I</b>
<b>Moisture Content (%)</b>	<b>38.8</b>	<b>39.7</b>	<b>40.3</b>	<b>N</b>
<b>Number of Blows</b>	<b>30</b>	<b>23</b>	<b>20</b>	<b>T</b>

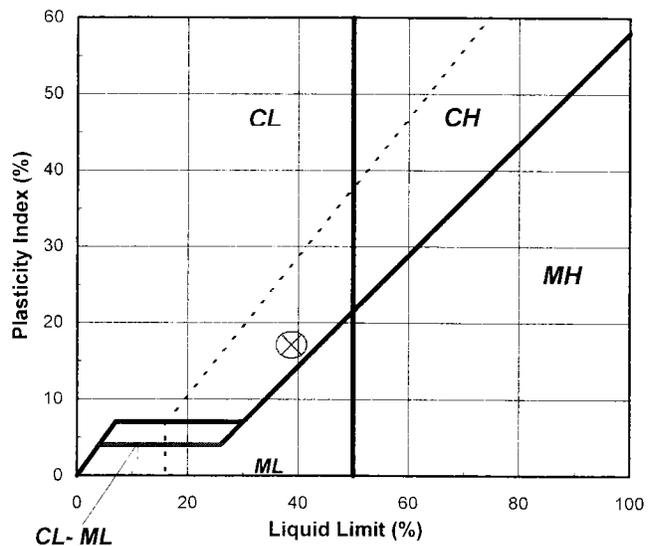
Plastic Limit Test	1	2	Range	Test Results
Tare Number	249	332		<b>Liquid Limit (%)</b> 39
Wt. of Tare & WS (gm)	27.19	25.45		<b>Plastic Limit (%)</b> 22
Wt. of Tare & DS (gm)	26.05	24.33		<b>Plasticity Index (%)</b> 17
Wt. of Tare (gm)	20.95	19.36		<b>USCS Symbol</b> CL
Wt. of Water (gm)	1.1	1.1		
Wt. of DS (gm)	5.1	5.0		
<b>Moisture Content (%)</b>	<b>22.4</b>	<b>22.5</b>	<b>-0.2</b>	

*Note: The acceptable range of the two Moisture contents is  $\pm 2.6$*

Flow Curve



Plasticity Chart



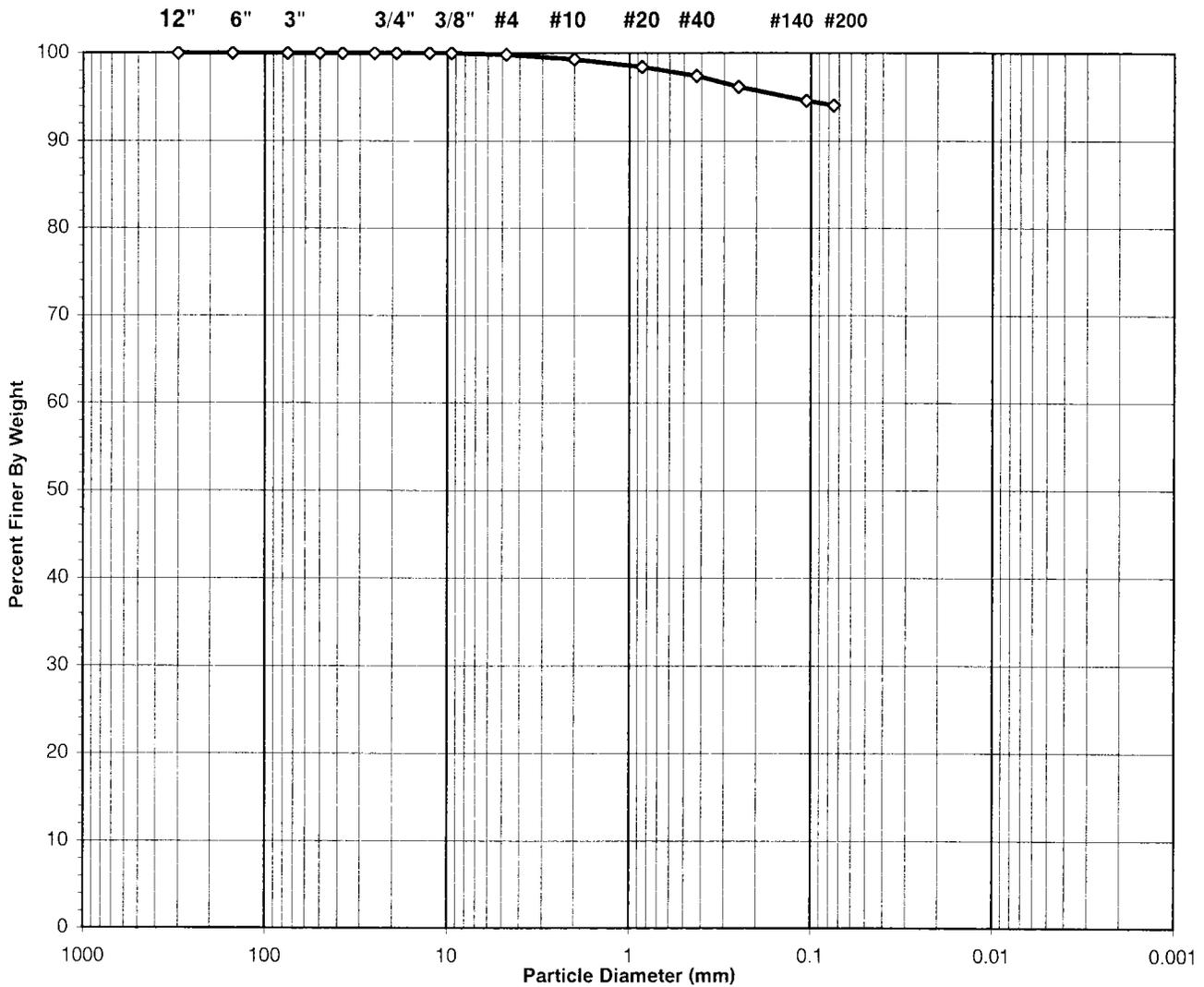
Tested By TO Date 11/21/12 Checked By KC Date 11-29-12

page 1 of 1 DCN: CT-S4B DATE: 12/20/06 REVISION: 3

**SIEVE ANALYSIS**  
ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-14
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-5
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-01	Soil Color	<b>REDDISH BROWN</b>

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



**USCS Symbol**      **CL, TESTED**

**USCS Classification**    **LEAN CLAY**

Tested By    **BK**      Date    **11/15/12**    Checked By    **hc**      Date    **11-29-12**

### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-14
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-5
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-01	Soil Color	REDDISH BROWN

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	51	Tare No.	NA
Wgt. Tare + Wet Specimen (gm)	962.80	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	868.92	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	201.32	Weight of Tare (gm)	NA
Weight of Water (gm)	93.88	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	667.60	Weight of Dry Soil (gm)	NA
<b>Moisture Content (%)</b>	<b>14.1</b>	<b>Moisture Content (%)</b>	<b>NA</b>

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	667.60
Dry Weight - 3/4" Sample (gm)	39.6	Weight of minus #200 material (gm)	627.96
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	39.64
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	0.00	0.00	0.00	100.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00	100.00
1/2"	12.50	0.00	0.00	0.00	100.00	100.00
3/8"	9.50	0.00	0.00	0.00	100.00	100.00
#4	4.75	1.06	0.16	0.16	99.84	99.84
#10	2.00	3.74	0.56	0.72	99.28	99.28
#20	0.850	5.71	0.86	1.57	98.43	98.43
#40	0.425	6.82	1.02	2.60	97.40	97.40
#60	0.250	8.22	1.23	3.83	96.17	96.17
#140	0.106	10.50	1.57	5.40	94.60	94.60
#200	0.075	3.59	0.54	5.94	94.06	94.06
Pan	-	627.96	94.06	100.00	-	-

Tested By BK Date 11/15/12 Checked By

Date 11-29-12

### ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89 (SOP - S4A)

Client	TETRA TECH	Boring No.	SB-14
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-5
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-01	Soil Description	<b>REDDISH BROWN LEAN CLAY</b>

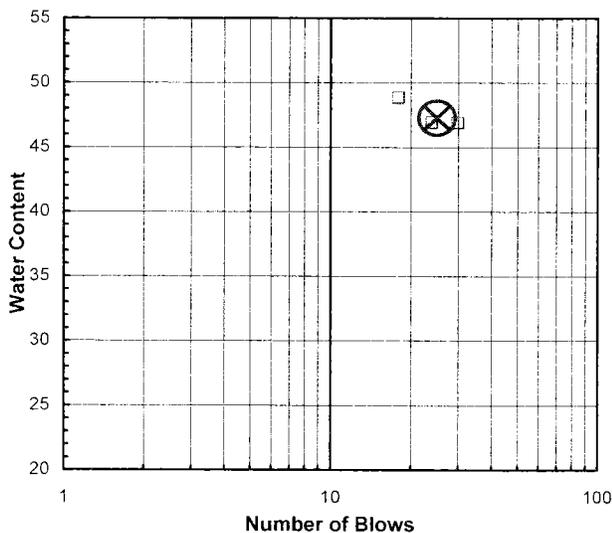
*Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*

Liquid Limit Test	1	2	3	
Tare Number	284	297	292	<b>M U L T I P L I C I T Y I N D E X</b>
Wt. of Tare & WS (gm)	38.81	40.02	43.56	
Wt. of Tare & DS (gm)	32.10	32.93	36.08	
Wt. of Tare (gm)	18.36	17.81	20.12	
Wt. of Water (gm)	6.7	7.1	7.5	
Wt. of DS (gm)	13.7	15.1	16.0	
<b>Moisture Content (%)</b>	<b>48.8</b>	<b>46.9</b>	<b>46.9</b>	
<b>Number of Blows</b>	<b>18</b>	<b>24</b>	<b>30</b>	

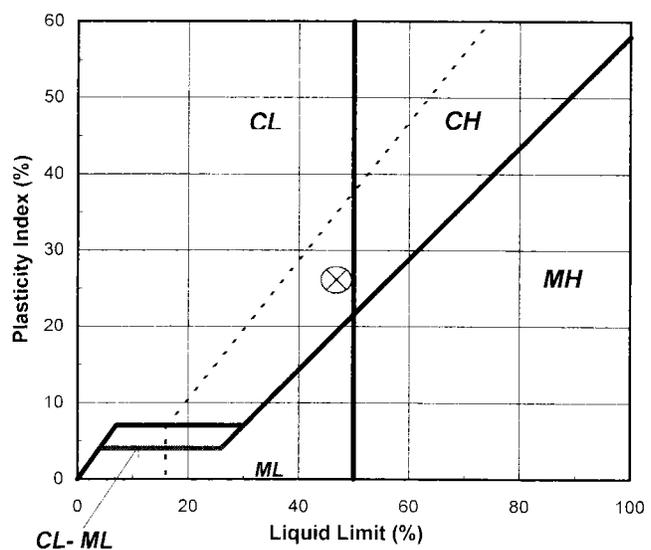
Plastic Limit Test	1	2	Range	Test Results
Tare Number	415	365		<b>Liquid Limit (%)</b> <b>47</b>  <b>Plastic Limit (%)</b> <b>21</b>  <b>Plasticity Index (%)</b> <b>26</b>  <b>USCS Symbol</b> <b>CL</b>
Wt. of Tare & WS (gm)	19.10	20.21		
Wt. of Tare & DS (gm)	18.00	19.11		
Wt. of Tare (gm)	12.81	13.98		
Wt. of Water (gm)	1.1	1.1		
Wt. of DS (gm)	5.2	5.1		
<b>Moisture Content (%)</b>	<b>21.2</b>	<b>21.4</b>	<b>-0.2</b>	

*Note: The acceptable range of the two Moisture contents is  $\pm 2.6$*

Flow Curve



Plasticity Chart



Tested By BK Date 11/19/12 Checked By KL Date 11-29-12

## MOISTURE DENSITY RELATIONSHIP

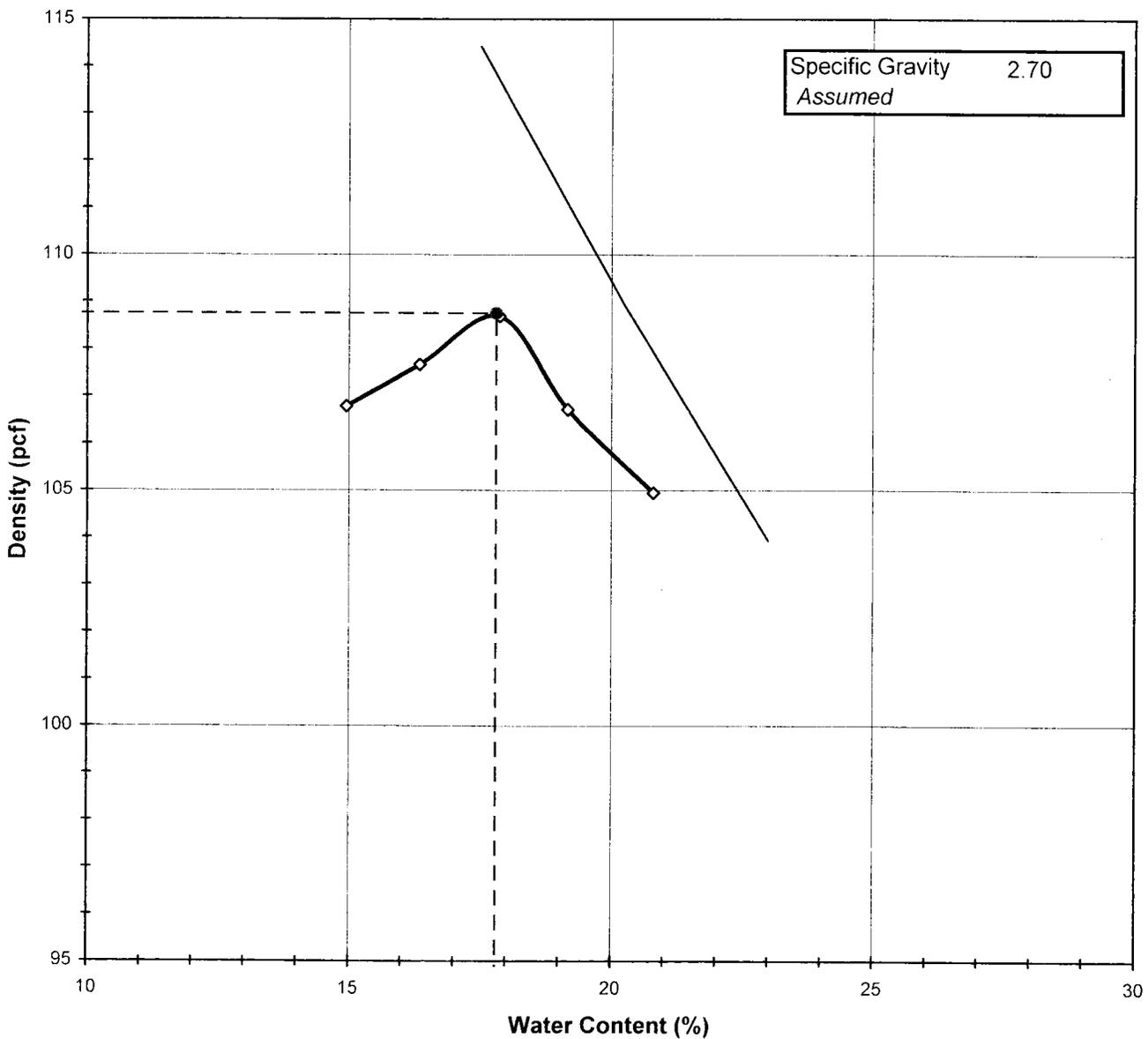
ASTM D698-12 SOP-S12

Client: TETRA TECH  
 Client Reference: NINE MILE RUN PHASE III 112G03820  
 Project No.: 2012-528-01  
 Lab ID: 2012-528-01-01

Boring No.: SB-14  
 Depth (ft): 0-5  
 Sample No.: NA  
 Test Method: **STANDARD**

Visual Description: REDDISH BROWN CLAY

**Optimum Water Content                      17.8**  
**Maximum Dry Density                         108.8**



Tested By: PC      Date: 11/20/12      Checked By: KC      Date: 11-28-12

**MOISTURE - DENSITY RELATIONSHIP**

ASTM D698-12 SOP-S12

Client	TETRA TECH	Boring No.	SB-14
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	0-5
Project No.	2012-528-01	Sample No.	NA
Lab ID	2012-528-01-01		

Visual Description      REDDISH BROWN CLAY

Total Weight of the Sample (gm)	NA
As Received Water Content(%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	B

TestType	<b>STANDARD</b>	
Rammer Weight (lbs)		5.5
Rammer Drop (in)		12
Rammer Type	MECHANICAL	
Machine ID	G	774
Mold ID	G	1031
Mold diameter		4"
Weight of the Mold		4238
Volume of the Mold(cc)		944

**Mold / Specimen**

Point No.	1	2	3	4	5
Wt. of Mold & WS (gm)	6095	6133	6176	6162	6156
Wt. of Mold (gm)	4238	4238	4238	4238	4238
Wt. of WS	1857	1895	1938	1924	1918
Mold Volume (cc)	944	944	944	944	944

**Moisture Content / Density**

Tare Number	566	912	914	898	895
Wt. of Tare & WS (gm)	357.26	384.93	341.76	381.25	358.85
Wt. of Tare & DS (gm)	321.81	346.38	306.67	337.59	315.92
Wt. of Tare (gm)	84.70	110.57	110.28	109.94	109.59
Wt. of Water (gm)	35.45	38.55	35.09	43.66	42.93
Wt. of DS (gm)	237.11	235.81	196.39	227.65	206.33

Wet Density (gm/cc)	1.97	2.01	2.05	2.04	2.03
Wet Density (pcf)	122.8	125.3	128.1	127.2	126.8
<b>Moisture Content (%)</b>	<b>15.0</b>	<b>16.3</b>	<b>17.9</b>	<b>19.2</b>	<b>20.8</b>
<b>Dry Density (pcf)</b>	<b>106.8</b>	<b>107.7</b>	<b>108.7</b>	<b>106.7</b>	<b>104.9</b>

**Zero Air Voids**

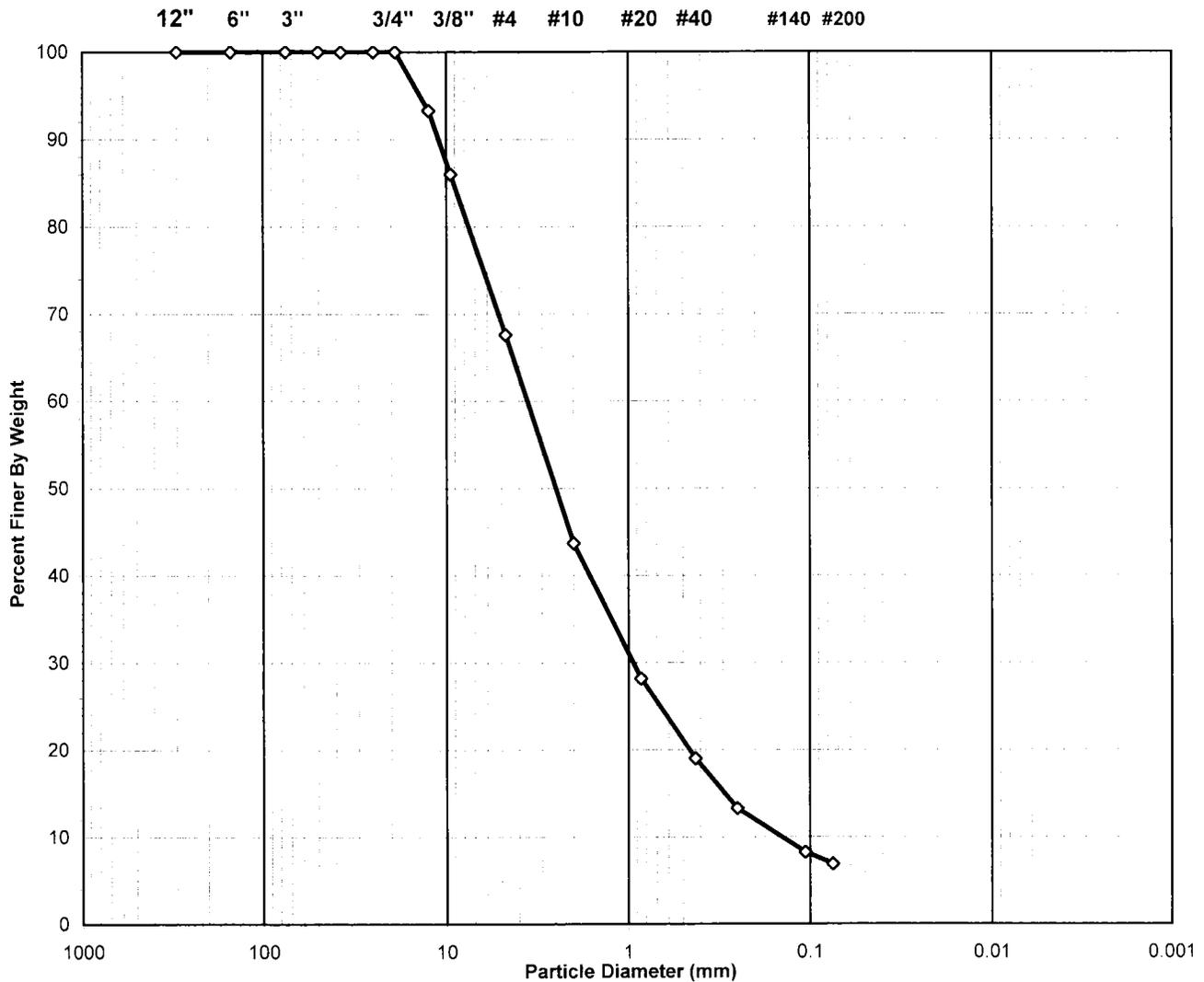
<b>Moisture Content (%)</b>	17.5	20.2	23.0
<b>Dry Unit Weight (pcf)</b>	114.4	108.9	103.9

Tested By      PC      Date      11/20/12      Checked By      *HL*      Date      11-28-12

**SIEVE ANALYSIS**  
ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-15
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	16-18
Project No.	2012-528-01	Sample No.	SS-10
Lab ID	2012-528-01-08	Soil Color	<b>DARK BROWN</b>

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



<b>USCS Symbol</b>	<b>SW-SM, TESTED</b>	<b>D60 = 3.61</b>	<b>CC = 1.71</b>
	<b>(NON-PLASTIC FINES)</b>		
<b>USCS Classification</b>	<b>WELL-GRADED SAND WITH SILT AND GRAVEL</b>	<b>D30 = 0.94</b>	<b>CU = 25.16</b>

**D10 = 0.14**

Tested By **BK** Date **11/29/12** Checked By **AL** Date **11-29-12**

### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-15
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	16-18
Project No.	2012-528-01	Sample No.	SS-10
Lab ID	2012-528-01-08	Soil Color	<b>DARK BROWN</b>

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	1445	Tare No.	NA
Wgt. Tare + Wet Specimen (gm)	440.95	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	440.95	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	146.26	Weight of Tare (gm)	NA
Weight of Water (gm)	0.00	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	294.69	Weight of Dry Soil (gm)	NA
<b>Moisture Content (%)</b>	<b>0.0</b>	<b>Moisture Content (%)</b>	<b>NA</b>

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	294.69
Dry Weight - 3/4" Sample (gm)	274.4	Weight of minus #200 material (gm)	20.30
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	274.39
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	0.00	0.00	0.00	100.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00	100.00
1/2"	12.50	19.81	6.72	6.72	93.28	93.28
3/8"	9.50	21.48	7.29	14.01	85.99	85.99
#4	4.75	54.19	18.39	32.40	67.60	67.60
#10	2.00	70.39	23.89	56.29	43.71	43.71
#20	0.850	45.78	15.53	71.82	28.18	28.18
#40	0.425	26.99	9.16	80.98	19.02	19.02
#60	0.250	16.91	5.74	86.72	13.28	13.28
#140	0.106	14.92	5.06	91.78	8.22	8.22
#200	0.075	3.92	1.33	93.11	6.89	6.89
Pan	-	20.30	6.89	100.00	-	-

Tested By BK Date 11/29/12 Checked By KL Date 11-29-12

**ATTERBERG LIMIT**  
ASTM D 4318-00 (SOP - S4)

Client	TETRA TECH	Boring No.	SB-15
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	16-18
Project No.	2012-528-01	Sample No.	SS-10
Lab ID	2012-528-01-08	Visual	<b>DARK BROWN SILT</b> ( Minus No. 40 sieve material, Airdried)

**NON - PLASTIC  
MATERIAL**

Tested By *TO* Date *11/21/12* Checked By *KC* Date *11-29-12*  
page 1 of 1 DCN: CT-S4C DATE: 7-11-97 REVISION : 2 C:\Users\Geojack\Documents\PRINT Q (LOCAL)\[A871.XLS]Sheet1





### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-16
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	14-16
Project No.	2012-528-01	Sample No.	SS-7
Lab ID	2012-528-01-06	Soil Color	<b>DARK BROWN</b>

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	1430	Tare No.	NA
Wgt. Tare + Wet Specimen (gm)	455.03	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	436.70	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	145.44	Weight of Tare (gm)	NA
Weight of Water (gm)	18.33	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	291.26	Weight of Dry Soil (gm)	NA
<b>Moisture Content (%)</b>	<b>6.3</b>	<b>Moisture Content (%)</b>	<b>NA</b>

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	291.26
Dry Weight - 3/4" Sample (gm)	177.7	Weight of minus #200 material (gm)	9.36
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	281.90
Dry Weight + 3/4" Sample (gm)	104.16		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	49.71	17.07	17.07	82.93	82.93
3/4"	19.0	54.45	18.69	35.76	64.24	64.24
1/2"	12.50	28.26	9.70	45.46	54.54	54.54
3/8"	9.50	34.51	11.85	57.31	42.69	42.69
#4	4.75	39.70	13.63	70.94	29.06	29.06
#10	2.00	27.75	9.53	80.47	19.53	19.53
#20	0.850	17.87	6.14	86.61	13.39	13.39
#40	0.425	12.98	4.46	91.06	8.94	8.94
#60	0.250	7.50	2.58	93.64	6.36	6.36
#140	0.106	7.19	2.47	96.11	3.89	3.89
#200	0.075	1.98	0.68	96.79	3.21	3.21
Pan	-	9.36	3.21	100.00	-	-

Tested By PC Date 11/16/12 Checked By RL Date 11-29-12

**ATTERBERG LIMIT**  
ASTM D 4318-00 (SOP - S4)

Client	TETRA TECH	Boring No.	SB-16
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	14-16
Project No.	2012-528-01	Sample No.	SS-7
Lab ID	2012-528-01-06	Visual	<b>DARK BROWN SILT</b> ( Minus No. 40 sieve material, Airdried)

**NON - PLASTIC  
MATERIAL**

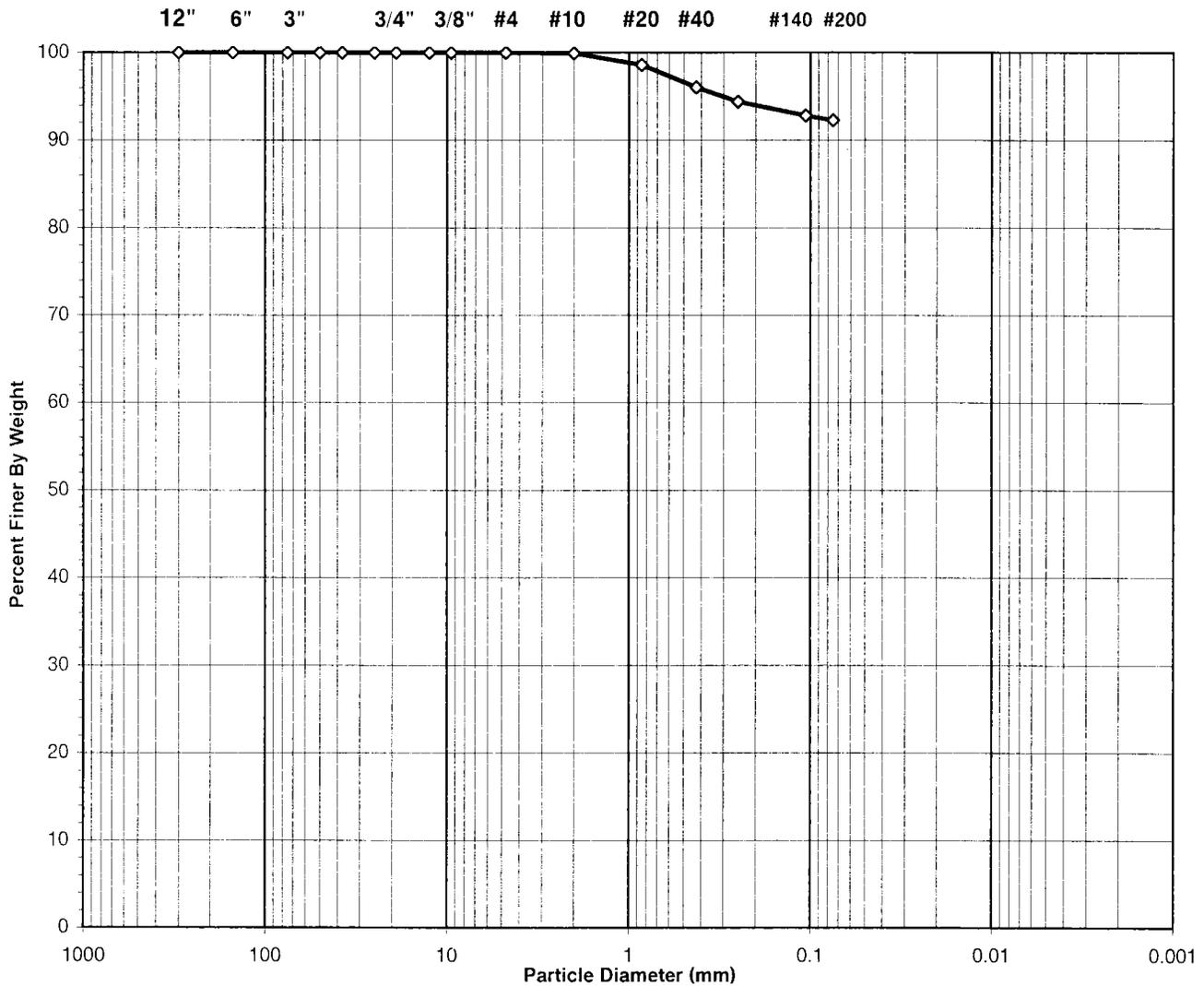
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*Tested By* PC    *Date* 11/14/12    *Checked By* *KL*    *Date* 11-16-12  
*page 1 of 1*    DCN: CT-S4C DATE: 7-11-97 REVISION : 2    C:\Users\Geojack\Documents\PRINT Q (LOCAL)\[A673.XLS]Sheet1

**SIEVE ANALYSIS**  
ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-12
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	6-8
Project No.	2012-528-01	Sample No.	SS-4
Lab ID	2012-528-01-07	Soil Color	<b>REDDISH BROWN</b>

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



**USCS Symbol**      **CL, TESTED**

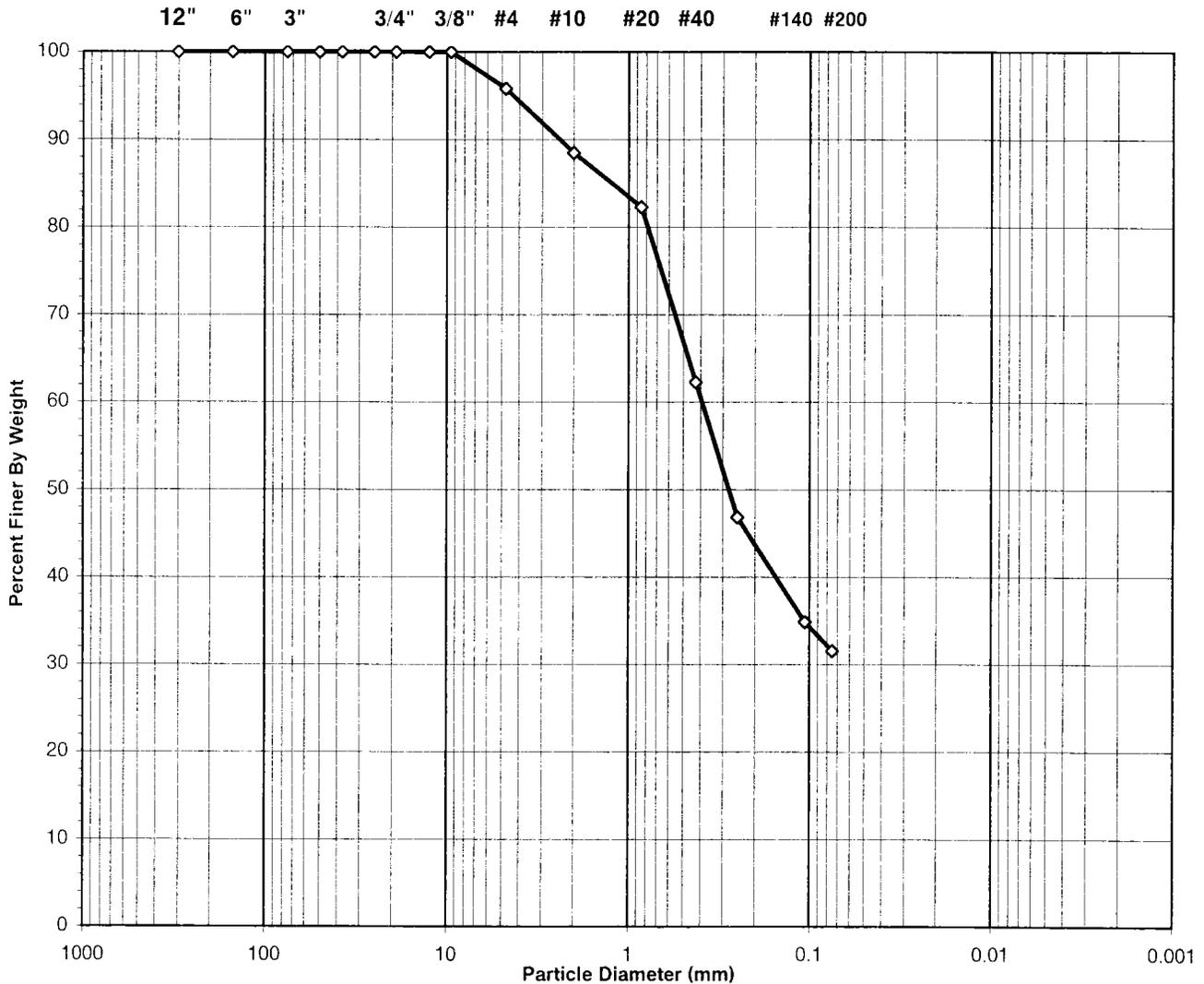
**USCS Classification**    **LEAN CLAY**

Tested By    BK      Date    11/28/12    Checked By    *KL*      Date    11-29-12

**SIEVE ANALYSIS**  
ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-19
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-2
Lab ID	2012-528-01-09	Soil Color	<b>BROWN</b>

<b>USCS</b>	<b>SIEVE ANALYSIS</b>		<b>HYDROMETER</b>
	gravel	sand	silt and clay



**USCS Symbol**      **SC, TESTED**

**USCS Classification**    **CLAYEY SAND**

Tested By    BK      Date    11/28/12    Checked By    *KC*      Date    11-29-12

### WASH SIEVE ANALYSIS

ASTM D 422-63 (2007) SOP-S3

Client	TETRA TECH	Boring No.	SB-19
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-2
Lab ID	2012-528-01-09	Soil Color	<b>BROWN</b>

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	1433	Tare No.	NA
Wgt. Tare + Wet Specimen (gm)	343.29	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	343.29	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	144.71	Weight of Tare (gm)	NA
Weight of Water (gm)	0.00	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	198.58	Weight of Dry Soil (gm)	NA
<b>Moisture Content (%)</b>	<b>0.0</b>	<b>Moisture Content (%)</b>	<b>NA</b>

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	198.58
Dry Weight - 3/4" Sample (gm)	136.0	Weight of minus #200 material (gm)	62.58
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	136.00
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	0.00	0.00	0.00	100.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00	100.00
1/2"	12.50	0.00	0.00	0.00	100.00	100.00
3/8"	9.50	0.00	0.00	0.00	100.00	100.00
#4	4.75	8.30	4.18	4.18	95.82	95.82
#10	2.00	14.58	7.34	11.52	88.48	88.48
#20	0.850	12.30	6.19	17.71	82.29	82.29
#40	0.425	39.70	19.99	37.71	62.29	62.29
#60	0.250	30.73	15.47	53.18	46.82	46.82
#140	0.106	23.78	11.98	65.16	34.84	34.84
#200	0.075	6.61	3.33	68.49	31.51	31.51
Pan	-	62.58	31.51	100.00	-	-

Tested By BK Date 11/28/12 Checked By *KL* Date 11-29-12

### ATTERBERG LIMITS

ASTM D 4318-10 / AASHTO T89 (SOP - S4A)

Client	TETRA TECH	Boring No.	SB-19
Client Reference	NINE MILE RUN PHASE III 112G03820	Depth (ft)	2-4
Project No.	2012-528-01	Sample No.	SS-2
Lab ID	2012-528-01-09	Soil Description	<b>REDDISH BROWN LEAN CLAY</b>

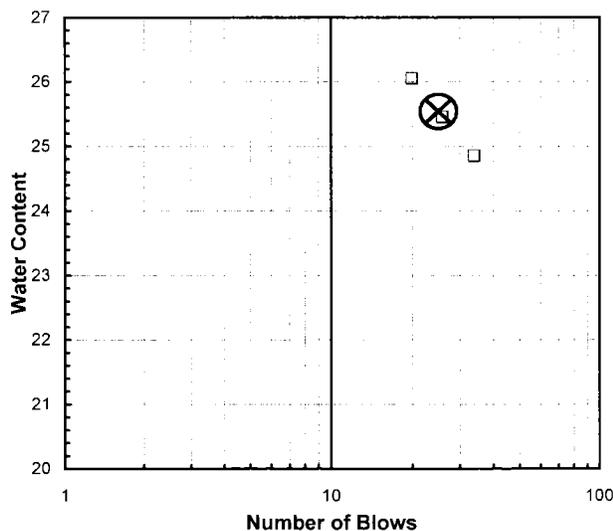
*Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.* (Minus No. 40 sieve material, Airdried)

Liquid Limit Test	1	2	3	M U L T I P O I N T
Tare Number	289	292	317	
Wt. of Tare & WS (gm)	36.29	43.88	33.22	
Wt. of Tare & DS (gm)	32.94	39.06	30.23	
Wt. of Tare (gm)	19.46	20.12	18.75	
Wt. of Water (gm)	3.4	4.8	3.0	
Wt. of DS (gm)	13.5	18.9	11.5	
<b>Moisture Content (%)</b>	<b>24.9</b>	<b>25.4</b>	<b>26.0</b>	
<b>Number of Blows</b>	<b>34</b>	<b>26</b>	<b>20</b>	

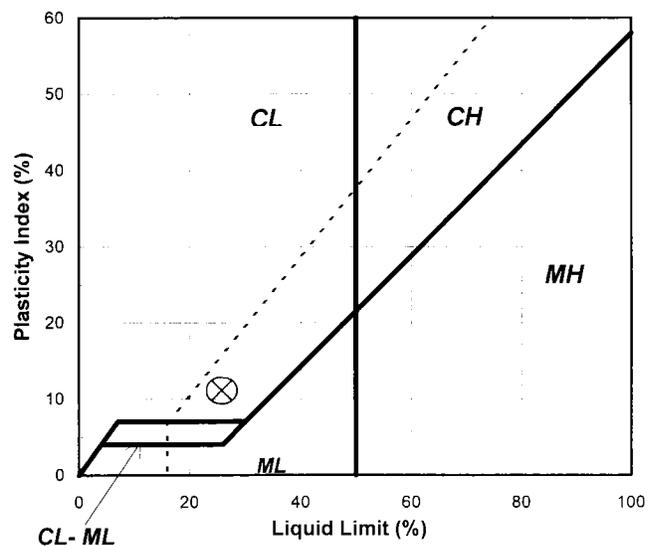
Plastic Limit Test	1	2	Range	Test Results
Tare Number	361	414		<b>Liquid Limit (%)</b> 26
Wt. of Tare & WS (gm)	23.19	19.97		<b>Plastic Limit (%)</b> 15
Wt. of Tare & DS (gm)	22.36	19.17		<b>Plasticity Index (%)</b> 11
Wt. of Tare (gm)	16.79	13.67		<b>USCS Symbol</b> CL
Wt. of Water (gm)	0.8	0.8		
Wt. of DS (gm)	5.6	5.5		
<b>Moisture Content (%)</b>	<b>14.9</b>	<b>14.5</b>	<b>0.4</b>	

*Note: The acceptable range of the two Moisture contents is  $\pm 2.6$*

**Flow Curve**



**Plasticity Chart**



Tested By JP      Date 11/26/12      Checked By HC      Date 11-29-12

## MOISTURE CONTENT

ASTM D 2216-10 (SOP-S1)

Client                    TETRA TECH  
 Client Reference      NINE MILE RUN PHASE III 112G03820  
 Project No.            2012-528-01

Lab ID	01	02	04	05	07
Boring No.	SB-14	SB-8	SB-6	SB-2	SB-12
Depth (ft)	0-5	5-15	0-10	2-4	6-8
Sample No.	NA	NA	NA	SS-1	SS-4
Tare Number	899	1723	537	20	20
Wt. of Tare & WS (gm)	644.09	911.9	921.8	122.37	45.06
Wt. of Tare & DS (gm)	580.52	821.92	831.39	101.7	39.86
Wt. of Tare (gm)	110.14	83.17	82.33	8.4	8.38
Wt. of Water (gm)	63.57	89.98	90.41	20.67	5.2
Wt. of DS (gm)	470.38	738.75	749.06	93.3	31.48
<b>Water Content (%)</b>	<b>13.5</b>	<b>12.2</b>	<b>12.1</b>	<b>22.2</b>	<b>16.5</b>

Notes :    NA

Tested By    PC                    Date    11/13/12    Checked By    *KC*                    Date    11-16-12  


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 page 1 of 1                    DCN: CT-S1 DATE 1-21-10 REVISION: 3                    C:\Users\Geojack\Documents\PRINT Q (LOCAL) [A649.XLS]Sheet1

**APPENDIX D**  
**JULY 27, 2011 CONSENT ORDER AMENDMENT**

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

**IN THE MATTER OF:**

Urban Redevelopment Authority of Pittsburgh	:	Clean Streams Law
	:	Solid Waste Management Act
	:	Hazardous Sites Cleanup Act
Summerset Land Development Associates, L.P.	:	Air Pollution Control Act
	:	Land Recycling and Environmental Remediation Standards Act
City of Pittsburgh	:	
	:	
Nine Mile Run Slag Disposal Site City of Pittsburgh Allegheny County	:	

**SECOND AMENDMENT TO JULY 14, 2000  
CONSENT ORDER AND AGREEMENT**

Made this 27<sup>th</sup> day of July, 2011, by and between the Commonwealth of Pennsylvania, Department of Environmental Protection (hereinafter "Department"), and Urban Redevelopment Authority of Pittsburgh (hereinafter "URA"), Summerset Land Development Associates, L. P. (hereinafter "Summerset"), and the City of Pittsburgh (hereinafter "City").

Findings

The Department has found and determined the following findings.

A. The Department is the agency with the duty and authority to implement the Land Recycling and Environmental Remediation Standards Act, Act of May 19, 1995, P.L. 4, 35 P.S. §§ 6026.101 - 6026.909 ("Land Recycling Act" or "Act 2"), and the duty and authority to administer and enforce the Clean Streams Law, Act of June 22, 1937, P.L. 1987, *as amended*, 35 P.S. §§ 691.1 - 691.1001 ("Clean Streams Law"); the Solid Waste Management Act, the Act of July 7, 1980, P.L. 380, *as amended*, 35 P.S. §§6018.101 - 6018.1003 ("SWMA"); the Hazardous Sites Cleanup Act, the Act of October 18, 1988, P.L. 756, 35 P.S. §§ 6020.101 - 6020.1305 ("HSCA"); the Air Pollution Control Act, Act of January 8, 1960, P.L. 2119, *as amended*, 35 P.S. §§ 4001 - 4015 ("APCA"); Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177, *as amended*, 71 P.S. § 510-17 ("Administrative Code"); and, the rules and regulations promulgated thereunder ("Rules and Regulations").

B. On July 14, 2000, the Department, Summerset, the URA, and the City executed a Consent Order and Agreement for the remediation and development of the Nine Mile Run Slag Disposal Site ("Site"). The July 14, 2000, Consent Order and Agreement ("July 14, 2000 CO&A") and the First Amendment to the July 14, 2000 Consent Order and Agreement referred to in the following Paragraph C are attached as Schedule F to the Contract for Disposition dated June 28, 2001 between URA and Summerset which was recorded in the Allegheny County Department of Real Estate on July 3, 2001 in Deed Book Volume 11098, page 54. Both are incorporated herein by reference.

C. On August 24, 2000, the Department, Summerset, the URA, and the City executed a First Amendment to the July 14, 2000 Consent Order and Agreement ("First Amendment").

D. Paragraph 47 of the July 14, 2000 CO&A provides, "no changes, additions, modifications, or amendments of this Consent Order and Agreement shall be effective unless they are set out in writing and signed by the parties hereto."

E. Paragraph O of the July 14, 2000 CO&A stated that the URA was to develop the Site over a 10 year period. To date, Phase I and Phase II A of the Site have been developed and the Department has granted Act 2 relief from liability for Phase I. The Parties and the Department have agreed to extend the development time frame for another 10 years from the date of execution of this Second Amendment for the completion of the development of the Site.

F. Paragraph T of the July 14, 2000 CO&A acknowledged that the Department issued NPDES Permit PA0217891 to the URA on June 7, 1999 ("NPDES Permit"). NPDES Permit has expired and a full and complete NPDES application is required for the remainder of the Phase II and entire Phase III Site development.

G. Paragraph Z of the July 14, 2000 CO&A and the Clean-Up Plan for Nine Mile Run Slag Area Final Report, dated May 1999, ("Cleanup Plan") defined final cover for the plateau area to be a mixture of four parts slag, four parts soil, and 1 part organic matter ("4/4/1 Mixture"), spread at a depth of two feet and overlaid with a one foot layer

of topsoil ("Final Cover"). The Cleanup Plan notes that only six inches (6") of soil cover is required to eliminate direct exposure to soil, however, the URA has proposed a twelve inch (12") depth for the clean soil cover.

H. The July 14, 2000 CO&A used the terminology of "topsoil" rather than "clean soil" in describing the twelve inches (12") of clean soil cover on the plateau area. The Department considers the term "topsoil" to be landscape quality soil ("Topsoil"). The URA, Summerset and the Department agree that clean soil will consist of either (i) the existing onsite pile of soil material located on the Site or (ii) material from off-site borrow sources determined by the URA to be acceptable based upon review of available information; such as site history and/or soil analysis ("Clean Soil").

I. The URA and Summerset proposed to the Department to modify the July 14, 2000 CO&A by allowing a Clean Soil alternative to the 4/4/1 Mixture as final cover on the plateau areas ("Modified Final Cover"). The Modified Final Cover would total thirty (30) inches, consisting of placing a base of twenty four inches (24") of Clean Soil over the slag and six inches (6") of Topsoil over the Clean Soil. In April 2006, GAI Consultants, Inc. (GAI") on behalf of the URA, submitted a Revised Clean-Up Plan, which was approved by the Department by letter to the URA dated November 30, 2010 that approved the use of the Modified Final Cover. The Modified Final Cover meets the Cleanup Plan requirement of the Final Cover by providing twenty-four inches (24") of material comprised of Clean Soil to sustain plant, shrub and tree growth, as well as at least six inches (6") of Topsoil to eliminate direct exposure to soil.

J. The URA constructed a Seep Intercept System ("SIS") to collect surface and groundwater that emanates through the slag prior to discharging into Nine Mile Run creek. The SIS is a response to the seeps described in Paragraph U of the July 14, 2000 CO&A and the obligation contained within Paragraph 12.b of the July 14, 2000 CO&A. The URA intends to convey ownership and maintenance of this SIS to the City at the completion of the development.

K. As described in Paragraph AM of the July 14, 2000 CO&A, the URA intended to convey to the City, through several separate conveyance documents, approximately 100 acres of the Site consisting mostly of the sloped areas of the Site. The conveyances will take place as each discrete portion of the sloped areas of the Site is covered and revegetated. Department and the Parties agree that conveyance can take place periodically after the Department approves the revegetation in each area for which the URA is seeking approval, provided URA agrees to maintain each revegetated parcel for five years after the date of the Department's approval.

L. Paragraph 13 of the July 14, 2000 CO&A required the URA to stabilize and revegetate the area between Biddle Street, the Jeep Trail and Nine Mile Run (Lower Slope) as needed, by November 30, 2002 or upon completion of the Corps' Project, whichever is later. The Parties agree that the Lower Slope (the area below the Jeep Trail) has not been adequately vegetated. The URA has conducted multiple studies and proposed various techniques to comply with the obligation contained in Paragraph 13 a. and 13 b. of the July 14, 2000 CO&A, however, the URA has not attempted, to date, to

cover and revegetate the exposed Lower Slope areas due to the difficulty that it has encountered in successfully revegetating that area.

After full and complete negotiation of all matters set forth in this Amendment and upon mutual exchange of covenants contained herein, the parties desiring to avoid litigation and intending to be legally bound, it is hereby ORDERED by the Department and AGREED to by Summerset, the URA and the City as follows:

1. This Amendment is an Order of the Department authorized and issued pursuant to Sections 5, 316 and 402 of the Clean Streams Law, 35 P.S. §§ 691.5, 691.316 and 691.402; Sections 104(7) and 602 of the SWMA, 35 P.S. §§ 6018.104(7) and 6018.602; Section 4 of the APCA, 35 P.S. § 4004; Section 301 and 501 of the Land Recycling Act, 35 P.S. §§ 6026.301 and 6026.501; Section 1917-A of the Administrative Code, 71 35 P.S. § 510-17.

2. Findings.

a. Summerset, the URA and the City ("Parties") agree that the findings in Paragraphs A through L are true and correct and, in any matter or proceeding involving any of the Parties and the Department, neither Summerset, the URA nor the City shall challenge the accuracy or validity of these findings.

b. The Parties do not authorize any other persons to use the findings in this Second Amendment in any matter or proceeding.

3. Paragraph O of the July 14, 2000 CO&A originally required the URA to develop all three phases of the Site within a 10 year period. The Department hereby extends the initial development timeframe by an additional 10 year time period from the date of execution of this Second Amendment subject to the possibility of further extensions by the Department upon written request by the any of the Parties.

4. Paragraph T of the July 14, 2000 CO&A and Paragraph F, above, noted the issuance to the URA of the NPDES Permit PA0217891 on June 7, 1999. This NPDES permit was not renewed and has expired.

i. The URA shall submit a full and complete application for a NPDES permit for the Phase II and Phase III within thirty (30) days of the execution of this Second Amendment.

5. Paragraph AM of the July 14, 2000 CO&A is deleted. Paragraph AM is replaced with the following:

AM. The URA intends to convey to the City, through separate conveyance documents, approximately 100 acres of the Site. This land includes, but is not limited to, the upper and lower outer slopes in Phase I, Phase II, and Phase III of the Site. The conveyance of these areas may take place separately after each area for which the URA intends to convey is covered and revegetated and such revegetated area is approved by the Department. URA will notify the Department in advance of its intention to convey any parcel to the City. Paragraph 26 c of the July 14, 2000 CO&A notwithstanding, URA agrees to maintain each revegetated parcel for five years after the

date of the Department's approval. The Department acknowledges that URA has conveyed to the City Parcel 5 in the Summerset at Frick Park Plan of Lots and Parcels 10, 11, 12 and 13 in Revision No. 9 to Summerset at Frick Park Plan of Lots and consents to those conveyances. The Department also consents to the dedication to the City of the streets in Phases IA, IB and IIA known as Crescent Place, Summerset Drive, Frick Lane, Hasley Lane, Zama Road, Overton Lane, Fairstead Lane, Sebak Street, Biltmore Lane, Burketon Way, McLean Place and Parkview Boulevard. The Department consents to URA's conveyance to the City of the parcels of land designated as Block and Lot Nos. 128-N-97 and 128-N-108, provided that the deed from URA to the City contains a reference to the CO&A, as amended, and prohibits the consumptive use of groundwater for any purpose and the removal of slag and Final Cover from the property and provides for the maintenance of any engineered or institutional controls employed at the property in accordance with the Final Cover Plan, as defined in the CO&A. The Department acknowledges that the current vegetative cover on Block and Lot Nos. 128-N-97 and 128-N-108 satisfy the Final Cover requirement. Furthermore, the Department acknowledges that the City's maintenance obligations only constitutes maintaining this cover. These conveyed parcels are part of the Department's approval of the Final Report for Phase I and therefore are entitled to liability protection under Section 501 of the Land Recycling Act. The lots and streets conveyed or dedicated to the City by the URA, as described in this paragraph, are identified on a map, attached hereto as Exhibit A.

6. Paragraph 6 of the July 14, 2000 CO&A is deleted. Paragraph 6 is replaced with the following:

6. The URA shall cause the placement of the approved Final Cover in the area of homes or apartments and related public areas. The approved Final Cover shall consist of either (i) a base of twenty-four inches (24") of acceptable clean soil material over the slag and at least six inches (6") of landscape quality topsoil over the clean soil or (ii) previously approved mixture of four parts slag, four parts soil, and one part organic matter ("4/4/1 Mixture") spread to a depth of two feet and overlaid with six inches (6") of landscape quality soil. The URA shall use reasonable means to limit access to unauthorized third parties to those portions of Phase II B and C and Phase III while those areas are under construction and where approved Final Cover has not been placed. Acceptable clean soil material shall mean either (i) the existing on-site piles of material located on the Site or (ii) material that has been determined to be acceptable by the URA based upon the procedure described in Paragraph I above. The approved Final Cover shall be placed on a particular parcel (i.e. home or apartment building) prior to occupancy and on public areas prior to use.

7. Paragraph 13 of the July 14, 2000 is deleted. Paragraph 13 is replaced with the following:

**Lower Slope**

13. (a) The URA must complete stabilization and vegetation of the area between Biddle Street, the "Jeep Trail" and Nine Mile Run ("Lower Slope") by December 31, 2015.

(b) Within 30 days of the execution of this Second Amendment, the URA shall submit a Lower Slope Revegetation Plan for review and approval. The Lower Slope Revegetation Plan should include, at a minimum: (i) a drawing showing proposed areas for revegetation and (ii) the method proposed to vegetate the identified areas.

(c) The URA will complete covering and the initial seeding of at least four test plots of the areas that require vegetation by December 31, 2012; however, if the contract between URA and the Department of Community and Economic Development, which provides funding for work on the Site under the Industrial Sites Reuse program and is scheduled to expire on June 30, 2011, is extended, then initial seeding of the four test plots will be completed by December 31, 2011.

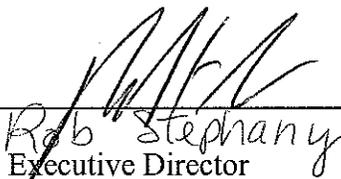
(d) Upon inspection of the test plots in accordance with the time frame set forth in the preceding Paragraph 13(c), the Department and the URA, or its designee, shall determine the effectiveness of the methods attempted and set a timetable to achieve the obligation contained in Paragraph 13 (a) above.

8. All other paragraphs of the July 14, 2000 CO&A and the First Amendment that are not specifically modified by this Second Amendment shall remain in effect.

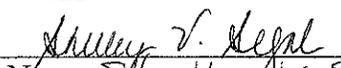
[SIGNATURE PAGES FOLLOW]

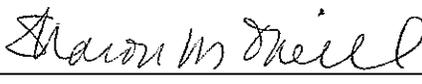
**IN WITNESS WHEREOF**, the Parties hereto have caused this Consent Order and Agreement to be executed by their duly authorized representatives. The undersigned representatives of the URA, the City and Summerset, certify under penalty of law, as provided by 18 Pa. C.S. § 4904, that they are authorized to execute this Consent Order and Agreement on behalf of the URA, the City and Summerset, respectively, and that the URA, the City and Summerset consent to the entry of this Consent Order and Agreement as a final ORDER of the Department; and that the URA, the City and Summerset hereby knowingly waive their rights to appeal this Consent Order and Agreement and to challenge its content or validity, which rights may be available under Section 4 of the Environmental Hearing Board Act, the Act of July 13, 1988, P.L 530, No. 1988-94, 35 P.S. 7514; the Administrative Agency Law, 2 Pa. C.S. § 103(a); and Chapters 5A and 7A; or any other provision of law. Signature by the attorneys certifies only that the agreement has been signed after consulting with counsel.

FOR URBAN REDEVELOPMENT  
AUTHORITY OF PITTSBURGH:

  
 Rob Stephany  
 Executive Director  
 Date 7/1/2011

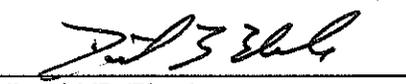
ATTEST

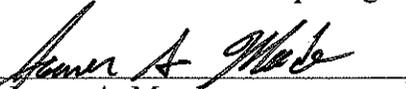
  
 Name Shelley V. Secal  
 Title Assistant Secretary  
 Date 7/1/2011

  
 Sharon McNeill  
 Date 7/1/2011

Attorney for Urban Redevelopment Authority  
of Pittsburgh

FOR THE COMMONWEALTH OF  
PENNSYLVANIA, DEPARTMENT OF  
ENVIRONMENTAL PROTECTION:

  
 David E. Eberle  
 Regional Manager  
 Environmental Cleanup Program  
 Date 7/27/11

  
 James A. Meade  
 Assistant Counsel  
 Date 7/27/11

FOR THE CITY OF PITTSBURGH

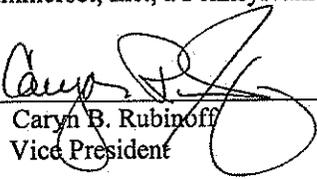
EXAMINED BY:

Clair G. Appel 7/14/11  
Name: Date  
Assistant City Solicitor

D. D. R. 7/15/11  
Name: Date  
City Solicitor

**SUMMERSET LAND DEVELOPMENT ASSOCIATES, L.P.**  
a Pennsylvania Limited Partnership

By: MRRC Summerset, Inc., a Pennsylvania Corporation, General Partner

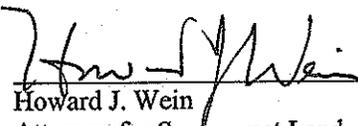
By:  \_\_\_\_\_ (SEAL)  
Caryn B. Rubinoff  
Title: Vice President

By: PF Real Estate Associates, L.P. a Pennsylvania Limited Partnership,  
General Partner

By: P.F. Summerset, L.L.C., a Pennsylvania Limited Liability Company, General Partner

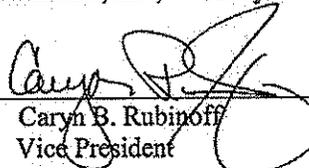
By: RKB, Inc., a Pennsylvania Corporation, Managing Member

BY: \_\_\_\_\_ (SEAL)  
Richard K. Barnhart, President

 \_\_\_\_\_  
Howard J. Wein                      7/7/11  
Attorney for Summerset Land              Date  
Development Associates, L.P.

**SUMMERSET LAND DEVELOPMENT ASSOCIATES, L.P.**  
a Pennsylvania Limited Partnership

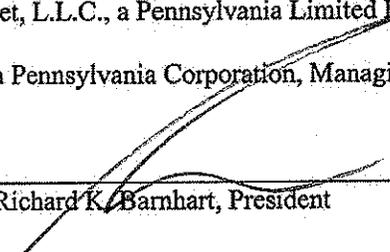
By: MRRC Summerset, Inc., a Pennsylvania Corporation, General Partner

By:  \_\_\_\_\_ (SEAL)  
Caryn B. Rubinoff  
Title: Vice President

By: PF Real Estate Associates, L.P. a Pennsylvania Limited Partnership,  
General Partner

By: P.F. Summerset, L.L.C., a Pennsylvania Limited Liability Company, General Partner

By: RKB, Inc., a Pennsylvania Corporation, Managing Member

BY:  \_\_\_\_\_ (SEAL)  
Richard K. Barnhart, President

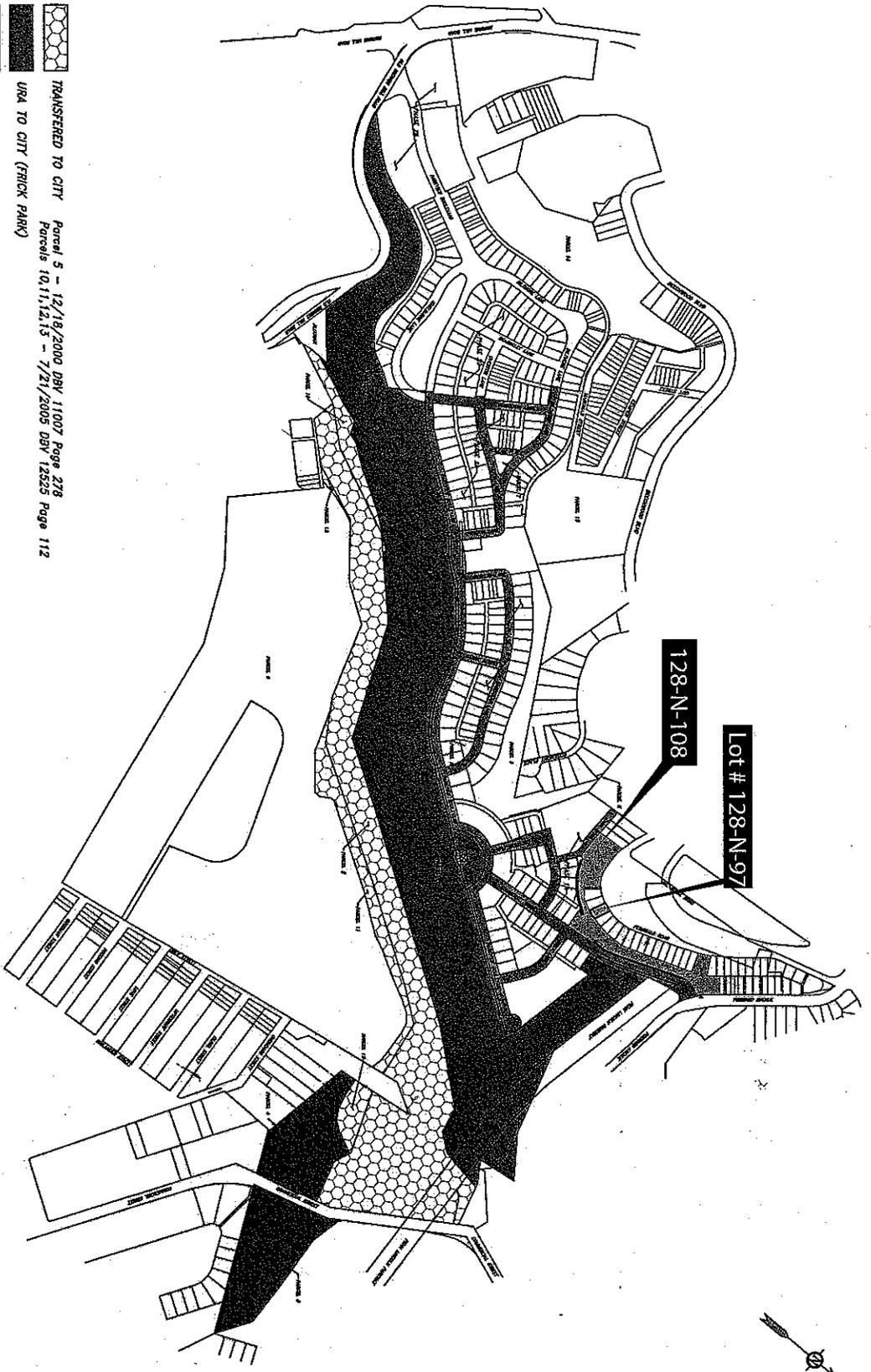
\_\_\_\_\_  
Howard J. Wein  
Attorney for Summerset Land  
Development Associates, L.P.

\_\_\_\_\_  
Date

Exhibit A

Lots and Streets of Phase I not previously conveyed.

-  TRANSFERRED TO CITY Parcel 5 - 12/18/2000 DBY 11007 Page 278
-  URA TO CITY (FRICK PARK) Parcels 10,11,12,13 - 7/21/2005 DBY 12525 Page 112
-  URA TO CITY ROW/STREETS
-  URA TO CITY (Greenway)



# Exhibit "A"