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June 4, 2007

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Cameron Johnson
Fac/Perm/Co ID# 01-05 | Date 8/7/13 | Doc ID# DIN

**RE: Coble's Sandrock C&D Landfill, Alamance County**
**Permit # 01-05 - Phase 3 Expansion**
**Response to DENR Comments and Revised Hydrogeologic Report**
**JEI Project No. 419.00; Task 27**

Dear Brian:

Enclosed please find a revised Hydrogeologic Report for the Coble's Sandrock C&D Landfill. This report incorporates the additional data and other changes requested in your letter dated June 15, 2006, and discussed in our meeting on October 12, 2006 and during subsequent phone conversations. Following is a point-by-point response to your questions and comments in the June 2006 letter.

DENR Comment #1: *Page 1 of the Hydrogeologic Report states, in part, the following: "The total acreage included in the Site Plan Application consists of approximately 139 acres in Alamance County ...". However, page 1 of the site suitability report states, in part, the following: "The proposed facility will include 114.4 acres in addition to the currently permitted 39.6 acres for a total facility area of 154.0 acres...". Please clarify the discrepancies of the new acreage to be added and the total acreage at the site.*

The acreage reported in the Site Suitability Report is correct. The currently permitted facility is 39.6 acres and the proposed expansion area is 114.4 acres so the total acreage for the proposed facility is 154 acres.

DENR Comment #2: *According to historical and current boring logs, construction diagrams for piezometers and monitoring wells, and groundwater elevation data (Table 5) submitted in the Report; the information compiled below by the SWS depicts some missing criteria... Based on some incomplete boring piezometer log information and water level data submitted thus far and noted above, site suitability for the new acreage 114.4 (?) acres and design study for Phase 3A, 3B cannot be determined at this time.*

Table 1 of the Hydrogeologic Report has been updated to include minimum and maximum water levels originally presented elsewhere in the report and to make some of the other data clearer. In some cases the "missing" data are not available, for example, some borings were terminated before reaching bedrock, so depths to bedrock are not available for those borings. In these cases, the minimum depth to bedrock is indicated by "> dd.dd" where dd.dd equals the total depth of the boring.

It should be noted that the majority of "missing" data are for old borings previously accepted by the Department of Environment and Natural Resources (DENR) as part of earlier permit applications. The piezometers with missing boring logs (P-2, P-2A, P-3 (now MW-6), P-4, P-5, P-6, and P-7) were installed by Trigon Engineering Consultants for the original permit application in 1997. Trigon did not include boring logs for these piezometers in the 1997 application. Data for these piezometers, such as depth to bedrock and groundwater levels, were presented in tables in the 1997 permit application. These data are included in Tables 1 and 5 of this report.

DENR Comment #3: *More Hydrogeological data is needed from borings in the proposed phase 3A and 3B areas. Presently, there is not enough complete boring/piezometer well data and boring number density at these proposed phases. It is the Solid Waste Section's policy that a minimum of one boring/piezometer per acre be installed within the proposed footprint(s) for design purposes. Also, an ample number of borings/piezometers need to be installed within the compliance area (250 feet from the footprint). As noted in the compliance table above, some of the historical borings/piezometers do not depict water levels at time of boring piezometer installation, nor depict historical high or low groundwater level trends (i.e.- B-2, B-3, B-4, B-5, C-3 within the proposed Phase 3B and B-1, C-1, and C-2 located near the existing C&D Phase 1; therefore, these borings represent incomplete data.*

In our meeting in October 2006 and during subsequent phone conversations, we discussed the need for additional borings in and around the Phase 3A and Phase 3B footprints. We agreed on installing three additional piezometers within the Phase 3A foot print (P-31, P-32, and P-33), 3 additional piezometers within the Phase 3B footprint (P-35, P-36, and P-37), and one additional piezometer just outside the Phase 3B footprint (P-38). These piezometers were installed between January 29 and February 5, 2007. The attached Revised Hydrogeologic Report presents the data from these piezometers, including soil analyses, core data, and slug test results. With the addition of these piezometers, there are now 6 existing wells/piezometers within the 6.3 acre footprint of Phase 3A (plus 1 abandoned boring with incomplete information) and 5 existing wells/piezometers within the 5.6 acre Phase 3B footprint (plus 2 abandoned borings and one abandoned well with incomplete information). In addition, there are 6 existing piezometers and 2 abandoned borings within 150 feet of the Phase 3A footprint and there are 3 existing piezometers, 2 abandoned piezometers, and 2 abandoned borings within 200 feet of the Phase 3B footprint.

DENR Comment #4: *There are not enough borings/piezometers and lithologic/hydrological data to adequately characterize the proposed additional 114.4 (?)acres for site suitability (i.e., especially on the eastern and southeastern side of the property.) It's the Solid Waste Sections policy that a minimum of one boring/piezometer per 10 acres be within the facility boundary for site suitability purposes. Also, some of the proposed new borings/piezometers need to be drilled and lithologically characterized to 50 feet below land surface according to Rule 15A NCAC 13B.0504(1)(c)(i)(E).*

Before the 2007 piezometer installations, there were 26 active monitoring wells and piezometers within the proposed 154 acre facility, which is one for every 5.92 acres. Eight of these borings extended to greater than 50 feet below the ground surface. Within the proposed 114.4 acre expansion area, there were 16 active monitoring wells and piezometers, which is one for every 7.15 acres. Four of these borings extended to greater than 50 feet below the ground surface. In addition, many of the borings that did not reach 50 feet below the ground surface did reach 15 feet or greater below bedrock. In a phone conversation in August 2006 and again in our October 2006 meeting, DENR agreed that the total number of borings/piezometers and the depths of characterization were adequate, but that there were two specific areas within the proposed expansion area that DENR believed were not adequately characterized. These were: (1) the area down gradient of the sedimentation pond on the east side of the facility, between the proposed waste area and the creek; and (2) near the southern end of the facility in the general vicinity of hand-augered piezometer P-27.

Since the creek is a potential receptor, piezometer P-34 was installed between the proposed waste area and the creek, down gradient of the sedimentation pond, to address the first area of concern. The data from this well, including soil analyses and slug test results, are included in the Revised Hydrogeologic Report.

The second area of concern was primarily focused on the lack of a boring near the southern end of the proposed facility that characterized the full stratigraphy to and including bedrock. As we discussed in our October 2006 meeting and phone conversations, this area is mostly low-lying, with very shallow groundwater and very soft, frequently saturated soil conditions, and some of this area may be considered wetlands. Since: (1) this area is not proposed for waste disposal due to shallow groundwater and possible wetlands impacts; (2) this area is hydrologically separated from the proposed waste areas by a groundwater discharge feature (a creek); therefore, a detailed hydrogeologic characterization of this area will not improve monitorability of the landfill; and (3) the area does not allow drill rig access without potential wetlands impacts; it was agreed that an additional piezometer was not needed in this area.

DENR Comment #5: *According to boring/piezometer logs in the Report and the compiled table above, some of the borings/piezometers (i.e.- B-1, B-2, B-3, MW-6, P-27, P-28, P-29, and P-30) do not show auger refusal (top of rock). Borings/piezometers need to show all lithological units, including top of bedrock (auger refusal).*

In cases where borings were terminated before reaching bedrock, the minimum depth to bedrock is assumed to be the total depth of the boring. Use of these minimum depths to constrain the depth to bedrock map results in a conservatively shallow bedrock map. Some of the piezometers installed for the original permit application in 1997 were installed using air-rotary drilling, so depth to bedrock based on auger refusal is not available. Trigon reported bedrock depths for these borings; however, these depths can only be considered estimates. In general, these depths were not used in producing the top of bedrock map presented in the Hydrogeologic Report. In most cases, Trigon's reported depth to bedrock is deeper than the bedrock surface as mapped, indicating that the bedrock map is conservative.

To better constrain the top of bedrock, all new piezometers installed in 2007 were installed using hollow-stem augers to auger refusal, then an air hammer to a minimum of 15 feet into bedrock, with the exception of P-34, which was advanced to auger refusal but not advanced into bedrock. The top of bedrock map and cross sections have been revised to incorporate these new data.

DENR Comment #6: *According to much of the existing boring/piezometer data submitted thus far, groundwater is noted below top of rock. Since this is the case, further characterization of the entire site (via more borings/piezometers, pump tests, etc.) is needed to determine if bedrock fractures are interconnected or not and if the site can be adequately monitored for the new Construction and Debris landfill phases.*

Although we distinguish between saprolite, partially weathered rock (PWR), and bedrock as lithological units at this site, we believe that there is ample evidence that the hydrologic characteristics of these units do not vary significantly and that they are strongly interconnected. It is reasonable to believe that groundwater flowing through these units will behave as if the units are a single, continuous aquifer; therefore, groundwater will be easily monitored, even where it is below the top of bedrock.

Rock core was obtained from two of the piezometer borings advanced in 2007, one in the Phase 2A footprint (P-32) and one in the Phase 2B footprint (P-37). Evidence from these rock cores, as well as the seven rock cores obtained prior to 2007, indicate that bedrock is highly fractured and weathered to a depth of at least 50 feet. Both strike and dip of fractures observed in cores appeared random. Evidence from topographic fracture trace analyses also shows that fracture orientations are generally random. These observations indicate that bedrock fractures are highly interconnected and are not expected to exhibit preferential flow paths or directions. The observed weathering profile on the site also indicates fractured bedrock is well connected to the overlying PWR and saprolite zones.

Evidence of strong hydrologic connection between shallow and deep portions of the aquifer can be seen in the three nested pairs of piezometers on the site. Monitoring wells MW-10S and MW-10D, piezometers P-9S and P-9D, and abandoned piezometers P-2 and

P-2A, are all pairs located very close to each other, but with significantly different screened intervals. By comparing the water levels in two such paired wells, we can determine the vertical hydraulic gradient. In general, a low vertical gradient means the deep and shallow zones are well-connected and behave as a single aquifer. The vertical gradients for these three pairs based on historic groundwater elevations are shown in Table 7 in the Revised Hydrogeologic Report. The very low vertical hydraulic gradients observed at this site are a strong indication that there is good connectivity between shallow and deep portions of the aquifer and that the bedrock and saprolite/PWR units act as a single aquifer.

Another line of evidence supporting the contention that the saprolite, PWR, and bedrock units can be monitored effectively, as if they are a single aquifer, comes from the slug test data collected for monitoring wells and piezometers on the site. Additional rising and falling head slug tests were performed on all of the new piezometers, plus piezometer P-20 in February 2007. Of the 23 wells/piezometers with slug test results, 12 were screened mostly or completely in fractured bedrock and 11 were screened in the saprolite/PWR zone. For many of these wells/piezometers, both rising-head and falling-head tests were conducted. The average hydraulic conductivities determined from the slug tests were 1.95E-04 cm/sec for the bedrock and 1.47E-04 cm/sec for the saprolite/PWR (see Table 2 in the revised Hydrogeologic Report). The very similar ranges of hydraulic conductivities indicate that there is little or no significant difference between the saprolite/PWR zone and the fractured bedrock in terms of groundwater flow.

If you have any further questions or comments regarding this workplan or other issues concerning this site, please email me at me at vburbach@joyceengineering.com or call me at (336) 323-0092. We appreciate all of your input on this project and look forward to working with you in the future.

Sincerely,
JOYCE ENGINEERING, INC.

Van Burbach

Van Burbach, Ph.D., PG
Senior Project Hydrogeologist

Copy: Kent Coble, Coble's Sandrock
JEI File

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01-05

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**Prepared for:**

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**JEI PROJECT NO. 419.00, TASK 27**

Received JUN 2007 Solid Waste Section

Received JUN 2007 Solid Waste Section

# COBLE'S SANDROCK, INC.
# ALAMANCE COUNTY, NORTH CAROLINA
# CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL

# VOLUME I
# SITE APPLICATION

SECTION 1 – SITE SUITABILITY REPORT
**SECTION 2 – HYDROGEOLOGIC REPORT**

**MARCH 2006**
**REVISED - JUNE 2007**

Carmen Johnson
Fac/Perm/Co ID # 01-05 | Date 8/7/13 | Doc ID# DIN

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**Liberty, North Carolina 27298**

**JEI PROJECT NO. 419.00, TASK 27**

# COBLE'S SANDROCK, INC.
# ALAMANCE COUNTY, NORTH CAROLINA
# CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL

# VOLUME I
# SITE APPLICATION

SECTION 1 – SITE SUITABILITY REPORT
**SECTION 2 – HYDROGEOLOGIC REPORT**

**MARCH 2006**
**REVISED - JUNE 2007**

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# SITE APPLICATION
# VOLUME ONE – SECTION II

# HYDROGEOLOGIC REPORT & GROUNDWATER MONITORING PLAN

# COBLE'S SANDROCK CONSTRUCTION AND DEMOLITION LANDFILL EXPANSION

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NORTH CAROLINA LICENSED SEAL 1349 GEOLOGIST G. VAN NESS BURBACH

*Prepared by:* G. Van Ness Burbach, Ph.D., P.G.

*Reviewed by:* Michelle M. Brown

**Certification Statement:**

We certify that the Water Quality Monitoring Plan included in this report, when implemented, will be effective in providing early detection of any release of hazardous constituents to the uppermost aquifer, so as to be protective of public health and the environment.

# *COBLE'S SANDROCK C and D LANDFILL SITE APPLICATION – HYDROGEOLOGIC REPORT (VOLUME I – SECTION 2)*

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# 1.0 INTRODUCTION AND OVERVIEW

In accordance with the NC Solid Waste Management Rules (NCSWMR) § .0504(1)(c and g), Coble's Sandrock is submitting this portion (Volume One, Section II) of the Site Application, which includes the Hydrogeologic Report and Groundwater Monitoring Plan, for a construction and demolition debris (C and D) landfill expansion at the Coble's Sandrock site in Alamance County, North Carolina. The purpose of this portion of the Site Application is to demonstrate general hydrogeologic site suitability for the facility acreage. A Construction Plan Application for the proposed landfill is being submitted as Volume Two of this report.

The property included in this Site Plan Application consists of approximately 154 acres in Alamance County, one half mile east of Kimesville, North Carolina and approximately eight miles south of Burlington, North Carolina. The 154 acres includes the currently permitted 39.6 acres plus an adjacent expansion area of 114.4 acres. The current C and D facility has been in operation since 1998 on the currently permitted 39.6 acres previously approved for site suitability. It includes a total of 12.86 acres approved for waste disposal, including Phase 1 (7.0 acres), Phase 2A (1.1 acres), and Phase 2B (4.76 acres). The proposed 114.4 acre expansion property is contiguous with and south and east of the currently permitted facility, and includes two proposed new waste cells, Phase 3A (6.3 acres) and Phase 3B (5.6 acres).

The details of the investigations conducted to characterize this facility are documented in this report. This report provides a detailed Hydrogeologic Report (Section 3.0) prepared in accordance with NCSWMR .0504(c), and a Groundwater Monitoring Plan (Section 4.0) prepared in accordance with NCSWMR .0504(g). Please note that the legend for the drawings referred to in the above documents is provided on Drawing DH-1. Use of the word "site" during the following discussions includes all 154 acres within the property boundaries of the proposed facility.

The results of this investigation show that this area meets all conditions for site suitability for a C and D Landfill. The bedrock elevations and seasonal high water table can be reasonably determined based on the available data. The groundwater monitoring network will be effective in monitoring for a potential release from the C and D disposal area in a manner that will be protective of current or potential groundwater users downgradient of the proposed facility.

# 2.0 SITE DESCRIPTION

This section describes the site location, its physical layout, and current land usage. Specific information regarding land usage in and around the site and geologic and hydrogeologic characteristics are discussed in subsequent sections of the report.

The site location, property boundaries, and surrounding topography are shown on Drawing DH-2. The site is located in the Piedmont physiographic province on a group of knolls and valleys. The northeast-flowing Poppaw Creek is located along the northern facility property line. Two primary drainages (small, intermittent creeks) transect the site and flow into Poppaw Creek. One of the drainages flows west-southwest across the southern half of the site and has a 2- to 4-acre man-made

pond at its upstream limit in the southeastern corner proposed site property. The other drainage flows north-northwest, roughly parallel to the eastern site boundary, and is fed by outflow from a small pond located on the site property and by two smaller, spring-fed drainages which flow into it from off the site property to east. These streams and ponds are shown on Drawing DH-2.

Agricultural fields comprise much of the proposed expansion area. Trees and heavy brush occupy the southwestern portion of the proposed area. A Land Clearing and Inert Debris (LCID) Landfill is located in the southeastern corner of the site. Another LCID Landfill is located adjacent to and southeast of the existing C and D Landfill.

# 3.0 HYDROGEOLOGIC REPORT

## 3.1 Previous Investigations

A site suitability study titled *Construction and Demolition Landfill Permit Application Siting Requirements* was performed by Trigon Engineering Consultants, Inc. and submitted to the Solid Waste Section on December 16, 1997, for the 39.60 acres where the current C and D Landfill operates. During the 1997 investigation, three monitoring wells (MW-1, MW-2, and MW-4) and eight piezometers (P-1, P-2, P-2A, P-3, P-4, P-5, P-6, and P-7) were installed. Piezometer P-1 was converted to upgradient monitoring well MW-3. Six soil borings (B-1, B-2, B-3, B-4, B-4A, and B-5) and three rock cores (C-1, C-2, and C-3) were also advanced in 1997. Two temporary wells (TW-1 and TW-2) were installed in borings from which rock core samples were obtained in June and July 1998 for additional site characterization. A summary of these borings is included as Table 1 and the available boring logs are located in Appendix DH-1. Trigon did not produce boring logs for piezometers P-1 through P-7, but reported depth to bedrock and other parameters in tables in their 1997 permit application.

Slug tests were performed on selected wells in 1997 to determine the hydraulic conductivity of the uppermost aquifer and the data were analyzed using the Bouwer and Rice Method. A summary of the aquifer tests is included as Table 2. Soil samples were also taken from selected borings as bag and undisturbed samples and laboratory tested for gradation, USCS classification, Atterberg Limits, permeability, and porosity. A summary of soil analyses are included as Table 3.

The initial waste disposal cell (Phase 1) had a 5.85-acre footprint situated within the 39.6-acre facility. During the initial permitting process, the facility obtained a local government franchise agreement for 7.0 acres. A modification to the Coble's Sandrock C and D Landfill Permit was prepared and submitted by Joyce Engineering, Inc. in the document entitled *Request for Modification to Construction and Demolition Debris Landfill Permit No. 01-05*, dated June 2, 2001, for expansion of the active waste cell by 1.15 acres in order to maximize the franchised acreage. In a letter from the Solid Waste Section, dated January 24, 2002, approval for the 1.15 acre expansion was granted, making the Phase 1 waste disposal footprint 7.0 acres. On September 4, 2001, Coble's Sandrock C and D Landfill was granted a five-year franchise extension, allowing for additional development within the 39.6 acre facility. The limits of the 2001 expansion are shown on Drawing DH-2.

Monitoring well MW-5 was installed and incorporated into the compliance groundwater monitoring network in January 2002. The boring log for MW-5 is located in Appendix DH-2.

A Construction Plan Application for Phase 2 of the Coble's Sandrock Construction and Demolition Landfill was prepared and submitted by Joyce Engineering, Inc. on June 18, 2002. Phase 2 site development included two new C and D disposal cells (identified as Phase 2A and Phase 2B), and filling within the existing C and D Disposal area to increase final grades from 3.5H:1V to 3H:1V on the side slopes. Phase 2 totals approximately 5.86 acres in size, with Phase 2A consisting of approximately 1.10 acres and Phase 2B consisting of approximately 4.76 acres. The limits of the Phase 2 cells are shown on Drawing DH-2. Piezometers P-6 and P-7 were abandoned in order to construct Phase 2B. Background well MW-3 was replaced with MW-6 (formerly P-3) and downgradient well MW-5 was replaced with MW-7 (Drawing DH-2). The boring log and the well construction diagram for MW-7 are included in Appendix DH-2. Table 1 presents available well construction details for the wells discussed above.

#### 3.1.1 Available Data from Monitoring Wells

As stated above, three monitoring wells (MW-1, MW-2, and MW-4) and eight piezometers (P-1, P-2, P-2A, P-3, P-4, P-5, P-6, and P-7) were installed during the Phase 1 site suitability study to characterize the uppermost aquifer. A letter dated September 18, 1998 from Trigon Engineering Consultants, Inc. to the Solid Waste Section stated that piezometer P-1 was converted to an upgradient monitoring well now known as MW-3. The sampling of the four monitoring wells began in September 1998 and continued semiannually through the April 2003 event. After April 2003, MW-3 was replaced with MW-6 (formerly P-3) as the upgradient background well. Well MW-5 was added to the compliance network before the April 2002 sampling event, but was replaced with MW-7 before the November 2003 sampling event at the request of the Solid Waste Section. Piezometers P-2 and P-2A were abandoned in order to construct Phase 1, and piezometers P-6 and P-7 were abandoned in order to construct Phase 2B. The available boring logs associated with the previous drilling programs have been included in Appendix DH-1.

#### 3.1.2 Conclusions from Previous Investigations

The groundwater analytical results since September 1998 have not indicated statistically significant increases of any groundwater monitoring constituents. This supports the assertion that the proposed expansion would be suitable for a C and D Landfill.

### 3.2 Scope of Current Investigation

The original field activities for this investigation were performed in January and February 2002 and consisted of installing ten piezometers (P-15, P-16, P-17, P-18, P-19S, P-19D, P-20, P-21, P-22, and P-23) and one monitoring well (MW-5). In addition, MW-7 was installed in December 2002. Split-spoon and/or undisturbed soil samples were obtained for analyses and rock core was obtained from the boring for P-21. The 2002 field activities also included a field survey of the new piezometers, development of piezometers, aquifer testing of piezometers, measurement of static groundwater elevations, and site reconnaissance to locate outcrops. The field activities are described in detail

below. Interpretation of the data collected during these activities is provided in subsequent sections of this report.

A second phase of field activities for this investigation was performed between March and September 2005 and consisted of installing three piezometers (P-24, P-25, and P-26), four hand-augered piezometers (P-27, P-28, P-29, and P-30), and four monitoring wells (MW-8, MW-9, MW-10S, and MW-10D). Split-spoon and/or undisturbed soil samples were obtained for analyses and rock core was obtained from the boring for P-26. Field activities in 2005 also included development of select piezometers and monitoring wells, aquifer testing of select piezometers and monitoring wells, a magnetometer survey for dikes, and measurement of static groundwater elevations. The field activities are described in detail below. Interpretation of the data collected during these activities is provided in subsequent sections of this report.

A third phase of field activities for this investigation was performed between January and March 2007 and consisted of installing eight piezometers (P-31, P-32, P-33, P-34, P-35, P-36, P-37, and P-38). Split-spoon and/or undisturbed soil samples were obtained for analyses and rock core was obtained from two borings (P-31 and P-37). Field activities in 2005 also included development and aquifer testing of the new piezometers plus P-20. The field activities are described in detail below. Interpretation of the data collected during these activities is provided in subsequent sections of this report.

### 3.2.1 Subsurface Investigations

Ten piezometers (P-15, P-16, P-17, P-18, P-19S, P-19D, P-20, P-21, P-22, and P-23) and one monitoring well (MW-5) were installed in and around the proposed C and D facility boundary between January 16 and 31, 2002. Bedford Well Drilling, Inc. of Bedford, Virginia, performed drilling and well installation activities. The drilling equipment consisted of an Ingersoll-Rand A-300 drilling rig equipped with 2.25 and 4.25-inch inner diameter (ID) hollow stem augers and an NQ rock core barrel, and an Ingersoll-Rand T3W drilling rig equipped with 6.0 and 10-inch outer diameter (OD) downhole hammers. Well MW-7 was installed on December 12, 2002 by Graham and Currie, Inc. using an Ingersoll-Rand T3W drilling rig equipped with 6.25-inch OD tricone bit.

Three piezometers (P-24, P-25, and P-26) and four monitoring wells (MW-8, MW-9, MW-10S, and MW-10D) were installed in and around the proposed Phase 3A waste cell limits between March 21 and 28, 2005. South Atlantic Environmental Drilling and Construction Company (SAEDACCO) of Fort Mill, South Carolina, performed drilling and well installation activities. The drilling equipment consisted of a Gus Pech GP1100E drilling rig equipped with 4.25 to 8.25-inch ID hollow stem augers, 5.75 to 8.25-inch OD downhole hammers and an NQ rock core barrel.

Four hand-augered piezometers (P-27, P-28, P-29, and P-30) were installed in the southern portion of the proposed C and D facility boundary using a 2.5-inch OD hand auger on April 4, 2005. These piezometers were installed using a hand-auger because they were located in a low-lying, partially inundated area where access with a drilling rig was not possible.

Between January 29 and February 5, 2007, eight piezometers were installed by SAEDACCO using a GP-1100E Drilling Rig with 8.25-inch OD hollow-stem augers to auger refusal, then a 6-inch OD air-hammer to total depth. Of these eight piezometers, three (P-31, P-32, and P-33) were installed in the Phase 3A footprint, one (P-34) was installed near the creek on the eastern side of the expansion property, and four (P-35, P-36, P-37, and P-38) were installed in or near the footprint of Phase 3B. Rock core was obtained from P-32 and P-27 using a 2-inch NQ core barrel and then the borings were over-drilled with the 6-inch air-hammer.

In addition to the rock core obtained during previous investigations, four boreholes (P-21, P-26, P-32, and P-37) were chosen for rock coring during the 2002, 2005, and 2007 investigations. Approximately 6.0 feet of rock core was obtained from the P-21, 23.5 feet of rock core was obtained from the P-26 borehole, and 15 feet of rock core was obtained from each of the borings for P-32 and P-37. A tricone bit or air hammer was used to advance the boring below the auger refusal depth before beginning the core runs. The rock core data are summarized in Table 4.

An experienced JEI geologist was present to observe the drilling and rock coring, log the boreholes, and supervise the piezometer and well construction during the 2002, 2005, and 2007 investigations. The locations of these piezometers and monitoring wells are provided on Drawing DH-2. An experienced JEI technician developed selected piezometers. The drilling and well construction data are summarized in Table 1. The boring logs for these borings are included in Appendix DH-2.

Well/piezometer construction was performed in accordance with the standards described in the *RCRA Technical Enforcement Guidance Document* (1986) and the *Draft North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities* (1995). Split-spoon samples were obtained at five-foot intervals and logged by the geologist for all of boreholes except P-19S and MW-10D. Split-spoon samples were not collected from P-19S and MW-10D because spilt-spoon samples were obtained from adjacent borings P-19D and MW-10S.

Drill-rig-installed piezometers P-19S and P-34 and hand-augered piezometers P-27, P-28, P-29, and P-30 were installed in the saprolite unit and range in depth from 4 to 23 feet below ground surface (bgs), with screens that range from 2 to 15 feet in length. Monitoring wells MW-5 and MW-7 and piezometers P-20 and P-22 were installed in the saprolite/partially weathered rock (PWR) transition zone and range in depth from 10 to 30 feet bgs, with screens that range from 6 to 15 feet in length. Piezometer P-18 was installed in the PWR unit to a depth of 34 feet bgs, with a screened interval 15 feet in length. Piezometers P-35, P-36, P-37, and P-38 were installed in the PWR/bedrock transition zone to depths of 30-40 feet bgs, with screened intervals of 20-feet. Piezometers P-15, P-16, P-17, P-19D, P-21, P-23, P-24, P-25, P-31, P-32, and P-33 were installed in bedrock and range in depth from 35 to 62.5 feet bgs, with screened intervals that range from 10 to 25 feet in length.

Lockable expansion caps were installed into the top of each well or piezometer casing. Monitoring Wells MW-5, MW-8, MW-9, MW-10S, MW-10D and piezometers P-15, P-16, P-17, P-19S, P-19D, and P-23 were covered by lockable aluminum standpipes installed into 3-foot x 3-foot x 0.5-foot concrete aprons to protect their integrity. Piezometer P-18 was installed with a 6-inch flush mount well cover in a 2-foot x 2-foot x 0.5-foot concrete apron. All other piezometers that will be

converted into permanent monitoring wells will have lockable aluminum standpipes and pads installed prior to the first sampling event. Piezometers P-20, P-21, P-24, P-25, P-31, P-32, P-33, P-34, P-35, P-36, P-37, and P-38 were grouted to the surface and lockable expansion caps installed into the top of each casing. Piezometer P-22 and hand-augered piezometers P-27, P-28, P-29, and P-30 were finished with bentonite placed to the surface and a lockable expansion cap installed into the top of the casing. The well construction information is summarized in Table 1 and boring logs for the groundwater monitoring wells and piezometers are contained in Appendices DH-1 and DH-2.

Following construction, monitoring wells MW-5 and MW-9 and piezometers P-16, P-17, P-18, P-19S, P-19D, P-20, P-21, P-22, P-25, P-31, P-32, P-33, P-34, P-35, P-36, P-37, and P-38 were developed with a submersible pump with surge block, bailer, or a combination to remove accumulated sediments resulting from the drilling and well construction process, and to hydraulically connect the wells with the surrounding soils. The surge block was used to loosen the disturbed sediments. Once the wells were thoroughly surged, the water-sediment mixture was removed and the wells were allowed to recharge. This process was repeated until sediment-free water could be obtained from the wells and/or until well conditions stabilized. Approximately 10 to 52.5 gallons (or up to 21 casing volumes) of water, depending on recharge rates, were removed from each well during the development process. Other piezometers that will be converted into permanent monitoring wells will be developed using these procedures prior to the first sampling event.

Monitoring well MW-5 and piezometers P-15, P-16, P-17, P-18, P-19S, P-19D, P-20, P-21, P-22, and P-23 were surveyed in January and February 2002 by Tritech Civil Environmental, P.C. (Tritech), of Asheboro, North Carolina. Monitoring wells MW-8, MW-9, MW-10S, and MW-10D, water supply well WW-1, piezometers P-24, -25, and -26, and hand-augered piezometers P-27, P-28, P-29, and P-30 were surveyed in April 2005 by Tritech. Piezometers P-31, P-32, P-33, P-34, P-35, P-36, P-37, and P-38 were surveyed in February 2007 by Tritech. The survey data prepared by Tritech is provided as Appendix DH-3. Wells and piezometers were surveyed to at least the following levels of accuracy: the horizontal location to the nearest 0.1 foot; the vertical control for the ground surface elevation to the nearest 0.01 foot; and the vertical control on the top of the inner PVC well casing to the nearest 0.01 foot.

Groundwater levels were measured for existing site monitoring wells and piezometers during periodic site visits. The measurements were collected using a decontaminated electric water level meter. The surveyed point on the top of the well casing was used as reference, and the measurements were recorded to within 0.01 foot. The groundwater elevation data were used to construct a groundwater potentiometric surface map, and to infer groundwater flow directions in the area. A historic summary of the depth to groundwater measurements and static groundwater elevations for all wells and piezometers is included in Tables 5a and 5b, respectively. Water levels measured on March 6, 2007 were used to prepare a groundwater surface contour map for the site (Drawing DH-3).

### 3.2.2 Hydrogeologic Testing

Following rigorous well development, aquifer testing was performed on many of the monitoring wells and piezometers. The purpose of the testing was to assess the values of horizontal hydraulic

conductivity at various locations within the saprolite, PWR, and bedrock potions of the aquifer at the site. In situ rising and falling-head tests (slug tests) were chosen for the assessment due to the relatively low well yields noted during well installation and development. Well MW-5 and piezometers P-16, P-17, P-19S, P-19D, P-21, and P-22 were tested in February-March 2002. Well MW-9 and piezometers P-18 and P-25 were tested in September 2005. Piezometers P-31, P-32, P-33, P-34, P-35, P-36, P-37, and P-38 were tested in February 2007.

Prior to slug testing, the monitoring wells were opened and groundwater levels were allowed to equilibrate. Water level measurements were then collected using an electric water level probe referenced to a point on the top of casing. For the 2002 and 2005 slug tests, a pressure transducer was lowered into the well casing and placed approximately one foot from the bottom of the well and the transducer was connected to an *In-Situ SE 1000C* data logger. For the 2007 slug tests, individual *In-Situ Mini-Troll* data loggers were placed into the well casing and set 1-3 feet above the bottom of the well. A polyvinyl chloride (PVC) slug measuring five feet in length or PVC bailers were used to displace water inside the wells.

For the tests using the PVC slug, the first portion of the test was a falling-head test that measured the rate water levels fell back to static after the introduction of the slug. The data logger recorded water level data from the transducer at logarithmic time intervals. Data from the transducer/data logger were verified with hand held water level readings. Falling-head tests were terminated after water levels had recovered to within 95% of their pre-test level. A rising-head test was performed on each well after the falling-head test was completed. In some cases, only rising-head tests were performed after the water level had equilibrated. The rising-head test was conducted by initiating a new logarithmic recording step on the data logger simultaneous with the removal of the PVC slug. The data were verified with hand held water-level readings, and the test was terminated after water levels had recovered to within 95% of the pre-test level. For tests using a bailer, the first test performed was the rising-head test after a volume of water was removed from the well, after which the falling-head test was performed after returning the full bailer to the well.

In situ rising- and falling-head tests provide a quantitative estimate of horizontal hydraulic conductivity (K) and a qualitative estimate of aquifer anisotropy in water-bearing units. The slug test data were analyzed using the Bouwer and Rice (1976 and 1989) equation, which is applicable to fully or partially penetrating wells in unconfined or confined aquifers. Aquifer thicknesses of 7.6-50.0 feet were assumed for all aquifers based upon information supplied on the boring logs. A packing porosity of 25% was assumed for the well filter pack. For the 2002 and 2005 slug tests, computer software produced by Starpoint Software, Inc. was used in the analysis and plotting of the data. For the 2007 slug tests, an Excel-based spreadsheet published by the United States Geological Survey (USGS, Halford and Kuniansky, 1998) was used in the analysis and plotting of the data. The individual data points and computer plots of time versus water level change are presented in Appendix DH-4. A summary of the results of all aquifer testing performed at the site is presented in Table 2. Data from P-31 were not usable due to non-linear recovery, possibly a result of well-skin effects. Data from P-32 and P-33 were poor due to rapid recharge and resulting low initial drawdown; however, the results were consistent and reasonable, and so they are included in Table 2.

## 3.3 Regional and Local Geology

This section of the report describes the geology of the site. The geology is evaluated with respect to the performance of engineered features upon the land surface in the proposed cell areas, the groundwater flow regime, and the ability to effectively monitor water quality at the site.

### 3.3.1 Bedrock Geology

The study site is located within the Carolina Slate Belt in the central Piedmont physiographic and geological province. The relevant geological features are shown on the 1:250,000-scale *Geologic Map of Region G* (Carpenter, P. A., 1982) included as Appendix DH-5. Geologic unit designations and descriptions used in this report are defined in *The Central Piedmont* (Butler and Secor, 1991).

The Carolina Slate Belt is made up of metamorphosed sediments, volcanics, and intrusive igneous rocks. The *Geologic Map of Region G* shows the site is underlain by a felsic intrusive complex. The map legend describes the complex as white to gray, fine- to coarse-grained, massive to foliated, metamorphosed bodies of assemblages of intimately associated felsic intrusive rock types. The rock types vary from granite, granodiorite, quartz diorite, to quartz monzonite. Narrow mafic dikes are common within the felsic intrusive units. This region is also characterized by regional- and small-scale Mesozoic diabase dikes. Most of the dikes are near-vertical in dip and trend north-south to northwest-southeast and are characterized by plagioclase, augite and olivine (Ragland, 1991).

The rock seen in float and/or large outcrop, as well as rock core from this site was predominantly medium-grained biotite-muscovite granite (Photographs 1-2 in Appendix DH-6). Foliation has been observed locally at an outcrop near P-5 (Photograph 3). Otherwise, site outcrops of granite were massive, with very little to no observed structure or foliation. No diabase dikes have been observed at the site, but numerous mafic (meta-volcanic) dikes do exist, most of which have been detected near the current C and D Landfill. During the original site plan investigation, Trigon located one such dike in that area that strikes N 125° W. Two similar features with a similar strike may exist under the site's Land Clearing and Inert Debris (LCID) Landfill, as noted by Trigon.

Other mafic dikes have been detected in recent field investigations. One such dike is located eighteen feet due west of monitoring well MW-1 and trends N 45° E. The dike has an approximate two-foot wide surface exposure and visibly extends ninety-three feet (Photograph 4). Another dike is located 135 ft due south of MW-3 and trends N 45° E. Its surface exposure is approximately 6 ft wide and visibly extends 60 ft (Photograph 5). Numerous other smaller dikes cut across the surface at similar trends, some of which can be seen in Photograph 6. The observed material that makes up these dikes are highly weathered, highly fractured, fine-grained mafic rock that appears to be meta-volcanic. It weathers to a soft, yellow to black rock.

At the request of the Solid Waste Section, JEI performed a magnetometer survey on April 10-20, 2005 to locate metavolcanic and diabase dikes across the site. A report detailing the event and results is included as Appendix DH-7. In general, the survey located a few small areas of elevated magnetic field strength that may represent metavolcanic dikes. The most pronounced of these are located in the west-central part of the site between piezometers P-16 and P-5 and in the north-

northeast portion of the site. These areas of elevated magnetic field strengths are considered to be too weak to represent diabase.

### 3.3.2 Joints and Fractures

A general conceptual model of fracture distribution at the site is useful for predicting preferred groundwater flow pathways. The model described below is based on the topography of the area surrounding the site, fracture orientations and densities in site outcrops (or lack thereof) and inferences from regional and site geology.

Topography of the area surrounding the site is shown on the Site Location Map on Drawing DH-1. The orientation of many first and second order stream segments may have been determined by geomorphological development of slopes draining to Poppaw Creek, rather than by fracture control. Because of this, the utility of topographic fracture-trace analyses is limited, as can be seen on the fracture-trace diagram and on the Rose Diagram included as Appendix DH-8. The Rose diagram shows that apparent fracture-trace orientations are generally random.

Of the rock exposures found on site, only one appears to be in place. That outcrop, located near P-5, consists of a weathered schist with a foliation of N44°W 72°NE. No fractures were identified in the outcrop. The strike and dip of fractures found in rock core taken at the site could not be determined as the core was not oriented, nor were there any pervasive fabric features that would allow for this determination. Generally, the fractures within the granite were great in number and randomly oriented.

Diabase dikes in this region typically create fracture zones in the country rock adjacent to their contacts. These fracture zones are limited in their horizontal/lateral extent, and are often characterized to be about 1/10 of the thickness of the dike, occurring on both sides of the feature. It is likely that there are many random fracture orientations associated with the rock adjacent to the dikes. Although no diabase dikes have been observed on site, the small metavolcanic dikes are expected to act in a similar way. One rock core (P-26) encountered metavolcanic material, which was highly-fractured with vertical to nearly horizontal dips, and voids of up to 1.5 feet; however, the metavolcanic rock was less weathered than the granitic rock encountered in most cores and had a higher rock-quality designation.

### 3.3.3 Definition and Properties of the Subsurface Hydrogeologic Units

Three subsurface hydrogeologic units for the site are defined in this section. Properties of the units described herein allow description of a general conceptual model of groundwater flow in the vicinity of the site. The conceptual model we believe to be best supported by the hydrogeologic data from this site is a model in which these three hydrogeologic units have gradational boundaries, are highly connected, and have similar hydrogeologic properties such that, for all practical purposes, they act as a single, unconfined aquifer. Estimates of hydraulic conductivity, effective porosity, and preferred flow directions assigned to the units are made with reference to the laboratory test results presented in Table 3 and Appendix DH-9, to the slug tests presented in Table 2 and Appendix DH-4, and to drilling information contained in Appendices DH-1 and DH-2.

### *3.3.3.1 Saprolite Hydrogeologic Unit*

The saprolite unit is continuous across the site, except for areas where grading activities have removed it, such as in the vicinity of piezometer P-31. The water table occurs within the saprolite unit over portions of the site. Saprolite is the uppermost hydrogeologic unit along the northern facility boundary, as demonstrated in wells MW-5 and MW-8 and piezometers P-19S and P-34. Saprolite is also the uppermost hydrogeologic unit along the proposed southern boundary, as demonstrated by piezometers P-17 and P-22 and hand auger piezometers P-27, P-28, P-29, and P-30. Saprolite is the uppermost hydrogeologic unit in the topographic depression near piezometer P-20. All of the borings drilled during this investigation, except P-31, encountered this unit, although there were distinct and unpredictable differences in the thickness of this unit across the site. Split-spoon samples and auger cuttings of this material are generally described in boring logs as silty sands and sandy silts. Fat and lean clays were noted in numerous borings as minor units that were generally found above the water table; however, these soils appear to be discontinuous in nature and their hydraulic characteristics are indistinguishable from the other saprolite materials.

Laboratory soils classifications of split-spoon samples, composite samples, and undisturbed (Shelby tube) samples were defined as silty sands, clayey sands, sandy silts, elastic silt, or lean clay (Table 3; Appendix DH-9). The average total porosity for the saprolite unit, as determined by laboratory testing of Shelby Tube samples, is approximately 0.38. Specific yield values for samples collected in the saprolite unit were calculated using the percent sand, silt, and clay based on the Wentworth Soil Classification System from the grain size distribution graphs for each sample, as presented in Appendix DH-9. The relative percentages of sand, silt and clay for each sample were applied to Johnson's (1967) *Textural Classification Triangle for Unconsolidated Material* to obtain approximate specific yield values. A copy of this triangle is included in Appendix DH-9. An approximate value for effective porosity of the saprolite aquifer is assumed to be 0.21 (21%) based on the average of values provided on Table 3. Average permeability for the saprolite from the values in Table 3 is approximately $3 \times 10^{-5}$ centimeters per second (cm/sec). Hydraulic conductivities are expected to be on the order of $10^{-4}$ cm/sec, based on slug test data from piezometer P-19S and P-34, screened within saprolite (Table 2a). The saprolite unit is considered to represent a minor hydrogeologic unit for the area around the proposed disposal areas, as most of the groundwater flow is believed to be through the PWR or bedrock zones.

### *3.3.3.2 Partially Weathered Rock Hydrogeologic Unit*

The partially weathered rock (PWR) unit is defined as the zone between saprolite and bedrock that has blow counts of at least 50 over 6 inches during standard penetration tests before auger refusal has been encountered. The PWR unit appears to be discontinuous across the site. Five borings (P-16, P-17, P-19D, P-23, and P-34) were advanced into bedrock without encountering the PWR unit. PWR is similar in composition to the silty sands and sandy silts that overly it. Laboratory soils classifications of split-spoon samples collected from this unit were defined as clayey sand or silty sand (Table 3; Appendix DH-9) and its hydraulic properties are very similar to those of the saprolite unit. The laboratory-derived effective porosity as determined from a sample from MW-8 was approximately 0.28 (28%), which is within the range of values determined for the saprolite unit

(Table 3). With depth through the weathering profile, effective porosities are expected to decrease (Harned and Daniel, 1989).

The PWR is relatively indistinguishable from the saprolite unit based on its soil classification and hydraulic properties. Hydraulic conductivities of the upper parts of the PWR unit are estimated to be similar to those estimated by slug tests in saprolite wells performed during the current investigation. Hydraulic conductivities are expected to be on the order of $10^{-4}$ to $10^{-5}$ cm/sec (Table 2).

*3.3.3.3 Fractured Bedrock Hydrogeologic Unit*

The top of the fractured bedrock unit is normally defined by auger refusal with a typical truck-mounted hollow-stem auger drilling rig. Alternatively, bedrock can be defined by blow-counts of 50 blows per 0.2 feet or greater from standard penetration tests (SPT). In borings where both auger refusal and SPT data were available, there was strong agreement between these methods. In the Piedmont geologic setting, the boundaries between saprolite, PWR, and bedrock are typically gradational and discontinuous. It is not unusual to encounter zones within the PWR that produce auger refusal and/or high blow counts that are horizontally or vertically limited in extent and underlain by softer, more weathered material. In these cases, true bedrock may be deeper than indicated by auger refusal or SPTs. A top of bedrock map based on available boring data from the site is presented in Drawing DH-4.

In the boring for piezometer P-32, auger refusal was encountered at 9 feet and the SPT seemed to confirm bedrock. The driller switched to an air hammer to advance a few feet farther before starting to core. Drilling seemed too soft to be competent bedrock, so the driller advanced to 15 feet before beginning to core. The first run of core recovered almost no cohesive rock, and only very small, highly weathered rock fragments. Cohesive rock was not encountered until 21 feet, and that was still highly weathered, with a rock quality designation (RQD) of only 38%. Based on the core data, the depth to bedrock in P-32 was set at 21 feet for mapping purposes (Drawing DH-4), and the shallower auger refusal was considered on a spatially limited, perched hard rock layer.

Similar conditions were encountered in the boring for piezometer P-33. Auger refusal was encountered at 5 feet; however, a STP did not confirm bedrock, with a blow count of 50 blows over 3 inches. The driller switched to the air hammer and encountered relatively soft drilling to the total depth of the boring (35'). This appears to be another case of a perched hard rock layer causing auger refusal; however, no core was obtained from this boring, so an alternate depth to true bedrock could not be determined. Nearby borings encountered auger refusal much deeper than 5 feet. The boring for MW-1, which is less than 100 feet west of P-33, was successfully augered to 33.6 feet with no auger refusal, and the boring for P-26, which is approximately 200 feet northeast of P-33 reached auger refusal at 25 feet. If the shallow auger refusal at P-33 represents true bedrock, it is an isolated pinnacle rising at least 20 feet above the bedrock encountered in surrounding borings. No bedrock depth was assigned to this boring for mapping purposes (Drawing DH-4).

The fractured bedrock is the uppermost hydrogeologic unit in two locations within the proposed facility boundary. One of those areas is in the southern and central parts of the proposed Phase 3A

waste cell, as indicated by piezometers P-24, P-25, and P-31 (Drawing DH-4). Groundwater levels in monitoring wells MW-10S and MW-10D and piezometer P-26 indicate that the water table transitions from fractured bedrock to PWR and saprolite in the northern portion of the proposed Phase 3A cell. Fractured bedrock is also the uppermost hydrogeologic unit near the center of the proposed facility, where there is a topographic and bedrock high running from the location of P-21 to the location of P-15 (Drawing DH-4).

Hydraulic conductivities estimated by slug tests in fractured bedrock wells are in the range of $10^{-4}$ to $10^{-6}$ cm/sec, with a geometric mean of $5 \times 10^{-5}$ cm/sec and an arithmetic mean of $2 \times 10^{-4}$ cm/sec (Table 2). The geometric and arithmetic means of slug tests in the saprolite and PWR units are $1.0 \times 10^{-4}$ cm/sec and $1.5 \times 10^{-4}$ cm/sec, respectively. The standard deviations for the bedrock values and the saprolite/PWR values are $1.7 \times 10^{-4}$ cm/sec and $2.9 \times 10^{-4}$ cm/sec, respectively. These data indicate considerable overlap between values of hydraulic conductivity in the bedrock and saprolite/PWR units such that the overall hydrologic regime is not expected to differ significantly between the units. Hydraulic conductivities of the fractured bedrock unit are somewhat more variable, and the variation is expected to reflect local variations in fracture intensity (see Section 3.2.2).

Although previous investigations characterized bedrock at the site as highly competent, recent rock cores indicate that bedrock is highly fractured and weathered to a depth of at least 50 feet bgs. Rock core data, including percent recovery and rock quality designations (RQDs), are summarized in Table 4. Because of the highly-fractures bedrock, groundwater flow through this unit is predicted to be similar to the saprolite and PWR units. Effective porosity of bedrock is typically expected to be one percent or less (Heath, 1989), but at this site it is expected to be higher due to the highly fractured nature of the bedrock. In areas where dikes are in contact with the granite, the fracture intensity is predicted to be much greater.

### 3.3.4 Weathering Profile

The majority of the area beneath the current landfill and the proposed facility is underlain by a relatively thin layer of saprolite and partially weathered rock. Depth to bedrock ranges from approximately 5 to 40 feet below ground surface and the average depth to bedrock is approximately 17 feet below ground surface. Some localized zones near or along the drainages are characterized by bedrock that is relatively shallow, between 5 and 10 feet below ground surface.

The typical weathering profile for the site consists of several feet of unconsolidated saprolite, grading into several feet of PWR, which grades into competent fractured bedrock; however, there are some areas where PWR is relatively thin to absent. A few borings encountered saprolite interlayered with PWR. The interface between partially weathered rock and unweathered bedrock is generally unclear, with rock core showing substantial weathering at depths of 40 feet of more. RQD's, fracture counts, and descriptions of rock core from site borings (Table 4 and Appendices DH-1 and DH-2) confirm this. SPT and auger refusal information (Appendices DH-1 and DH-2) are highly variable over short intervals; the SPT blow counts were generally very low for some of the borings.

## 3.4 Site Hydrogeology

The following section discusses the hydrogeological aspects of the site, with emphasis on the proposed C and D disposal area. A significant amount of hydrogeologic investigation has been performed on the site, including the installation of 10 monitoring wells, 32 piezometers, 6 borings, and 7 rock corings.

### 3.4.1 Hydrology and Discharge Features

As discussed in Section 2.0, the site is located on a group of knolls and valleys, the highest elevations of which rise approximately 100 feet above the floodplain of Poppaw Creek (Figure 1). Regionally, surface water and groundwater both flow north and northwest to Poppaw Creek, which is located adjacent to the north and northwest property line of the site. Groundwater beneath the site flows in three vertically interconnected hydrogeologic units; saprolite, PWR, and a fractured bedrock aquifer. In the vicinity of the proposed Phase 3A cell, groundwater flow is generally to the north, and discharges directly to Poppaw Creek, with a component of discharge to the on-site tributary east of the proposed cell that also flows to Poppaw Creek. In the vicinity of the proposed Phase 3B cell, groundwater flow is northwest and eventually discharges to Poppaw Creek west of the site boundary.

### 3.4.2 Site Groundwater Flow Regime

The surficial aquifer beneath the site occurs within saprolite, PWR, and bedrock. Generally, the saprolite and PWR units are relatively thin (5 to 40 feet thick) in the area in and around the proposed cells. The saprolite and PWR are expected to behave as a relatively isotropic, porous medium, whereas groundwater flow in the bedrock is primarily through fractures; however, the bedrock is highly fractured and well connected to the overlying units so they are expected to behave as a single aquifer. The groundwater potentiometric surface, based on water level readings taken on March 6, 2007, is shown on Drawing DH-3. Groundwater flow directions conform to the potentiometric surface, with flow perpendicular to the contours.

#### *3.4.2.1 Horizontal Gradient and Velocity Calculations*

Horizontal hydraulic gradients for the proposed C and D disposal areas were calculated using five groundwater flow line segments indicated on the groundwater surface contour map (Drawing DH-3). Average linear groundwater flow velocities were calculated using the following modified Darcy equation:

$$\mathbf{V = Ki/n}$$

where **V** = average linear velocity (feet per day), **K** = hydraulic conductivity (ft/day), **i** = horizontal hydraulic gradient, and **n** = effective porosity. An effective porosity of **n** = 0.21 (21%) was assumed based on average effective porosities for saprolite and PWR determined by laboratory analysis of soil samples (Table 3). The average gradients (**i**) were determined for each flow path shown on Drawing DH-3. The geometric mean of the hydraulic conductivities of all slug test conducted on the site (**K** = $6.96 \times 10^{-5}$ cm/sec) was used for groundwater flow calculations for the site.

The above equation makes the simplifying assumptions of a homogeneous, isotropic aquifer in a porous medium. Groundwater flow velocities were calculated using saprolite and PWR data because the site's uppermost aquifer is primarily in those hydrogeologic units. An average linear groundwater flow velocity was calculated across areas where bedrock is the surficial aquifer because rock cores have shown that bedrock is highly fractured to the point that groundwater flow is expected to behave relatively similar to the unconsolidated hydrogeologic units. Also, aquifer tests conducted on bedrock wells and piezometers showed similar range of values for hydraulic conductivity. Groundwater flow velocities within the fractured bedrock aquifer are likely to be variable.

Data and calculations for the horizontal gradients are presented in Table 6. The calculated horizontal gradients from five flow line segments across the site range from 0.02 to 0.05 feet/foot. Calculated linear groundwater velocities ranged from approximately 8.4 to 15.5 feet/year.

#### *3.4.2.2 Vertical Gradient Calculations*

Two nested well pairs (MW-10S and MW-10D and P-19S and P-19D) were used to measure vertical hydraulic gradients. Wells MW-10S and MW-10D are located east of the proposed disposal area, adjacent to a tributary of Poppaw Creek. Piezometers P-19S and P-19D are located downgradient of the proposed disposal area near Poppaw Creek, at the northern boundary of the site. Calculations were performed using water levels measured on several different dates. Vertical gradients were calculated using the vertical distance between the screen midpoints. A summary of vertical gradient data is presented in Table 7. Table 7 also includes historic data from a third well pair, P-2 and P-2A, which were abandoned prior to construction of Phase 1 of the landfill.

Vertical gradients calculated for well pairs MW-10S and MW-10D and P-19S and D suggest seasonal fluctuations with groundwater discharge in spring and groundwater recharge in summer near the surface water features. The relatively small vertical gradients observed at all the well pairs at this site, along with the seasonal fluctuations between positive and negative gradients, give strong support to the proposition that the bedrock and saprolite/PWR portions of the aquifer are strongly connected and behave as a single aquifer.

## 3.5 Site Suitability

The following paragraphs discuss the proposed site's suitability as a C and D waste management facility, with special attention to the areas of proposed disposal.

### 3.5.1 Relationship of Geology and Groundwater to Waste Disposal Units

Numerous wells and piezometers have been drilled on site, and the area has been adequately explored. The water table occurs within saprolite, PWR, and bedrock at various locations on the site; however, the three units are well connected and have similar hydrologic properties so they are expected to behave as a single aquifer. This conceptual model is supported by the following facts: 1) rock core data show the bedrock to be highly fractured, and significantly weathered to depths of at least 40 feet across the site; 2) aquifer tests found similar ranges of hydraulic conductivity for wells screened in saprolite, PWR, and bedrock; and 3) vertical hydraulic gradients between adjacent pairs of wells screened in saprolite/PWR and bedrock were very small. The geologic characteristics of the

site are typical of the Piedmont and should pose no unusual monitoring requirements. Drawing DH-4 shows the bedrock surface in relationship to the proposed base grades. Drawing DH-5 shows the estimated seasonal high water table relative to the proposed base grades.

#### *3.5.1.1 Vertical Separation from Bedrock*

Bedrock surface elevation contours, based on auger refusal depths and additional information obtained from borings and rock coring, are shown on Drawing DH-4. The bedrock surface was defined primarily by hollow-stem auger refusal or by blow counts from SPT's. A STP blow-count of 50/.2 (50 blows with 0.2 feet of penetration) was considered bedrock. Some of the borings on the site were not advanced with hollow-stem augers but with air-drilling (e.g. – piezometers P-2 through P-7). Bedrock elevations from these borings were discounted as less accurate than those determined by auger refusal or blow counts; however, they were used as supplemental data in some cases. In general, bedrock elevations from air-hammer or air-rotary drilling are expected to be deeper than picks in the same location based on auger refusal, so where these data were used they were considered maximum possible depths to bedrock. These data were only considered in the contouring of the bedrock surface if they were consistent with the auger-refusal depths from near-by borings. For discussion of other issues related to mapping the bedrock, see Section 3.3.3.3.

Proposed base grade contours are also shown on Drawing DH-4 to allow comparison of the vertical separation from bedrock. The proposed base grades are at least 4 feet above the top of competent bedrock. In the area beneath the proposed footprint for the Phase 3A waste disposal cell, the uppermost aquifer is transitioning from bedrock in the southern portion of the cell to saprolite and PWR in the northern portion of the proposed disposal area. In the area beneath the proposed footprint for the Phase 3B waste disposal cell, the uppermost aquifer is mostly within the saprolite/PWR unit. This is illustrated on the hydrogeologic cross-sections presented in Drawings DH-6, DH-7a, and DH-7b.

#### *3.5.1.2 Vertical Separation from Seasonal High Water Table*

At the time design base grades for the C and D area were finalized, only limited seasonal groundwater data were available for the site piezometers installed in 2005 and 2007; therefore, predictions of the seasonal range of water levels for the site were based primarily on the recorded ranges of available measurements from site monitoring wells installed between 1997 and 2002. Observed water table elevation data and calculations of the seasonal high water levels for the site wells are presented in Table 8.

Historical precipitation data for Burlington, NC between 1950 and 2004 are presented in Table 9. These data demonstrate annual precipitation ranging from 30.29 to 65.07 inches per year. The mean annual precipitation over the entire historical record is 44.88 inches per year with a standard deviation of 6.56 inches per year. The mean precipitation over the last three years for which data has been compiled (2002-2005) was 47.77 inches per year, which is above the historical mean. Also, the highest annual precipitation ever recorded occurred in 2003. These precipitation data suggest that maximum groundwater levels determined from water level measurements between 2002 and 2005 should include the highest water levels to be reasonably expected at this site. Since most of the wells

used to determine the seasonal high water table for the site were installed in January 2002 or earlier, the water level measurements obtained for the 2002-2005 period are more than sufficient to accurately determine seasonal high water tables.

Seasonal high water table elevations for wells and piezometers installed in 2005 and earlier, as shown in Table 8, were calculated in the following manner. Appropriate adjustment factors to predict the seasonal high water table from the August 2, 2005 water level data were determined by comparing the maximum water level observed for the period 2002-2005 to the August 2005 level for each well for which we had adequate data. We then computed an average difference between the 2002-2005 maximum and the August 2005 levels for two subsets of wells: 1) wells screened in saprolite or PWR; and 2) wells screened in fractured bedrock. Rounding these averages up to the nearest ¼ foot gave us adjustment factors of 2.25 feet for saprolite/PWR wells and 3.25 feet for bedrock wells. Adjusted high water elevations were calculated by adding 2.25 feet to the August 2, 2005 groundwater elevation for any well screened in saprolite and/or PWR or by adding 3.25 to the August 2, 2005 groundwater elevation for any well screened in bedrock. If the maximum historic groundwater elevation (including data back to 1997) for any well was higher than the adjusted groundwater elevation, the maximum historic groundwater elevation was used as the seasonal high. If the adjusted groundwater elevation was higher than ground surface for any well, the ground surface elevation was used.

For the piezometers installed in 2007, an adjustment based on March 6, 2007 groundwater elevations was calculated in the following manner. The difference between the water elevations observed on March 6, 2007 and the seasonal high water table determined for earlier wells in Table 8 were calculated for all wells with both values. The average of these differences (2.15 feet) was added to the March 6, 2007 water elevations for the piezometers installed in 2007. These values are also shown in Table 8.

Proposed base of liner elevations are at least four feet above the estimated seasonal high groundwater levels, as seen on the Seasonal High Groundwater Contour Map (Drawing DH-5) and in cross-sections presented in Drawings DH-6, DH-7a, and DH-7b.

### 3.5.2 Potential Groundwater Receptors

Well WW-1 is the only water supply well located within the proposed facility boundary. The well is associated with a former dwelling and is currently being used for water level data only and is not used as a water source. The well will be removed and abandoned prior to violation of the buffers specified in Rule .0503(2)(f)(ii). Specific well abandonment activities are summarized in Section 4.0 of this report.

There are several residences along Foster Store Road (east of the site) that obtain water from individual water supply wells that are within 500 feet of the proposed facility boundary. The closest of these wells is less than 100 feet from the proposed facility boundary. None of the dwellings or water wells are within 500 feet of the proposed waste disposal areas. All of the residences and wells along Foster Store Road are upgradient of the proposed facility.

There are also residences with water supply wells along Alamance Church Road (west of the site), two of which are approximately 470-480 feet from the western facility boundary. None of the dwellings or their water wells are within 500 feet of the proposed waste disposal areas. Although these residences are generally down-gradient of the site, they are not downgradient of the proposed Phase 3 waste disposal units.

### 3.5.3 Ability to Effectively Monitor Groundwater

No known or potentially significant sources of groundwater contamination have been identified within 2000 feet of the site boundary. The nearest commercial property that could be a potential source is an automotive body shop located approximately 1200 feet northwest of the site on the opposite side of Poppaw Creek. Even if there were a significant release from the body shop, it would not compromise the ability to monitor for a release from the landfill.

Groundwater flowing north-northwest in the three interconnected hydrogeologic units from the proposed disposal areas will be monitored by the well network described in the Groundwater Monitoring Plan. There are no known conditions, physical or hydrogeologic, which will interfere with the effective monitoring of the proposed facility, and specifically the proposed C and D disposal areas. The discharge feature (Poppaw Creek) along the northern facility boundary is expected to act as an effective groundwater flow boundary between the proposed Phase 3 cells and potential receptors.

## 3.6 Conclusions

The purpose of this Hydrogeologic Report is to present the assessment of geologic and hydrogeologic characteristics of the proposed site, especially as they relate to proposed C and D construction. This report presents our current understanding of the groundwater flow regime and the relationship of the solid waste management units to groundwater receptors and groundwater discharge features. In addition, this report demonstrates that the proposed site can be monitored effectively for potential releases. Hydrogeologic data from the site indicate that it is appropriate for C and D waste management activities.

In summary, a review of the geologic and hydrogeologic data indicates that the site is located within typical Piedmont terrain. The uppermost aquifer at the site is generally contained within three interconnected hydrogeologic units (saprolite, partially weathered rock, and fractured bedrock). Depths to groundwater and bedrock are well defined in and around the site. Study of the regional and site structural setting indicates little potential for preferential flow paths, as reflected in the site drainage patterns. No other site-specific preferential fractures were noted in the rock core collected or outcrops observed during this study. Instead, bedrock appears to be highly fractured with intersecting trends to a depth of at least 50 feet, to an extent that groundwater is expected to follow the general interpreted flow direction and velocity; therefore, the design of an effective groundwater monitoring system for the facility is possible. The facility boundary extends to a groundwater discharge, Poppaw Creek, and a minimum of a 500-foot buffer exists between the residential dwellings and water-supply wells and the proposed C and D disposal areas.

# 4.0 GROUNDWATER MONITORING PLAN

## 4.1 Introduction and Purpose

This plan shall replace any previous groundwater monitoring plans that may have been submitted for Coble's Sandrock C and D Landfill. This Groundwater Monitoring Plan will serve as a guidance document for collecting and analyzing groundwater and surface water samples, managing the associated analytical results, and monitoring for potential releases to the uppermost aquifer from the Coble's Sandrock C and D Landfill. The plan complies with Section .0600 of the North Carolina Solid Waste Management Rules, which specifies the requirements for groundwater and surface water monitoring at C and D landfills. The plan also addresses the specific issues addressed in the Solid Waste Section's January 1995 policy memorandum (*Re: Sampling and Analysis Requirements, Construction and Demolition Landfills and Closed Sanitary Landfills*).

## 4.2 Groundwater Monitoring Network

The groundwater monitoring network is designed to monitor for potential releases to the uppermost aquifer at the proposed site. The boring log and well completion details for all of the existing groundwater monitoring wells are included as Appendices DH-1 and DH-2 to this report. A summary of well construction specifications, well status, and the role of each well in the proposed monitoring plan is provided in Table 10.

### 4.2.1 Background and Compliance Monitoring Wells

Monitoring well MW-6 (formerly P-3) is proposed to remain as the upgradient background monitoring well for the facility. This well was installed during site characterization activities in August 1997. Although installed as a piezometer, it was constructed to meet the requirements for a long term monitoring point. A protective casing was added to this well during field activities performed in January 2002. This well replaced MW-3 as the facility background well before the November 2003 sampling event. Monitoring wells MW-2, MW-4, and MW-7 are proposed to remain as downgradient compliance wells. Wells MW-2 and MW-4 were installed during the original permitting activities in 1997. Well MW-7 replaced MW-5 at the request of the Solid Waste Section before the November 2003 sampling event. Newly installed monitoring wells MW-8 and MW-10S are proposed to become additional downgradient compliance wells. MW-9 will need to be abandoned for construction of a proposed sediment basin; therefore, piezometer P-19S will be converted to compliance well to replace MW-9. Wells MW-1 and MW-3 will be abandoned for the construction of the proposed Phase 3A disposal area. Well MW-5 will continue to be used for the collection of groundwater level data. In addition, a new monitoring well, MW-11, will be installed northwest of the proposed Phase 3B disposal area prior to any waste being received into Phase 3B. Thus, the proposed compliance network will include the following eight wells: MW-2, MW-4, MW-7, MW-6 (background), MW-8, MW-10S, P-19S, and MW-11. The proposed monitoring well network is shown on Drawing DH-8.

### 4.2.2 Installation and Maintenance of Groundwater Monitoring Network

Monitoring wells MW-2, MW-4, and MW-6 were installed by Trigon Engineering Consultants, Inc. between March and August 1997 as part of the permitting activities for the initial waste cell. Well construction activities are discussed in the December 1997 submittal titled *Construction and Demolition Landfill Permit Application Siting Requirements*. Monitoring well MW-7 was installed by JEI on December 19, 2002, at the request of the Solid Waste Section. Wells MW-8, MW-9, and MW-10S were installed by JEI between March 21 and 25, 2005, as part of Phase 3 permitting activities. The wells were constructed according to specifications for monitoring wells codified in 15A NCAC Subchapter 2C, Section .0100, and according to draft guidance document *North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities* (March 1995). Piezometer P-19S was installed by JEI in January 2002 and meets the requirements for a permanent monitoring well in accordance with 15A NCAC Subchapter 2C, Section .0100.

A new monitoring well, MW-11, will be installed northwest of the proposed Phase 3B disposal area to serve as an additional down-gradient monitoring point for Phase 3B. The well will be installed approximately 400 feet north of piezometer P-16 in accordance with 15A NCAC Subchapter 2C, Section .0100. MW-11 will be installed and background developed prior to any waste being received into Phase 3B.

The facility monitoring wells will be used and maintained in accordance with design specifications throughout the life of the monitoring program. Routine monitoring well maintenance will include inspection and correction/repair of well identification tags, cement pads, well caps and locks, and access to the wells. Should it be determined that the background or a compliance monitoring well no longer provides samples that are representative of the quality of groundwater passing the relevant point of compliance, the Solid Waste Section will be notified. The owner will re-evaluate the monitoring network, and recommendations will be made for modifying, rehabilitating, abandoning, or installing replacement or additional monitoring wells, as appropriate.

## 4.3 Groundwater Monitoring

Groundwater samples from the facility will be collected and analyzed for the constituents listed in Appendix I of 40 CFR Part 258, plus mercury, chloride, manganese, sulfate, iron, alkalinity, and total dissolved solids. In addition, field analyses for temperature, pH, and specific conductance will be performed for each sample. The laboratory analytical results and field parameters will be submitted to the Solid Waste Section at least semiannually. Any exceedances of the NC 2L Drinking Water Standards will be identified in the semiannual submittals.

### 4.3.1 Establishment of Background Data

A minimum of four independent groundwater samples will be collected from any new compliance wells prior to the start of disposal operations in their respective areas at the proposed C and D facility. These data will be evaluated statistically to determine background concentrations for each well.

### 4.3.2 Groundwater Sampling Methodology

Groundwater samples will be collected in accordance with Solid Waste Management Rules 15A NCAC 13B .1630 through .1633 and guidance provided in the *Draft North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities; Solid Waste Section, Division of Solid Waste Management; Department of Environment, Health and Natural Resources* (March 1995). Details of well purging, sample withdrawal, and decontamination methods, as well as chain-of-custody procedures are outlined below.

Static water elevations and the total well depth will be measured to the nearest 0.01 of a foot in each well prior to the sampling of each well. An electronic depth meter will be used for the measurements. This device is lowered into the well and emits an audible tone when water is reached. The distance from the top of the well casing to the water surface and to the bottom of the well will be measured using the tape attached to the probe. Reference elevations of the proposed wells have been obtained from a North Carolina registered land surveyor.

A low-yield well (one that is incapable of yielding three well volumes within a reasonable time) will be purged so that water is removed from the bottom of the screened interval. Low-yield wells will be evacuated to dryness once. As soon as the well recharges or within 24 hours, the first sample will be field tested for pH, temperature, and specific conductance. Samples will then be collected and containerized in the order of the parameters' volatilization sensitivity (i.e., volatile organics then total metals).

A high-yield well (one that is capable of yielding more than three well volumes during purging) will be purged so that water is drawn down from the uppermost part of the water column to ensure that fresh water from the formation will move upward in the screen. At no time will a well be evacuated to dryness if the recharge rate causes the formation water to vigorously cascade down the sides of the screen, which could cause an accelerated loss of volatiles.

A minimum of three well volumes will be evacuated from high-yield wells prior to sampling. A well volume is defined as the water contained within the well casing and pore spaces of the surrounding filter pack. The well volume will be calculated using the following formulas:

$$V_c = (d_c^2/4) \times 3.14 \times h_w \times 7.48 \text{ gallons/cubic foot}$$
$$V_c \text{ (gallons)} = 0.163 \times h_w$$

where:

$V_c$ = volume in the well casing
$d_c$ = casing diameter in feet ($d_c$ = 0.167 for a 2-inch well)
$h_w$ = height of the water column (i.e., well depth minus depth to water)

The purge volume will be a minimum of 3 times the calculated well volume.

Each well will be evacuated (purged) and sampled with a disposable bailer. The bailer will be lowered gently into the well to minimize the possibility of causing degassing of the water. All equipment used for sampling will be handled in such a manner to ensure that the equipment remains

decontaminated prior to use. In between wells and following completion of the field sampling, the electronic depth meter will be decontaminated. Clean disposable gloves will be worn by sampling personnel.

The upgradient/background well will be sampled first, followed by the downgradient wells. The order of sampling of the downgradient wells will be evaluated each sampling event to provide a sequence going from less contaminated to more contaminated, if applicable, based on the previous sampling event.

Field measurements of temperature, pH, and specific conductance will be made before and after sample collection as a check on the stability of the water sampled over time. The direct reading equipment used at each well will be calibrated according to the manufacturer's specifications prior to each sampling event. Groundwater samples will be collected and containerized in the order of the volatilization sensitivity (i.e., VOCs first, followed by the metals).

Pre-preserved sample containers will be supplied by the laboratory. The VOC vials will be filled in such a manner that no headspace remains after filling. Immediately upon collection, all samples will be placed in coolers on ice where they will be stored prior to/and during transit to the laboratory.

In between wells and following completion of the field sampling, the electronic depth meter will be decontaminated using the following procedure.

1) Phosphate-free soap and distilled water wash;
2) Distilled water rinse;
3) Air dry.

Samples collected will be properly containerized, packed into pre-cooled coolers, and either hand-delivered or shipped via overnight courier to the laboratory for analysis. The chain-of-custody program will allow for tracing of possession and handling of samples from the time of field collection through laboratory analysis. The chain-of-custody program will include sample labels and seals, field logs, and chain-of-custody record, and laboratory log.

Labels sufficiently durable to remain legible when wet will contain the following information:

- Job and sample identification number;
- Monitoring well number or other location;
- Date and time of collection;
- Name of collector;
- Parameter to be analyzed; and
- Preservative, if applicable.

The shipping container will be sealed to ensure that the samples have not been disturbed during transport to the laboratory. The tape is labeled with instructions to notify the shipper if the seal is broken prior to receipt at the laboratory. If the sample cannot be analyzed because of damage or

disturbance, whenever possible, the damaged sample will be replaced during the same compliance period.

The field log will contain sheets documenting the following information:

- Identification of the well;
- Well depth;
- Static water level depth;
- Presence of immiscible layers, odors or other indications of potential contamination;
- Well yield-high or low;
- Purge volume (given in gallons or number of bailers);
- Time well was purged;
- Date and time of collection;
- Well sampling sequence;
- Types of sampling containers used and sample identification numbers;
- Preservative used;
- Field analysis data and methods;
- Field observations on sampling event;
- Name of collector(s);
- Internal temperature of shipping container at the time of sample placement; and
- Climatic conditions including air temperatures.

The chain-of-custody record is required to establish the documentation necessary to trace sample possession from time of collection to time of receipt at destination. A chain-of-custody record will accompany each individual shipment. The record will contain the following information:

- Sample destination and transporter;
- Sample identification numbers;
- Signature of collector;
- Date and time of collection;
- Sample type;
- Identification of well;
- Number of sample containers in shipping container;
- Parameters requested for analysis;
- Signature of person(s) involved in the chain of possession;
- Inclusive dates of possession; and
- Internal temperature of shipping container upon opening in laboratory (noted by the laboratory).

A copy of the completed chain-of-custody sheet will accompany the shipment and will be returned to the shipper with the analytical results. The chain of custody record will also be used as the analysis request sheet.

A field/equipment blank will be collected and analyzed during each sampling event to verify that the sample collection and handling processes have not affected the integrity of the field samples. The field/equipment blank will be prepared in the field from lab pure water (Type II reagent grade water) supplied by the laboratory. One field/equipment blank will be prepared for each sampling event. The field/equipment blank will be generated by exposing the lab pure water to the sampling environment and sampling equipment/media in the same manner as actual field samples being collected. The lab will provide appropriate sample containers for generation of the field/equipment blank(s). The field/equipment blank will be subjected to the same analysis(es) as the groundwater samples. As with all other samples, the time(s) of the field/equipment blank collection will be recorded so that the sampling sequence is documented. The field/equipment blank monitors for contamination from the sampling equipment/media, or from cross-contamination that might occur between samples and sample containers as they are opened and exposed to the sampling environment.

Whenever groundwater samples are being collected for volatiles analysis, a trip blank will be generated by the laboratory prior to shipment of sampling containers and coolers to the field. The same lab pure water as above shall be used. The trip blank shall be transported with the empty sampling containers to the field, but will not be opened at any time prior to analysis at the laboratory. The trip blank will accompany the groundwater samples in the cooler(s) back to the laboratory and will be analyzed by the same volatile methods as the associated field samples. The trip blank monitors for potential cross-contamination that might occur between samples or that may be a result of the shipping environment.

Detectable levels of contaminants found in the field/equipment blanks or trip blanks will not be used to correct the groundwater data, but will be noted accordingly. Contaminants present in trip blanks or field/equipment blanks at concentrations within an order of magnitude of those observed in the corresponding groundwater samples may be cause for resampling.

### 4.3.3 Sample Analysis Requirements

#### *4.3.3.1 Analytical Requirements*

Analysis of groundwater and surface water samples from the facility will be conducted by a laboratory certified by the NCDENR. Analyses will be performed in accordance with U.S. EPA SW 846 methods. Both groundwater and surface water samples will be analyzed for the constituents listed in Appendix I of 40 CFR Part 258, plus mercury, chloride, manganese, sulfate, iron, alkalinity, and total dissolved solids. In addition, field analyses for temperature, pH, and specific conductance will be performed for each sample. Appendix DH-10 includes a table of all Appendix I and Appendix II constituents with their respective analytical methods, CAS numbers, NCDENR Solid Waste Section Limits, and 15A NCAC 2L groundwater standards.

#### *4.3.3.2 Reporting and Record Keeping*

The laboratory analytical results will be submitted to the Solid Waste Section at least semiannually. The following measurements, analytical data, calculations, and other relevant groundwater

monitoring records will be kept throughout the active life of the facility and the post-closure care period:

- Records of all groundwater quality data;
- Associated sample collection field logs and measurements, such as static water level measured in compliance wells at the time of sample collection; and
- Notices and reports of NC 2L exceedances, reporting or data error, missing data, etc.

#### *4.3.3.3 Well Abandonment*

All recently installed piezometers or pre-existing wells at the site that are not used for permanent monitoring will be properly abandoned in accordance with the procedures for permanent abandonment, as described in 15A NCAC 2C Rule .0113(a)(2). The piezometers and wells will be progressively abandoned as necessary to complete construction activities. The remaining piezometers will be used to supplement groundwater elevation data. The piezometers and wells that are within the proposed footprints of Phase 3 waste cells will be overdrilled before they are grouted. Other wells that will potentially interfere with clearing and construction activities but are not within the waste footprint will be grouted in place without overdrilling.

Inactive supply well WW-1 will be permanently abandoned before construction of any waste cell that would produce a violation of buffers specified in Rule .0503(2)(f)(ii). The abandonment will be performed in conformance with Rule .0113(a)(2).

## 4.4 Surface Water Monitoring

Two surface water monitoring points are proposed for the facility as shown on Drawing DH-8. Surface water point SW-1 is located to monitor water quality in Poppaw Creek, shortly after it enters the site. The sample location is at the property line near the northwest edge of the site.

Surface water monitoring point SW-2 will serve as a downstream monitoring point. Samples from this point will be collected at a location approximately 350 feet northeast of the proposed Phase 3 disposal area near the northeastern corner of the site and where a small tributary that flows adjacent to the eastern property boundary discharges into Poppaw Creek.

The surface water will be sampled for the constituents, as outlined above, that are required for C and D landfills and the locations will be monitored at least semiannually during the life of the facility. The results of the analysis of the surface water data will be submitted to the Solid Waste Section semiannually with the groundwater data.

## 4.5 Ability to Effectively Monitor Releases from Proposed C and D Areas

No known or potential sources of significant contamination have been identified within 2000 feet of the property boundary. There are no known conditions, physical or hydrogeologic, which will

interfere with the effective monitoring of the proposed C and D cells. The proposed Water Quality Monitoring Plan, when implemented, will be effective in providing early detection of any release of hazardous constituents to the uppermost aquifer, so as to be protective of public health and the environment.

## 5.0 REFERENCES


Bouwer, H. and Rice, R.C., June 1976, *A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells*; Water Resources Research, American Geophysical Union, pp. 423-428.

Bouwer, H., 1989, *The Bouwer and Rice slug test-an update*; Ground Water, vol. 27, No. 3, May-June, pp. 304 - 309.

Brown, Philip M., Chief Geologist, 1985, Geologic Map of North Carolina, The North Carolina Geologic Survey, scale 1:500,000.

Butler, J. Robert, and Secor, Jr., Donald T., 1991, *The Central Piedmont*, in Horton, J. W., Jr., and Zullo, V. A., eds., The Geology of the Carolinas: The University of Tennessee Press, p. 59-78.

Carpenter III, P. Albert, Geologic Map of Region G, North Carolina: A Guide for NC Mineral Resource Development and Land Use Planning: NC Mineral Resources Sec., Regional Geology Series 2, 76 p.

Halford, Keith J., and Kuniansky, Eve L., 1998. *Bower and Rice Slug Test Analysis, in: Documentation of Spreadsheets for the Analysis of Aquifer Test Data*: USGS OFR 02-197.

Harned, D.A., and Daniel, Charles C., III, 1989, *The Transition Zone Between Bedrock and Saprolite: Conduit For Contamination?*, in Ground Water in the Piedmont; Edited by Daniel, C., White, R., and Stone, P., Proceedings published by Clemson University, pp. 336-348.

Heath, R.C., 1989, *The Piedmont Ground-Water System*, in Ground Water in the Piedmont; Edited by Daniel, C.,White, R., and Stone, P., Proceedings published by Clemson University, pp. 1-13.

JEI, June 2, 2001. *Request for Modification to Construction and Demolition Debris Landfill Permit No. 01-05.*

JEI, June 18, 2002. *Construction Plan Application – Coble's Sandrock C and D Landfill, Permit No. 01-05.*

North Carolina Dept. Environment, Health, and Natural Resources (NCDEHNR), 1995, Sampling and Analysis Requirements, Construction and Demolition Landfills and Closed Sanitary Landfills, N.C. Solid Waste Section.

North Carolina Dept. Environment, Health, and Natural Resources (NCDEHNR), 1995, Draft N.C. Water Quality Monitoring Guidance Document for Solid Waste Facilities.

Parker, B.L. et al. May 1994. 1) *A conceptual understanding of contaminant migration in fractured media*, 2) *Calculations and real data: fractured media*. In: Dissolved Organic Contaminants in Groundwater Short Course [unpublished short course notes and published references contained therein]. Waterloo Centre for Groundwater Research, Univ. Of Waterloo, Ontario.

RCRA Ground Water Monitoring Technical Enforcement Guidance Document (TEGD), 1986.

Ragland, Paul C., 1991, *Mesozoic Igneous Rocks*, in Horton, J. W., Jr., and Zullo, V. A., eds., The Geology of the Carolinas: The University of Tennessee Press, p. 171-190.

Trigon Engineering Consultants, Inc., 1997, *Construction and Demolition Landfill Permit Application Siting Requirements Prepared for Coble's Sandrock, Inc.*

Trigon Engineering Consultants, Inc., 1998, *Construction and Demolition Landfill Permit Application and Construction Plan Application Prepared for Coble's Sandrock, Inc.*

*P:\Coble's Sandrock\Environmental\419.00.T5,18,19 - Hydrogeo Phase 3\Hydrogeologic and GMP Reports\RTC and Revised Hydrogeo(June 2007)\Revised Hydrogeo Rpt\Final\Vol 1 Section 2 - Hydrogeo Rpt (June 2007).doc*

# TABLE 1
## Boring, Piezometer, and Well Completion Summary
## Coble's Sandrock Construction and Demolition Landfill

| PIEZOMETER OR WELL ID | DATE INSTALLED | CASING DIAM. | WELL ELEVATIONS | | TOTAL DEPTH DRILLED | | TOP OF BEDROCK | | SCREENED INTERVAL | | | | WATER TABLE | | | | LITHOLOGY OF SCREENED INTERVAL | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GROUND SURFACE | TOC | | | | | | | | | MIN. | MAX. | MIN. | MAX. | | |
| | | | | | DEPTH BGS | ELEV. MSL | DEPTH BGS | ELEV. MSL | DEPTH BGS | | ELEV. MSL | | DEPTH TOC | DEPTH TOC | ELEV. MSL | ELEV. MSL | | |
| | | inches | feet above MSL | | | | | | from | to | from | to | | | | | | |
| MW-1 | 03/25/97 | 2 | 600.46 | 602.46 | 33.60 | 566.86 | >33.6 | <566.86 | 18.10 | 33.10 | 582.36 | 567.36 | 35.55 | 30.98 | 566.91 | 571.48 | Saprolite/PWR | --- |
| MW-2 | 03/28/97 | 2 | 580.31 | 582.31 | 22.00 | 558.31 | >22.0 | <558.31 | 5.00 | 20.00 | 575.31 | 560.31 | 17.53 | 11.95 | 564.78 | 570.36 | Saprolite/PWR | Compliance Well |
| MW-3 (P-1) | 03/31/97 | 2 | 610.23 | 613.05 | 57.00 | 553.23 | 21.50 | 588.73 | 37.00 | 57.00 | 573.23 | 553.23 | 39.18 | 32.75 | 573.87 | 580.30 | Bedrock | --- |
| MW-4 | 04/01/97 | 2 | 580.64 | 582.64 | 21.30 | 559.34 | >21.3 | <559.34 | 6.30 | 21.30 | 574.34 | 559.34 | 16.61 | 12.90 | 566.03 | 569.74 | Saprolite/PWR | Compliance Well |
| MW-5 | 01/18/02 | 2 | 575.21 | 577.41 | 15.00 | 560.21 | 15.00 | 560.21 | 5.00 | 15.00 | 570.21 | 560.21 | 9.52 | 6.49 | 567.89 | 570.92 | Saprolite/PWR | --- |
| MW-6 (P-3) | 08/05/97 | 2 | 652.76 | 652.56 | 41.00 | 611.76 | 16.00 | 636.76 | 21.00 | 41.00 | 631.76 | 611.76 | 30.78 | 17.99 | 621.78 | 634.57 | Bedrock | Background Well |
| MW-7 | 12/19/02 | 2 | 581.08 | 583.33 | 13.50 | 567.58 | 13.50 | 567.58 | 3.50 | 13.50 | 577.58 | 567.58 | 12.44 | 6.85 | 570.89 | 576.48 | Saprolite/PWR | Compliance Well |
| MW-8 | 03/21/05 | 2 | 571.50 | 574.26 | 20.00 | 551.50 | >20.0 | <551.50 | 5.00 | 20.00 | 566.50 | 551.50 | 18.66 | 5.42 | 555.60 | 568.84 | Saprolite/PWR | Compliance Well |
| MW-9 | 03/21/05 | 2 | 586.43 | 589.09 | 37.50 | 548.93 | 37.50 | 548.93 | 22.50 | 37.50 | 563.93 | 548.93 | 24.30 | 19.38 | 564.79 | 569.71 | PWR | --- |
| MW-10S | 03/22/05 | 2 | 589.62 | 592.46 | 21.50 | 568.12 | 5.00 | 584.62 | 6.50 | 21.50 | 583.12 | 568.12 | 9.43 | 7.91 | 583.03 | 584.55 | Bedrock | Compliance Well |
| MW-10D | 03/25/05 | 2 | 589.90 | 592.76 | 64.00 | 525.90 | 5.00 | 584.90 | 54.00 | 64.00 | 535.90 | 525.90 | 9.79 | 6.81 | 582.97 | 585.95 | Bedrock | --- |
| P-2 | 08/05/97 | 2 | 575.61 | 578.86 | 21.60 | 554.01 | 12.00 | 563.61 | 11.60 | 21.60 | 564.01 | 554.01 | 9.20 | -1.44 | 569.66 | 570.25 | Bedrock | Abandoned |
| P-2A | 08/05/97 | 2 | 574.86 | 578.96 | 50.00 | 524.86 | 12.00 | 562.86 | 40.00 | 50.00 | 534.86 | 524.86 | 9.28 | 8.30 | 569.68 | 570.06 | Bedrock | Abandoned |
| P-4 | 08/05/97 | 2 | 628.56 | 631.88 | 62.00 | 566.56 | 32.00 | 596.56 | 42.00 | 62.00 | 586.56 | 566.56 | 29.93 | 22.32 | 601.95 | 609.56 | Bedrock | --- |
| P-5 | 08/05/97 | 2 | 611.26 | 611.91 | 61.50 | 549.76 | 15.00 | 596.26 | 41.50 | 61.50 | 569.76 | 549.76 | 45.53 | 4.00 | 566.38 | 607.91 | Bedrock | --- |
| P-6 | 08/05/97 | 2 | 602.93 | 606.06 | 61.00 | 541.93 | 15.00 | 587.93 | 41.00 | 61.00 | 561.93 | 541.93 | 59.01 | 19.13 | 547.05 | 586.93 | Bedrock | Abandoned |
| P-7 | 08/05/97 | 2 | 617.90 | 621.51 | 56.50 | 561.40 | 8.00 | 609.90 | 36.50 | 56.50 | 581.40 | 561.40 | 26.03 | 22.06 | 595.48 | 599.45 | Bedrock | Abandoned |
| P-15 | 01/17/02 | 2 | 649.07 | 651.22 | 50.00 | 599.07 | 17.00 | 632.07 | 40.00 | 50.00 | 609.07 | 599.07 | 41.85 | 35.92 | 609.37 | 615.30 | Bedrock | --- |
| P-16 | 01/18/02 | 2 | 609.85 | 612.05 | 41.00 | 568.85 | 5.00 | 604.85 | 26.00 | 41.00 | 583.85 | 568.85 | 17.88 | 7.10 | 594.17 | 604.95 | Bedrock | --- |
| P-17 | 01/18/02 | 2 | 643.78 | 646.28 | 36.00 | 607.78 | 22.00 | 621.78 | 21.00 | 36.00 | 622.78 | 607.78 | 20.42 | 4.79 | 625.86 | 641.49 | Saprolite/Bedrock | --- |
| P-18 | 01/30/02 | 2 | 652.16 | 651.76 | 34.00 | 618.16 | 34.00 | 618.16 | 19.00 | 34.00 | 633.16 | 618.16 | 26.09 | 18.67 | 625.67 | 633.09 | PWR | --- |
| P-19S | 01/31/02 | 2 | 569.18 | 572.18 | 10.00 | 559.18 | >10.0 | <559.18 | 4.00 | 10.00 | 565.18 | 559.18 | 7.80 | 4.53 | 564.38 | 567.65 | Saprolite | Compliance Well |
| P-19D | 01/31/02 | 2 | 569.65 | 571.85 | 60.00 | 509.65 | 10.00 | 559.65 | 45.00 | 60.00 | 524.65 | 509.65 | 7.48 | 3.41 | 564.37 | 568.44 | Bedrock | --- |
| P-20 | 01/29/02 | 2 | 638.81 | 641.11 | 30.00 | 608.81 | 30.00 | 608.81 | 15.00 | 30.00 | 623.81 | 608.81 | 15.94 | 4.27 | 625.17 | 636.84 | Saprolite/PWR | --- |
| P-21 | 01/30/02 | 2 | 665.67 | 668.42 | 62.50 | 603.17 | 44.00 | 642.67 | 47.50 | 62.50 | 618.17 | 603.17 | 49.50 | 38.42 | 618.92 | 630.00 | Bedrock | --- |
| P-22 | 1/17/2002 | 2 | 627.90 | 629.90 | 10.00 | 617.90 | 10.00 | 617.90 | 4.00 | 10.00 | 623.90 | 617.90 | 11.29 | 2.26 | 618.61 | 627.64 | Saprolite/PWR | --- |
| P-23 | 01/17/02 | 2 | 637.87 | 640.37 | 41.00 | 596.87 | 27.00 | 610.87 | 31.00 | 41.00 | 606.87 | 596.87 | 31.62 | 22.22 | 608.75 | 618.15 | Bedrock | --- |
| P-24 | 03/24/05 | 2 | 612.52 | 613.89 | 38.00 | 574.52 | 18.00 | 594.52 | 28.00 | 38.00 | 584.52 | 574.52 | 29.95 | 26.04 | 583.94 | 587.85 | Bedrock | --- |
| P-25 | 03/24/05 | 2 | 616.37 | 617.81 | 38.00 | 578.37 | 14.00 | 602.37 | 28.00 | 38.00 | 588.37 | 578.37 | 23.75 | 19.59 | 594.06 | 598.22 | Bedrock | --- |
| P-26 | 03/28/05 | 2 | 594.27 | 597.13 | 52.00 | 542.27 | 25.00 | 569.27 | 37.00 | 52.00 | 557.27 | 542.27 | 29.91 | 26.71 | 567.22 | 570.42 | Bedrock | --- |
| P-27 | 04/04/05 | 2 | 625.25 | 627.45 | 4.50 | 620.75 | >4.5 | <620.75 | 2.50 | 4.50 | 622.75 | 620.75 | 5.95 | 2.45 | 621.50 | 625.00 | Saprolite | --- |
| P-28 | 04/04/05 | 2 | 610.36 | 613.15 | 4.00 | 606.36 | >4.0 | <606.36 | 2.00 | 4.00 | 608.36 | 606.36 | 5.50 | 3.28 | 607.65 | 609.87 | Saprolite | --- |
| P-29 | 04/04/05 | 2 | 617.31 | 619.49 | 5.00 | 612.31 | >5.0 | <612.31 | 3.00 | 5.00 | 614.31 | 612.31 | 4.27 | 2.67 | 615.22 | 616.82 | Saprolite | --- |
| P-30 | 04/04/05 | 2 | 634.75 | 637.49 | 4.00 | 630.75 | >4.0 | <630.75 | 2.00 | 4.00 | 632.75 | 630.75 | 3.18 | 3.13 | 634.31 | 634.36 | Saprolite | --- |
| P-31 | 01/29/07 | 2 | 607.00 | 608.56 | 44.00 | 563.00 | 15.00 | 592.00 | 15.00 | 40.00 | 592.00 | 567.00 | 21.56 | 21.56 | 587.00 | 587.00 | Bedrock | --- |
| P-32 | 01/30/07 | 2 | 598.10 | 600.35 | 40.00 | 558.10 | 21.0 * | 577.1 * | 15.00 | 40.00 | 583.10 | 558.10 | 24.30 | 24.30 | 576.05 | 576.05 | Bedrock | --- |
| P-33 | 01/31/07 | 2 | 595.50 | 597.68 | 35.00 | 560.50 | --- * | --- * | 15.00 | 35.00 | 580.50 | 560.50 | 24.10 | 24.10 | 573.58 | 573.58 | PWR/Bedrock | --- |
| P-34 | 01/31/07 | 2 | 626.80 | 629.73 | 23.00 | 603.80 | 23.00 | 603.80 | 8.00 | 23.00 | 618.80 | 603.80 | 6.92 | 6.92 | 622.81 | 622.81 | Saprolite | --- |
| P-35 | 02/02/07 | 2 | 613.90 | 616.33 | 30.00 | 583.90 | 17.50 | 596.40 | 10.00 | 30.00 | 603.90 | 583.90 | 9.94 | 9.94 | 606.39 | 606.39 | PWR/Bedrock | --- |
| P-36 | 02/01/07 | 2 | 623.10 | 624.84 | 30.00 | 593.10 | 14.00 | 609.10 | 10.00 | 30.00 | 613.10 | 593.10 | 4.66 | 4.66 | 620.18 | 620.18 | PWR/Bedrock | --- |
| P-37 | 02/05/07 | 2 | 611.90 | 613.61 | 30.00 | 581.90 | 15.00 | 596.90 | 10.00 | 30.00 | 601.90 | 581.90 | 6.50 | 6.50 | 607.11 | 607.11 | PWR/Bedrock | --- |
| P-38 | 01/31/07 | 2 | 628.80 | 631.33 | 45.00 | 583.80 | 33.00 | 595.80 | 20.00 | 40.00 | 608.80 | 588.80 | 19.74 | 19.74 | 611.59 | 611.59 | PWR/Bedrock | --- |
| B-1 | 03/24/97 | --- | 589.00 | --- | 18.90 | 570.10 | >18.9 | <570.10 | --- | --- | --- | --- | na | na | na | na | --- | Abandoned |
| B-2 | 04/01/97 | --- | 622.00 | --- | 18.90 | 603.10 | >18.9 | <603.10 | --- | --- | --- | --- | na | na | na | na | --- | Abandoned |
| B-3 | 03/27/97 | --- | 628.00 | --- | 19.00 | 609.00 | >19.0 | <609.00 | --- | --- | --- | --- | na | na | na | na | --- | Abandoned |
| B-4 | 04/01/97 | --- | 608.00 | --- | 10.50 | 597.50 | 10.50 | 597.50 | --- | --- | --- | --- | na | na | na | na | --- | Abandoned |
| B-4A | 04/01/97 | --- | --- | --- | 10.00 | --- | 10.00 | --- | --- | --- | --- | --- | na | na | na | na | --- | Abandoned |
| B-5 | 03/27/97 | --- | 615.00 | --- | 18.60 | 596.40 | >18.6 | <596.40 | --- | --- | --- | --- | na | na | na | na | --- | Abandoned |
| C-1 | 07/29/97 | --- | 579.00 | --- | 55.40 | 523.60 | 45.40 | 533.60 | --- | --- | --- | --- | na | na | na | na | --- | Abandoned |
| C-2 | 07/29/97 | --- | 616.00 | --- | 48.50 | 567.50 | 38.50 | 577.50 | --- | --- | --- | --- | na | na | na | na | --- | Abandoned |
| C-3 | 08/01/97 | --- | 604.00 | --- | 23.10 | 580.90 | 13.10 | 590.90 | --- | --- | --- | --- | na | na | na | na | --- | Abandoned |
| TW-1 | 06/12/98 | 2 | 578.00 | --- | 22.60 | 555.40 | 13.20 | 564.80 | 17.60 | 22.60 | 560.40 | 555.40 | na | na | na | na | Bedrock | Abandoned |
| TW-2 | 07/29/98 | 2 | 609.00 | --- | 29.50 | 579.50 | 8.50 | 600.50 | 14.50 | 29.50 | 594.50 | 579.50 | na | na | na | na | Bedrock | Abandoned |
| WW-1 | na | 24 | 622.83 | 625.20 | 23.00 | 599.83 | >23 | <599.83 | na | na | na | na | 18.35 | 8.80 | --- | --- | Saprolite | --- |

NOTES:
1. All elevations are referenced to mean sea level (MSL.); depths are referenced to below ground surface (BGS) or top of casing (TOC).
2. na = data not available or not applicable
3. The installation date and details for well WW-1 are unknown.
4. Well MW-5 and piezometers P-15, P-16, P-17, P-18, P-19S, P-19D, P-20, P-21, P-22, and P-23 were installed by Joyce Engineering, Inc. in January 2002.
5. Monitoring well MW-7 was installed by Joyce Engineering, Inc.on December 19, 2002.
6. Wells MW-8, MW-9, MW-10S, MW-10D and piezometers P-24, P-25, and P-26 were installed by by Joyce Engineering, Inc. in March 2005.
7. Piezometers P-27, P-28, P-29, and P-30 were installed using hand-augers by Joyce Engineering, Inc. on April 4, 2005.
8. Wells MW-1, MW-2, MW-3, MW-4, MW-6 (P-3) and piezometers P-4, P-5, P-6, and P-7 were installed by Trigon Engineering Consultants, Inc. between March and August 1997.
9. Piezometers P-2, P-2A, P-3 (now MW-6), P-4, P-5, P-6, and P-7 were installed using an air-hammer by Trigon Engineering Consultants in 1997, so depth to bedrock is not based on auger refusal.
11. No boring logs are available for Piezometers P-2, P-2A, P-3 (now MW-6), P-4, P-5, P-6, and P-7. Depth to Bedrock was reported by Trigon in their 1997 report.
12. No survey information is available for B-1, B-2, B-3, B-4, B-5, C-1, C-2, C-3, TW-1, and TW-2, so elevations are considered approximate.

* - See Text for explanation of bedrock depths in P-32 and P-33.

# TABLE 2

**Summarry of Slug Test Data**
**Coble's Sandrock C and D Landfill**

*Table 2a. Saprolite and Partially Weathered Rock (PWR) Wells*

| WELL AND PIEZOMETER IDENTIFICATION | SATURATED AQUIFER THICKNESS VALUE (feet) | SCREEN LENGTH (feet) | WELL DIAMETER (inches) | SLUG TEST TYPE | HYDRAULIC CONDUCTIVITY K (cm/s) | SCREENED LITHOLOGY |
|---|---|---|---|---|---|---|
| MW-1 | --- | 15 | 2 | Rising | 1.85E-04 | Saprolite/PWR |
| MW-2 | --- | 15 | 2 | Rising | 1.66E-04 | Saprolite/PWR |
| MW-4 | --- | 15 | 2 | Rising | 7.60E-04 | Saprolite/PWR |
| MW-5 | 9.45 | 10 | 2 | Rising | 3.53E-05 | Saprolite/PWR |
| MW-9 | 15.86 | 15 | 2 | Falling | 1.11E-04 | PWR |
| MW-9 | 15.86 | 15 | 2 | Rising | 9.18E-05 | PWR |
| P-18 | 9.81 | 15 | 2 | Rising | 7.45E-05 | PWR |
| P-19S | 7.61 | 6 | 2 | Falling | 1.27E-04 | Saprolite |
| P-19S | 7.61 | 6 | 2 | Rising | 1.61E-04 | Saprolite |
| P-20 | 27.91 | 15 | 2 | Falling | 8.60E-05 | PWR |
| P-20 | 27.91 | 15 | 2 | Rising | 9.64E-05 | PWR |
| P-22 | 8.32 | 6 | 2 | Falling | 6.02E-05 | Saprolite/PWR |
| P-22 | 8.32 | 6 | 2 | Rising | 2.66E-05 | Saprolite/PWR |
| P-34 | 22.87 | 15 | 2 | Falling | 1.98E-04 | Saprolite |
| P-34 | 22.87 | 15 | 2 | Rising | 1.60E-04 | Saprolite |
| P-38 | 23.87 | 20 | 2 | Falling | 1.77E-05 | PWR |
| | | | | **Geometric Mean:** | **9.97E-05** | **cm/sec** |
| | | | | **Arithmetic Mean:** | **1.47E-04** | **cm/sec** |
| | | | | **Std. Dev.** | **1.73E-04** | **cm/sec** |

*Table 2b. Bedrock Wells*

| WELL AND PIEZOMETER IDENTIFICATION | SATURATED AQUIFER THICKNESS VALUE (feet) | SCREEN LENGTH (feet) | WELL DIAMETER (inches) | SLUG TEST TYPE | HYDRAULIC CONDUCTIVITY K (cm/s) | SCREENED LITHOLOGY |
|---|---|---|---|---|---|---|
| TW-1 | --- | 5 | 2 | Rising | 1.27E-04 | Bedrock |
| TW-2 | --- | 15 | 2 | Rising | 1.40E-04 | Bedrock |
| P-16 | 50 | 15 | 2 | Falling | 6.92E-06 | Bedrock |
| P-16 | 50 | 15 | 2 | Rising | 1.88E-06 | Bedrock |
| P-17 | 50 | 15 | 2 | Falling | 8.25E-04 | Saprolite/Bedrock |
| P-17 | 50 | 15 | 2 | Rising | 3.17E-04 | Saprolite/Bedrock |
| P-19D | 50 | 15 | 2 | Falling | 1.49E-05 | Bedrock |
| P-19D | 50 | 15 | 2 | Rising | 2.16E-06 | Bedrock |
| P-21 | 50 | 15 | 2 | Falling | 2.82E-05 | Bedrock |
| P-21 | 50 | 15 | 2 | Rising | 1.58E-05 | Bedrock |
| P-25 | 50 | 10 | 2 | Rising | 2.43E-04 | Bedrock |
| P-32 | 19.01 | 17.51 | 2 | Rising | 2.55E-06 | Bedrock |
| P-33 | 14.76 | 12.26 | 2 | Rising | 2.10E-05 | PWR/Bedrock |
| P-35 | 23.58 | 20 | 2 | Falling | 5.95E-05 | PWR/Bedrock |
| P-35 | 23.58 | 20 | 2 | Rising | 5.99E-05 | PWR/Bedrock |
| P-36 | 30.02 | 20 | 2 | Falling | 7.35E-04 | PWR/Bedrock |
| P-36 | 30.02 | 20 | 2 | Rising | 8.86E-04 | PWR/Bedrock |
| P-37 | 26.15 | 20 | 2 | Falling | 1.10E-04 | PWR/Bedrock |
| P-37 | 26.15 | 20 | 2 | Rising | 1.11E-04 | PWR/Bedrock |
| | | | | **Geometric Mean:** | **5.14E-05** | **cm/sec** |
| | | | | **Arithmetic Mean:** | **1.95E-04** | **cm/sec** |
| | | | | **Std. Dev.** | **2.90E-04** | **cm/sec** |

| | | |
|---|---|---|
| **Geometric Mean of all Tests:** | **6.96E-05** | **cm/sec** |

**NOTES:**

1. --- = data not available
2. Aquifer analysis for MW-1, -2, and -4 were performed by Trigon Engineering Consultants, Inc. on May 14, 1998.
3. Aquifer analysis for TW-1and TW-2 were performed by Trigon Engineering Consultants, Inc. on June 23, 1998.
4. Aquifer analysis for MW-5, P-16, -17, -19S, -19D, -21, and -22were performed by Joyce Engineering, Inc. between February 5-18, 2002.
5. Aquifer analysis for MW-9, P-18 and P-25 were performed by Joyce Engineering, Inc. on September 16, 2005.
6. Aquifer analysis for P-20, P-31, P-32, P-33, P-34, P-35, P-36, & P-37 were performed by Joyce Engineering, Inc. on February 12-14, 2007.
7. Results for P-31 were unusable due to non-linear recovery.

# TABLE 3
## Summary of Laboratory Soils Test Data
## Coble's Sandrock Construction and Demolition Landfill

| BORING NUMBER | HYDROGEOLOGIC UNIT | SAMPLE DEPTH (feet) | SAMPLE TYPE | USCS CLASSIFICATION | USCS SYMBOL | NATURAL MOISTURE CONTENT (%) | DRY UNIT WEIGHT (pcf) | SPECIFIC GRAVITY | GRADATION RESULTS (% passing) | | | | | | | | | | | | USDA SOIL CLASSIFICATION SYSTEM | | ASTM SOIL CLASSIFICATION SYSTEM | | WENTWORTH SOIL CLASSIFICATION SYSTEM | | ATTERBERG LIMITS | | | POROSITY (percent) | EFFECTIVE POROSITY (percent) | PERMEABILITY (cm/sec) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1' | 3/4' | 1/2' | 3/8" | #4 | #10 | #20 | #40 | #60 | #100 | #140 | #200 | PERCENT SILT | PERCENT CLAY | PERCENT SILT | PERCENT CLAY | PERCENT SILT | PERCENT CLAY | LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX | | | |
| B-1 | Saprolite | 0-7 | Bag | Sandy Clayey Silt | ML | 17.5 | 101.0 | --- | 100 | 100 | 100 | 100 | 99 | 94 | --- | 80 | --- | 68 | --- | 67 | 50.00 | 13.00 | 45.5 | 21.5 | 47 | 18 | 42 | 30 | 12 | 39.8 | 12 | 1.70E-07 |
| B-1 | Saprolite | 0-10 | --- | Sandy Silt | ML | --- | --- | --- | 100 | 100 | 100 | 100 | 99 | 94 | --- | 64 | --- | 38 | --- | 35 | 27.50 | 2.00 | 31 | 4 | 30 | 3 | --- | --- | --- | --- | 24 | --- |
| B-2 | Saprolite | 0-5 | --- | Sandy Silt | ML | --- | --- | --- | 100 | 100 | 100 | 100 | 100 | 99 | --- | 75 | --- | 44 | --- | 42 | 36.50 | 1.00 | 40 | 2 | 38.5 | 2 | --- | --- | --- | --- | 26 | --- |
| B-3 | Saprolite | 0-15 | --- | Sandy Silt | ML | --- | --- | --- | 100 | 100 | 100 | 100 | 100 | 98 | --- | 58 | --- | 32 | --- | 31 | 27.00 | 0.50 | 28 | 3 | 27.5 | 2 | --- | --- | --- | --- | 29 | --- |
| B-5 | Saprolite | 0-10 | --- | Sandy Silt | ML | --- | --- | --- | 100 | 100 | 100 | 100 | 100 | 96 | --- | 71 | --- | 49 | --- | 47 | 34.00 | 8.00 | 36.5 | 10.5 | 35.5 | 9.5 | --- | --- | --- | --- | 20 | --- |
| MW-1 | Saprolite | 0-7 | Bag | Sandy Silt | ML | 27.3 | 101.4 | --- | 100 | 100 | 100 | 100 | 100 | 96 | --- | 85 | --- | 49 | --- | 47 | 27.50 | 9.50 | 36 | 11 | 33 | 10.5 | 49 | 40 | 9 | 38 | 20 | --- |
| MW-2 | Saprolite | 0-10 | --- | Sandy Silt | ML | 27.3 | --- | --- | 100 | 100 | 100 | 100 | 100 | 99 | --- | 75 | --- | 49 | --- | 48 | 30.50 | 11.00 | 35 | 13 | 32.5 | 12.5 | --- | --- | --- | --- | 18 | --- |
| MW-3 | Saprolite | 0-10 | --- | Sandy Silt | ML | --- | --- | --- | 100 | 100 | 100 | 100 | 99 | 92 | --- | 46 | --- | 22 | --- | 21 | 16.50 | 1.00 | 19 | 2 | 18.5 | 1.5 | --- | --- | --- | 32.6 | 33 | --- |
| MW-4 | Saprolite | 0-10 | --- | Sandy Silt | ML | --- | --- | --- | 100 | 100 | 100 | 100 | 100 | 92 | --- | 51 | --- | 29 | --- | 28 | 20.50 | 2.00 | 24.5 | 3.5 | 22.5 | 3 | --- | --- | --- | --- | 30 | --- |
| MW-4 | Saprolite | 11-12.5 | Undisturbed | Sandy Silt | ML | 14.2 | 111.5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31 | NP | NP | 32.6 | --- | 2.30E-05 |
| UD-1 | --- | 0.5-2.5 | Undisturbed | --- | --- | 31.6 | 85.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 49.9 | --- | 5.10E-06 |
| P-15 | Saprolite | 5-7 | Split Spoon | Silty Clayey Sand | SC-SM | --- | --- | --- | 100 | 100 | 100 | 100.0 | 99.0 | 89.5 | --- | 58.8 | --- | 42.9 | --- | 35.2 | --- | --- | --- | --- | --- | --- | 26 | 19 | 7 | --- | --- | --- |
| P-17 | Saprolite | 5-7 | Split Spoon | Elastic Silt | MH | --- | --- | --- | 100 | 100 | 100 | 100.0 | 100.0 | 99.2 | --- | 94.3 | --- | 92.0 | --- | 90.2 | --- | --- | --- | --- | --- | --- | 62 | 36 | 26 | --- | --- | --- |
| P-19S | Saprolite | 4-6 | Undisturbed | Silty Sand | SM | 27.2 | 99.0 | --- | 100 | 100 | 100 | 98.4 | 95.5 | 90.7 | --- | 56.7 | --- | 39.0 | --- | 32.5 | --- | --- | --- | --- | --- | --- | 31 | 23 | 8 | 39.4 | --- | 7.74E-08 |
| P-20 | Saprolite/PWR | 20-22 | Split Spoon | Silty Sand | SM | --- | --- | --- | 100 | 100 | 100 | 100.0 | 99.1 | 84.8 | --- | 40.3 | --- | 25.2 | --- | 18.3 | --- | --- | --- | --- | --- | --- | 27 | 27 | 0 | --- | --- | --- |
| P-21 | Saprolite | 2-10 | Bulk | Sandy Lean Clay | CL | --- | 108.4 | --- | 100 | 100 | 100 | 100.0 | 100.0 | 97.0 | --- | 89.0 | --- | 83.7 | --- | 78.4 | --- | --- | --- | --- | --- | --- | 42 | 24 | 18 | 35.4 | --- | 8.76E-08 |
| P-23 | Saprolite | 0-2 | Split Spoon | Sandy Elastic Silt | MH | --- | --- | --- | 100 | 100 | 100 | 100.0 | 100.0 | 95.7 | --- | 77.6 | --- | 71.2 | --- | 67.2 | --- | --- | --- | --- | --- | --- | 60 | 32 | 28 | --- | --- | --- |
| MW-8 | Saprolite | 2-6 | Composite | Sandy Lean Clay | CL | --- | --- | --- | 100 | 100 | 100 | 100.0 | 99.3 | 98.3 | --- | 90.3 | --- | --- | --- | 65.1 | 30.72 | 32.46 | 26.27 | 38.87 | 27.55 | 36.24 | 44 | 18 | 26 | --- | 3.2 | --- |
| MW-8 | PWR | 15-22 | Composite | Clayey Sand | SC | --- | --- | --- | 100 | 100 | 100 | 100.0 | 99.1 | 93.1 | --- | 59.8 | --- | --- | --- | 27.3 | 21.65 | 3.73 | 21.19 | 6.07 | 20.54 | 5.09 | 35 | 19 | 16 | --- | 28 | --- |
| P-24 | Saprolite | 5-12 | Composite | Clayey Sand | SC | --- | --- | --- | 100 | 100 | 100 | 99.4 | 97.5 | 90.0 | --- | 64.3 | --- | --- | --- | 42.1 | 27.08 | 16.12 | 22.9 | 19.24 | 23.02 | 17.64 | 38 | 19 | 19 | --- | 12 | --- |
| P-31 | PWR | 6 | Split Spoon | Silty Sand | --/SM | 3.8 | --- | 2.73 | 100 | 100 | 100 | 100 | 94.9 | 72.5 | 48.5 | 34.9 | 28.1 | --- | 19.6 | 16.9 | --- | --- | --- | --- | --- | --- | NP | NP | NP | --- | --- | --- |
| P-32 | PWR | 10 | Split Spoon | Silty Sand | --/SM | 6.3 | --- | 2.76 | 100 | 100 | 100 | 100 | 98.3 | 91.4 | 78.3 | 67.9 | 58.8 | --- | 47.6 | 43.8 | --- | --- | --- | --- | --- | --- | NP | NP | NP | --- | --- | --- |
| P-33 | Saprolite/PWR | 6 | Split Spoon | Clayey Sand | CL/SC | 9.9 | --- | --- | 100 | 100 | 100 | 100 | 99.6 | 89.8 | 71.2 | 56.0 | 45.2 | --- | 33.5 | 30.1 | 22.84 | 7.18 | --- | --- | --- | --- | 31 | 19 | 12 | --- | --- | --- |
| P-34 | Saprolite | 10 | Split Spoon | Elastic Silt w/ Sand | MH/MH | 61.9 | --- | --- | 100 | 100 | 100 | 100 | 100 | 97.7 | 91.8 | 86.5 | 82.3 | --- | 76.5 | 47.2 | 42.78 | 28.25 | --- | --- | --- | --- | 54 | 36 | 18 | --- | --- | --- |
| P-35 | Saprolite | 2-4 | Undisturbed | Sandy Lean Clay | CL/CL | 28.6 | --- | 2.8 | 100 | 100 | 100 | 100 | 99.9 | 91.2 | 80.7 | 70.1 | 63.6 | --- | 56.2 | 53.7 | 25.38 | 30.80 | --- | --- | --- | --- | 46 | 20 | 26 | --- | --- | 9.20E-07 |
| P-36 | Saprolite/PWR | 5 | Split Spoon | Silty Sand | ML/SM | 7.7 | --- | 2.71 | 100 | 100 | 100 | 99.5 | 95.9 | 79.4 | 56.9 | 43.5 | 36.3 | --- | 26.8 | 23.5 | | | --- | --- | --- | --- | 30 | 25 | 5 | --- | --- | --- |
| P-37 | Saprolite | 2-4 | Undisturbed | Clayey Sand | CL/SC | 19.2 | --- | --- | 100 | 100 | 100 | 99.7 | 99.0 | 93.4 | 79.9 | 65.9 | 54.6 | --- | 41.1 | 37.3 | 20.65 | 17.09 | --- | --- | --- | --- | 49 | 22 | 27 | --- | --- | 1.60E-04 |
| P-38 | Saprolite | 10 | Split Spoon | Clayey Sand | CL/SC | 13.8 | --- | --- | 100 | 100 | 100 | 100 | 95.5 | 76.0 | 57.4 | 45.4 | 38.1 | --- | 29.8 | 27.0 | 21.63 | 9.91 | --- | --- | --- | --- | 41 | 22 | 19 | --- | --- | --- |
| P-38 | PWR | 25 | Split Spoon | Clayey Sand | CL/SC | 9.9 | --- | --- | 100 | 100 | 95.5 | 92.9 | 87.7 | 80.7 | 65.5 | 54.2 | 46.5 | --- | 37.5 | 34.3 | --- | --- | --- | --- | --- | --- | 47 | 16 | 28 | --- | --- | --- |

NOTES:
1. na = not applicable
2. NP = non-plastic
3. --- = no data available
4. Soils analysis performed by Trigon Engineering Consultants, Inc. and Geotechnics
5. NP = Non-Plastic material; therefore, Atterberg Limits not available.
6. The USDA Soil Classification System sets a grain size boundary for sand and silt at 0.05 mm and for silt and clay at 0.002 mm.
7. The ASTM Soil Classification System sets a grain size boundary for sand and silt at 0.075 mm and for silt and clay at 0.005 mm.
8. The Wentworth Soil Classification System sets a grain size boundary for sand and silt at 0.0625 mm and for silt and clay at 0.0039 mm.
9. The grain size distribution from the Wentworth Soil Classification System was plotted on the Textural Classification Triangle developed by A.I. Johnson (1967) to determine specific yield, which is considered approximately equivalent to effective porosity, and recorded on the table above.
10. Effective porosity values were calculated assuming that all material greater than 0.0625 mm is sand size. There is a minor amount of material larger than sand in each sample provided.
11. The porosity values provided are an average of "Before Test" and "After Test" porosity values provided on the porosity data sheets in Appendix DH-9.

For P-31 through P-38:
1st USCS Symbol from Atterberg Limits Pages
2nd USCS Symbol & Classification from Sieve Analysis

## TABLE 4
## Summary of Rock Core Data
## Coble's Sandrock Construction and Demolition Landfill

| BORING LOCATION | CORED INTERVAL (feet) | % RECOVERY | % RQD | ROCK TYPE | COMMENTS |
|---|---|---|---|---|---|
| C-1 | 45.4-50.4 | 91 | 61 | Granite | C-1, C-2 and C-3 were cored in July and August 1997 by Trigon Engineering Consultants, Inc. using an NQ wire-line rock coring device on a Mobil B-61 rig. |
| | 50.4-55.4 | 100 | 100 | Granite | |
| C-2 | 38.5-43.5 | 98 | 86 | Granite | |
| | 43.5-48.5 | 100 | 90 | Granite | |
| C-3 | 13.1-18.1 | 98 | 85 | Granite | |
| | 18.1-23.1 | 100 | 90 | Granite | |
| TW-1 | 13.2-17.5 | 85 | --- | Granite | TW-1 and TW-2 were cored between June and July 1998 by Trigon Engineering Consultants, Inc. |
| | 17.5-22.6 | 80 | 86 | Granite | |
| TW-2 | 8.5-13.5 | 93 | 90 | Meta-volcanic | |
| | 13.5-18.5 | 97 | 100 | Meta-volcanic | |
| | 18.5-23.5 | 84 | 98 | Meta-volcanic | |
| | 23.5-28.5 | 100 | 100 | Meta-volcanic | |
| P-21 | 44-50 | 82 | 38 | Granite | P-21 was cored in February 2002 by Bedford Well Drilling, Inc. using an NQ wire-line rock coring device on a Ingersoll-Rand A-300 rig. |
| P-26 | 25-30 | 85 | 28 | Granite | |
| | 30-35 | 70 | 36 | Granite | |
| | 35-40 | 38 | 0 | Meta-volcanic | P-26 was cored in March 2005 by SAEDACCO using an NQ rock coring device on a Gus Pech GP-1100E rig. |
| | 40-45 | 94 | 62 | Granite | |
| | 45-48.5 | 95 | 43 | Granite | |
| P-32 | 16-21 | 7 | 0 | Granite | P-32 and P-37 were cored in January-February 2007 by SAEDACCO using an NQ rock coring device on a Gus Pech GP-1100E rig. |
| | 21-26 | 85 | 38 | Granite | |
| | 26-31 | 95 | 70 | Granite | |
| P-37 | 16-21 | 95 | 86 | Granite | |
| | 21-26 | 94 | 82 | Granite | |
| | 26-31 | 43 | 80 | Granite | |

**NOTES:** RQD = Rock Quality Designator.

# TABLE 5a
## Coble's Sandrock C and D Landfill
## Depth to Water at Wells and Piezometers

| Well / Piezometer | MW-1 | MW-2 | MW-3 | MW-4 | MW-5 | MW-6 | MW-7 | MW-8 | MW-9 | MW-10S | MW-10D | WW-1 | P-4 | P-5 | P-6 | P-7 | P-8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOC Elevation | 602.46 | 582.31 | 613.05 | 582.64 | 577.41 | 652.56 | 583.33 | 574.26 | 589.09 | 592.46 | 592.76 | 625.20 | 631.88 | 610.99 | 606.06 | 621.51 | 477.45 |
| Initial | --- | --- | --- | --- | 12.38 | --- | 6.85 | 11.43 | 38.38 | 11.45 | 26.45 | na | --- | --- | --- | --- | --- |
| 24 hr * | --- | --- | --- | --- | --- | --- | na | 5.91 | 21.91 | 8.38 | 6.60 | na | --- | --- | --- | --- | --- |
| 7 day * | --- | --- | --- | --- | 6.65 | --- | na | 4.15 | 18.62 | 6.83 | 6.81 | na | --- | --- | --- | --- | --- |
| 4/20/2000 | 32.87 | 12.50 | 33.14 | 13.57 | --- | N/A | --- | --- | --- | --- | --- | --- | 23.26 | 6.60 | 21.93 | 23.00 | 9.38 |
| 8/15/2000 | 34.25 | 15.34 | 34.82 | 14.56 | --- | 25.14 | --- | --- | --- | --- | --- | --- | --- | 9.04 | 25.78 | 24.09 | 10.91 |
| 10/15/2000 | 33.16 | 13.76 | 34.80 | 13.83 | --- | N/A | --- | --- | --- | --- | --- | --- | 26.84 | 8.05 | 24.90 | 23.39 | 10.03 |
| 11/30/2000 | 34.37 | 15.44 | 35.58 | 15.60 | --- | 25.26 | --- | --- | --- | --- | --- | --- | 28.55 | 9.98 | 27.75 | 25.10 | 10.90 |
| 4/10/2001 | 30.98 | 12.59 | 34.38 | 13.58 | --- | 25.39 | --- | --- | --- | --- | --- | --- | 23.93 | 6.97 | 21.27 | 22.93 | 9.36 |
| 12/11/2001 | 35.18 | 17.00 | 37.15 | 16.43 | --- | 30.78 | --- | --- | --- | --- | --- | --- | 29.69 | 10.53 | 28.84 | 25.93 | 10.86 |
| 2/1/2002 | --- | --- | --- | --- | 6.93 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2/5/2002 | --- | --- | --- | --- | 7.38 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2/13/2002 | --- | --- | --- | --- | 7.75 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2/18/2002 | --- | --- | --- | --- | 7.94 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3/6/2002 | --- | --- | --- | --- | 7.67 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3/22/2002 | --- | --- | --- | --- | 7.38 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/2/2002 | --- | --- | --- | --- | 7.42 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/30/2002 | 34.29 | 14.47 | 36.96 | 14.43 | 8.09 | 28.62 | --- | --- | --- | --- | --- | --- | 28.04 | 9.09 | 27.32 | 24.15 | 10.77 |
| 5/20/2002 | --- | --- | --- | --- | 8.35 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6/25/2002 | --- | --- | --- | --- | 9.52 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7/29/2002 | --- | --- | --- | --- | 8.46 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/23/2002 | --- | --- | --- | --- | 9.34 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10/4/2002 | --- | --- | --- | --- | 8.23 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11/21/2002 | 31.86 | 11.95 | 34.58 | 12.90 | 6.96 | 26.24 | --- | --- | --- | --- | --- | --- | 24.54 | 5.73 | 20.32 | 22.06 | 9.32 |
| 12/19/2002 | --- | --- | --- | --- | 7.08 | --- | 6.85 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/29/2003 | 30.80 | 13.13 | 33.35 | 13.80 | 7.09 | 19.16 | 8.95 | --- | --- | --- | --- | --- | 24.73 | 7.25 | --- | --- | 9.58 |
| 7/10/2003 | --- | --- | --- | --- | 7.02 | --- | 8.79 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11/11/2003 | 33.97 | 14.93 | 34.51 | 15.17 | 7.82 | 20.03 | 10.89 | --- | --- | --- | --- | --- | 26.64 | 7.96 | --- | --- | 9.97 |
| 4/20/2004 | 33.92 | 13.87 | 34.13 | 14.81 | 7.55 | 22.43 | 9.70 | --- | --- | --- | --- | --- | 24.84 | 7.58 | --- | --- | 9.71 |
| 10/19/2004 | 34.60 | 14.39 | 35.44 | 14.73 | 7.11 | 23.96 | 10.03 | --- | --- | --- | --- | --- | 26.75 | 7.50 | --- | --- | 9.96 |
| 4/4/2005 | --- | --- | --- | --- | 6.49 | --- | 8.00 | 5.42 | 19.38 | 7.91 | 6.81 | 8.80 | --- | --- | --- | --- | --- |
| 4/19/2005 | 33.56 | 13.62 | 34.51 | 14.48 | 6.65 | 21.91 | 8.79 | 6.02 | 19.56 | 8.12 | 7.03 | 13.85 | 23.45 | 4.79 | --- | --- | 9.64 |
| 8/2/2005 | --- | --- | --- | --- | 7.34 | --- | 10.72 | 6.29 | 20.85 | 8.12 | 8.51 | 16.37 | --- | --- | --- | --- | --- |
| 10/20/2005 | 35.30 | 16.79 | 36.72 | 16.21 | 8.29 | 26.91 | 12.09 | --- | --- | --- | --- | --- | 28.48 | 8.43 | --- | --- | 11.94 |
| 4/27/2006 | 34.62 | 12.95 | --- | 13.30 | --- | 28.10 | 10.56 | --- | --- | --- | --- | --- | 27.55 | 7.11 | --- | --- | 9.61 |
| 10/11/2006 | 34.55 | 15.09 | 35.46 | 14.35 | 7.30 | 28.11 | 11.56 | 7.23 | 21.17 | 8.51 | 9.14 | --- | --- | --- | --- | --- | --- |
| 3/6/2007 | 32.50 | 12.64 | 33.44 | 13.62 | 6.28 | 19.30 | 8.60 | 5.48 | 19.60 | 7.80 | 7.70 | --- | 24.34 | 4.80 | --- | --- | 9.68 |

| Well / Piezometer | P-9 | P-10 | P-11 | P-12 | P-13 | P-14 | P-15 | P-16 | P-17 | P-18 | P-19S | P-19D | P-20 | P-21 | P-22 | P-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOC Elevation | 477.90 | 476.05 | 481.92 | --- | 625.50 | 625.50 | 651.22 | 612.05 | 646.28 | 651.76 | 572.18 | 571.85 | 641.11 | 668.42 | 629.90 | 640.37 |
| Initial | --- | --- | --- | --- | --- | --- | 50.60 | 30.90 | 19.82 | 32.66 | 5.52 | Dry | 26.40 | 64.56 | 3.97 | 35.71 |
| 24 hr * | --- | --- | --- | --- | --- | --- | 41.08 | na | na | 25.12 | 5.08 | 42.04 | 12.93 | 48.50 | 3.44 | 31.04 |
| 7 day * | --- | --- | --- | --- | --- | --- | 40.62 | 12.63 | 19.26 | 24.78 | 5.39 | 5.59 | 12.99 | 48.43 | 2.86 | 30.60 |
| 4/20/2000 | 10.91 | 5.45 | 8.93 | N/I | N/I | N/I | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/15/2000 | 12.01 | 8.62 | 10.82 | N/I | N/I | N/I | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10/15/2000 | 11.32 | 7.07 | 8.56 | 4.93 | 12.34 | DRY | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11/30/2000 | 11.85 | 8.79 | 9.89 | 5.73 | 11.40 | DRY | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/10/2001 | 10.72 | 5.45 | 8.52 | --- | 9.49 | DRY | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12/11/2001 | 12.42 | 10.03 | 9.27 | --- | 13.91 | DRY | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2/1/2002 | --- | --- | --- | --- | --- | --- | 40.82 | 12.73 | 17.99 | 24.78 | 5.08 | 42.04 | 12.62 | 48.38 | 2.75 | 30.25 |
| 2/5/2002 | --- | --- | --- | --- | --- | --- | 40.94 | 13.71 | 17.88 | 24.82 | 5.37 | 5.59 | 12.99 | 48.43 | 3.18 | 30.31 |
| 2/13/2002 | --- | --- | --- | --- | --- | --- | 40.96 | 12.65 | 17.45 | 24.27 | 5.23 | 4.88 | 12.14 | 48.11 | 3.13 | 30.10 |
| 2/18/2002 | --- | --- | --- | --- | --- | --- | 40.98 | 13.86 | 17.26 | 24.12 | 5.39 | 5.04 | 11.99 | 48.07 | 3.79 | 30.13 |
| 3/6/2002 | --- | --- | --- | --- | --- | --- | 41.03 | 12.57 | 16.99 | 24.35 | 5.15 | 4.78 | 12.38 | 48.07 | 3.55 | 30.16 |
| 3/22/2002 | --- | --- | --- | --- | --- | --- | 41.07 | 11.69 | 16.18 | 23.89 | 4.91 | 4.51 | 11.44 | 48.15 | 3.43 | 29.96 |
| 4/2/2002 | --- | --- | --- | --- | --- | --- | 40.69 | 11.61 | 15.48 | 23.82 | 4.97 | 4.64 | 10.70 | 48.03 | 3.58 | 29.66 |
| 4/30/2002 | 12.02 | 8.03 | 10.62 | --- | 12.57 | DRY | 40.63 | 15.70 | 15.40 | 24.23 | 5.74 | 5.43 | 11.76 | 47.90 | 8.39 | 30.03 |
| 5/20/2002 | --- | --- | --- | --- | --- | --- | 40.75 | 16.48 | 16.02 | 24.49 | 6.09 | 5.79 | 12.86 | 47.97 | 9.64 | 30.42 |
| 6/25/2002 | --- | --- | --- | --- | --- | --- | 41.12 | 17.13 | 18.24 | 25.16 | 7.80 | 7.26 | 14.24 | 48.61 | 10.72 | 31.13 |
| 7/29/2002 | --- | --- | --- | --- | --- | --- | 41.43 | 17.22 | 19.88 | 25.69 | 6.07 | 6.09 | 15.29 | 49.50 | 4.43 | 31.36 |
| 8/23/2002 | --- | --- | --- | --- | --- | --- | 41.65 | 17.88 | 20.42 | 26.09 | 7.70 | 7.48 | 15.94 | 49.26 | 11.29 | 31.62 |
| 10/4/2002 | --- | --- | --- | --- | --- | --- | 41.85 | 16.64 | 19.97 | 25.88 | 6.25 | 6.17 | 15.69 | 49.41 | 4.49 | 31.31 |
| 11/21/2002 | 10.71 | 5.75 | 8.46 | --- | 8.34 | 18.59 | 40.20 | 7.73 | 14.51 | 23.57 | 4.53 | 3.41 | 9.61 | 47.36 | 2.60 | 27.73 |
| 12/19/2002 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/29/2003 | 11.20 | 5.91 | 9.48 | --- | 9.84 | DRY | 37.06 | 11.71 | 6.81 | 21.95 | 4.77 | 4.47 | 7.42 | 40.98 | 2.83 | 22.87 |
| 7/10/2003 | --- | --- | --- | --- | --- | --- | 36.31 | 11.92 | 6.99 | --- | 4.87 | 4.61 | 4.27 | 39.12 | 2.26 | 22.22 |
| 11/11/2003 | 11.66 | --- | 10.34 | --- | 10.39 | DRY | 36.17 | 14.42 | 10.10 | 21.03 | 5.40 | 4.84 | 5.04 | 38.42 | 2.85 | 24.40 |
| 4/20/2004 | 11.58 | --- | 9.51 | --- | 9.82 | DRY | 35.92 | 11.12 | 6.68 | 20.25 | 5.14 | 4.66 | 5.94 | 40.84 | 3.58 | 25.00 |
| 10/19/2004 | 11.68 | --- | 10.40 | --- | 10.29 | DRY | 37.18 | 13.44 | 7.02 | --- | 5.03 | 4.71 | 7.02 | 42.51 | 3.74 | 26.22 |
| 4/4/2005 | --- | --- | --- | --- | --- | --- | 36.24 | 7.10 | 4.79 | 19.27 | 4.91 | 4.17 | 6.81 | 40.67 | 2.50 | 23.72 |
| 4/19/2005 | 11.31 | --- | 9.83 | --- | 7.59 | DRY | 36.00 | 8.93 | 5.45 | 18.67 | 4.99 | 4.40 | 6.38 | 40.29 | 3.27 | --- |
| 8/2/2005 | --- | --- | --- | --- | --- | --- | 36.95 | 13.70 | 12.95 | 20.97 | 5.37 | 5.15 | 9.42 | 43.07 | 3.07 | 27.41 |
| 10/20/2005 | 12.80 | --- | --- | --- | --- | --- | 38.05 | 14.99 | 15.46 | 22.26 | 6.52 | 6.40 | 12.22 | 45.27 | 5.55 | 29.21 |
| 4/27/2006 | --- | --- | --- | --- | --- | --- | 38.90 | 13.20 | 13.37 | 23.65 | 4.08 | 4.30 | 12.17 | 46.75 | 3.15 | --- |
| 10/11/2006 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3/6/2007 | 11.12 | --- | --- | --- | --- | --- | --- | 8.20 | 9.64 | 23.58 | 5.00 | 4.02 | 6.32 | 42.50 | 2.66 | 26.88 |

| Well / Piezometer | P-24 | P-25 | P-26 | P-27 | P-28 | P-29 | P-30 | P-31 | P-32 | P-33 | P-34 | P-35 | P-36 | P-37 | P-38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOC Elevation | 613.89 | 617.81 | 597.13 | 627.45 | 613.15 | 619.49 | 637.49 | 608.56 | 600.35 | 597.68 | 629.73 | 616.33 | 624.84 | 613.61 | 631.33 |
| Initial | 26.76 | 20.70 | Dry | 5.95 | 3.28 | 4.27 | 3.13 | dry | 30.10 | 25.30 | --- | --- | 9.00 | --- | --- |
| 24 hr * | 26.44 | 20.13 | | | | | | 21.61 | 26.56 | 25.07 | 8.42 | 9.50 | --- | --- | 22.40 |
| 7 day * | 26.04 | 19.59 | 26.71 | | | | | 21.45 | 25.00 | 24.98 | 7.16 | 11.12 | 4.91 | 8.09 | --- |
| 4/4/2005 | 26.04 | 19.59 | 26.71 | 5.95 | 3.28 | 4.27 | 3.13 | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/19/2005 | 26.37 | 20.01 | 26.99 | 2.45 | 3.52 | 2.67 | 3.18 | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/2/2005 | 29.06 | 21.85 | 28.84 | 5.40 | 3.54 | 2.70 | dry | --- | --- | --- | --- | --- | --- | --- | --- |
| 10/20/2005 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/27/2006 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10/11/2006 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3/6/2007 | --- | 21.28 | --- | --- | --- | --- | --- | 21.56 | 24.30 | 24.10 | 6.92 | 9.94 | 4.66 | 6.50 | 19.74 |

All values represent depth to static groundwater level measured in feet below top of casing (TOC).

TOC Elevation is in feet above mean sea level.

* 24-hour and 7-day water levels are not all exactly 24-hours or 7-days after well installation, data presented here are the closest data available.

# TABLE 5b
## Coble's Sandrock C and D Landfill
## Elevation of Water Table at Wells and Piezometers

| Well / Piezometer | MW-1 | MW-2 | MW-3 | MW-4 | MW-5 | MW-6 | MW-7 | MW-8 | MW-9 | MW-10S | MW-10D | WW-1 | P-4 | P-5 | P-6 | P-7 | P-8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOC Elevation | 602.46 | 582.31 | 613.05 | 582.64 | 577.41 | 652.56 | 583.33 | 574.26 | 589.09 | 592.46 | 592.76 | 625.20 | 631.88 | 610.99 | 606.06 | 621.51 | 477.45 |
| Initial | --- | --- | --- | --- | 565.03 | --- | 576.48 | 562.83 | 550.71 | 581.01 | 566.31 | --- | --- | --- | --- | --- | --- |
| 24 hr | --- | --- | --- | --- | --- | --- | --- | 568.35 | 567.18 | 584.08 | 586.16 | --- | --- | --- | --- | --- | --- |
| 7 day | --- | --- | --- | --- | 570.76 | --- | --- | 570.11 | 570.47 | 585.63 | 585.95 | --- | --- | --- | --- | --- | --- |
| 4/20/2000 | 569.59 | 569.81 | 579.91 | 569.07 | --- | --- | --- | --- | --- | --- | --- | --- | 608.62 | 604.39 | 584.13 | 598.51 | 468.07 |
| 8/15/2000 | 568.21 | 566.97 | 578.23 | 568.08 | --- | 627.42 | --- | --- | --- | --- | --- | --- | --- | 601.95 | 580.28 | 597.42 | 466.54 |
| 10/15/2000 | 569.30 | 568.55 | 578.25 | 568.81 | --- | --- | --- | --- | --- | --- | --- | --- | 605.04 | 602.94 | 581.16 | 598.12 | 467.42 |
| 11/30/2000 | 568.09 | 566.87 | 577.47 | 567.04 | --- | 627.30 | --- | --- | --- | --- | --- | --- | 603.33 | 601.01 | 578.31 | 596.41 | 466.55 |
| 4/10/2001 | 571.48 | 569.72 | 578.67 | 569.06 | --- | 627.17 | --- | --- | --- | --- | --- | --- | 607.95 | 604.02 | 584.79 | 598.58 | 468.09 |
| 12/11/2001 | 567.28 | 565.31 | 575.90 | 566.21 | --- | 621.78 | --- | --- | --- | --- | --- | --- | 602.19 | 600.46 | 577.22 | 595.58 | 466.59 |
| 2/1/2002 | --- | --- | --- | --- | 570.48 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2/5/2002 | --- | --- | --- | --- | 570.03 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2/13/2002 | --- | --- | --- | --- | 569.66 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2/18/2002 | --- | --- | --- | --- | 569.47 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3/6/2002 | --- | --- | --- | --- | 569.74 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3/22/2002 | --- | --- | --- | --- | 570.03 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/2/2002 | --- | --- | --- | --- | 569.99 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/30/2002 | 568.17 | 567.84 | 576.09 | 568.21 | 569.32 | 623.94 | --- | --- | --- | --- | --- | --- | 603.84 | 601.90 | 578.74 | 597.36 | 466.68 |
| 5/20/2002 | --- | --- | --- | --- | 569.06 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6/25/2002 | --- | --- | --- | --- | 567.89 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7/29/2002 | --- | --- | --- | --- | 568.95 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/23/2002 | --- | --- | --- | --- | 568.07 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10/4/2002 | --- | --- | --- | --- | 569.18 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11/21/2002 | 570.60 | 570.36 | 578.47 | 569.74 | 570.45 | 626.32 | --- | --- | --- | --- | --- | --- | 607.34 | 605.26 | 585.74 | 599.45 | 468.13 |
| 12/19/2002 | --- | --- | --- | --- | 570.33 | --- | 576.48 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/29/2003 | 571.66 | 569.18 | 579.70 | 568.84 | 570.32 | 633.40 | 574.38 | --- | --- | --- | --- | --- | 607.15 | 603.74 | --- | --- | 467.87 |
| 7/10/2003 | --- | --- | --- | --- | 570.39 | --- | 574.54 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11/11/2003 | 568.49 | 567.38 | 578.54 | 567.47 | 569.59 | 632.53 | 572.44 | --- | --- | --- | --- | --- | 605.24 | 603.03 | --- | --- | 467.48 |
| 4/20/2004 | 568.54 | 568.44 | 578.92 | 567.83 | 569.86 | 630.13 | 573.63 | --- | --- | --- | --- | --- | 607.04 | 603.41 | --- | --- | 467.74 |
| 10/19/2004 | 567.86 | 567.92 | 577.61 | 567.91 | 570.30 | 628.60 | 573.30 | --- | --- | --- | --- | --- | 605.13 | 603.49 | --- | --- | 467.49 |
| 4/4/2005 | --- | --- | --- | --- | 570.92 | --- | 575.33 | 568.84 | 569.71 | 584.55 | 585.95 | 616.40 | --- | --- | --- | --- | --- |
| 4/19/2005 | 568.90 | 568.69 | 578.54 | 568.16 | 570.76 | 630.65 | 574.54 | 568.24 | 569.53 | 584.34 | 585.73 | 611.35 | 608.43 | 606.20 | --- | --- | 467.81 |
| 8/2/2005 | --- | --- | --- | --- | 570.07 | --- | 572.61 | 567.97 | 568.24 | 584.34 | 584.25 | 608.83 | --- | --- | --- | --- | --- |
| 10/20/2005 | 567.16 | 565.52 | 576.33 | 566.43 | 569.12 | 625.65 | 571.24 | --- | --- | --- | --- | --- | 603.40 | 602.56 | --- | --- | 465.51 |
| 4/27/2006 | 567.84 | 569.36 | --- | 569.34 | --- | 624.46 | 572.77 | --- | --- | --- | --- | --- | 604.33 | 603.88 | --- | --- | 467.84 |
| 10/11/2006 | 567.91 | 567.22 | 577.59 | 568.29 | 570.11 | 624.45 | 571.77 | 567.03 | 567.92 | 583.95 | 583.62 | --- | --- | --- | --- | --- | |
| 3/6/2007 | 569.96 | 569.67 | 579.61 | 569.02 | 571.13 | 633.26 | 574.73 | 568.78 | 569.49 | 584.66 | 585.06 | --- | 607.54 | 606.19 | --- | --- | 467.77 |

| Well / Piezometer | P-9 | P-10 | P-11 | P-12 | P-13 | P-14 | P-15 | P-16 | P-17 | P-18 | P-19S | P-19D | P-20 | P-21 | P-22 | P-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOC Elevation | 477.90 | 476.05 | 481.92 | --- | 625.50 | 625.50 | 651.22 | 612.05 | 646.28 | 651.76 | 572.18 | 571.85 | 641.11 | 668.42 | 629.90 | 640.37 |
| Initial | --- | --- | --- | --- | --- | --- | 600.62 | 581.15 | 626.46 | 619.10 | 566.66 | Dry | 614.71 | 603.86 | 625.93 | 604.66 |
| 24 hr | --- | --- | --- | --- | --- | --- | 610.14 | | | 626.64 | 567.10 | 529.81 | 628.18 | 619.92 | 626.46 | 609.33 |
| 7 day | --- | --- | --- | --- | --- | --- | 610.60 | 599.42 | 627.02 | 626.98 | 566.79 | 566.26 | 628.12 | 619.99 | 627.04 | 609.77 |
| 4/20/2000 | 466.99 | 470.60 | 472.99 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/15/2000 | 465.89 | 467.43 | 471.10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10/15/2000 | 466.58 | 468.98 | 473.36 | --- | 613.16 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11/30/2000 | 466.05 | 467.26 | 472.03 | --- | 614.10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/10/2001 | 467.18 | 470.60 | 473.40 | --- | 616.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12/11/2001 | 465.48 | 466.02 | 472.65 | --- | 611.59 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2/1/2002 | --- | --- | --- | --- | --- | --- | 610.40 | 599.32 | 628.29 | 626.98 | 567.10 | 529.81 | 628.49 | 620.04 | 627.15 | 610.12 |
| 2/5/2002 | --- | --- | --- | --- | --- | --- | 610.28 | 598.34 | 628.40 | 626.94 | 566.81 | 566.26 | 628.12 | 619.99 | 626.72 | 610.06 |
| 2/13/2002 | --- | --- | --- | --- | --- | --- | 610.26 | 599.40 | 628.83 | 627.49 | 566.95 | 566.97 | 628.97 | 620.31 | 626.77 | 610.27 |
| 2/18/2002 | --- | --- | --- | --- | --- | --- | 610.24 | 598.19 | 629.02 | 627.64 | 566.79 | 566.81 | 629.12 | 620.35 | 626.11 | 610.24 |
| 3/6/2002 | --- | --- | --- | --- | --- | --- | 610.19 | 599.48 | 629.29 | 627.41 | 567.03 | 567.07 | 628.73 | 620.35 | 626.35 | 610.21 |
| 3/22/2002 | --- | --- | --- | --- | --- | --- | 610.15 | 600.36 | 630.10 | 627.87 | 567.27 | 567.34 | 629.67 | 620.27 | 626.47 | 610.41 |
| 4/2/2002 | --- | --- | --- | --- | --- | --- | 610.53 | 600.44 | 630.80 | 627.94 | 567.21 | 567.21 | 630.41 | 620.39 | 626.32 | 610.71 |
| 4/30/2002 | 465.88 | 468.02 | 471.30 | --- | 612.93 | --- | 610.59 | 596.35 | 630.88 | 627.53 | 566.44 | 566.42 | 629.35 | 620.52 | 621.51 | 610.34 |
| 5/20/2002 | --- | --- | --- | --- | --- | --- | 610.47 | 595.57 | 630.26 | 627.27 | 566.09 | 566.06 | 628.25 | 620.45 | 620.26 | 609.95 |
| 6/25/2002 | --- | --- | --- | --- | --- | --- | 610.10 | 594.92 | 628.04 | 626.60 | 564.38 | 564.59 | 626.87 | 619.81 | 619.18 | 609.24 |
| 7/29/2002 | --- | --- | --- | --- | --- | --- | 609.79 | 594.83 | 626.40 | 626.07 | 566.11 | 565.76 | 625.82 | 618.92 | 625.47 | 609.01 |
| 8/23/2002 | --- | --- | --- | --- | --- | --- | 609.57 | 594.17 | 625.86 | 625.67 | 564.48 | 564.37 | 625.17 | 619.16 | 618.61 | 608.75 |
| 10/4/2002 | --- | --- | --- | --- | --- | --- | 609.37 | 595.41 | 626.31 | 625.88 | 565.93 | 565.68 | 625.42 | 619.01 | 625.41 | 609.06 |
| 11/21/2002 | 467.19 | 470.30 | 473.46 | --- | 617.16 | 606.91 | 611.02 | 604.32 | 631.77 | 628.19 | 567.65 | 568.44 | 631.50 | 621.06 | 627.30 | 612.64 |
| 12/19/2002 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/29/2003 | 466.70 | 470.14 | 472.44 | --- | 615.66 | --- | 614.16 | 600.34 | 639.47 | 629.81 | 567.41 | 567.38 | 633.69 | 627.44 | 627.07 | 617.50 |
| 7/10/2003 | --- | --- | --- | --- | --- | --- | 614.91 | 600.13 | 639.29 | | 567.31 | 567.24 | 636.84 | 629.30 | 627.64 | 618.15 |
| 11/11/2003 | 466.24 | --- | 471.58 | --- | 615.11 | --- | 615.05 | 597.63 | 636.18 | 630.73 | 566.78 | 567.01 | 636.07 | 630.00 | 627.05 | 615.97 |
| 4/20/2004 | 466.32 | --- | 472.41 | --- | 615.68 | --- | 615.30 | 600.93 | 639.60 | 631.51 | 567.04 | 567.19 | 635.17 | 627.58 | 626.32 | 615.37 |
| 10/19/2004 | 466.22 | --- | 471.52 | --- | 615.21 | --- | 614.04 | 598.61 | 639.26 | --- | 567.15 | 567.14 | 634.09 | 625.91 | 626.16 | 614.15 |
| 4/4/2005 | --- | --- | --- | --- | --- | --- | 614.98 | 604.95 | 641.49 | 632.49 | 567.27 | 567.68 | 634.30 | 627.75 | 627.40 | 616.65 |
| 4/19/2005 | 466.59 | --- | 472.09 | --- | 617.91 | --- | 615.22 | 603.12 | 640.83 | 633.09 | 567.19 | 567.45 | 634.73 | 628.13 | 626.63 | --- |
| 8/2/2005 | --- | --- | --- | --- | --- | --- | 614.27 | 598.35 | 633.33 | 630.79 | 566.81 | 566.70 | 631.69 | 625.35 | 626.83 | 612.96 |
| 10/20/2005 | 465.10 | --- | --- | --- | --- | --- | 613.17 | 597.06 | 630.82 | 629.50 | 565.66 | 565.45 | 628.89 | 623.15 | 624.35 | 611.16 |
| 4/27/2006 | --- | --- | --- | --- | --- | --- | 612.32 | 598.85 | 632.91 | 628.11 | 568.10 | 567.55 | 628.94 | 621.67 | 626.75 | --- |
| 10/11/2006 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3/6/2007 | 466.78 | --- | --- | --- | --- | --- | --- | 603.85 | 636.64 | 628.18 | 567.18 | 567.83 | 634.79 | 625.92 | 627.24 | 613.49 |

| Well / Piezometer | P-24 | P-25 | P-26 | P-27 | P-28 | P-29 | P-30 | P-31 | P-32 | P-33 | P-34 | P-35 | P-36 | P-37 | P-38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOC Elevation | 613.89 | 617.81 | 597.13 | 627.45 | 613.15 | 619.49 | 637.49 | 608.56 | 600.35 | 597.68 | 629.73 | 616.33 | 624.84 | 613.61 | 631.33 |
| Initial | 587.13 | 597.11 | Dry | 621.50 | 609.87 | 615.22 | 634.36 | Dry | 570.25 | 572.38 | | | 615.84 | | |
| 24 hr | 587.45 | 597.68 | --- | --- | --- | --- | --- | 586.95 | 573.79 | 572.61 | 621.31 | 606.83 | | | 608.93 |
| 7 day | 587.85 | 598.22 | 570.42 | --- | --- | --- | --- | 587.11 | 575.35 | 572.70 | 622.57 | 605.21 | 619.93 | 605.52 | |
| 4/4/2005 | 587.85 | 598.22 | 570.42 | 621.50 | 609.87 | 615.22 | 634.36 | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/19/2005 | 587.52 | 597.80 | 570.14 | 625.00 | 609.63 | 616.82 | 634.31 | --- | --- | --- | --- | --- | --- | --- | --- |
| 8/2/2005 | 584.83 | 595.96 | 568.29 | 622.05 | 609.61 | 616.79 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10/20/2005 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4/27/2006 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10/11/2006 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3/6/2007 | --- | 596.53 | --- | --- | --- | --- | --- | 587.00 | 576.05 | 573.58 | 622.81 | 606.39 | 620.18 | 607.11 | 611.59 |

All values represent elevation of static groundwater level measured in feet above mean sea level.

* 24-hour and 7-day water levels are not all exactly 24-hours or 7-days after well installation, data presented here are the closest data available.

# TABLE 6
## Hydraulic Gradients and Linear Flow Velocities
## Coble's Sandrock Construction and Demolition Landfill

| FLOW SEGMENT | HYDRAULIC CONDUCTIVITY ( K, cm/s ) | EFFECTIVE POROSITY ( n, % ) | SEGMENT LENGTH ( feet ) | FLOW DIRECTION | 03/06/07 Groundwater Elevations | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Elevation ( ft, AMSL ) | Gradient (i) ( ft/ft ) | Velocity (V) ( cm/sec ) | Velocity (V) ( ft/yr ) |
| $i_1$ | 6.96E-05 | 21% | 1557 | NW | 625.00 | 0.035 | 1.17E-05 | 12.11 |
| | | | | | 570.00 | | | |
| $i_2$ | 6.96E-05 | 21% | 1103 | NW | 630 | 0.045 | 1.50E-05 | 15.54 |
| | | | | | 580 | | | |
| $i_3$ | 6.96E-05 | 21% | 651 | WNW | 620 | 0.038 | 1.27E-05 | 13.16 |
| | | | | | 595 | | | |
| $i_4$ | 6.96E-05 | 21% | 752 | SSW | 630 | 0.027 | 8.81E-06 | 9.11 |
| | | | | | 610 | | | |
| $i_5$ | 6.96E-05 | 21% | 1023 | W | 635 | 0.024 | 8.09E-06 | 8.38 |
| | | | | | 610 | | | |
| | | | | | **Averages:** | **0.034** | **1.13E-05** | **11.66** |

NOTES:

1. The hydraulic conductivity (**K**) is taken from the geometric mean of **K** estimated from slug tests (see Table 2).
2. The effective porosity (**n**) is taken from the average **n** determined by laboratory analysis of soil samples (see Table 3)
3. The horizontal hydraulic gradient (**i**) is the change in groundwater elevation divided by the segment length.
4. The groundwater flow velocity (**V**) is calculated based on the modified Darcy equation: **V=Ki/n**.

# TABLE 7
## Coble's Sandrock C and D Landfill
## Vertical Hydrologic Gradients

### Vertical Gradient Calculations for Paired Wells & Piezometers

| Well ID | Top Screen | Bottom Screen | Mid. Screen | GW Elev. 08/07/97 | GW Elev. 08/14/97 | GW Elev. 11/12/97 | GW Elev. 02/05/02 | GW Elev. 02/13/02 | GW Elev. 02/18/02 | GW Elev. 03/06/02 | GW Elev. 03/22/02 | GW Elev. 04/02/02 | GW Elev. 04/30/02 | GW Elev. 05/20/02 | GW Elev. 06/25/02 | GW Elev. 07/29/02 | GW Elev. 08/23/02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-10S | 583.12 | 568.12 | 575.62 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MW-10D | 535.90 | 525.90 | 530.90 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| diff. | --- | --- | 44.72 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| V. Grad. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | | | | | | | | | |
| P-19S | 565.18 | 559.18 | 562.18 | --- | --- | --- | 566.81 | 566.95 | 566.79 | 567.03 | 567.27 | 567.21 | 566.44 | 566.09 | 564.38 | 566.11 | 564.48 |
| P-19D | 524.65 | 509.65 | 517.15 | --- | --- | --- | 566.26 | 566.97 | 566.81 | 567.07 | 567.34 | 567.21 | 566.42 | 566.06 | 564.59 | 565.76 | 564.37 |
| diff. | --- | --- | 45.03 | --- | --- | --- | -0.55 | 0.02 | 0.02 | 0.04 | 0.07 | 0.00 | -0.02 | -0.03 | 0.21 | -0.35 | -0.11 |
| V. Grad. | --- | --- | --- | --- | --- | --- | **-0.0122** | **0.0004** | **0.0004** | **0.0009** | **0.0016** | **0.0000** | **-0.0004** | **-0.0007** | **0.0047** | **-0.0078** | **-0.0024** |
| | | | | | | | | | | | | | | | | | |
| P-2 | 564.01 | 554.01 | 559.01 | 570.01 | 569.66 | 570.25 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| P-2A | 534.86 | 524.86 | 529.86 | 570.01 | 569.68 | 570.06 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| diff. | --- | --- | 29.15 | 0.00 | 0.02 | -0.19 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| V. Grad. | --- | --- | --- | **0.0000** | **0.0007** | **-0.0065** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

| GW Elev. 10/04/02 | GW Elev. 11/21/02 | GW Elev. 04/29/03 | GW Elev. 07/10/03 | GW Elev. 11/11/03 | GW Elev. 04/20/04 | GW Elev. 10/19/04 | GW Elev. 04/04/05 | GW Elev. 04/19/05 | GW Elev. 08/02/05 | GW. Elev. 09/23/05 | GW. Elev. 4/27/06 | GW. Elev. 10/11/06 | GW. Elev. 03/06/07 | AVG. | ST. DEV. | Well ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | 584.55 | 584.34 | 584.34 | 583.03 | --- | 583.95 | 584.66 | --- | --- | MW-10S |
| --- | --- | --- | --- | --- | --- | --- | 585.95 | 585.73 | 584.25 | 582.97 | --- | 583.62 | 585.06 | --- | --- | MW-10D |
| --- | --- | --- | --- | --- | --- | --- | 1.40 | 1.39 | -0.09 | -0.06 | --- | -0.33 | 0.40 | 0.45 | 0.77 | diff. |
| | | | | | | | **0.0313** | **0.0311** | **-0.0020** | **-0.0013** | **---** | **-0.0074** | **0.0089** | **0.0101** | **0.0172** | V. Grad. |
| | | | | | | | | | | | | | | | | |
| 565.93 | 567.65 | 567.41 | 567.31 | 566.78 | 567.04 | 567.15 | 567.27 | 567.19 | 566.81 | 564.76 | 568.10 | --- | 567.18 | --- | --- | P-19S |
| 565.68 | 568.44 | 567.38 | 567.24 | 567.01 | 567.19 | 567.14 | 567.68 | 567.45 | 566.70 | 564.82 | 567.55 | --- | 567.83 | --- | --- | P-19D |
| -0.25 | 0.79 | -0.03 | -0.07 | 0.23 | 0.15 | -0.01 | 0.41 | 0.26 | -0.11 | 0.06 | -0.55 | --- | 0.65 | 0.03 | 0.31 | diff. |
| **-0.0056** | **0.0175** | **-0.0007** | **-0.0016** | **0.0051** | **0.0033** | **-0.0002** | **0.0091** | **0.0058** | **-0.0024** | **0.0013** | **-0.0122** | **---** | **0.0144** | **0.0008** | **0.0069** | V. Grad. |
| | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | P-2 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | P-2A |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | -0.06 | 0.12 | diff. |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **-0.0019** | **0.0040** | V. Grad. |

diff. = difference between shallow and deep wells.
Vert. Grad. = vertical hydraulic gradient = (Deep GW Elev. - Shallow GW Elev.)/(Deep mid-screen elev. - shallow mid-screen elev.)
Positive Vertical Gradient indicates upward flow of groundwater.

NOTE: P-2 & P-2A have been abandonded.

# TABLE 8
## Summary of Estimated Long-Term Seasonal High Groundwater Elevations
## Coble's Sandrock Construction and Demolition Landfill

| Piezometer or Well ID | Ground Surface Elevation | Maximum Groundwater Elevation | 08/02/05 Groundwater Elevations | Seasonal High Adjustment for 08/02/05 Levels | 08/02/05 Groundwater Elevation + Seasonal High Adjustment | 03/07/07 Groundwater Elevations | Seasonal High Adjustment for 03/06/07 Levels | 03/06/07 Groundwater Elevation + Seasonal High Adjustment | Estimated Seasonal High Groundwater Elevation |
|---|---|---|---|---|---|---|---|---|---|
| MW-1 | 600.26 | 571.48 | 567.85 | 2.25 | 570.10 | 569.96 | --- | --- | 571.48 |
| MW-2 | 580.31 | 570.36 | 566.91 | 2.25 | 569.16 | 569.67 | --- | --- | 570.36 |
| MW-3 | 610.23 | 580.30 | 578.60 | 3.25 | 581.85 | 579.61 | --- | --- | 581.85 |
| MW-4 | 580.64 | 569.74 | 567.69 | 2.25 | 569.94 | 569.02 | --- | --- | 569.94 |
| MW-5 | 575.21 | 570.92 | 570.07 | 2.25 | 572.32 | 571.13 | --- | --- | 572.32 |
| MW-6 | 652.86 | 634.57 | 627.69 | 3.25 | 630.94 | 633.26 | --- | --- | 634.57 |
| MW-7 | 580.83 | 576.48 | 572.61 | 2.25 | 574.86 | 574.73 | --- | --- | 576.48 |
| MW-8 | 571.50 | 568.84 | 567.97 | 2.25 | 570.22 | 568.78 | --- | --- | 570.22 |
| MW-9 | 586.43 | 569.71 | 568.24 | 2.25 | 570.49 | 569.49 | --- | --- | 570.49 |
| MW-10D | 589.90 | 585.95 | 584.25 | 3.25 | 587.50 | 584.66 | --- | --- | 587.50 |
| MW-10S | 589.62 | 584.55 | 584.34 | 3.25 | 587.59 | 585.06 | --- | --- | 587.59 |
| P-4 | 628.56 | 609.56 | 604.66 | 3.25 | 607.91 | 607.54 | --- | --- | 609.56 |
| P-5 | 611.26 | 607.91 | 605.55 | 3.25 | 608.80 | 606.19 | --- | --- | 608.80 |
| P-6 | 602.93 | 586.93 | 586.93 | 3.25 | 590.18 | --- | --- | --- | 590.18 |
| P-7 | 617.90 | 599.45 | 599.42 | 3.25 | 602.67 | --- | --- | --- | 602.67 |
| P-15 | 649.07 | 615.30 | 614.27 | 3.25 | 617.52 | --- | --- | --- | 617.52 |
| P-16 | 609.85 | 604.95 | 598.35 | 3.25 | 601.60 | 603.85 | --- | --- | 604.95 |
| P-17 | 643.78 | 641.49 | 633.33 | 2.25 | 635.58 | 636.64 | --- | --- | 641.49 |
| P-18 | 652.16 | 633.09 | 630.79 | 2.25 | 633.04 | 628.18 | --- | --- | 633.09 |
| P-19D | 569.65 | 568.44 | 566.70 | 3.25 | 569.95 | 567.18 | --- | --- | 569.65 |
| P-19S | 569.18 | 567.65 | 566.81 | 2.25 | 569.06 | 567.83 | --- | --- | 569.18 |
| P-20 | 638.81 | 636.84 | 631.69 | 2.25 | 633.94 | 634.79 | --- | --- | 636.84 |
| P-21 | 665.67 | 630 | 625.35 | 3.25 | 628.60 | 625.92 | --- | --- | 630.00 |
| P-22 | 627.90 | 627.64 | 626.83 | 2.25 | 629.08 | 627.24 | --- | --- | 569.18 |
| P-23 | 637.87 | 618.15 | 612.96 | 3.25 | 616.21 | 613.49 | --- | --- | 618.15 |
| P-24 | 612.52 | 587.85 | 584.83 | 3.25 | 588.08 | --- | --- | --- | 588.08 |
| P-25 | 616.37 | 598.22 | 595.96 | 3.25 | 599.21 | 596.53 | --- | --- | 599.21 |
| P-26 | 594.27 | 570.42 | 568.29 | 3.25 | 571.54 | --- | --- | --- | 571.54 |
| P-27 | 625.25 | 625.00 | 622.05 | 2.25 | 624.30 | --- | --- | --- | 625.00 |
| P-28 | 610.36 | 609.87 | 609.61 | 2.25 | 611.86 | --- | --- | --- | 610.36 |
| P-29 | 617.31 | 616.82 | 616.79 | 2.25 | 619.04 | --- | --- | --- | 617.31 |
| P-30 | 634.75 | 634.36 | <630.75 | 2.25 | 633.00 | --- | --- | --- | 634.36 |
| P-31 | 607.00 | --- | --- | --- | --- | 587.00 | 2.15 | 589.15 | 589.15 |
| P-32 | 598.10 | --- | --- | --- | --- | 576.05 | 2.15 | 578.20 | 578.20 |
| P-33 | 595.50 | --- | --- | --- | --- | 573.58 | 2.15 | 575.73 | 575.73 |
| P-34 | 626.80 | --- | --- | --- | --- | 622.81 | 2.15 | 624.96 | 624.96 |
| P-35 | 613.90 | --- | --- | --- | --- | 606.39 | 2.15 | 608.54 | 608.54 |
| P-36 | 623.10 | --- | --- | --- | --- | 620.18 | 2.15 | 622.33 | 622.33 |
| P-37 | 611.90 | --- | --- | --- | --- | 607.11 | 2.15 | 609.26 | 609.26 |
| P-38 | 628.80 | --- | --- | --- | --- | 611.59 | 2.15 | 613.74 | 613.74 |
| WW-2 | 622.83 | 616.40 | 608.83 | 2.25 | 611.08 | | --- | --- | 616.40 |

| | |
|---|---|
| 3.25 | = Seasonal High Adjustment Factor for bedrock wells based on 08/02/05 groundwater data. |
| 2.25 | = Seasonal High Adjustment Factor for saprolite/PWR wells based on 08/02/05 groundwater data. |
| 2.15 | = Seasonal High Adjustment Factor for new wells based on 03/06/07 groundwater data. |

624.96 = Seasonal High Groundwater Elevation and source.

**NOTES:**

The groundwater elevation with the seasonal high adjustment was used as the estimated seasonal high groundwater elevation, except for the following scenarios:

(a.) If the estimated seasonal high groundwater elevations were above ground surface, the ground surface elevation was used as the seasonal high value; or

(b.) If the maximum recorded groundwater elevation for a well or piezometer was greater than the groundwater elevation with the seasonal high adjustment, the maximum recorded groundwater elevation was used as the seasonal high value.

## TABLE 9
## Summary of Precipitation Data for Burlington, North Carolina
## Coble's Sandrock Construction and Demolition Landfill

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1950 | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.50 x | 0.00 |
| 1951 | 0.00 z | 1.88 | 3.21 | 4.43 | 0.06 z | 1.56 o | 2.63 | 1.11 u | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 12.15 |
| 1952 | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 0.00 z | 1.57 | 3.39 | 3.67 | 8.63 |
| 1953 | 4.48 | 4.79 | 4.54 | 3.21 | 2.11 | 3.84 | 2.80 | 1.45 | 3.99 | 0.27 | 0.54 | 4.80 | 36.82 |
| 1954 | 6.68 | 1.50 | 5.54 | 2.50 | 3.72 | 2.63 | 4.78 | 4.00 | 0.66 | 7.45 | 5.14 | 3.04 | 47.64 |
| 1955 | 1.94 | 3.98 | 2.43 | 4.33 | 2.96 | 2.49 | 6.28 | 5.36 | 5.07 | 4.32 | 2.33 | 0.33 | 41.82 |
| 1956 | 1.51 | 5.92 | 3.03 | 3.53 | 2.22 | 2.77 | 4.65 | 4.56 | 6.84 | 4.51 | 2.32 | 3.01 | 44.87 |
| 1957 | 3.66 | 5.89 | 3.01 | 3.79 | 1.66 | 4.00 | 3.68 | 6.13 | 6.87 | 2.27 | 5.44 | 2.33 | 48.73 |
| 1958 | 4.66 | 3.61 | 2.67 | 5.55 | 5.16 | 4.10 | 3.94 | 6.81 | 1.52 | 1.95 | 2.02 | 4.37 | 46.36 |
| 1959 | 2.62 | 3.28 | 2.89 | 4.98 | 2.85 | 1.68 | 5.81 | 5.75 | 3.91 | 7.33 | 3.25 | 3.10 | 47.45 |
| 1960 | 3.95 | 5.61 | 5.97 | 4.16 | 3.99 | 1.08 | 6.20 | 4.94 | 3.99 | 2.35 | 0.65 | 2.34 | 45.23 |
| 1961 | 1.81 | 5.13 | 5.68 | 4.07 | 5.56 | 4.53 | 3.32 | 7.62 | 0.65 | 1.32 | 1.88 | 5.82 | 47.39 |
| 1962 | 6.58 | 4.26 a | 4.55 | 2.47 a | 2.76 | 7.11 | 5.14 | 3.12 | 3.89 | 0.78 | 5.63 | 3.71 | 50.00 |
| 1963 | 2.59 | 3.23 | 5.68 | 2.50 | 1.56 | 1.87 | 3.76 | 2.71 | 7.66 | 0.39 | 5.84 | 2.30 | 40.09 |
| 1964 | 4.15 | 4.55 | 2.38 | 3.38 | 0.88 | 4.51 | 4.89 | 6.24 | 3.60 | 5.33 | 1.70 | 3.51 | 45.12 |
| 1965 | 1.81 | 2.58 | 4.39 | 3.45 | 1.22 | 8.12 | 11.56 | 3.42 | 3.03 | 3.11 | 1.48 | 0.34 | 44.51 |
| 1966 | 4.99 | 4.97 | 1.30 | 1.36 | 5.72 | 1.04 | 1.52 | 3.27 | 4.63 | 3.10 | 1.88 | 2.54 | 36.32 |
| 1967 | 1.83 | 3.37 | 1.59 | 1.76 | 4.62 | 2.94 | 4.02 | 7.89 | 2.50 | 0.85 | 1.21 | 6.57 | 39.15 |
| 1968 | 4.00 | 0.67 | 4.32 | 2.06 | 4.98 | 2.24 | 4.49 | 3.25 | 0.10 | 2.71 | 4.37 | 3.35 | 36.54 |
| 1969 | 1.68 | 3.67 | 3.87 | 5.48 | 4.22 | 6.76 | 4.74 | 3.19 | 4.06 | 1.15 | 0.80 | 3.98 | 43.60 |
| 1970 | 1.79 | 3.50 | 4.21 | 3.87 | 3.10 | 3.02 | 5.34 | 5.16 | 1.30 | 6.50 | 3.70 | 2.91 | 44.40 |
| 1971 | 1.70 | 3.63 | 3.86 | 2.86 | 5.83 | 2.16 | 3.41 | 5.19 | 3.68 | 8.74 | 2.67 | 1.66 | 45.39 |
| 1972 | 1.78 | 4.42 | 2.42 | 2.03 | 5.01 | 5.04 | 4.81 | 3.40 | 7.52 | 3.93 | 5.54 | 4.57 | 50.47 |
| 1973 | 2.98 | 3.39 | 5.27 | 4.96 | 4.52 | 7.42 | 4.18 | 2.31 | 2.52 | 1.95 | 0.96 | 5.95 | 46.41 |
| 1974 | 5.09 | 3.39 | 3.42 | 2.14 | 8.75 | 5.55 | 1.67 | 6.29 | 8.55 | 0.82 | 2.05 | 4.96 | 52.68 |
| 1975 | 6.54 | 3.64 | 8.29 | 1.19 | 2.96 | 1.46 | 8.73 | 4.56 | 8.61 | 1.70 | 2.31 | 2.72 | 52.71 |
| 1976 | 3.15 | 1.54 | 2.00 | 0.47 | 4.31 | 4.99 | 1.07 | 1.88 | 2.75 | 4.95 | 2.35 | 3.82 | 33.28 |
| 1977 | 2.69 | 1.77 | 3.79 | 1.38 | 2.68 | 6.43 | 1.45 | 2.93 | 5.76 | 5.24 | 2.56 | 3.01 | 39.69 |
| 1978 | 8.43 | 1.19 | 4.07 | 6.51 | 6.84 | 4.14 | 5.25 | 7.51 | 1.56 | 1.95 | 2.59 a | 4.43 | 54.47 |
| 1979 | 5.86 | 4.96 | 3.76 | 2.98 | 5.85 | 7.20 | 3.70 | 3.60 | 7.54 | 2.50 | 3.81 | 1.15 | 52.91 |
| 1980 | 4.43 | 1.82 | 5.69 | 2.79 | 3.86 | 8.17 | 4.53 | 2.58 | 4.18 | 4.56 | 2.62 | 1.58 | 46.81 |
| 1981 | 1.04 | 4.52 | 2.91 | 1.55 | 3.67 | 3.36 | 8.50 | 4.67 | 2.72 | 5.13 | 0.45 | 3.95 | 42.47 |
| 1982 | 5.13 | 5.81 | 1.66 | 4.21 | 6.23 | 10.16 | 3.43 | 1.55 | 1.94 | 4.74 | 2.88 | 4.64 | 52.38 |
| 1983 | 1.86 | 4.08 | 5.06 | 7.59 | 5.61 | 2.59 | 0.79 | 1.99 | 2.63 | 3.44 | 5.02 | 6.95 | 47.61 |
| 1984 | 4.72 | 6.85 | 7.22 | 3.50 | 4.39 | 2.92 | 8.64 | 2.20 | 0.66 | 2.98 | 1.76 | 2.62 | 48.46 |
| 1985 | 4.07 | 5.18 | 1.36 | 0.68 | 4.47 | 1.18 | 9.63 | 10.19 | 0.07 | 2.92 | 8.86 | 1.86 | 50.47 |
| 1986 | 0.96 | 1.51 | 2.44 | 2.65 | 2.45 | 1.14 | 4.11 | 6.05 a | 1.05 | 2.48 | 4.24 | 4.34 | 33.42 |
| 1987 | 4.22 b | 3.45 | 3.18 | 6.76 a | 1.47 | 1.06 | 4.48 | 2.65 | 7.66 | 1.19 | 3.72 | 3.25 | 43.09 |
| 1988 | 2.70 | 1.27 | 1.55 | 3.17 | 4.87 | 0.00 z | 3.02 | 3.01 | 4.02 | 2.63 | 3.94 | 0.86 | 31.04 |
| 1989 | 1.67 | 6.63 a | 7.87 | 3.39 | 3.87 | 6.65 | 5.35 | 5.95 | 2.53 | 3.00 | 2.46 | 2.58 | 51.95 |
| 1990 | 4.63 | 3.28 | 2.57 a | 1.98 | 7.52 | 0.89 | 2.48 | 3.85 a | 0.16 | 7.78 | 2.21 | 3.93 | 41.28 |
| 1991 | 5.00 | 1.93 | 5.61 | 2.58 a | 2.72 | 2.29 a | 6.32 | 4.38 | 4.68 | 1.21 | 0.40 | 3.03 | 40.15 |
| 1992 | 3.70 | 3.10 | 2.90 | 3.16 | 3.38 | 6.75 | 2.49 | 3.57 | 1.97 | 5.42 | 4.88 | 3.01 | 44.33 |
| 1993 | 3.89 | 3.59 | 8.50 a | 4.59 | 3.33 | 1.60 | 7.36 | 2.93 | 3.17 | 1.14 | 3.73 | 2.29 | 46.12 |
| 1994 | 4.77 a | 2.39 | 5.92 | 2.42 | 1.10 a | 1.37 a | 6.44 | 4.67 | 0.80 | 1.17 | 1.55 | 0.75 | 33.35 |
| 1995 | 4.94 | 3.21 | 3.57 a | 0.70 | 3.52 | 12.00 | 4.97 | 5.06 | 1.67 | 6.84 | 4.03 | 0.94 | 51.45 |
| 1996 | 2.63 e | 1.86 b | 5.32 a | 2.18 c | 5.79 | 1.43 | 2.94 | 7.19 | 11.73 | 4.25 | 3.06 | 3.84 | 52.22 |
| 1997 | 2.84 b | 2.62 | 3.14 | 5.77 | 1.46 | 5.15 a | 5.02 | 1.35 | 4.22 | 2.07 b | 3.26 | 2.97 c | 39.87 |
| 1998 | 6.23 | 5.63 | 6.52 | 4.82 | 4.57 | 2.23 | 0.80 | 0.36 | 4.38 | 1.50 | 1.31 | 4.90 | 43.25 |
| 1999 | 5.22 | 1.77 a | 3.21 | 4.24 | 2.50 | 1.26 | 4.29 | 3.56 a | 12.80 | 2.37 | 2.12 | 1.86 | 45.20 |
| 2000 | 3.60 d | 2.08 | 3.64 | 3.83 | 1.04 b | 3.51 | 3.53 a | 5.90 a | 5.16 | 0.02 | 1.99 | 1.69 | 35.99 |
| 2001 | 2.17 | 2.60 | 5.02 a | 3.02 | 3.27 a | 2.02 d | 4.28 a | 1.25 | 3.66 | 0.78 | 0.15 | 2.07 | 30.29 |
| 2002 | 4.58 b | 0.98 | 3.92 a | 0.69 a | 1.75 a | 1.82 | 3.14 a | 2.58 a | 6.47 | 9.80 | 5.07 | 3.81 c | 44.61 |
| 2003 | 2.32 e | 2.97 b | 7.10 a | 6.86 | 8.47 | 8.39 | 7.65 a | 9.26 c | 5.49 | 2.50 a | 1.43 | 2.63 b | 65.07 |
| 2004 | 1.45 b | 1.57 b | 1.33 a | 2.37 a | 3.76 | 3.75 a | 6.39 c | 6.20 | 5.23 d | 1.58 a | 2.43 f | 2.39 u | 33.63 |

| Period of Record Statistics | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MEAN | 3.61 | 3.42 | 4.06 | 3.34 | 3.87 | 3.94 | 4.61 | 4.34 | 4.07 | 3.22 | 2.88 | 3.17 | 44.88 |
| S.D. | 1.71 | 1.55 | 1.82 | 1.66 | 1.86 | 2.64 | 2.24 | 2.13 | 2.83 | 2.31 | 1.73 | 1.50 | 6.56 |
| SKEW | 0.48 | 0.28 | 0.58 | 0.50 | 0.54 | 0.99 | 0.76 | 0.55 | 0.93 | 0.96 | 0.89 | 0.31 | 0.13 |
| MAX | 8.43 | 6.85 | 8.50 | 7.59 | 8.75 | 12.00 | 11.56 | 10.19 | 12.80 | 9.80 | 8.86 | 6.95 | 65.07 |
| MIN | 0.96 | 0.67 | 1.30 | 0.47 | 0.88 | 0.89 | 0.79 | 0.36 | 0.07 | 0.02 | 0.15 | 0.33 | 30.29 |
| NO YRS | 52 | 53 | 53 | 53 | 52 | 51 | 53 | 52 | 52 | 53 | 52 | 52 | 50 |

**Notes:**
1. Data taken from the Southeast Regional Climate Center web page (http://www.dnr.state.sc.us/climate/sercc/index.html).
2. File last updated on Jan 14, 2005.
3. Provisional data after September 2004.
4. The following identifiers were used to represent incomplete data: a = 1 day missing, b = 2 days missing, c = 3 days missing, etc., and z = 26 or more days missing.
5. Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value.
6. Individual months not used for annual or monthly statistics if more than 5 days are missing.
7. Individual years not used for annual statistics if any month in that year has more than 5 days missing.

# TABLE 10

## Summary of Proposed Groundwater Monitoring Plan
## Coble's Sandrock, Alamance County, NC

| PIEZOMETER OR WELL IDENTIFICATION | DATE INSTALLED | CASING DIAMETER (inches) | WELL ELEVATIONS | | TOTAL DEPTH DRILLED | | TOP OF BEDROCK | | SCREENED INTERVAL | | | | LITHOLOGY OF SCREENED INTERVAL | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GROUND SURFACE | T.O.C. | DEPTH | ELEV. | DEPTH | ELEV. | DEPTH B.G.S. | | ELEVATION (feet M.S.L.) | | | |
| | | | feet above M.S.L. | | feet B.G.S. | feet M.S.L. | feet B.G.S. | feet M.S.L. | from | to | from | to | | |
| MW-1 | 03/25/97 | 2 | 600.46 | 602.46 | 33.6 | 566.86 | >33.6 | <566.86 | 18 | 33 | 582.36 | 567.36 | Saprolite/PWR | To Be Abandoned |
| MW-2 | 03/28/97 | 2 | 580.31 | 582.31 | 22.0 | 558.31 | >22.0 | <558.31 | 5 | 20 | 575.31 | 560.31 | Saprolite/PWR | **Compliance Well** |
| MW-3 (P-1) | 03/31/97 | 2 | 610.23 | 613.05 | 57 | 553.23 | 21.5 | 588.73 | 37 | 57 | 573.23 | 553.23 | Bedrock | To Be Abandoned |
| MW-4 | 04/01/97 | 2 | 580.64 | 582.64 | 21.3 | 559.34 | >21.3 | <559.34 | 6.3 | 21.3 | 574.34 | 559.34 | Saprolite/PWR | **Compliance Well** |
| MW-5 | 01/18/02 | 2 | 574.91 | 577.41 | 15 | 559.91 | 15 | 559.91 | 5 | 15 | 569.91 | 559.91 | Saprolite/PWR | Water Level Only |
| MW-6 (P-3) | 08/05/97 | 2 | 652.76 | 652.56 | 41 | 611.76 | 16 | 636.76 | 21 | 41 | 631.76 | 611.76 | Bedrock | **Compliance Well** |
| MW-7 | 12/19/02 | 2 | 581.08 | 583.33 | 13.5 | 567.58 | 13.5 | 567.58 | 3.5 | 13.5 | 577.58 | 567.58 | Saprolite/PWR | **Compliance Well** |
| MW-8 | 03/21/05 | 2 | 571.50 | 574.26 | 20 | 551.50 | >20 | <551.50 | 5 | 20 | 566.50 | 551.50 | Saprolite/PWR | **Compliance Well** |
| MW-9 | 03/21/05 | 2 | 586.43 | 589.09 | 37.5 | 548.93 | 37.5 | 548.93 | 22.5 | 37.5 | 563.93 | 548.93 | PWR | To Be Abandoned |
| MW-10S | 03/22/05 | 2 | 589.62 | 592.46 | 21.5 | 568.12 | 5 | 584.62 | 6.5 | 21.5 | 583.12 | 568.12 | Bedrock | **Compliance Well** |
| MW-10D | 03/25/05 | 2 | 589.90 | 592.76 | 64 | 525.90 | 5 | 584.90 | 54 | 64 | 535.90 | 525.90 | Bedrock | Water Level Only |
| P-2 | 08/05/97 | 2 | 575.61 | 578.86 | 21.6 | 554.01 | 12 | 563.61 | 11.6 | 21.6 | 564.01 | 554.01 | Bedrock | Abandoned |
| P-2A | 08/05/97 | 2 | 574.86 | 578.96 | 50 | 524.86 | 12 | 562.86 | 40 | 50 | 534.86 | 524.86 | Bedrock | Abandoned |
| P-4 | 08/05/97 | 2 | 628.56 | 631.88 | 62 | 566.56 | 32 | 596.56 | 42 | 62 | 586.56 | 566.56 | Bedrock | To Be Abandoned |
| P-5 | 08/05/97 | 2 | 611.26 | 611.91 | 61.5 | 549.76 | 15 | 596.26 | 41.5 | 61.5 | 569.76 | 549.76 | Bedrock | To Be Abandoned |
| P-6 | 08/05/97 | 2 | 602.93 | 606.06 | 61 | 541.93 | 15 | 587.93 | 41 | 61 | 561.93 | 541.93 | Bedrock | Abandoned |
| P-7 | 08/05/97 | 2 | 617.90 | 621.51 | 56.5 | 561.40 | 8 | 609.90 | 36.5 | 56.5 | 581.40 | 561.40 | Bedrock | Abandoned |
| P-15 | 01/17/02 | 2 | 649.07 | 651.22 | 50 | 599.07 | 17 | 632.07 | 40 | 50 | 609.07 | 599.07 | Bedrock | Water Level Only |
| P-16 | 01/18/02 | 2 | 609.85 | 612.05 | 41 | 568.85 | 5 | 604.85 | 26 | 41 | 583.85 | 568.85 | Bedrock | Water Level Only |
| P-17 | 01/18/02 | 2 | 643.78 | 646.28 | 36 | 607.78 | 22 | 621.78 | 21 | 36 | 622.78 | 607.78 | Saprolite/Bedrock | Water Level Only |
| P-18 | 01/30/02 | 2 | 652.16 | 651.76 | 34 | 618.16 | 34 | 618.16 | 19 | 34 | 633.16 | 618.16 | PWR | Water Level Only |
| P-19S | 01/31/02 | 2 | 569.18 | 572.18 | 10 | 559.18 | >10 | <559.18 | 4 | 10 | 565.18 | 559.18 | Saprolite | **Compliance Well** |
| P-19D | 01/31/02 | 2 | 569.65 | 571.85 | 60 | 509.65 | 10 | 559.65 | 45 | 60 | 524.65 | 509.65 | Bedrock | Water Level Only |
| P-20 | 01/29/02 | 2 | 638.81 | 641.11 | 30 | 608.81 | 30 | 608.81 | 15 | 30 | 623.81 | 608.81 | Saprolite/PWR | Water Level Only |
| P-21 | 01/30/02 | 2 | 665.67 | 668.42 | 62.5 | 603.17 | 23 | 642.67 | 47.5 | 62.5 | 618.17 | 603.17 | Bedrock | Water Level Only |
| P-22 | 1/17/2002 | 2 | 627.90 | 629.90 | 10 | 617.90 | 10 | 617.90 | 4 | 10 | 623.90 | 617.90 | Saprolite/PWR | Water Level Only |
| P-23 | 01/17/02 | 2 | 637.87 | 640.37 | 41 | 596.87 | 27 | 610.87 | 31 | 41 | 606.87 | 596.87 | Bedrock | Water Level Only |
| P-24 | 03/24/05 | 2 | 612.52 | 613.89 | 38 | 574.52 | 18 | 594.52 | 28 | 38 | 584.52 | 574.52 | Bedrock | To Be Abandoned |
| P-25 | 03/24/05 | 2 | 616.37 | 617.81 | 38 | 578.37 | 14 | 602.37 | 28 | 38 | 588.37 | 578.37 | Bedrock | To Be Abandoned |
| P-26 | 03/28/05 | 2 | 594.27 | 597.13 | 52 | 542.27 | 25 | 569.27 | 37 | 52 | 557.27 | 542.27 | Bedrock | To Be Abandoned |
| P-27 | 04/04/05 | 2 | 625.25 | 627.45 | 4.5 | 620.75 | >4.5 | <620.75 | 2.5 | 4.5 | 622.75 | 620.75 | Saprolite | Water Level Only |
| P-28 | 04/04/05 | 2 | 610.36 | 613.15 | 4 | 606.36 | >4 | <606.36 | 2 | 4 | 608.36 | 606.36 | Saprolite | Water Level Only |
| P-29 | 04/04/05 | 2 | 617.31 | 619.49 | 5 | 612.31 | >5 | <612.31 | 3 | 5 | 614.31 | 612.31 | Saprolite | Water Level Only |
| P-30 | 04/04/05 | 2 | 634.75 | 637.49 | 4 | 630.75 | >4 | <630.75 | 2 | 4 | 632.75 | 630.75 | Saprolite | Water Level Only |
| P-31 | 01/29/07 | 2 | 607.00 | 608.56 | 44.00 | 563.00 | 15.00 | 592.00 | 15.00 | 40.00 | 592.00 | 567.00 | Bedrock | To Be Abandoned |
| P-32 | 01/30/07 | 2 | 598.10 | 600.35 | 40.00 | 558.10 | 21.0 * | 577.1 * | 15.00 | 40.00 | 583.10 | 558.10 | Bedrock | To Be Abandoned |
| P-33 | 01/31/07 | 2 | 595.50 | 597.68 | 35.00 | 560.50 | --- * | --- * | 15.00 | 35.00 | 580.50 | 560.50 | PWR/Bedrock | To Be Abandoned |
| P-34 | 01/31/07 | 2 | 626.80 | 629.73 | 23.00 | 603.80 | 23.00 | 603.80 | 8.00 | 23.00 | 618.80 | 603.80 | Saprolite | Water Level Only |
| P-35 | 02/02/07 | 2 | 613.90 | 616.33 | 30.00 | 583.90 | 17.50 | 596.40 | 10.00 | 30.00 | 603.90 | 583.90 | PWR/Bedrock | To Be Abandoned |
| P-36 | 02/01/07 | 2 | 623.10 | 624.84 | 30.00 | 593.10 | 14.00 | 609.10 | 10.00 | 30.00 | 613.10 | 593.10 | PWR/Bedrock | To Be Abandoned |
| P-37 | 02/05/07 | 2 | 611.90 | 613.61 | 30.00 | 581.90 | 15.00 | 596.90 | 10.00 | 30.00 | 601.90 | 581.90 | PWR/Bedrock | To Be Abandoned |
| P-38 | 01/31/07 | 2 | 628.80 | 631.33 | 45.00 | 583.80 | 33.00 | 595.80 | 20.00 | 40.00 | 608.80 | 588.80 | PWR/Bedrock | To Be Abandoned |
| B-1 | 03/24/97 | --- | 589.00 | --- | 18.9 | 570.10 | >18.9 | <570.10 | --- | --- | --- | --- | --- | Abandoned |
| B-2 | 04/01/97 | --- | 622.00 | --- | 18.9 | 603.10 | >18.9 | <603.10 | --- | --- | --- | --- | --- | Abandoned |
| B-3 | 03/27/97 | --- | 628.00 | --- | 19 | 609.00 | >19.0 | <609.00 | --- | --- | --- | --- | --- | Abandoned |
| B-4 | 04/01/97 | --- | 608.00 | --- | 10.5 | 597.50 | 10.5 | 597.50 | --- | --- | --- | --- | --- | Abandoned |
| B-4A | 04/01/97 | --- | --- | --- | 10 | --- | 10.0 | --- | --- | --- | --- | --- | --- | Abandoned |
| B-5 | 03/27/97 | --- | 615.00 | --- | 18.6 | 596.40 | >18.6 | <596.40 | --- | --- | --- | --- | --- | Abandoned |
| C-1 | 07/29/97 | --- | 579.00 | --- | 55.4 | 523.60 | 45.4 | 533.60 | --- | --- | --- | --- | --- | Abandoned |
| C-2 | 07/29/97 | --- | 616.00 | --- | 48.5 | 567.50 | 38.5 | 577.50 | --- | --- | --- | --- | --- | Abandoned |
| C-3 | 08/01/97 | --- | 604.00 | --- | 23.1 | 580.90 | 13.1 | 590.90 | --- | --- | --- | --- | --- | Abandoned |
| TW-1 | 06/12/98 | 2 | 578.00 | --- | 22.6 | 555.40 | 13.2 | 564.80 | 17.6 | 22.6 | 560.40 | 555.40 | Bedrock | Abandoned |
| TW-2 | 07/29/98 | 2 | 609.00 | --- | 29.5 | 579.50 | 8.5 | 600.50 | 14.5 | 29.5 | 594.50 | 579.50 | Bedrock | Abandoned |
| WW-1 | na | 24 | 622.83 | 625.20 | 23 | 599.83 | >23 | <599.83 | na | na | na | na | Saprolite | Water Level Only - To be abandonded eventually. |
| MW-11 | not yet | 2 | | | 30 | | | | 10 | 30 | | | PWR/Bedrock | **Compliance Well** To be installed prior to construction of Phase 3B |

NOTES:

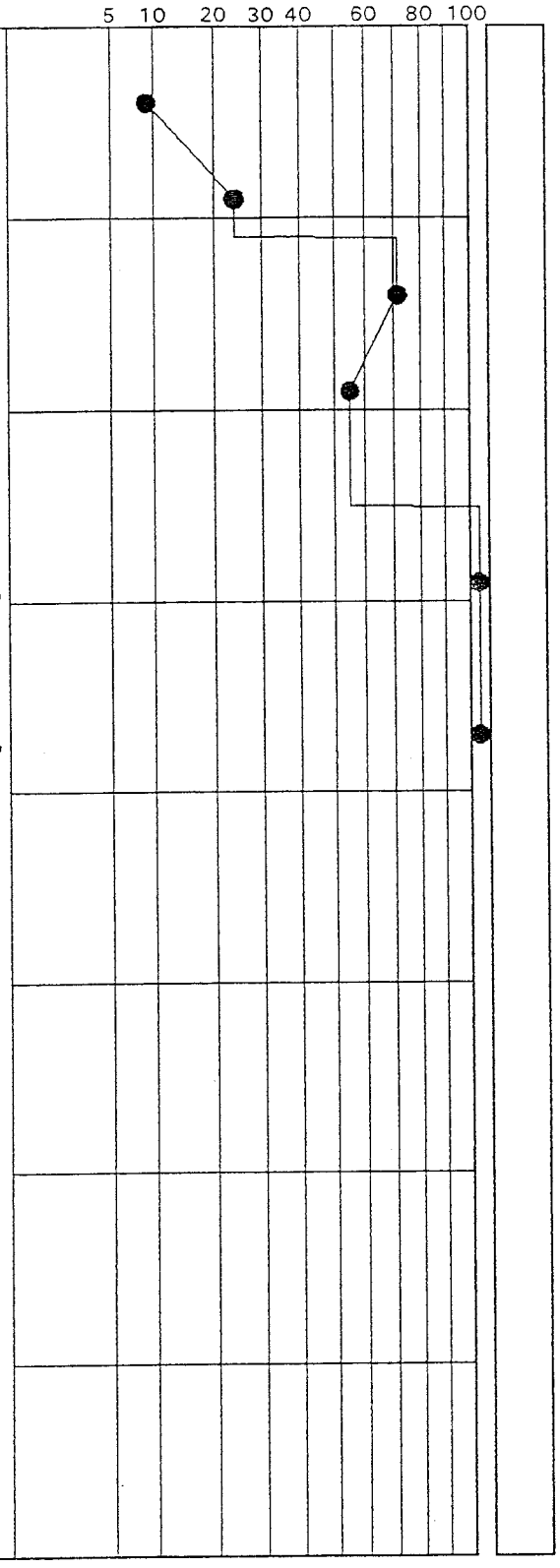
1. All elevations are referenced to mean sea level (M.S.L.); depths are referenced to below ground surface (B.G.S.).
2. Unless otherwise noted, ground surface elevations were calculated by subtracting measured stick-up heights from surveyed T.O.C. elevations.
3. Elevations for P-8, P-9, P-10, P-11, P-12, and P-13 are approximate based on approximate ground surface elevations as determined on topographic map..
4. na = not available
5. B.G.S. = below ground surface
6. T.O.C. = top of casing
7. PWR = partially weathered rock
8. The installation date and details for well WW-1 are unknown.
9. Wells MW-1, MW-2, MW-3, MW-4, MW-6 (P-3) and piezometers P-4, P-5, P-6, and P-7 were installed by Trigon Engineering Consultants, Inc. between March and August 1997.
10. Piezometers P-8, P-9, P-10, and P-12 were installed by Joyce Engineering, Inc. on April 11, 2000.
11. Piezometers P-12, P-13, and P-14 were installed by Joyce Engineering, Inc. on September 11, 2000.
12. Well MW-5 and piezometers P-15, P-16, P-17, P-18, P-19S, P-19D, P-20, P-21, P-22, and P-23 were installed by Joyce Engineering, Inc. in January 2002.
13. Monitoring well MW-7 was installed by Joyce Engineering, Inc.on December 19, 2002.
14. Wells MW-8, MW-9, MW-10S, MW-10D and piezometers P-24, P-25, and P-26 were installed by by Joyce Engineering, Inc. in March 2005.
15. Piezometers P-27, P-28, P-29, and P-30 were installed by Joyce Engineering, Inc. on April 4, 2005.
16. Elevations for B-1 through B-5, C-1 through C-3, and TW-1 through TW-2 are approximate.
17. Data for MW-11 are anticipated values since the well has not yet been installed.

# APPENDIX DH-1

## Boring Logs and Construction Diagrams for Monitoring Wells, Piezometers, and Borings from Previous Investigations

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Topsoil | | |
| | Stiff to Very Stiff Grey, Orange, and Brown Slightly Clayey Slightly Fine Sandy SILT-Residual (ML) | 0 | 9 |
| | | 0 | 24 |
| 5.5 | Very Dense Tan-White Slightly Silty Medium to Fine SAND (SM) | 0.4 | 72 |
| | | 0 | 55 |
| 12.5 | Partially Weathered Rock Samples as Tan, White, and Brown Slightly Silty Coarse to Fine SAND (SM/SW) | 0 | 50/5" |
| 18.9 | Boring Terminated<br>No Groundwater Encountered | 0 | 50/4" |

● PENETRATION - BLOWS PER FT.




# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

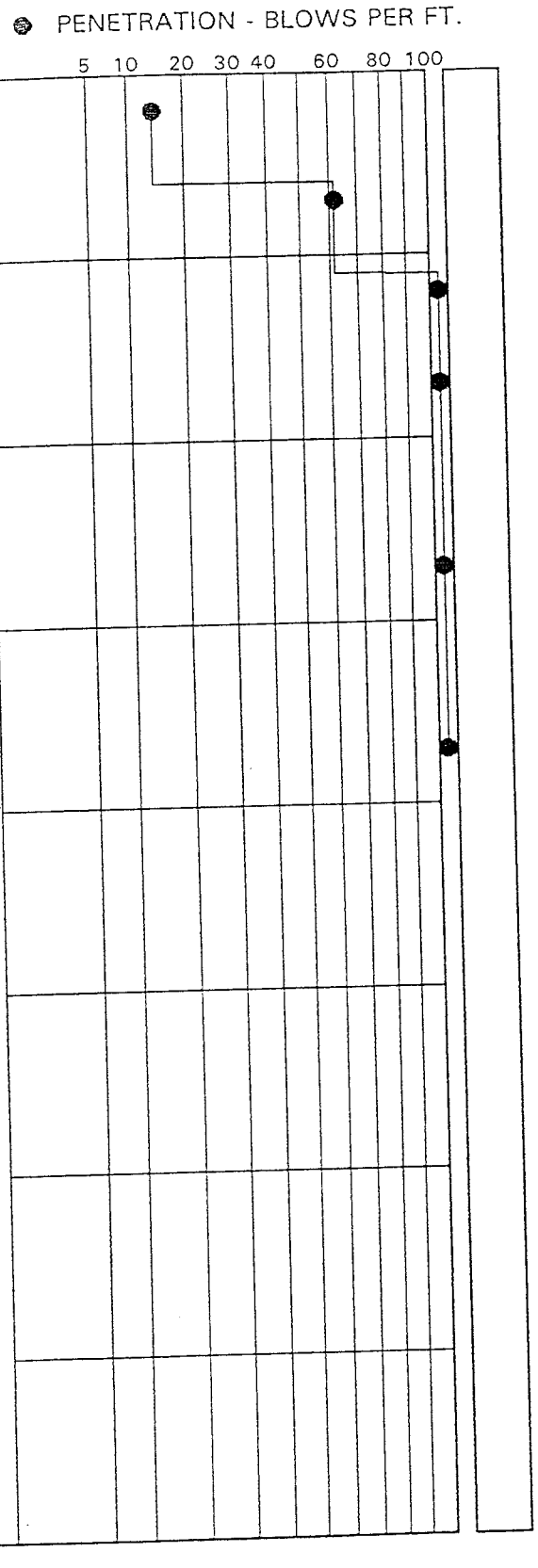
ETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER
LLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE
50% ROCK CORE RECOVERY
LOSS OF DRILLING WATER
WATER TABLE-24 HR.
WATER TABLE-1 HR.
CAVE-IN DEPTH

BORING NO. B-1
DATE DRILLED 3/24/97
JOB NO. 152-97-010C
PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Brown Slightly Clayey Medium to Fine Sandy SILT (ML) | 0 | 14 |
| 3.0 | Stiff Tan Slightly Coarse to Fine Sandy Clayey SILT-Residual (ML) | 0.2 | 62 |
| 5.5 | Very Hard Orange, Tan, and Brown Slightly Fine Sandy SILT (ML) | 0 | 50/5" |
| | Partially Weathered Rock Samples as Tan, White, and Orange Slightly Fine Sandy SILT (ML) | 0.4 | 50/ 5.5" |
| 14.0 | Partially Weathered Rock Samples as Tan-Brown Slightly Silty Medium to Fine SAND (SM/SW) | 0 | 50/3" |
| 18.9 | Boring Terminated<br>No Groundwater Encountered | | 50/4" |




# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. B-2

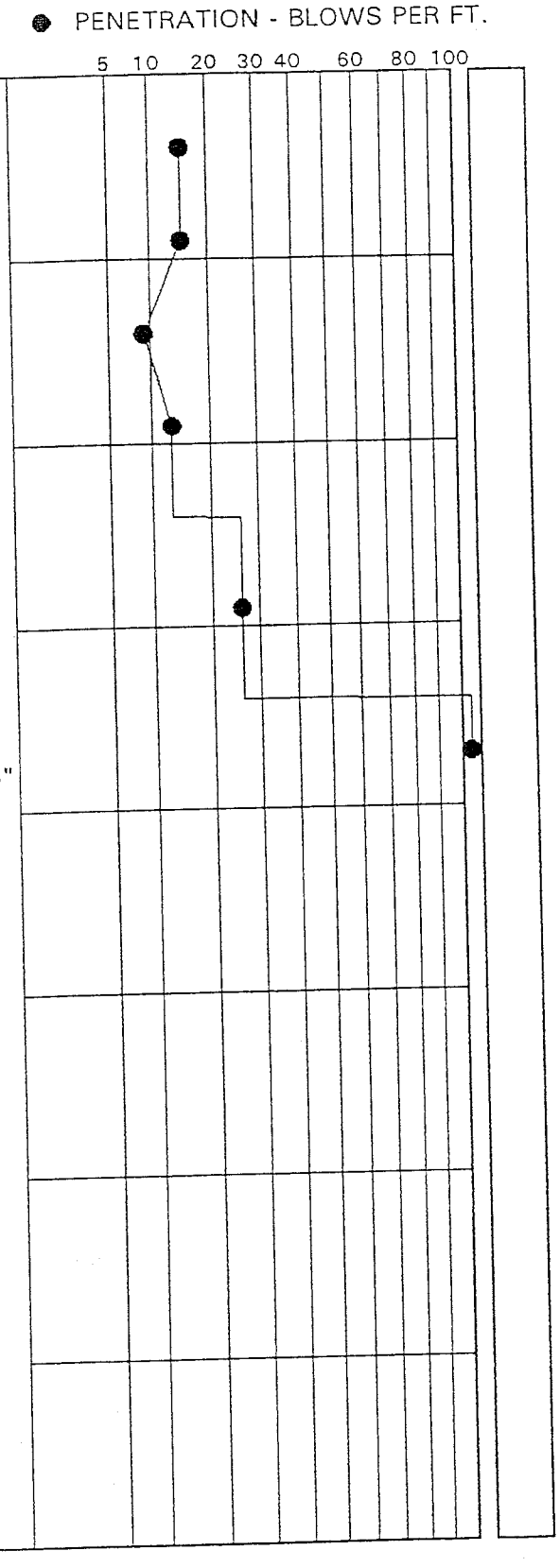
DATE DRILLED 4/1/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Topsoil | | |
| | Stiff Tan-Brown Coarse to Fine Sandy Clayey SILT (MH) | | 15 |
| | | | 15 |
| | | | 9 |
| | | | 13 |
| 12.0 | | | |
| | Very Firm Tan, Brown, and White Silty Coarse to Fine SAND (SM) | | 26 |
| 17.0 | | | |
| | Partially Weathered Rock Samples as Tan, Brown, and White Slightly Silty Coarse to Fine SAND (SM/SW) | | 50/5" |
| 19.0 | | | |
| | Boring Terminated<br>No Groundwater Encountered | | |




# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

◄ LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. B-3

DATE DRILLED 3/27/97

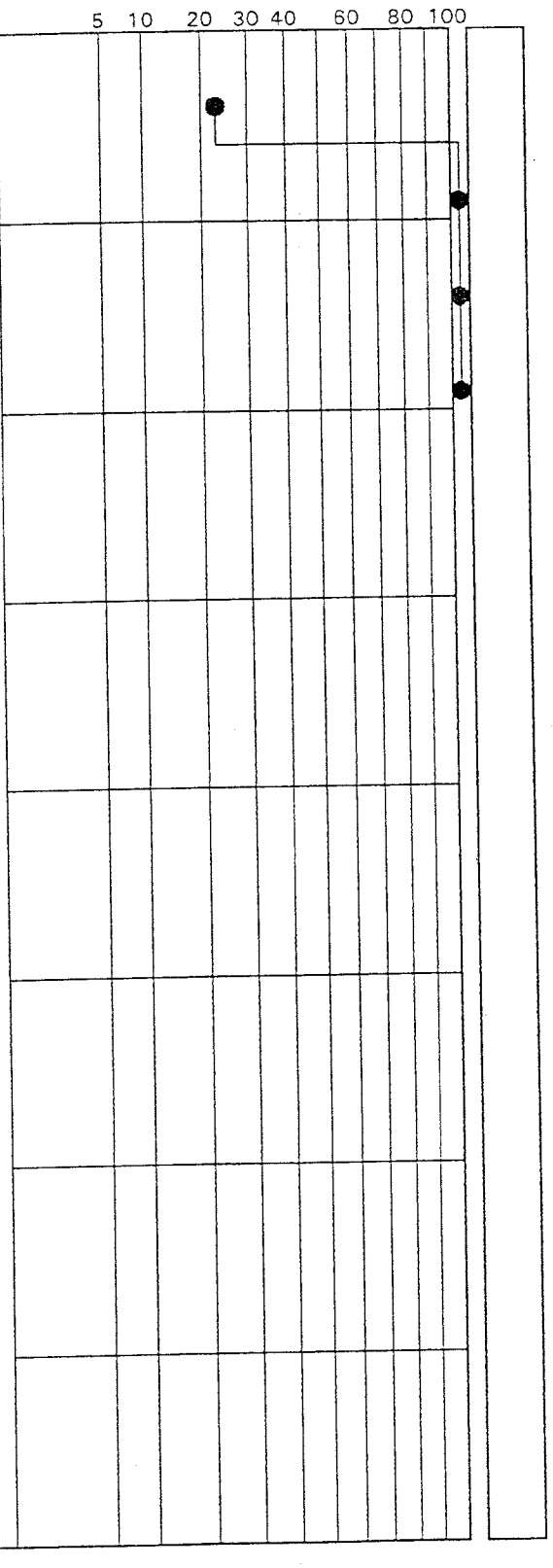
JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Topsoil | | |
| 1.0 | Tan-Brown Slightly Coarse to Fine Sandy Clayey SILT (MH) | | 23 |
| 3.0 | Firm Tan, Brown, and White Silty Coarse to Fine SAND (SM) | | |
| | Partially Weathered Rock Samples as Tan, Boring, and White Silty Coarse to Fine SAND (SM) | | 50/ 4.5" |
| | | | 50/5" |
| | | | 50/6" |
| 10.5 | Auger Refusal<br>No Groundwater Encountered | | |
| | NOTE: Split-spoon bounced off bottom of hole. | | |

● PENETRATION - BLOWS PER FT.




# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

ETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER LLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

◄ LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. B-4

DATE DRILLED 4/1/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count | ● PENETRATION - BLOWS PER FT. 5 10 20 30 40 60 80 100 |
|---|---|---|---|---|
| 0.0 | Auger Probe | | | |
| 10.0 | Auger Refusal<br>No Groundwater Encountered | | | |

# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

ETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER LLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

◄ LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. B-4A

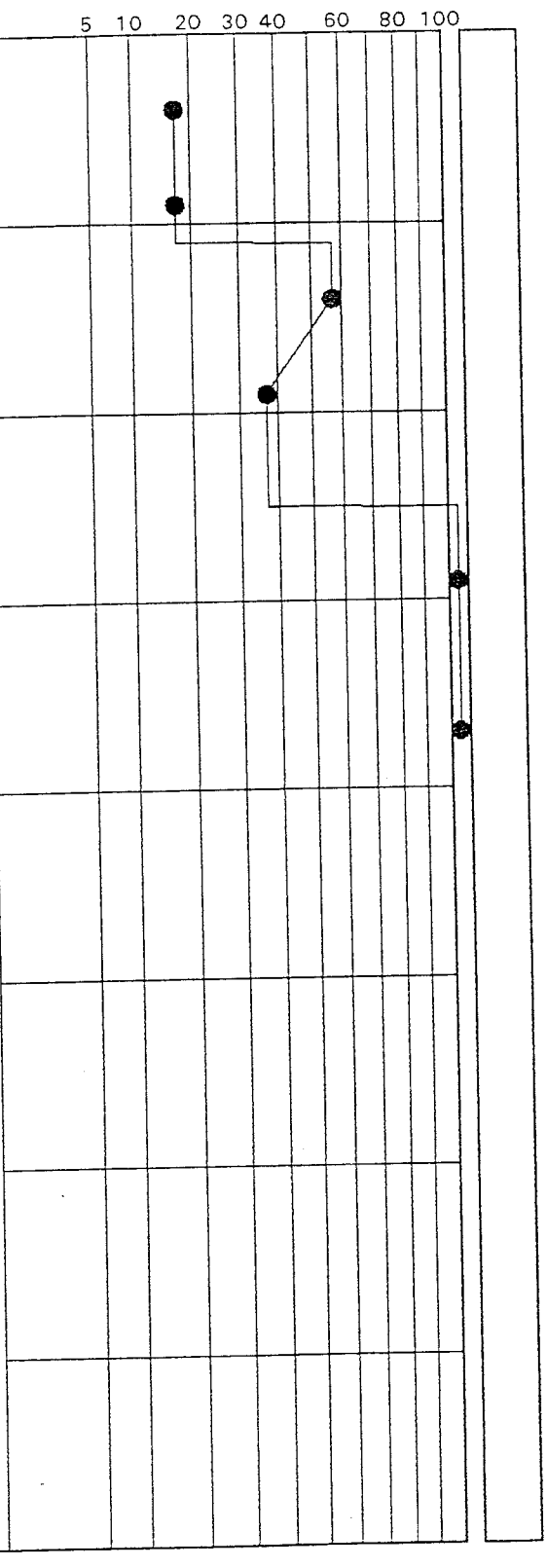
DATE DRILLED 4/1/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Topsoil | | |
| | Stiff to Very Stiff Tan-Brown Slightly Clayey Coarse to Fine Sandy SILT (ML) | | 17 |
| | | | 17 |
| 5.5 | Very Hard and Hard Tan, Brown, and White Fine Sandy SILT (ML) | | 57 |
| | | | 37 |
| 12.5 | Partially Weathered Rock Samples as Tan, Brown, and White Medium to Fine Sandy SILT with Quartz Fragments (ML/SW) | | 50/3" |
| 18.6 | Boring Terminated<br>No Groundwater Encountered | | 50/1" |




# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. B-5

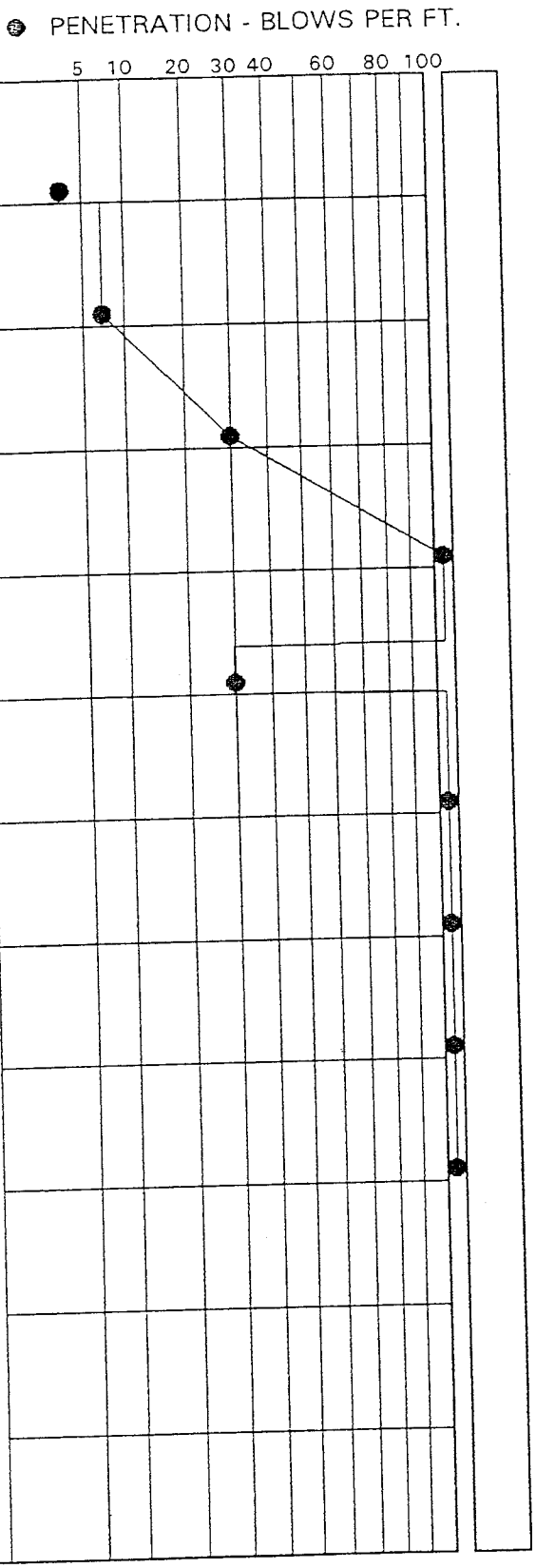
DATE DRILLED 3/27/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Topsoil | | |
| | Soft Tan Silty Medium to Coarse Grained Sandy CLAY (CL) | | |
| 5.0 | Loose to Dense Tan-White Fine to Coarse Grained SAND (SM) | | 3 |
| | | | 7 |
| | | | 30 |
| | | | 50/6" |
| 23.0 | Very Stiff Brown to Brown-Red Slightly Sandy Slightly Clayey SILT (ML) | | 30 |
| 25.0 | Partially Weathered Rock Samples as Tan-White Medium to Coarse Grained SAND (SM/SW) | | 50/3" |
| | | | 50/ 1.5" |
| 40.0 | Partially Weathered Rock Samples as White-Tan Coarse Grained SAND (SM/SW) | | 50/2" |
| 45.4 | Granite Coring REC = 91%, RQD = 61% | | 50/ 1.5" |
| 50.4 | Granite Coring REC = 100%, RQD = 100% | | |
| 55.4 | Coring Terminated | | |




# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. C-1

DATE DRILLED 7/29/97

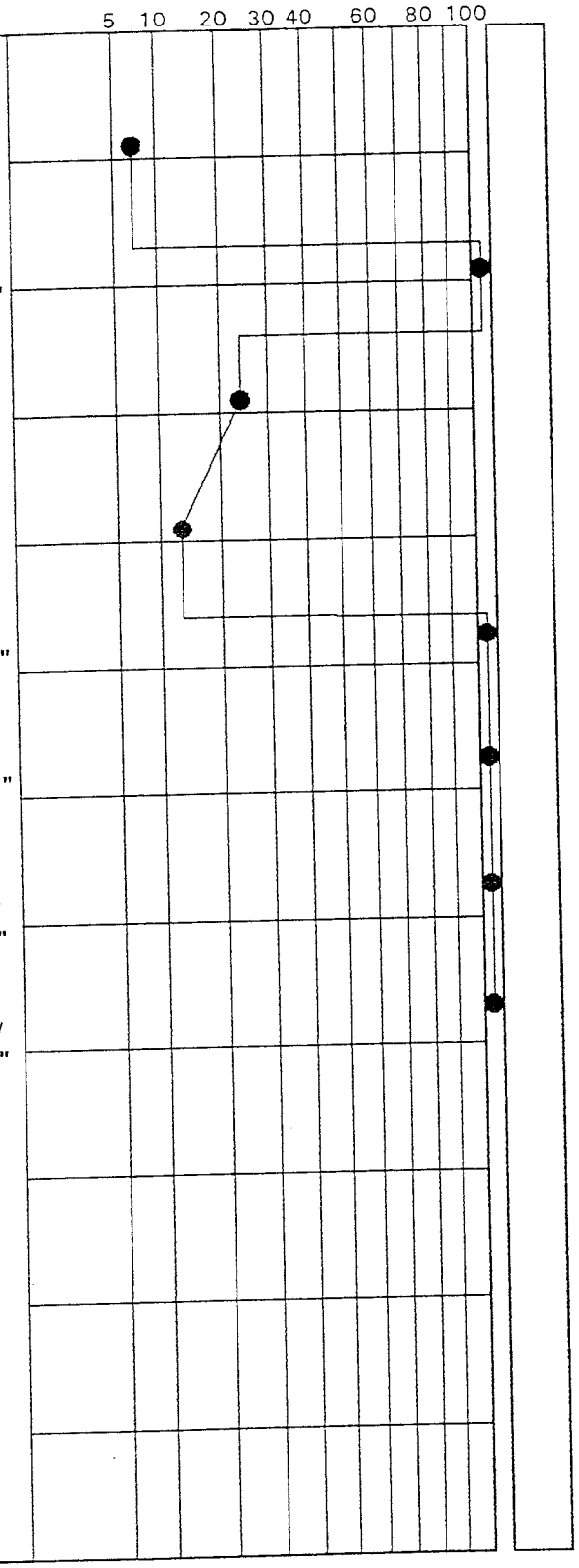
JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.2 | Topsoil | | |
| | Firm Tan-Brown Slightly Clayey SILT (ML) | | 7 |
| 8.5 | | | |
| | Partially Weathered Rock Samples as Tan-Brown SAND (SM/SW) | | 50/6" |
| 12.0 | | | |
| | Stiff to Very Stiff Tan-Brown Slightly Clayey SILT (ML) | | 24 |
| | | | 13 |
| 23.0 | | | |
| | Partially Weathered Rock Samples as Medium to Coarse Grained SAND (SM/SW) | | 50/4" |
| | | | 50/3" |
| | | | 50/ 2.5" |
| 38.5 | | | |
| | Granite Coring REC = 98%, RQD = 86% | | 50/ 0.5" |
| 43.5 | | | |
| | Granite Coring REC = 100%, RQD = 90% | | |
| 48.5 | | | |
| | Coring Terminated | | |

● PENETRATION - BLOWS PER FT.




# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

ETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER LLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

◄ LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. C-2

DATE DRILLED 7/29/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count | PENETRATION - BLOWS PER FT. (5 10 20 30 40 60 80 100) |
|---|---|---|---|---|
| 0.0 | | | | |
| 1.0 | Firm Red-Brown Silty Clay (CL) | | | |
| | Loose White-Tan Coarse to Medium Grained SAND (SM) | | 7 | |
| | | | 9 | |
| 12.5 | | | | |
| 13.1 | Partially Weathered Rock Samples as White-Tan Coarse to Medium Grained SAND (SM/SW) | | | |
| | Granite Coring<br>REC = 98%, RQD = 85% | | | |
| 18.1 | | | | |
| | Granite Coring<br>REC = 100%, RQD = 90% | | | |
| 23.1 | | | | |
| | Coring Terminated | | | |

# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. C-3

DATE DRILLED 8/1/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | Blow Count | PENETRATION - BLOWS PER FT. (5 10 20 30 40 60 80 100) |
|---|---|---|---|
| 0.0 | Unconsolidated Material - See Boring Log for MW-4<br>Tricone Refusal @ 13.2' | | |
| 13.2 | Rock Core - Igneous, high quartz content, 4 - 14 inches between joints, joint spacing ≤ 1mm, joint surfaces clean, no filling, quartzose granite.<br>REC = 85%, RQD = Granite | | |
| 17.5 | REC = 80%, RQD = 86% | | |
| 22.6 | End of Core Hole | | |

12.0'

# TEST BORING RECOR

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. TW-1

DATE DRILLED 6/12/98

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611-7687, PHONE (919) 733-3221

# WELL CONSTRUCTION RECORD

FOR OFFICE USE ONLY

Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

**DRILLING CONTRACTOR** Trigon Engineering Consultants, Inc.

**DRILLER REGISTRATION NUMBER** 813

**STATE WELL CONSTRUCTION PERMIT NUMBER:** NA

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Liberty
   Foster Store Road
   (Road, Community, or Subdivision and Lot No.)
   County: Alamance

2. OWNER Kent Coble
   ADDRESS Foster Store Road
   (Street or Route No.)
   Liberty (City or Town) North Carolina (State) Zip Code

3. DATE DRILLED 06/12/98 USE OF WELL Monitoring
4. TOTAL DEPTH 22.6 CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 12.5 FT. ☐ above TOP OF CASING, ☒ below
   TOP OF CASING IS 0 FT. ABOVE LAND SURFACE
7. YIELD (gpm): N/A METHOD OF TEST N/A
8. WATER ZONES (depth): N/A
9. CHLORINATION: Type N/A Amount N/A

TW-1

DRILLING LOG

| Depth From | To | Formation Description |
|---|---|---|
| | | See Boring Log TW-1 |

If additional space is needed, use back of form.

10. \SING:

| Depth | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|
| From 0 To 17.6 Ft. | 2" | Schedule 40 | PVC |
| From ___ To ___ Ft. | | | |
| From ___ To ___ Ft. | | | |

11. GROUT:

| Depth | Material | Method |
|---|---|---|
| From ___ To ___ Ft. | Portland | Pour |
| From ___ To ___ Ft. | | |

12. SCREEN:

| Depth | Diameter | Slot Size | Material |
|---|---|---|---|
| From 17.6 To 22.6 Ft. | 2" | in. 0.010 | in. PVC |
| From ___ To ___ Ft. | | in. | in. |
| From ___ To ___ Ft. | | in. | in. |

13. GRAVEL PACK:

| Depth | Size | Material |
|---|---|---|
| From 15.5 To 22.6 Ft. | Fine Filter | Sand |
| From ___ To ___ Ft. | | |

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

See Drawing No. 151-97-010C-2

14. REMARKS: Bentonite at 0' to 15.5'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

DATE

SIGNATURE OF CONTRACTOR OR AGENT
Submit original to Division of Environmental Management and copy to well ow

s:\word\0152\wells\7010tw1.doc

| DEPTH, FT. | DESCRIPTION | | Blow Count | PENETRATION - BLOWS PER FT. (5 10 20 30 40 60 80 100) |
|---|---|---|---|---|
| 0.0 | Unconsolidated Material - Loose Light Tan Coarse to Fine Sandy SILT Tricone Refusal @ 8.5' | | | |
| 8.5 | Light Colored Metamorphosed Felsic Granitic Rock (9.4' to 10.8' interbedded with intermediate metavolcanic "dike material") | REC 93% | | |
| 10.8 | Medium to Dark Grey-Green Intermediate Metavolcanic Rock. "Dike Material" Fractures 4 to 48 inches apart, <1mm spacing. | RQD 90% | | |
| | | REC 97% | | |
| | | RQD 100% | | 17.0 |
| | | REC 84% | | |
| | | RQD 98% | | |
| | | REC 100% | | |
| | | RQD 100% | | |
| 29.5 | Coring Terminated | | | |

# TEST BORING RECORI

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. TW-2

DATE DRILLED 7/29/98

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611-7687, PHONE (919) 733-3221

# WELL CONSTRUCTION RECORD

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

DRILLING CONTRACTOR Trigon Engineering Consultants, Inc.

DRILLER REGISTRATION NUMBER 813

STATE WELL CONSTRUCTION PERMIT NUMBER: NA

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Liberty
   Foster Store Road
   (Road, Community, or Subdivision and Lot No.)
   County: Alamance

2. OWNER Kent Coble
   ADDRESS Foster Store Road
   (Street or Route No.)
   Liberty (City or Town) North Carolina (State) (Zip Code)

3. DATE DRILLED 07/29/98 USE OF WELL Monitoring
4. TOTAL DEPTH 29.5 CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: _____ FT. ☐ above TOP OF CASING, ☒ below
   TOP OF CASING IS 0.5 FT. ABOVE LAND SURFACE
7. YIELD (gpm): N/A METHOD OF TEST N/A
8. WATER ZONES (depth): N/A
9. CHLORINATION: Type N/A Amount N/A

TW-2

| Depth From | Depth To | DRILLING LOG Formation Description |
|---|---|---|
| | | See Boring Log TW-2 |

If additional space is needed, use back of form.

10. CASING:

| Depth | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|
| From 0 To 14.5 Ft. | 2" | Schedule 40 | PVC |
| From ____ To ____ Ft. | | | |
| From ____ To ____ Ft. | | | |

11. GROUT:

| Depth | Material | Method |
|---|---|---|
| From 0 To 10.5 Ft. | Portland | Hand |
| From ____ To ____ Ft. | | |

12. SCREEN:

| Depth | Diameter | Slot Size | Material |
|---|---|---|---|
| From 14.5 To 29.5 Ft. | 2" | in. 0.010 | in. PVC |
| From ____ To ____ Ft. | | in. | in. |
| From ____ To ____ Ft. | | in. | in. |

13. GRAVEL PACK:

| Depth | Size | Material |
|---|---|---|
| From 12.5 To 29.5 Ft. | Fine Filter | Sand |
| From ____ To ____ Ft. | | |

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

See Drawing No. 151-97-010C-2

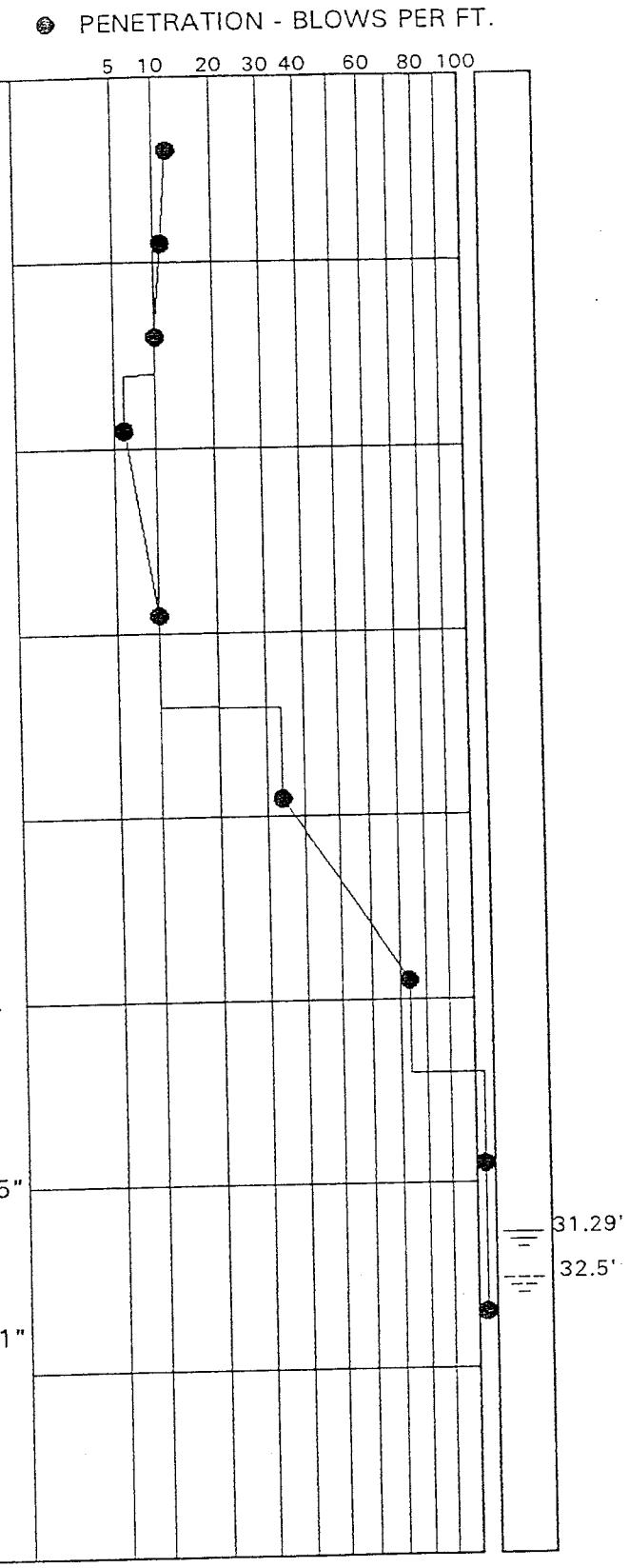
14. REMARKS: Bentonite at 10.5 to 12.5'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

DATE

SIGNATURE OF CONTRACTOR OR AGENT
Submit original to Division of Environmental Management and copy to well owr

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Topsoil | | |
| | Stiff Red-Orange Slightly Micaceous Slightly Clayey Slightly Coarse to Fine Sandy SILT-Residual (ML) | 0 | 12 |
| | | 0 | 11 |
| | | 10 | 10 |
| 8.0 | Firm to Stiff Tan-White Slightly Micaceous Coarse to Fine Sandy SILT (ML) | 0.2 | 6 |
| | | 0.4 | 10 |
| 17.0 | Dense to Very Dense White, Tan, and Orange Slightly Micaceous Silty Coarse to Fine SAND (SM) | 0.2 | 34 |
| | | 0.8 | 74 |
| 27.0 | Partially Weathered Rock Samples as White, Tan, and Gray Slightly Silty Coarse to Fine SAND (SM/SW) | 0.4 | 50/5" |
| 33.6 | Boring Terminated | 0 | 50/1" |




# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. MW-1

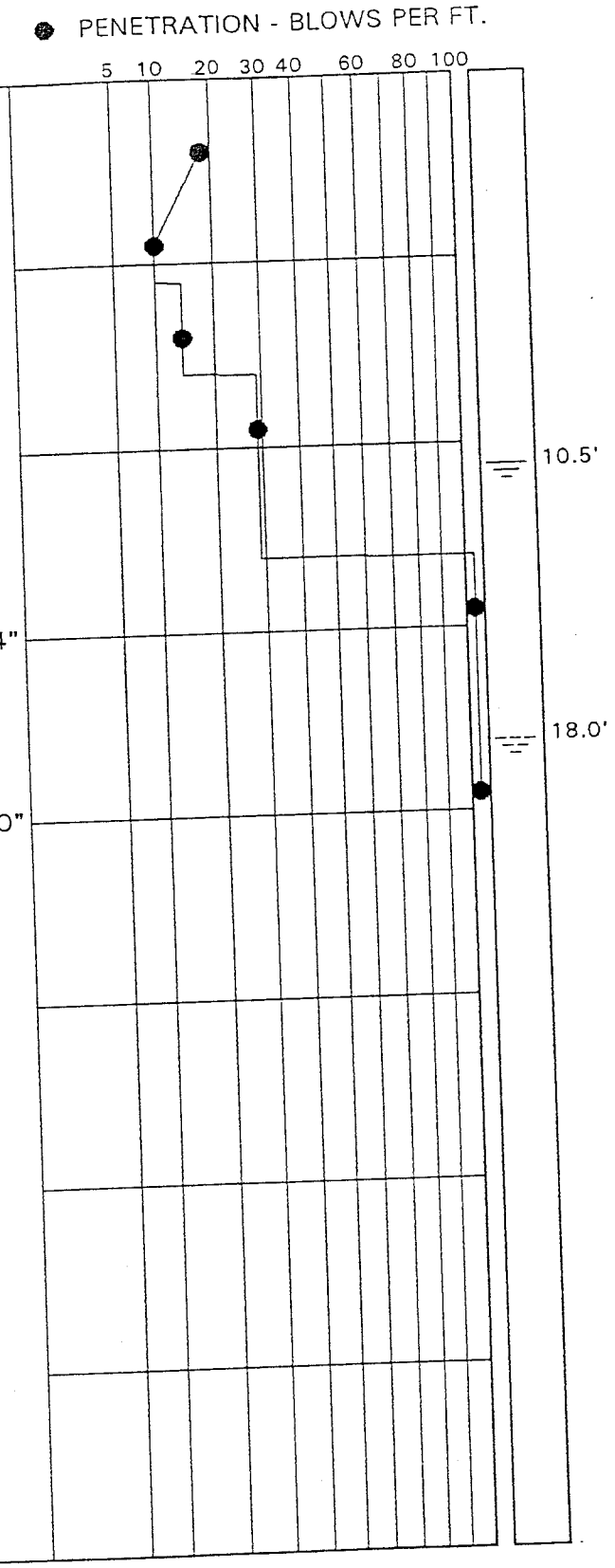
DATE DRILLED 3/25/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Topsoil | | |
| | Very Stiff to Stiff Red-Orange Slightly Micaceous Slightly Clayey Coarse to Fine Sandy SILT-Residual (ML) | | 18 |
| | | | 10 |
| 5.5 | Stiff Orange-Tan Coarse to Fine Sandy SILT (ML) | | 14 |
| 8.0 | Hard Tan, Brown, and Orange Coarse to Fine Sandy SILT (ML) | | 29 |
| 13.0 | Partially Weathered Rock Samples as Brown, Tan, and White Coarse to Fine SAND (SM/SW) | | 50/4" |
| | | | 50/0" |
| 22.0 | Boring Terminated | | |

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BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. MW-2

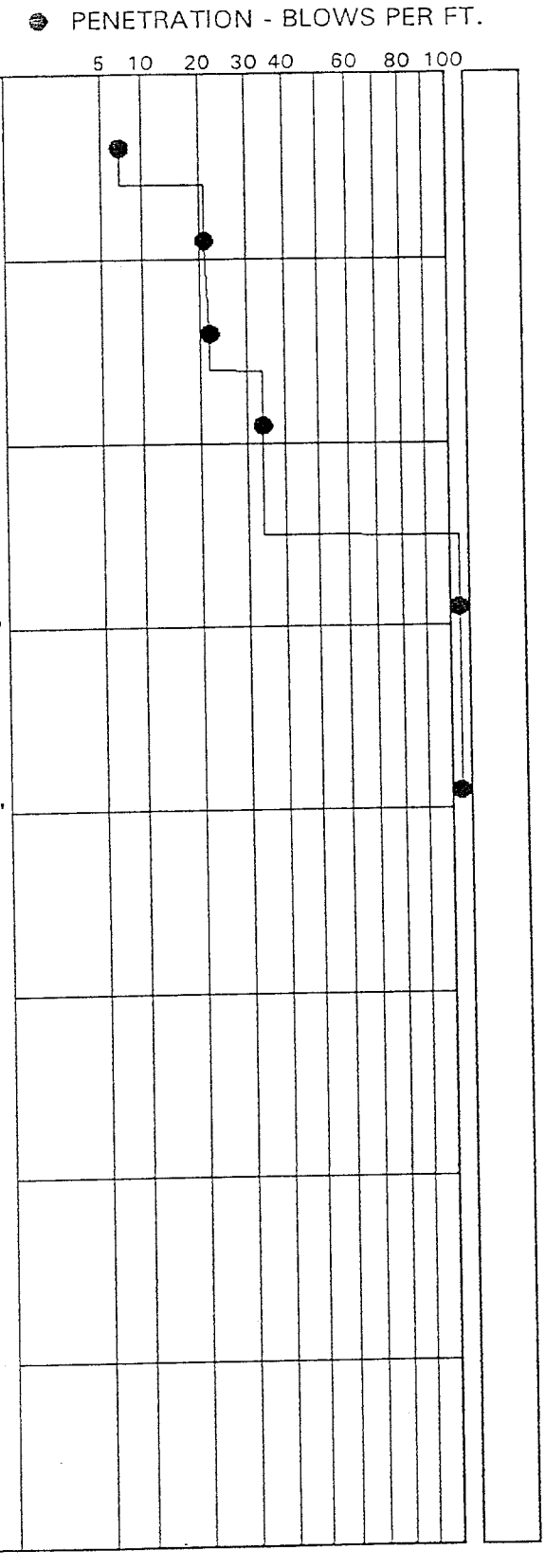
DATE DRILLED 3/28/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Topsoil | | |
| | Firm Tan-Brown Slightly Clayey Medium to Fine Sandy SILT-Residual (ML) | | 7 |
| 3.0 | Very Firm Tan-Brown Slightly Micaceous Silty Coarse to Fine SAND (SM) | | 21 |
| | | | 22 |
| 8.0 | Dense Tan, Brown, and White Silty Coarse to Fine SAND (SM) | | 34 |
| 12.5 | Partially Weathered Rock Samples as White-Tan Coarse to Fine SAND with Quartz Fragments (SM/SW) | | 50/2" |
| | | | 50/1" |
| 21.5 | Auger Refusal<br>No Groundwater Encountered | | |
| | NOTE: Did not set well. | | |




# TEST BORING RECORD

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN, I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. MW-3

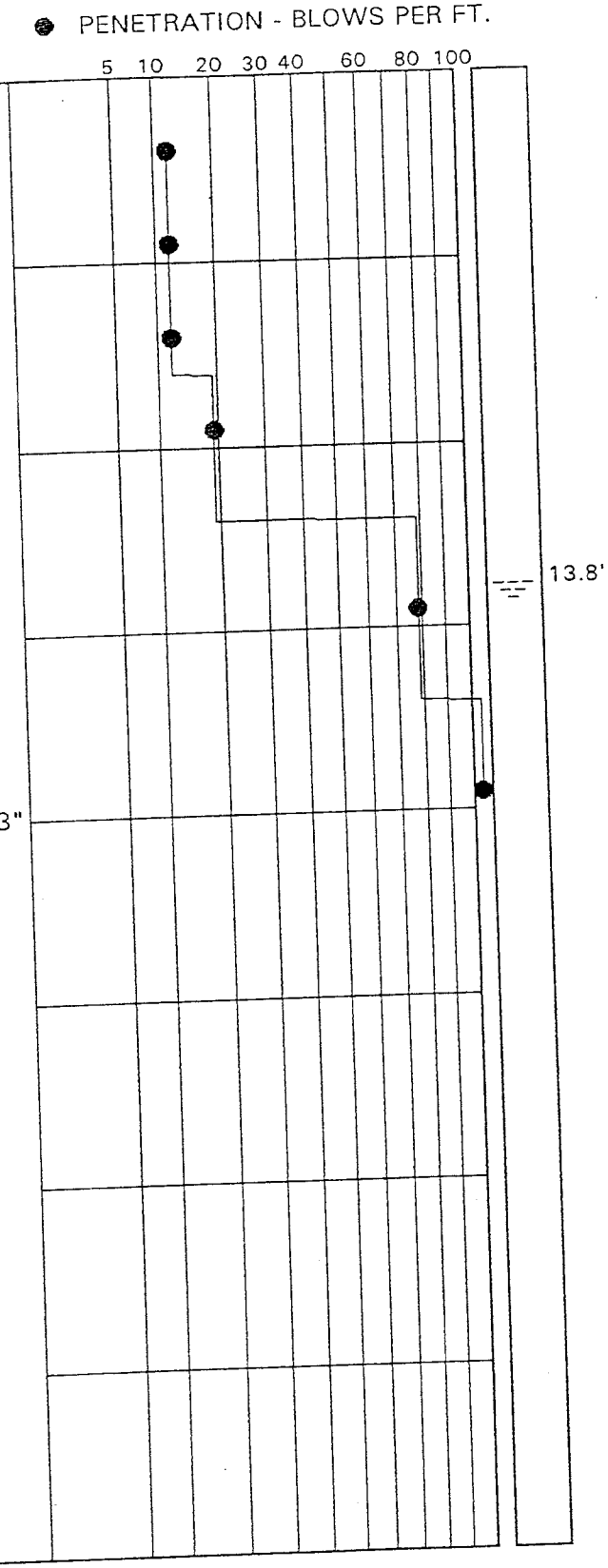
DATE DRILLED 3/31/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

| DEPTH, FT. | DESCRIPTION | OVA Reading | Blow Count |
|---|---|---|---|
| 0.0 | | | |
| 0.5 | Topsoil | | |
| | Stiff Orange-Brown Slightly Clayey Coarse to Fine Sandy SILT-Residual (ML) | | 12 |
| | | | 12 |
| | | | 12 |
| 8.0 | | | |
| | Firm Tan, Brown, and Orange Silty Coarse to Fine SAND (SM) | | 19 |
| 12.0 | | | |
| | Very Dense Brown-White Slightly Micaceous Slightly Silty Coarse to Fine SAND (SM) | | 79 |
| 17.0 | | | |
| | Partially Weathered Rock Samples as Brown-White Slightly Micaceous Slightly Silty Coarse to Fine SAND (SM/SW) | | 50/3" |
| 21.3 | | | |
| | Boring Terminated | | |

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BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

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UNDISTURBED SAMPLE

50% ROCK CORE RECOVERY

LOSS OF DRILLING WATER

WATER TABLE-24 HR.

WATER TABLE-1 HR.

CAVE-IN DEPTH

BORING NO. MW-4

DATE DRILLED 4/1/97

JOB NO. 152-97-010C

PAGE 1 of 1

TRIGON

# APPENDIX DH-2

## Boring Logs, Construction Diagrams, and Development Forms for Monitoring Wells and Piezometers from the Current Investigation

ENGINEERING, INC.

# LOG OF BORING MW-5

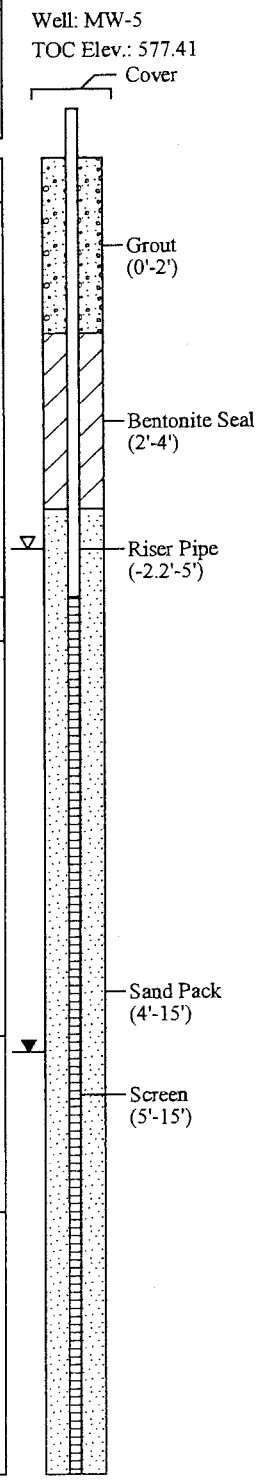


Coble's Sandrock
C&D Permit Modification
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/18/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/18/02 | Northing Coord. | : 801773.030 |
| Hole Diameter | : 6.25-inch | Easting Coord. | : 1842527.075 |
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 575.21 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 575 | 2 | 60 | SM | SANDY SILT - orange/tan |
| 1 | 574 | 2, 3 | | CH | FAT CLAY - gray/tan, moist |
| 2 | 573 | 2 | | | |
| 3 | 572 | | | | |
| 4 | 571 | | | | |
| 5 | 570 | 5 | 75 | SC | SANDY CLAY - tan, moist |
| 6 | 569 | 9, 11 | | SM | SANDY SILT - light gray to white with some granitic texture, iron staining in place of mafic minerals, noticable clay content, moist |
| 7 | 568 | 12 | | | |
| 8 | 567 | | | | |
| 9 | 566 | | | | |
| 10 | 565 | 3 | 70 | CH | FAT CLAY - tan |
| 11 | 564 | 5, 9 | | | |
| 12 | 563 | 18 | | PWR | PWR - gray with white coarse-grained quartz crystals, hard to drill through, wet |
| 13 | 562 | | | | |
| 14 | 561 | | | | *Auger refusal at 15 ft* |
| 15 | | 50/1 | 5 | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/18/02 |
| Hole Diameter(s) | : 6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.20-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 2.25-inch ID hollow stem augers to auger refusal at approximately 15 feet.

2. Solid triangle represents water level at time of drilling (12.38 feet below TOC). Open triangle represents water level 6 days after well construction (6.65 feet below TOC).

ENGINEERING, INC

# LOG OF BORING MW-7

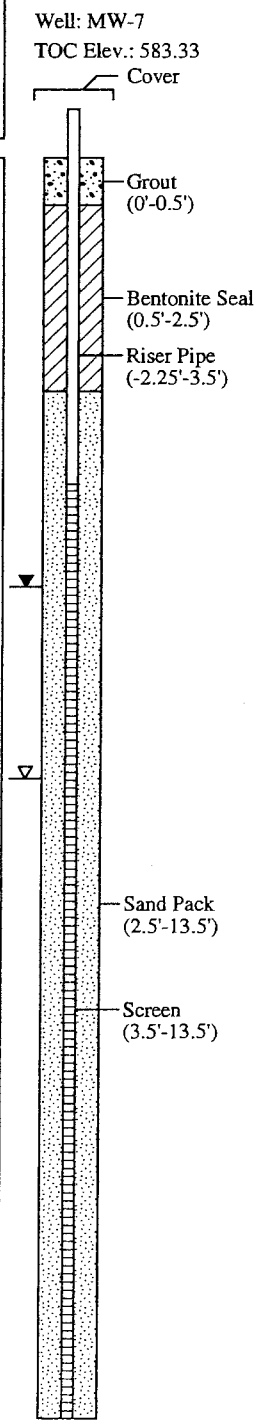


Coble's Sandrock
New Well Installation
Alamance County, NC

JEI Project No. 419.00,Task 14

| | | | |
|---|---|---|---|
| Date Started | : 12/19/02 | Drilling Company | : Graham & Currie, Inc. |
| Date Completed | : 12/19/02 | Logged By | : David Reedy |
| Hole Diameter | : 6.25-inch | Surveyed By | : Tritech Civil Env., PC |
| Drilling Method | : Air Rotary w/ Tricone Bit | Northing | : 801573.32 |
| Sampling Method | : Drill Cuttings | Easting | : 1842522.11 |

| Depth in Feet | Surf. Elev. 581.08 | USCS | DESCRIPTION |
|---|---|---|---|
| 0 | 581 | SM | SANDY SILT- orange silty sand with some clay, coarse grained sand, moist |
| 1 | 580 | | |
| 2 | 579 | | |
| 3 | 578 | | |
| 4 | 577 | | |
| 5 | 576 | | |
| 6 | 575 | | |
| 7 | 574 | | |
| 8 | 573 | PWR | PARTIALL WEATHERED ROCK- more competent, yellow/orange silty sand<br>Wet cuttings at 8 ft |
| 9 | 572 | | |
| 10 | 571 | | Coarse-grained sandrock material at 10 ft, tan/orange color |
| 11 | 570 | | |
| 12 | 569 | | |
| 13 | 568 | | Drilling terminated at top of rock at 13.5 ft |
| 14 | | | |




## Well Construction Information

| | |
|---|---|
| **WELL CONSTRUCTION** | |
| Date Compl. | : 12/19/02 |
| Hole Diameter(s) | : 6.25 inch |
| Drilling Method(s) | : Air Rotary w/ tricone bit |
| Company Rep. | : Dan Graham |
| **WELL CASING** | |
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.25 feet |
| **WELL SCREEN** | |
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |
| **GRAVEL PACK** | |
| Type | : DSI # 2 Sand |
| **WELL SCREEN SEAL** | |
| Type | : 3/8" Bentonite chips |
| **ANNULUS SEAL** | |
| Type | : No. 1 Portland grout |
| **PROTECTIVE CSG.** | |
| Type | : 4"X4" Locking alum. casing |
| **WELL PAD** | |
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll Rand T3W drilling rig utilizing a 6-inch tricone bit.

2. Solid triangle represents water level at time of well construction (6.85 feet below TOC). Open triangle represents water level on July 9, 2003 (8.91 feet below TOC).

ENGINEERING, INC.

# LOG OF BORING MW-8

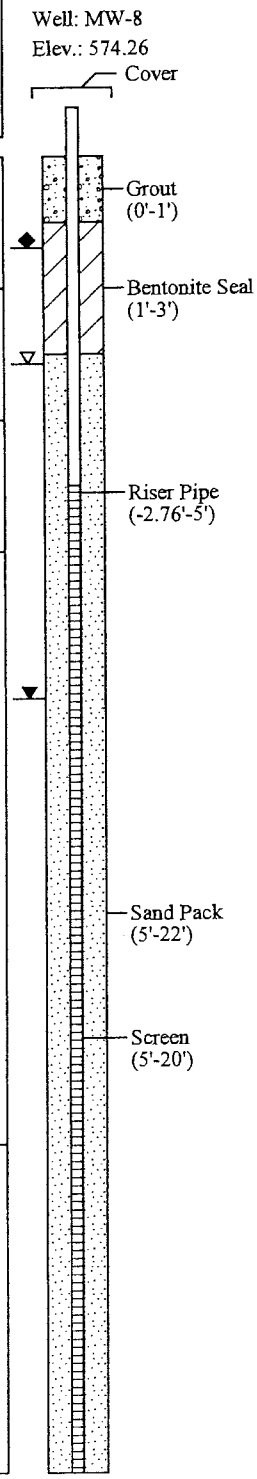


Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/21/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/21/05 | Northing Coord. | : 802580.807320 |
| Hole Diameter | : 8.25-inch | Easting Coord. | : 1842586.6295300 |
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 571.50 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 571 | 2, 2, 2, 2 | 85 | SM | SANDY SILT- reddish brown with organics |
| 1 | 570 | | | | |
| 2 | 569 | 2, 2, 3, 6 | 85 | CL | LEAN CLAY - tan to orange |
| 3 | 568 | | | | |
| 4 | 567 | 3, 4, 5, 10 | 85 | ML | CLAYEY SILT - tan, wet at 4 feet, very moist below |
| 5 | 566 | | | | |
| 6 | 565 | 4, 5, 5, 10 | 85 | SM | SILTY SAND - white with relic structure |
| 7 | 564 | | | | |
| 8 | 563 | 5, 13, 13, 18 | 85 | | |
| 9 | 562 | | | | |
| 10 | 561 | 7, 7, 13, 18 | 85 | | Relic structure has granitic texture |
| 11 | 560 | | | | |
| 12 | 559 | | | | |
| 13 | 558 | | | | |
| 14 | 557 | | | | |
| 15 | 556 | 31, 50/3 | 30 | PWR | PARTIALLY WEATHERED ROCK - white clayey sand with granitic texture |
| 16 | 555 | | | | |
| 17 | 554 | | | | |
| 18 | 553 | | | | |
| 19 | 552 | 50/5 | 20 | | Iron staining and weathered mica present at 20 feet<br>Terminated boring at 20 feet |
| 20 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/21/05 |
| Hole Diameter(s) | : 8.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.76-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers.

2. Solid triangle represents water level at time of drilling (11.43 feet below TOC). Open triangle represents water level ~24 hours after well construction (5.91 feet below TOC). Solid square represents water level 7 days after well construction (4.15 feet below TOC).

MW-8

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Robert Miller CERTIFICATION # 2675

WELL CONTRACTOR COMPANY NAME SAEDACCO, Inc. PHONE # (803) 548-2180

STATE WELL CONSTRUCTION PERMIT# _____ (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
Nearest Town: Kimesville County ALAMANCE
Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____ (degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock C&D Landfill
Address Foster Store RD.
(Street or Route No.)
Kimesville NC
City or Town State Zip Code
(___)-_____
Area code- Phone number

4. DATE DRILLED 3/21/05
5. TOTAL DEPTH: 20'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: 5.42 FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 3' FT. Above Land Surface*
***Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.**
9. YIELD (gpm): _____ METHOD OF TEST _____
10. WATER ZONES (depth): _____

| DEPTH From | To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 22' | TN SILT |
| 22' | | Rock |

11. DISINFECTION: Type _____ Amount _____
12. CASING:

| | Depth From | To | Diameter Ft. | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | 0 | 5' | 2" | Sch40 | PVC |
| | | | | | |
| | | | | | |

13. GROUT:

| | Depth From | To | Material Ft. | Method |
|---|---|---|---|---|
| | 0 | 3' | Portland | Pour |
| | | | | |

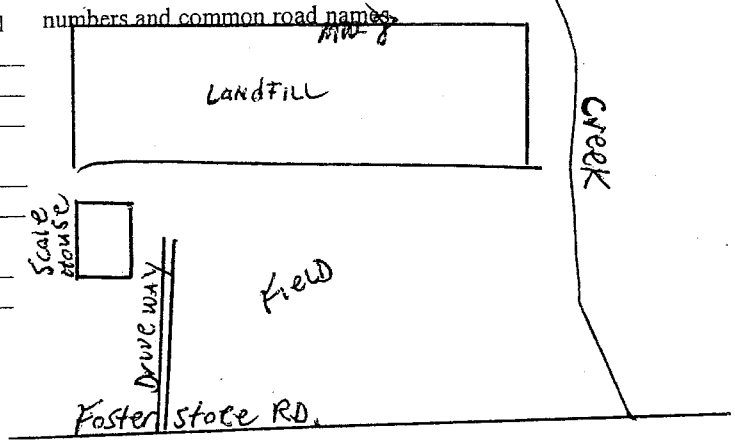
14. SCREEN:

| | Depth From | To | Diameter Ft. | in. | Slot Size in. | Material |
|---|---|---|---|---|---|---|
| | 5' | 20' | 2" | | .010 | PVC |
| | | | | | | |

15. SAND/GRAVEL PACK:

| | Depth From | To | Size Ft. | Material |
|---|---|---|---|---|
| | 4' | 20' | 20/30 | Silica Sand |
| | | | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: 1' Bentonite Seal 3' to 4'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Robert L. Miller 3/29/05
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.**

GW-1 REV. 07/2001

ENGINEERING, INC.

# LOG OF BORING MW-9

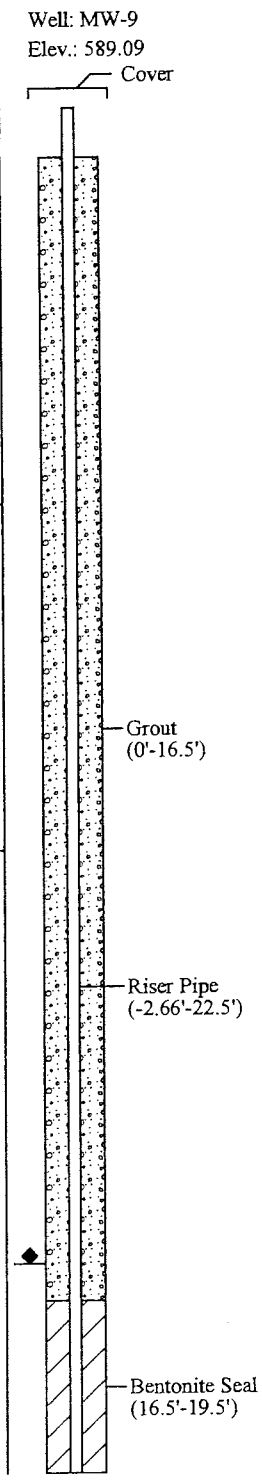


Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/21/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/21/05 | Northing Coord. | : 802741.0630780 |
| Hole Diameter | : 8.25-inch | Easting Coord. | : 1843102.1614300 |
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 586.43 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 586 | 3, 4, 5, 8 | 90 | SC | CLAYEY SAND - 2 inches of topsoil followed by orange coarse-grained clayey sand, moist |
| 1 | 585 | | | | |
| 2 | 584 | | | | |
| 3 | 583 | | | | |
| 4 | 582 | | | | |
| 5 | 581 | 3, 4, 5, 12 | 85 | SM | SILTY SAND - orange with some weathered mica, moist |
| 6 | 580 | | | | |
| 7 | 579 | | | | |
| 8 | 578 | | | | |
| 9 | 577 | | | | |
| 10 | 576 | 3, 20, 50/5 | 25 | PWR | PARTIALLY WEATHERED ROCK - white silty sand with granitic texture, weathered mica, and iron staining, dry |
| 11 | 575 | | | | |
| 12 | 574 | | | | |
| 13 | 573 | | | | |
| 14 | 572 | | | | |
| 15 | 571 | 50/4 | 10 | | |
| 16 | 570 | | | | |
| 17 | 569 | | | | |
| 18 | 568 | | | | |
| 19 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/21/05 |
| Hole Diameter(s) | : 8.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.66-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers to auger refusal.

2. Solid triangle represents water level at time of drilling (38.38 feet below TOC). Open triangle represents water level ~24 hours after well construction (21.91 feet below TOC). Solid square represents water level 7 days after well construction (16.62 feet below TOC).

ENGINEERING, INC.

# LOG OF BORING MW-9



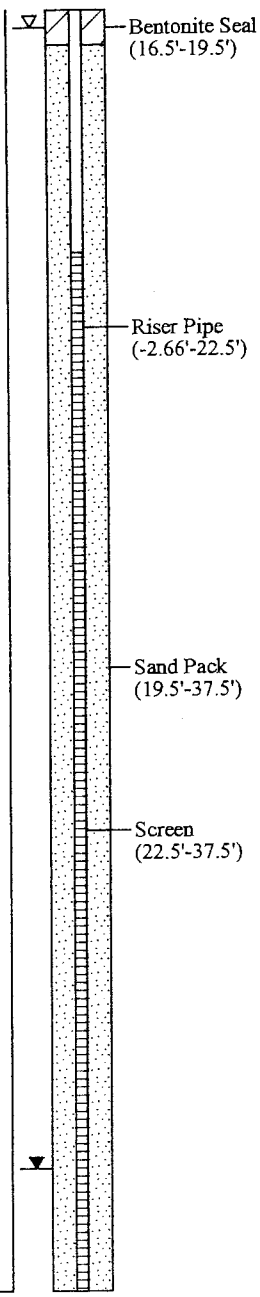
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/21/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/21/05 | Northing Coord. | : 802741.0630780 |
| Hole Diameter | : 8.25-inch | Easting Coord. | : 1843102.1614300 |
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 586.43 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 19 | | | | | |
| | 567 | | | | |
| 20 | | 50/3 | 10 | | |
| | 566 | | | | |
| 21 | | | | | |
| | 565 | | | | |
| 22 | | | | | |
| | 564 | | | | |
| 23 | | | | | |
| | 563 | | | | |
| 24 | | | | | |
| | 562 | | | | |
| 25 | | 50/4 | 5 | | Brown and white silty sand with pebble-size quartz fragments, slightly moist |
| | 561 | | | | |
| 26 | | | | | |
| | 560 | | | | |
| 27 | | | | | |
| | 559 | | | | |
| 28 | | | | PWR | |
| | 558 | | | | |
| 29 | | | | | |
| | 557 | | | | |
| 30 | | 50/0 | 0 | | |
| | 556 | | | | |
| 31 | | | | | |
| | 555 | | | | |
| 32 | | | | | |
| | 554 | | | | |
| 33 | | | | | |
| | 553 | | | | |
| 34 | | | | | |
| | 552 | | | | |
| 35 | | 50/0 | 0 | | |
| | 551 | | | | |
| 36 | | | | | |
| | 550 | | | | |
| 37 | | | | | *Auger refusal at 37.5 feet* |
| | 549 | | | | |
| 38 | | | | | |

Well: MW-9
Elev.: 589.09




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/21/05 |
| Hole Diameter(s) | : 8.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.66-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers to auger refusal.

2. Solid triangle represents water level at time of drilling (38.38 feet below TOC). Open triangle represents water level ~24 hours after well construction (21.91 feet below TOC). Solid square represents water level 7 days after well construction (16.62 feet below TOC).

MW-9

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Robert Miller CERTIFICATION # 2675

WELL CONTRACTOR COMPANY NAME SAEDACCO, Inc. PHONE # (803) 548-2180

STATE WELL CONSTRUCTION PERMIT# _____ (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
Nearest Town: Kimesville County ALAMANCE
Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☒Flat
(check appropriate box)
Latitude/longitude of well location
_____ (degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Cable's Sandrock C&D Land Fill
Address Foster Store RD.
(Street or Route No.)
Kimesville NC
City or Town State Zip Code
( )- _____
Area code- Phone number

4. DATE DRILLED 3/21/05
5. TOTAL DEPTH: 37'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: 19.38 FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 3' FT. Above Land Surface*
***Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.**
9. YIELD (gpm): _____ METHOD OF TEST _____
10. WATER ZONES (depth): _____
11. DISINFECTION: Type _____ Amount _____

| DEPTH From | To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 32' | TN SILT |
| 32' | 37' | Rock |

12. CASING:

| | Depth From | To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | 0 | 22' | 2" | SCH40 | PVC |
| | | | | | |
| | | | | | |

13. GROUT:

| | Depth From | To | Material | Method |
|---|---|---|---|---|
| | 0 | 18' | Portland | Pour |
| | | | | |

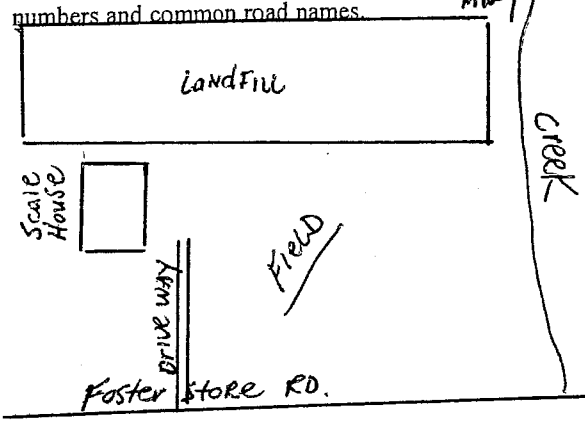
14. SCREEN:

| | Depth From | To | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| | 22' | 37' | 2" in. | .010 in. | PVC |
| | | | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth From | To | Size | Material |
|---|---|---|---|---|
| | 20' | 37' | 20/30 | Silica Sand |
| | | | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: 2' Bentonite Seal 18' to 20'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Robert L. Miller 3/29/05
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.**

GW-1 REV. 07/2001

ENGINEERING, INC

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: Coble's Sandrock
Date: 09/13/05
Casing Type: PVC
Well/Boring Number MW-9
Casing Diameter in inches (Dr): 2 inches
Screened Interval: 22.5-37.5 feet below TOC
Riser Elevation: 2.66
Total Well Depth (Lw) in feet: 37.50
Depth to Water (Lf) in feet: 22.11
Time of Measurement: 9:10

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw - Lf) =$ 2.5 Gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp ( C) | pH | Conduc-tivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| **Before Development** | 16.1 | 7.46 | 223 | 8.92 | 0.0 | 22.11 | 10:58 |
| **After Purging** | | | | | | | |
| **1 Well Vol** | 15.1 | 7.29 | 221 | 669 | 2.5 | — | 11:02 |
| **2 Well Vol** | 15.4 | 7.21 | 206 | 867 | 5.0 | 27.10 | — |
| **3 Well Vol** | 15.2 | 7.30 | 200 | 637 | 7.5 | — | 11:13 |
| **4 Well Vol** | 15.4 | 7.06 | 195.5 | >1000 | 10.0 | 31.40 | 11:15 |
| **5 Well Vol** | 15.4 | 7.22 | 194.2 | >1000 | 12.5 | — | 11:21 |
| **6 Well Vol** | 15.2 | 7.07 | 184.7 | >1000 | 15.0 | 32.84 | 11:28 |
| **7 Well Vol** | 15.1 | 7.13 | 188.7 | >1000 | 17.5 | — | 11:37 |
| **8 Well Vol** | 15.3 | 7.08 | 168.4 | >1000 | 20.0 | 35.15 | 11:41 |
| **9 Well Vol** | 15.3 | 7.18 | 203 | >1000 | 22.5 | — | 11:48 |
| **9 Well Vol** | 15.4 | 7.26 | 195 | >1000 | 23.0 | DRY | 11:56 |

*(Fill in one or more of the above columns depending on available equipment)*

Method of purging (bailer or pump) Bailer
If pumped, pumping rate:
Well Purged Dry 9 & 16 gal
Continuous Recharge
Notes concerning condition of well, odors, color, etc.:
Cloudy, temps in low 80s

Developer's Signature

ENGINEERING, INC.

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: Coble's Sandrock
Date: 09/13/05
Casing Type: PVC
Well/Boring Number MW-9
Casing Diameter in inches (Dr): 2 inches
Screened Interval: 22.5-37.5 feet below TOC
Riser Elevation: 2.66
Total Well Depth (Lw) in feet: 37.50
Depth to Water (Lf) in feet: 22.11
Time of Measurement: 9:10

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw - Lf) =$ 2.5 Gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp ( C) | pH | Conduc-tivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| **9 Well Vol** | 16.1 | 6.79 | 161.3 | >1000 | 23.0 | 22.99 | 13:21 |
| **10 Well Vol** | 15.4 | 7.06 | 198.2 | >1000 | 25.5 | — | 13:24 |
| **11 Well Vol** | 16.1 | 7.03 | 184.3 | >1000 | 28.0 | — | 13:29 |
| **12 Well Vol** | 15.3 | 6.84 | 153.8 | >1000 | 30.5 | — | 13:33 |
| **13 Well Vol** | 15.9 | 6.92 | 157.5 | >1000 | 33.0 | 34.22 | 13:40 |
| **14 Well Vol** | 15.1 | 7.06 | 169.2 | >1000 | 35.5 | — | 13:44 |
| **15 Well Vol** | 15.0 | 7.09 | 163.9 | >1000 | 38.0 | 36.92 | 13:55 |
| **16 Well Vol** | 16.0 | 7.17 | 178.1 | >1000 | 40.0 | DRY | 14:04 |

*(Fill in one or more of the above columns depending on available equipment)*

Method of purging (bailer or pump) Bailer
Well Purged Dry 9 & 16 gal
If pumped, pumping rate:
Continuous Recharge
Notes concerning condition of well, odors, color, etc.:
Cloudy, temps in low 80s

Developer's Signature

JOYCE ENGINEERING, INC.

# LOG OF BORING MW-10S

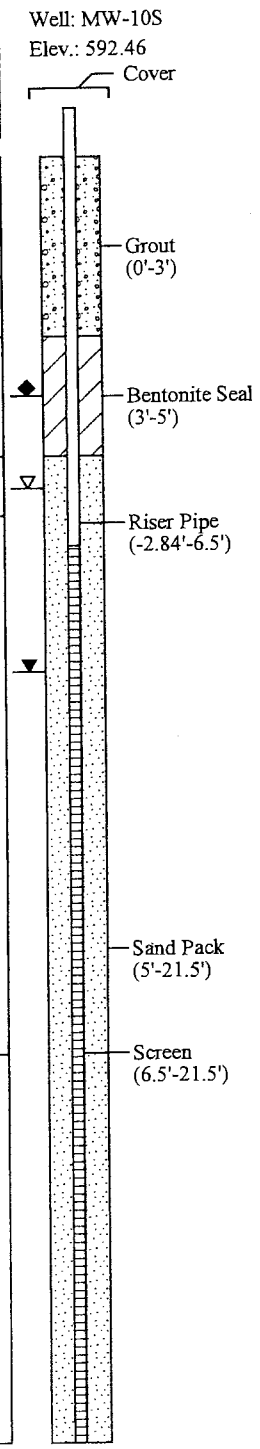


Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/22/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/22/05 | Northing Coord. | : 802197.9668300 |
| Hole Diameter | : 12.25-inch/8.25-inch | Easting Coord. | : 1843379.0247800 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 589.62 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 589 | | | CL | FILL - orange sandy clay |
| 1 | 588 | | | TS | TOPSOIL - brown with organics |
| 2 | 587 | | | SM | SILTY SAND - orange |
| 3 | 586 | | | PWR | PARTIALLY WEATHERED ROCK - white and orange silty sand with granitic texture |
| 4 | 585 | | | | *Auger refusal at 5 feet* |
| 5 | 584 | 50/4 | 10 | BR | BEDROCK - green to gray metavolcanic rock from 5 to 6 feet |
| 6 | 583 | | | BR | BEDROCK - granitic rock |
| 7 | 582 | | | | |
| 8 | 581 | | | | |
| 9 | 580 | | | | Possible fracture at 9 feet, based on color of cuttings and temporary reduction of dust |
| 10 | 579 | | | | Possible fracture at 10 feet based on drilling response |
| 11 | 578 | | | | |
| 12 | 577 | | | | |
| 13 | 576 | | | | |
| 14 | 575 | | | | Wet cuttings by 14 feet |
| 15 | 574 | | | BR | BEDROCK - green to gray metavolcanic cuttings<br>Possible fracture at 16 feet, based on reduction of dust |
| 16 | 573 | | | | |
| 17 | 572 | | | | |
| 18 | 571 | | | | Very weathered zone from 18 to 21.5 feet, moist green cuttings |
| 19 | 570 | | | | |
| 20 | 569 | | | | Very wet brown cuttings at 20 feet |
| 21 | 568 | | | | Terminated drilling at 21.5 feet |
| 22 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/22/05 |
| Hole Diameter(s) | : 12.25-inch/8.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.84-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with a Gus Pech GP-1100E utilizing 8.25-inch ID hollow stem augers to auger refusal. Borehole was continued utilizing an 8.25-inch hammer to approximately 21.5 feet.

2. Solid triangle represents water level at time of drilling (11.45 feet below TOC). Open triangle represents water level ~24 hours after well construction (8.38 feet below TOC). Solid square represents water level 6 days after well construction (6.83 feet below TOC).

MW-10S

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Robert Miller CERTIFICATION # 2675

WELL CONTRACTOR COMPANY NAME SAEDACCO, Inc. PHONE # (803) 548-2180

STATE WELL CONSTRUCTION PERMIT# _____ (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
Nearest Town: Kimesville County ALAMANCE
Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☒Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Cobler's Sandrock C&D
Address Foster store RD.
(Street or Route No.)
Kimesville NC
City or Town State Zip Code
(___)-_____
Area code- Phone number

| DEPTH From | To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 5' | TN Silt |
| 5' | 20' | Rock |

4. DATE DRILLED 3/22/05
5. TOTAL DEPTH: 20'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: 7.91 FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 3' FT. Above Land Surface*
***Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.**
9. YIELD (gpm): _____ METHOD OF TEST _____
10. WATER ZONES (depth): _____
11. DISINFECTION: Type _____ Amount _____
12. CASING:

| | Depth From | To | Diameter Ft. | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | 0 | 5' | 2" | SCH40 | PVC |
| | | | | | |
| | | | | | |

13. GROUT:

| | Depth From | To | Material | Method |
|---|---|---|---|---|
| | 0 | 3' | Portland | Pour |
| | | | | |

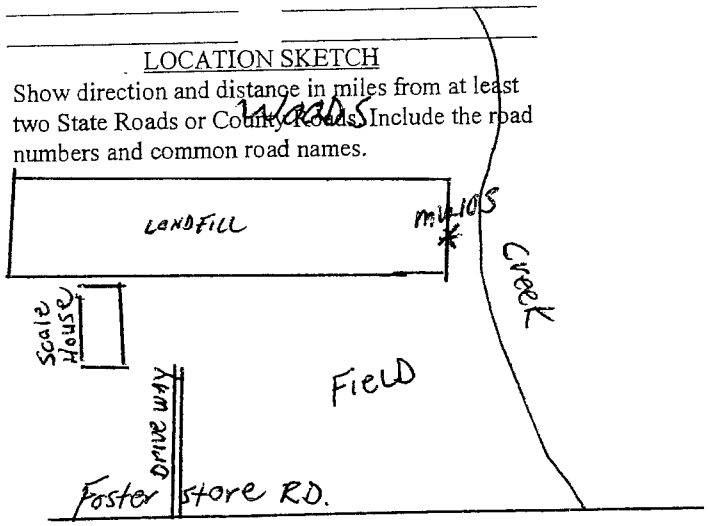
14. SCREEN:

| | Depth From | To | Diameter Ft. | Slot Size in. | Material |
|---|---|---|---|---|---|
| | 5' | 20' | 2" | .010 | PVC |
| | | | | | |

15. SAND/GRAVEL PACK:

| | Depth From | To | Size Ft. | Material |
|---|---|---|---|---|
| | 4' | 20' | 20/30 | Silica Sand |
| | | | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: 1' Bentonite Seal 3' to 4'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Robert L. Miller 3/29/05
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.**

GW-1 REV. 07/2001

JOYCE ENGINEERING, INC.

# LOG OF BORING MW-10D



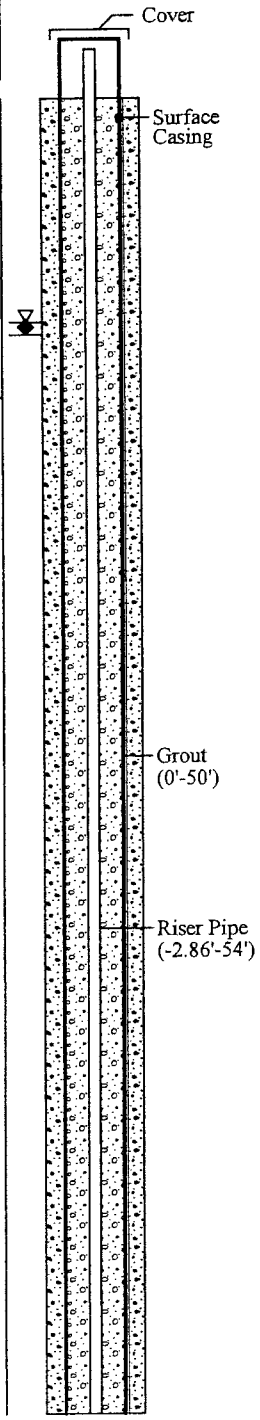
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/22/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/25/05 | Northing Coord. | : 802203.6444670 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843369.3340900 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 589.90 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | CL | FILL - orange sandy clay, moist |
| 1 | 589 | | | TS | TOPSOIL - brown with organics |
| 2 | 588 | | | SM | SILTY SAND - orange |
| 3 | 587 | | | PWR | PARTIALLY WEATHERED ROCK - tan cuttings, hammer starts to fire at 3 feet |
| 4 | 586 | | | BR | BEDROCK - white granitic cuttings |
| 5 | 585 | | | | |
| 6 | 584 | | | | |
| 7 | 583 | | | | |
| 8 | 582 | | | | Possible fracture at 8 feet, based on reduction of dust |
| 9 | 581 | | | | |
| 10 | 580 | | | | |
| 11 | 579 | | | | Possible fracture at 11 feet, based on moist cuttings and a reduction of dust |
| 12 | 578 | | | | |
| 13 | 577 | | | | Wet cuttings at 13 feet after stopping to add drill rod |
| 14 | 576 | | | | Producing a lot of water by 15 feet with very little cuttings |
| 15 | 575 | | | | |
| 16 | 574 | | | | Minor amount of green cuttings at 16 feet |
| 17 | 573 | | | | |
| 18 | 572 | | | | |
| 19 | 571 | | | | |
| 20 | 570 | | | | |
| 21 | 569 | | | | |
| 22 | 568 | | | | |

Well: MW-10D
Elev.: 592.76




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/25/05 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

SURFACE CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 6-inch |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.86-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with a Gus Pech GP-1100E utilizing 8.25-inch hammer to approximately 30 feet. Six-inch surface casing was installed and grouted in place to 30 feet. The boring was advance utilizing a 5.75-inch hammer to approximately 64 feet.

2. Solid triangle represents water level at time of drilling (26.45 feet below TOC). Open triangle represents water level ~24 hours after well construction (6.60 feet below TOC). Solid square represents water level 6 days after well construction (6.81 feet below TOC).

ENGINEERING, INC.

# LOG OF BORING MW-10D



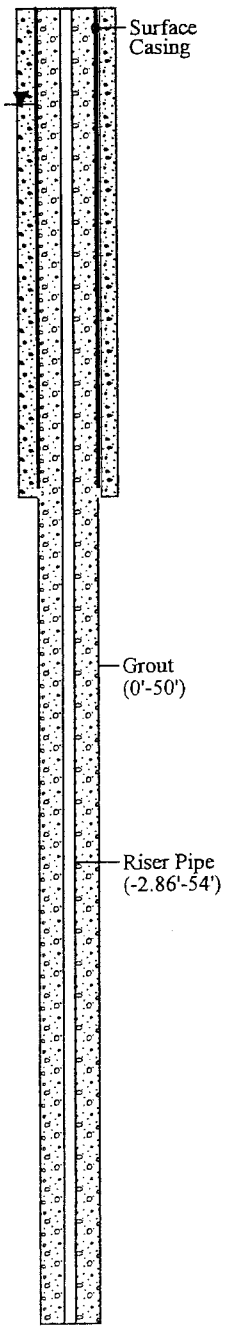
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/22/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/25/05 | Northing Coord. | : 802203.6444670 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843369.3340900 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 589.90 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 22 | | | | | |
| 23 | 567 | | | | |
| 24 | 566 | | | | |
| 25 | 565 | | | | |
| 26 | 564 | | | | |
| 27 | 563 | | | | |
| 28 | 562 | | | | |
| 29 | 561 | | | | |
| 30 | 560 | | | | Terminated boring at 30 feet to set surface casing. Resumed drilling on 03/25/05 |
| 31 | 559 | | | | |
| 32 | 558 | | | | |
| 33 | 557 | | | BR | Tan weathered cuttings at 33 feet, producing some water |
| 34 | 556 | | | | |
| 35 | 555 | | | | |
| 36 | 554 | | | | |
| 37 | 553 | | | | |
| 38 | 552 | | | | |
| 39 | 551 | | | | |
| 40 | 550 | | | | |
| 41 | 549 | | | | |
| 42 | 548 | | | | |
| 43 | 547 | | | | Weathered rock continues, producing a lot a water by 43 feet |
| 44 | 546 | | | | |

Well: MW-10D
Elev.: 592.76




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/25/05 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

SURFACE CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 6-inch |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.86-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with a Gus Pech GP-1100E utilizing 8.25-inch hammer to approximately 30 feet. Six-inch surface casing was installed and grouted in place to 30 feet. The boring was advance utilizing a 5.75-inch hammer to approximately 64 feet.

2. Solid triangle represents water level at time of drilling (26.45 feet below TOC). Open triangle represents water level ~24 hours after well construction (6.60 feet below TOC). Solid square represents water level 6 days after well construction (6.81 feet below TOC).

ENGINEERING, INC.

# LOG OF BORING MW-10D



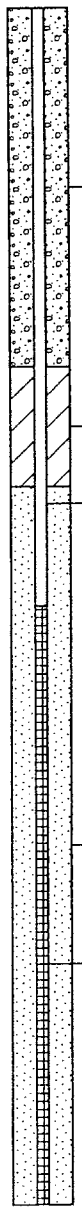
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/22/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/25/05 | Northing Coord. | : 802203.6444670 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843369.3340900 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

Well: MW-10D
Elev.: 592.76

| Depth in Feet | Surf. Elev. 589.90 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 44 | | | | | |
| 45 | 545 | | | | Possible fracture at 45 feet, based on drilling response |
| 46 | 544 | | | | |
| 47 | 543 | | | | |
| 48 | 542 | | | | |
| 49 | 541 | | | | Competent bedrock at 53 feet |
| 50 | 540 | | | | |
| 51 | 539 | | | | |
| 52 | 538 | | | | |
| 53 | 537 | | | | |
| 54 | 536 | | | BR | |
| 55 | 535 | | | | |
| 56 | 534 | | | | |
| 57 | 533 | | | | |
| 58 | 532 | | | | |
| 59 | 531 | | | | |
| 60 | 530 | | | | |
| 61 | 529 | | | | |
| 62 | 528 | | | | Large mud filled fracture from 62 to 63 feet |
| 63 | 527 | | | | |
| 64 | 526 | | | | Terminated boring at 64 feet |
| 65 | 525 | | | | |
| 66 | 524 | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/25/05 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

SURFACE CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 6-inch |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.86-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with a Gus Pech GP-1100E utilizing 8.25-inch hammer to approximately 30 feet. Six-inch surface casing was installed and grouted in place to 30 feet. The boring was advance utilizing a 5.75-inch hammer to approximately 64 feet.

2. Solid triangle represents water level at time of drilling (26.45 feet below TOC). Open triangle represents water level ~24 hours after well construction (6.60 feet below TOC). Solid square represents water level 6 days after well construction (6.81 feet below TOC).

MW-10D

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Robert Miller CERTIFICATION # 2675

WELL CONTRACTOR COMPANY NAME SAEDACCO, Inc. PHONE # (803) 548-2180

STATE WELL CONSTRUCTION PERMIT# _____ (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
Nearest Town: Kimesville County ALAMANCE
Foster store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☒Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock C&D Landfill
Address Foster store RD.
(Street or Route No.)
Kimesville NC
City or Town State Zip Code
(____)-_____
Area code- Phone number

4. DATE DRILLED 3/25/05
5. TOTAL DEPTH: 64'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: 6.81 FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 3' FT. Above Land Surface*
***Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.**
9. YIELD (gpm): _____ METHOD OF TEST _____
10. WATER ZONES (depth): _____

| DEPTH From | To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 5' | TN SILT |
| 5' | 64' | Rock |

11. DISINFECTION: Type _____ Amount _____
12. CASING:

| | Depth | | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| From 0 | To 54' | Ft. | 2" | SCH 40 | PVC |
| From 0 | To 30' | Ft. | 6" | SCH 40 | PVC |
| From | To | Ft. | | | |

13. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 50' | Ft. | Portland | Trime |
| From | To | Ft. | | |

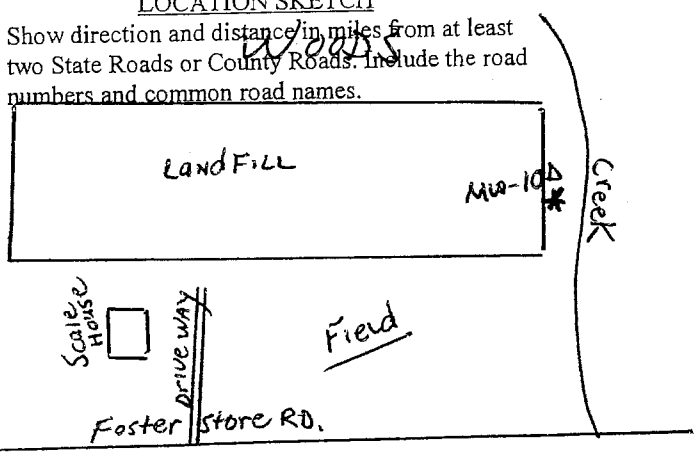
14. SCREEN:

| | Depth | | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| From 54' | To 64' | Ft. | 2" in. | .010 in. | PVC |
| From | To | Ft. | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 52' | To 64' | Ft. | 20/30 | Silica Sand |
| From | To | Ft. | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: 2' Bentonite seal 50' to 52'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Robert L. Miller 3/29/05
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.**

GW-1 REV. 07/2001

ENGINEERING, INC.

# LOG OF BORING P-15

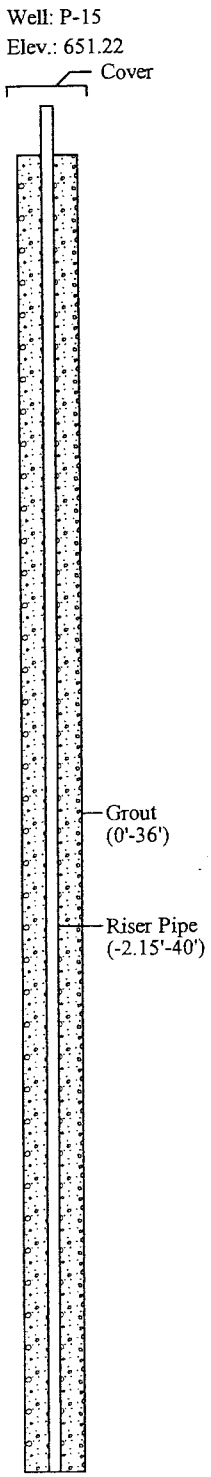


Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/16/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/17/02 | Northing Coord. | : 799910.089 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842914.445 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 649.07 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 649 | 5 | | TS | TOPSOIL- Dark brown with organics |
| 1 | 648 | 2, 4, 7 | 10 | SC | CLAYEY SAND - orange/yellow, moist |
| 2 | 647 | | | | |
| 3 | 646 | | | | Becoming more of a sandy clay, orange, moist |
| 4 | 645 | | | | Becoming sandier, rock fragments present, dry |
| 5 | 644 | 7 | | SM | SILTY SAND - orange/yellow, fine-grained quartz grains present |
| 6 | 643 | 15, 22 | 75 | | |
| 7 | 642 | 33 | | | Faint granitic texture apparent, slightly moist |
| 8 | 641 | | | | |
| 9 | 640 | | | | Becoming dryer and changing to gray in color, weathered pebbles are present |
| 10 | 639 | 14, 32 | | | Yellow silty sand |
| 11 | 638 | 40 | 50 | | |
| 12 | 637 | 50/5.75 | | PWR | PARTIALLY WEATHERED ROCK - white and yellow silty sand, dry |
| 13 | 636 | | | | Very hard drilling from 13 to 15 feet |
| 14 | 635 | | | | |
| 15 | 634 | 9 | | SM | SILTY SAND - tan with granitic texture, very dry, possible fracture preserved at 16 feet oriented at approximately 70 degrees. |
| 16 | 633 | 13, 15 | 100 | | |
| 17 | 632 | 22 | | | Augers getting hung up in hole and augering is terminated at 17 feet, near refusal |
| 18 | 631 | | | BR | BEDROCK - whitish yellow cuttings, dry, hard rock |
| 19 | 630 | | | | |
| 20 | 629 | | | | |
| 21 | 628 | | | | |
| 22 | 627 | | | | |
| 23 | 626 | | | | |
| 24 | 625 | | | | |
| 25 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/17/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.15-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to auger refusal. Borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 50 feet.

2. Solid triangle represents water level at time of drilling (50.60 feet below TOC). Solid square represents water level ~24 hours after well construction (41.08 feet below TOC). Open triangle represents water level 7 days after well construction (40.62 feet below TOC). Dry cuttings were observed with air rotary drilling from 17-50 feet.

JOYCE ENGINEERING, INC.

# LOG OF BORING P-15



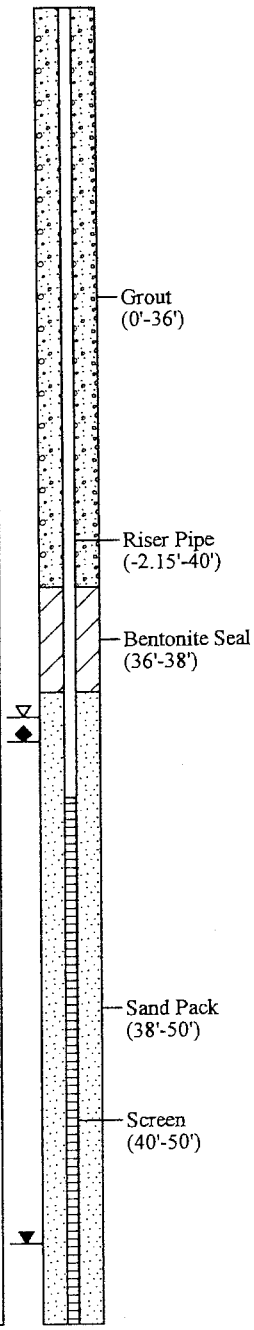
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/16/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/17/02 | Northing Coord. | : 799910.089 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842914.445 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 649.07 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 25 | 624 | | | | |
| 26 | 623 | | | | |
| 27 | 622 | | | | |
| 28 | 621 | | | | |
| 29 | 620 | | | | |
| 30 | 619 | | | | |
| 31 | 618 | | | | |
| 32 | 617 | | | | |
| 33 | 616 | | | | |
| 34 | 615 | | | | |
| 35 | 614 | | | | |
| 36 | 613 | | | | |
| 37 | 612 | | | BR | |
| 38 | 611 | | | | |
| 39 | 610 | | | | |
| 40 | 609 | | | | |
| 41 | 608 | | | | |
| 42 | 607 | | | | |
| 43 | 606 | | | | |
| 44 | 605 | | | | |
| 45 | 604 | | | | Soft spot or possible fracture at 45 feet, about a foot thick |
| 46 | 603 | | | | |
| 47 | 602 | | | | |
| 48 | 601 | | | | |
| 49 | 600 | | | | Terminated boring at 50 feet |
| 50 | | | | | |

Well: P-15
Elev.: 651.22




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/17/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.15-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to auger refusal. Borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 50 feet.

2. Solid triangle represents water level at time of drilling (50.60 feet below TOC). Solid square represents water level ~24 hours after well construction (41.08 feet below TOC). Open triangle represents water level 7 days after well construction (40.62 feet below TOC). Dry cuttings were observed with air rotary drilling from 17-50 feet.

P-15 COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael F. Monaghan CERTIFICATION # 2895

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # (540) -586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer Installation

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Road 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Cobb's Sandrock
Address 5833 Foster Store Road
(Street or Route No.)
Liberty NC 27298
City or Town State Zip Code
(336)- 565-4750
Area code- Phone number

4. DATE DRILLED 01/18/02
5. TOTAL DEPTH: 50'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

| DEPTH From | To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 15 | Silty Sand/Saprolite |
| 15 | 17 | Partially weathered Rock |
| 17 | 50 | Granite/Bedrock |

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

| | Depth | | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| From +2.5 | To 40 | Ft. | 2 | Sch 40 | PVC |
| From | To | Ft. | | | |
| From | To | Ft. | | | |

13. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 36 | To 38 | Ft. | Bent. Chips | Poured |
| From 0 | To 36 | Ft. | Bent/Cement | Pumped |

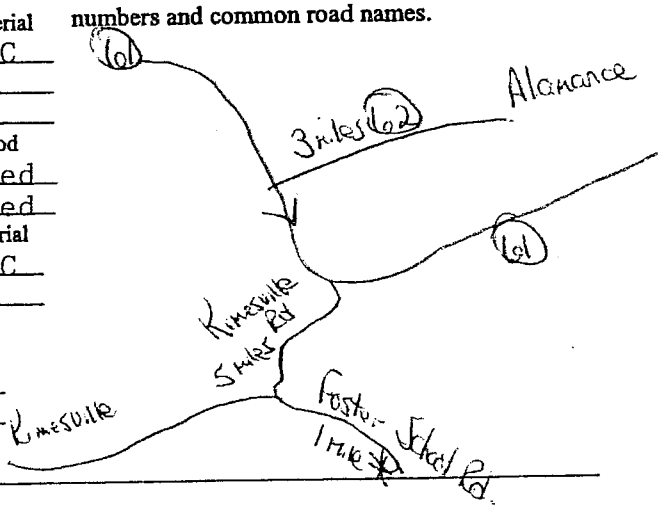
14. SCREEN:

| | Depth | | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| From 40 | To 50 | Ft. | 2 in. | .010 in. | PVC |
| From | To | Ft. | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 38 | To 50 | Ft. | #1 | Sand |
| From | To | Ft. | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: P-15

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Michael F. Monaghan 1/18/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

JOYCE ENGINEERING, INC.

# LOG OF BORING P-16

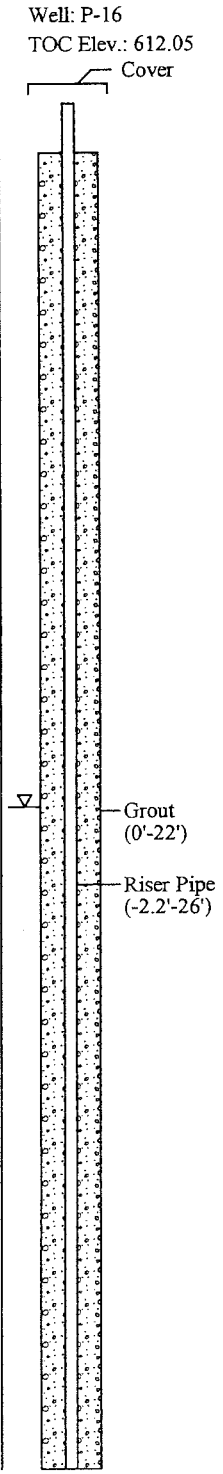


Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/17/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/18/02 | Northing Coord. | : 800591.064 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842674.247 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 609.85 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | 2 2 3 5 | 70 | TS | TOPSOIL- Dark brown with organics |
| 1 | 609 | | | SM | SANDY CLAY - white/orange, moist, quartz grains visible |
| 2 | 608 | | | | |
| 3 | 607 | | | | |
| 4 | 606 | | | SM | SILTY SAND - granitic texture, very hard to drill through |
| 5 | 605 | 50/ 5.5 | 20 | | *Auger refusal at 5 feet* |
| 6 | 604 | | | BR | BEDROCK - weathered rock with yellow cuttings, dry |
| 7 | 603 | | | | |
| 8 | 602 | | | | |
| 9 | 601 | | | | |
| 10 | 600 | | | | |
| 11 | 599 | | | | |
| 12 | 598 | | | | |
| 13 | 597 | | | | |
| 14 | 596 | | | | |
| 15 | 595 | | | | Soft spot or possible fracture at 15 feet |
| 16 | 594 | | | | |
| 17 | 593 | | | | |
| 18 | 592 | | | | Becomes competent at 18 feet with white cuttings |
| 19 | 591 | | | | |
| 20 | 590 | | | | |
| 21 | 589 | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/18/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.20-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to auger refusal. Borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 41 feet.

2. Solid triangle represents water level at time of drilling (30.90 feet below TOC). Open triangle represents water level 6 days after well construction (12.63 feet below TOC). Dry cuttings were observed with air rotary drilling from 18-41 feet.

# LOG OF BORING P-16



JOYCE ENGINEERING, INC.

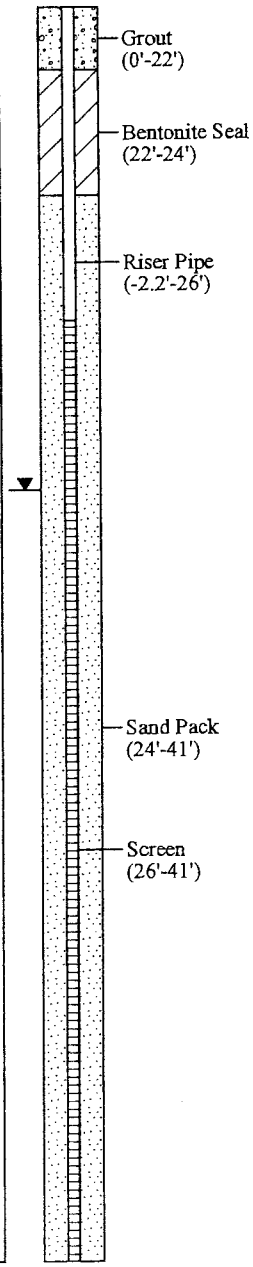
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/17/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/18/02 | Northing Coord. | : 800591.064 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842674.247 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 609.85 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 21 | | | | | |
| 22 | 588 | | | | |
| 23 | 587 | | | | |
| 24 | 586 | | | | |
| 25 | 585 | | | | |
| 26 | 584 | | | | Becomes very hard at 26 feet |
| 27 | 583 | | | | |
| 28 | 582 | | | | |
| 29 | 581 | | | | |
| 30 | 580 | | | | |
| 31 | 579 | | | BR | |
| 32 | 578 | | | | |
| 33 | 577 | | | | |
| 34 | 576 | | | | |
| 35 | 575 | | | | |
| 36 | 574 | | | | |
| 37 | 573 | | | | |
| 38 | 572 | | | | |
| 39 | 571 | | | | |
| 40 | 570 | | | | |
| 41 | 569 | | | | *Drilling terminated at 41 feet* |
| 42 | 568 | | | | |

Well: P-16
TOC Elev.: 612.05




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/18/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.20-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to auger refusal. Borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 41 feet.

2. Solid triangle represents water level at time of drilling (30.90 feet below TOC). Open triangle represents water level 6 days after well construction (12.63 feet below TOC). Dry cuttings were observed with air rotary drilling from 18-41 feet.

P-16

COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael F. Monaghan CERTIFICATION # 2895

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # 640 586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer Installed

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Road 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Cable's Sandrock
Address 5833 Foster Store Road
(Street or Route No.)
Liberty NC 27298
City or Town State Zip Code
(336)- 565- 4750
Area code- Phone number

4. DATE DRILLED 01-18-02
5. TOTAL DEPTH: 41'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒X
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

| DEPTH From | To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 5 | Silty Sand / Saprolite |
| 5 | 18 | Partially Weathered Rock |
| 18 | 41 | Granite Bedrock |

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

| | Depth | | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| From +2.5 | To 26 | Ft. | 2" | Sch 40 | PVC |
| From | To | Ft. | | | |
| From | To | Ft. | | | |

13. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 22 | Ft. | Bent/Cement | Pumped |
| From 22 | To 24 | Ft. | Bent. Pellets | Poured |

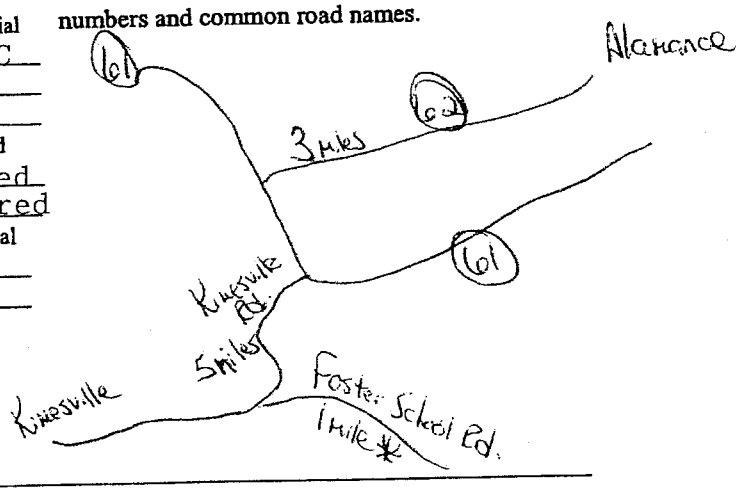
14. SCREEN:

| | Depth | | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| From 26 | To 41 | Ft. | 2 in. | .010 in. | PVC |
| From | To | Ft. | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 24 | To 41 | Ft. | #1 | Sand |
| From | To | Ft. | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: P-16

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Michael F. Monaghan 1/18/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.**

GW-1 REV. 07/2001

ENGINEERING, INC.

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: 419.06 Date: 2/5/02 – 2/6/02

Casing Type: Schedule 40 PVC

Well/Boring Number: P-16

Casing Diameter (Dr): 2"

Screened Interval: 28.2-43.2

Riser Elevation:

Total Well Depth (Lw): 43.2

Depth to Water (Lf): 13.71

Time of Measurement: 1449

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf) = 29.49 = 4.81$ gal

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|---|
| Before Development | | 11.3 | 6.10 | 168.2 | clear | 0 | 13.71 | 1459 |
| After Purging | | 12.6 | 7.27 | 203.0 | cloudy tan | 24.12 | dry | 1240 |
| 1 Well Vol | | 12.6 | 6.73 | 206.0 | >1000 | 4.81 | | 1511 |
| 2 Well Vol | | 11.6 | 6.77 | 181.2 | cloudy | 9.62 | 39.19 | 1537 |
| 3 Well Vol | | 13.4 | 6.60 | 200.0 | cloudy | 14.12 | dry | 1556 |
| 3 Well Vol | 2/6/02 | 12.6 | 7.06 | 215.0 | slightly cloudy | 14.12 | 18.88 | 1217 |
| 4 Well Vol | | 13.2 | 6.93 | 219.0 | slightly cloudy | 19.12 | | 1221 |
| 5 Well Vol | | 12.6 | 7.27 | 203.0 | slightly cloudy | 24.12 | dry | 1240 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (pump and bailer)

Well Purged Dry @ 14.12 and 24.12 gal.

If pumped, pumping rate:

Continuous Recharge: no

NOTES:

2/5/02, temp in low 30's, sunny

2/6/02, temp in low 40's, cloudy

Sampler's Signature

G:\DataShared\Administration\Team 12\blank dev form.doc

JOYCE ENGINEERING, INC.

# LOG OF BORING P-17

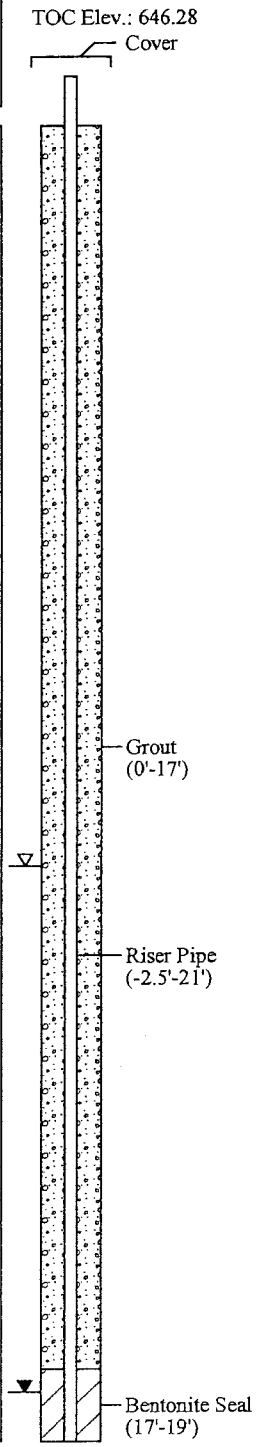


Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/17/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/18/02 | Northing Coord. | : 799356.506 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1844577.645 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 643.78 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | 1 | | TS | TOPSOIL - Dark brown with organics |
| 1 | 643 | 1 | 45 | SM | SANDY SILT - tan/orange, moist, contains some clay |
| | | 3 | | | |
| 2 | 642 | 4 | | | |
| 3 | 641 | | | | |
| 4 | 640 | | | | |
| 5 | 639 | | | | |
| | | 5 | | MH | SILT - tan/orange, mottled texture, moist |
| 6 | 638 | 9 | 70 | | |
| | | 11 | | | |
| 7 | 637 | 12 | | | |
| 8 | 636 | | | | |
| 9 | 635 | | | | |
| 10 | 634 | | | | Clayey sand zone approximately 0.5 feet thick, saturated |
| | | 3 | | | |
| 11 | 633 | 4 | 60 | | |
| | | 5 | | | |
| 12 | 632 | 7 | | | |
| 13 | 631 | | | | |
| 14 | 630 | | | | |
| 15 | 629 | | | | |
| | | 5 | | SC | SANDY CLAY - tan medium-grained sand, saturated |
| 16 | 628 | 9 | 60 | | |
| | | 13 | | CL | SILTY CLAY - tan/orange and moist |
| 17 | 627 | 16 | | | |
| 18 | 626 | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/18/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.50-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to 20 feet. Borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 36 feet.

2. Solid triangle represents water level at time of drilling (19.82 feet below TOC). Open triangle represents water level 6 days after well construction (12.63 feet below TOC).

ENGINEERING, INC.

# LOG OF BORING P-17



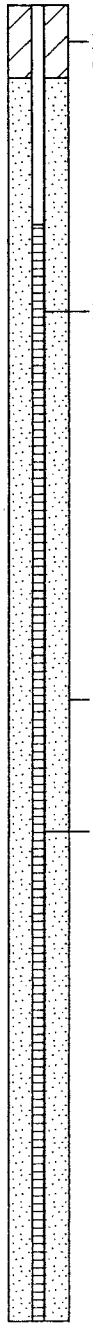
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/17/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/18/02 | Northing Coord. | : 799356.506 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1844577.645 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

Well: P-17
TOC Elev.: 646.28

| Depth in Feet | Surf. Elev. 643.78 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 18 | | | | | |
| 19 | 625 | | | CL | |
| 20 | 624 | | | | |
| 21 | 623 | 6<br>13<br>41<br>50/5 | 60 | ML | CLAYEY SILT - with pebble-size rock fragments, moist<br><br>*Auger refusal at 22 feet* |
| 22 | 622 | | | | |
| 23 | 621 | | | BR | BEDROCK - weathered white rock fragments that consist of mainly quartz, moist |
| 24 | 620 | | | | Gray cuttings, moist, rather hard material |
| 25 | 619 | | | | |
| 26 | 618 | | | | |
| 27 | 617 | | | | |
| 28 | 616 | | | | |
| 29 | 615 | | | | |
| 30 | 614 | | | | |
| 31 | 613 | | | | |
| 32 | 612 | | | | |
| 33 | 611 | | | | |
| 34 | 610 | | | | |
| 35 | 609 | | | | *Drilling terminated at 36 feet* |
| 36 | 608 | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/18/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.50-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to 20 feet. Borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 36 feet.

2. Solid triangle represents water level at time of drilling (19.82 feet below TOC). Open triangle represents water level 6 days after well construction (12.63 feet below TOC).

P-17

COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael F. Monaghan CERTIFICATION # 2895

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # (540) 586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Road 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock
Address 5833 Foster Store Road
(Street or Route No.)
Liberty NC 27298
City or Town State Zip Code
(336)- 565- 4750
Area code- Phone number

4. DATE DRILLED 1-18-02
5. TOTAL DEPTH: 36'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

| DEPTH From | DEPTH To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 20 | Sandy Clay/ Saprolite |
| 20 | 36 | Partially Weathered Rock |

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

| | Depth From | Depth To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | +2.5 | 21 | 2" | Sch 40 | PVC |
| | | | | | |
| | | | | | |

13. GROUT:

| | Depth From | Depth To | Material | Method |
|---|---|---|---|---|
| | 0 | 17 | Cement/Bent | Poured |
| | 17 | 19 | Bent. Chips | Poured |

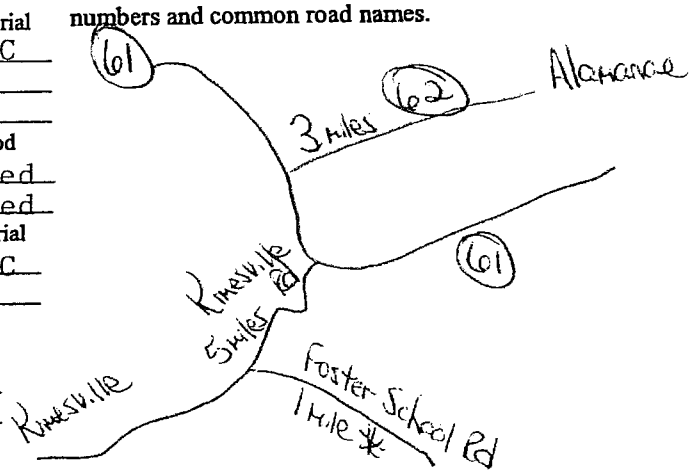
14. SCREEN:

| | Depth From | Depth To | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| | 21 | 36 | 2 in. | .010 in. | PVC |
| | | | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth From | Depth To | Size | Material |
|---|---|---|---|---|
| | 19 | 36 | #1 | Sand |
| | | | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: P-17

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Michael F. Monaghan 1/18/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

ENGINEERING, INC.

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: 419.06 Date: 2/5/02

Casing Type: Schedule 40 PVC

Well/Boring Number: P-17

Casing Diameter (Dr): 2"

Screened Interval: 23.5-38.5

Riser Elevation:

Total Well Depth (Lw): 38.5

Depth to Water (Lf): 17.88

Time of Measurement: 1055

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf) = 20.62 = 3.36$ gal

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp ( C) | pH | Conduc-tivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 13.8 | 7.67 | 63.4 | >1000 | 0 | 17.88 | 1346 |
| After Purging | 13.2 | 6.55 | 60.2 | clear orange | 13.44 | 18.92 | 1430 |
| 1 Well Vol | 13.2 | 7.52 | 66.9 | >1000 tan | 3.36 | | 13.49 |
| 2 Well Vol | 13.6 | 6.82 | 62.5 | >1000 slightly | 6.72 | | 1403 |
| 3 Well Vol | 14.0 | 6.97 | 61.7 | cloudy | 10.08 | | 1417 |
| 4 Well Vol | 13.2 | 6.55 | 60.2 | clear | 13.44 | 18.92 | 1430 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (pump)

If pumped, pumping rate:

Well Purged Dry @

Continuous Recharge: yes

NOTES:

temps in low 30's, sunny

Sampler's Signature

*G:\DataShared\Administration\Team 12\blank dev form.doc*

ENGINEERING, INC

# LOG OF BORING P-18



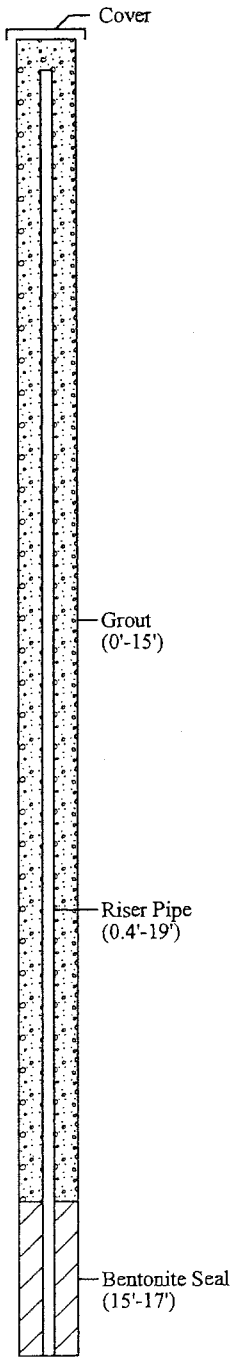
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/30/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/30/02 | Northing Coord. | : 800605.058 |
| Hole Diameter | : 8.25-inch | Easting Coord. | : 1844289.782 |
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 652.16 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 652 | 2, 6, 4, 4 | 65 | SM | SILTY SAND - tan with some organics to 0.5 ft |
| 1 | 651 | | | | |
| 2 | 650 | | | CH | FAT CLAY - orange, slightly moist |
| 3 | 649 | | | | |
| 4 | 648 | | | | |
| 5 | 647 | 4, 6, 9, 11 | 85 | SM | SILTY SAND - white with orange iron staining, granitic texture, medium-grained quartz grains, slightly moist |
| 6 | 646 | | | | |
| 7 | 645 | | | | |
| 8 | 644 | | | | |
| 9 | 643 | | | | |
| 10 | 642 | 13, 23, 47 | 75 | | Changes to tan/brown/orange silty sand with strong granitic texture, some clay mixed in, large mica crystals, slightly moist |
| 11 | 641 | | | | |
| 12 | 640 | 50/4 | | PWR | PARTIALLY WEATHERED ROCK - silty sand with strong granitic texture |
| 13 | 639 | | | | |
| 14 | 638 | | | | |
| 15 | 637 | | | | White/orange/brown silty sand, medium to course-grained, dry |
| 16 | 636 | 50/5 | 10 | | |
| 17 | | | | | |

Well: P-18
TOC Elev.: 651.76




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/30/02 |
| Hole Diameter(s) | : 8.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : -0.4-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 6" Flush mount |

WELL PAD

| | |
|---|---|
| Type | : 2' X 2' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers.

2. Solid triangle represents water level at time of drilling (32.66 feet below TOC). Solid square represents water level ~24 hours after well construction (25.12 feet below TOC). Open triangle represents water level 7 days after well construction (24.78 feet below TOC).

JOYCE ENGINEERING, INC.

# LOG OF BORING P-18



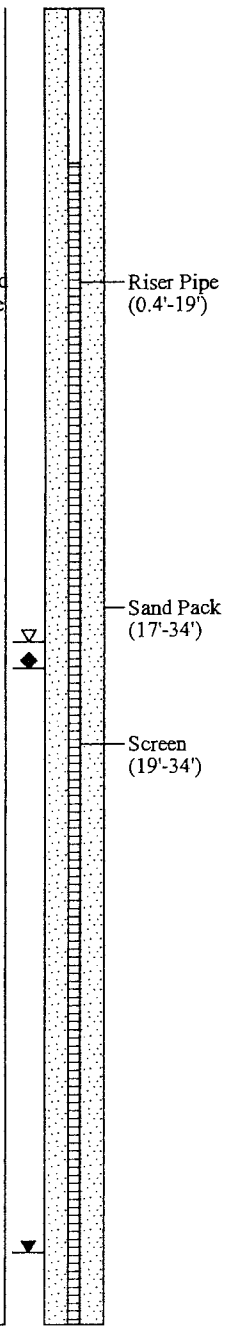
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/30/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/30/02 | Northing Coord. | : 800605.058 |
| Hole Diameter | : 8.25-inch | Easting Coord. | : 1844289.782 |
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

Well: P-18
TOC Elev.: 651.76

| Depth in Feet | Surf. Elev. 652.16 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 17 | 635 | | | | |
| 18 | 634 | | | | Material becomes softer at 18 ft |
| 19 | 633 | | | | |
| 20 | 632 | | | | |
| 21 | 631 | 50/4 | 25 | | Tan/orange/brown silty sand, coarse-grained quartz and weathered micas, slight moisture on grains |
| 22 | 630 | | | | |
| 23 | 629 | | | | Some pebble sized quartz and rock fragments in cuttings at 23 ft, moist |
| 24 | 628 | | | | |
| 25 | 627 | 27 | | PWR | White/orange/brown silty sand, granitic texture, medium grained quartz with weathered micas, some moisture on grains |
| 26 | 626 | 35<br>50/<br>5.75 | 65 | | |
| 27 | 625 | | | | |
| 28 | 624 | | | | |
| 29 | 623 | | | | |
| 30 | 622 | 50 | 50 | | White with some orange iron staining, medium grained silty sand with come clay, slightly moist grains |
| 31 | 621 | 50/2 | | | |
| 32 | 620 | | | | |
| 33 | 619 | | | | *Auger refusal at 34 ft* |
| 34 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/30/02 |
| Hole Diameter(s) | : 8.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : -0.4-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 6" Flush mount |

WELL PAD

| | |
|---|---|
| Type | : 2' X 2' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers.

2. Solid triangle represents water level at time of drilling (32.66 feet below TOC). Solid square represents water level ~24 hours after well construction (25.12 feet below TOC). Open triangle represents water level 7 days after well construction (24.78 feet below TOC).

P-18

COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael P. Monaghan CERTIFICATION # 2842

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # 540 586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Rd., 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock
Address 5833 Foster Store Rd.
(Street or Route No.)
Eden NC 27298
City or Town State Zip Code
(336)-565-4750
Area code- Phone number

4. DATE DRILLED 01/28/02
5. TOTAL DEPTH: 34'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 0 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

| DEPTH From | DEPTH To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 10 | Silty Sand/Saprolite |
| 10 | 34 | Partially Weathered Rock |

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

| | Depth From | Depth To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | 0 | 19 | 2" | Sch 40 | PVC |
| | | | | | |
| | | | | | |

13. GROUT:

| | Depth From | Depth To | Material | Method |
|---|---|---|---|---|
| | 0 | 15 | Bent/Cement | Poured |
| | 15 | 17 | Bent. Chips | Poured |

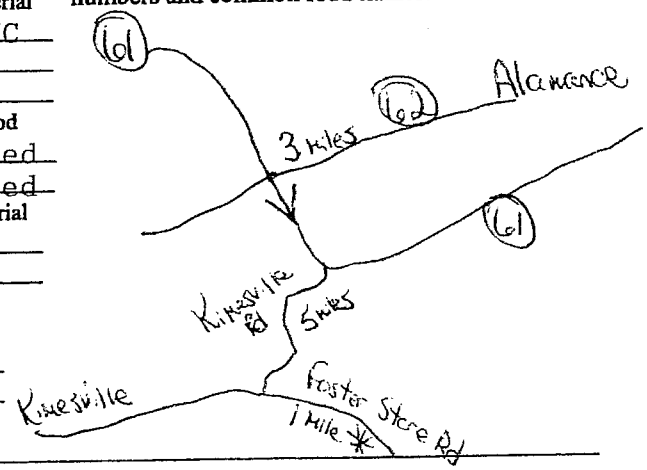
14. SCREEN:

| | Depth From | Depth To | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| | 19 | 34 | 2 in. | .010 in. | PVC |
| | | | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth From | Depth To | Size | Material |
|---|---|---|---|---|
| | 17 | 34 | #1 | Sand |
| | | | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: P-18

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Patrick Monaghan 1/28/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.**

GW-1 REV. 07/2001

ENGINEERING, INC.

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: Coble's Sandrock
Date: 09/13/05
Casing Type: PVC
Well/Boring Number P-18
Casing Diameter in inches (Dr): 2 inches
Screened Interval: 19-34 feet below TOC
Riser Elevation: -0.4 feet
Total Well Depth (Lw) in feet: 34.00 feet
Depth to Water (Lf) in feet: 21.48
Time of Measurement: 12:52

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw - Lf) =$ 2 Gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp ( C) | pH | Conductivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| **Before Development** | 16.5 | 6.08 | 345 | 38.3 | 0.0 | 21.48 | 12:36 |
| **After Purging** | | | | | | | |
| **1 Well Vol** | 16.7 | 6.04 | 358 | >1000 | 2.0 | --- | 12:40 |
| **2 Well Vol** | 16.0 | 6.03 | 361 | >1000 | 4.0 | --- | 12:46 |
| **3 Well Vol** | 16.5 | 6.12 | 357 | >1000 | 6.0 | 32.15 | 12:56 |
| **3.5 Well Vol** | 17.3 | 6.19 | 225 | >1000 | 7.0 | DRY | 13:03 |
| **3.5 Well Vol** | 16.6 | 6.90 | 367 | 817 | 7.0 | 22.88 | 15:33 |
| **4.5 Well Vol** | 16.1 | 6.18 | 355 | >1000 | 9.0 | --- | 15:38 |
| **5 Well Vol** | 16.4 | 6.30 | 353 | >1000 | 10.0 | DRY | 15:47 |

*(Fill in one or more of the above columns depending on available equipment)*

Method of purging (bailer or pump) Bailer
Well Purged Dry 7 & 10 gal.
If pumped, pumping rate:
Continuous Recharge
Notes concerning condition of well, odors, color, etc.:
Cloudy, temps in low 80s

Developer's Signature

ENGINEERING, INC.

# LOG OF BORING P-19S

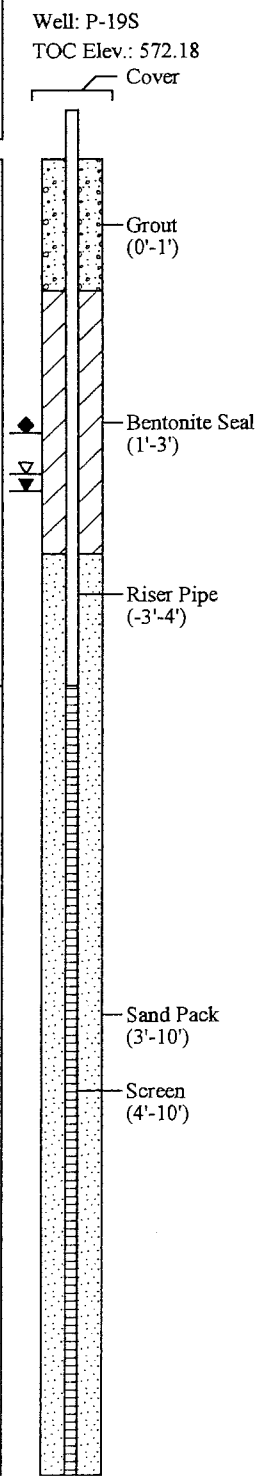


Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/31/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/31/02 | Northing Coord. | : 802873.387 |
| Hole Diameter | : 6.25-inch | Easting Coord. | : 1843159.210 |
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 569.18 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 569 | | | SC | SANDY CLAY - orange/brown, saturated |
| 1 | 568 | | | | |
| 2 | 567 | | | | |
| 3 | 566 | | | | |
| 4 | 565 | | | | SILTY SAND - gray/brown, highly saturated |
| 5 | 564 | | | | |
| 6 | 563 | | | | |
| 7 | 562 | | | SM | Harder at 7 ft |
| 8 | 561 | | | | |
| 9 | 560 | | | | *Boring terminated at 10 ft (near refusal)* |
| 10 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/31/02 |
| Hole Diameter(s) | : 6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 3.0-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 2.25-inch ID hollow stem augers.

2. Solid triangle represents water level at time of drilling (5.52 feet below TOC). Solid square represents water level ~24 hours after well construction (5.08 feet below TOC). Open triangle represents water level 6 days after well construction (5.39 feet below TOC).

P-19S

COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael P Monaghan CERTIFICATION # 2842

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # (540) 586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer Installed

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Road 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock
Address 5833 Foster Store Rd
(Street or Route No.)
Eden NC 27298
City or Town State Zip Code
(336) 565-4750
Area code- Phone number

4. DATE DRILLED 01/16/02
5. TOTAL DEPTH: 10'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

| DEPTH From | To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 10 | Sandy Clay |

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

| | Depth From | To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | +2.5 | 4 | 2" | Sch 40 | PVC |
| | | | | | |
| | | | | | |

13. GROUT:

| | Depth From | To | Material | Method |
|---|---|---|---|---|
| | 0 | 2 | Bentonite Chips | Poured |
| | | | | |

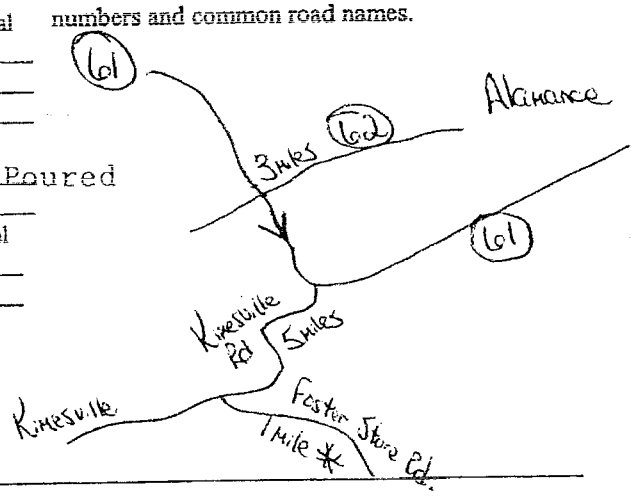
14. SCREEN:

| | Depth From | To | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| | 4 | 10 | 2 in. | .010 in. | PVC |
| | | | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth From | To | Size | Material |
|---|---|---|---|---|
| | 2 | 10 | #1 | Sand |
| | | | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: P-19S

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Patrick Monaghan 1/16/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.**

GW-1 REV. 07/2001

ENGINEERING, INC.

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: 419.06 Date: 2/5/02

Casing Type: Schedule 40 PVC

Well/Boring Number: P-19S

Casing Diameter (Dr): 2"

Screened Interval: 7.0-13.0

Riser Elevation:

Total Well Depth (Lw): 13.0

Depth to Water (Lf): 5.37

Time of Measurement: 1055

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf) = 7.63 = 1.24$ gal

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 9.4 | 6.96 | 99.1 | clear | 0 | 5.37 | 1100 |
| After Purging | 9.8 | 6.39 | 112.1 | cloudy | 23.72 | 8.26 | 1208 |
| 1 Well Vol | 9.4 | 6.77 | 96.5 | >1000 | 1.24 | 6.45 | 1104 |
| 2 Well Vol | 9.7 | 6.60 | 103.4 | >1000 | 2.48 | 7.09 | 1107 |
| 3 Well Vol | 9.8 | 6.52 | 108.1 | >1000 | 3.72 | 7.55 | 1110 |
| 4 Well Vol | 9.7 | 6.50 | 107.1 | >1000 | 4.96 | 7.28 | 1113 |
| 5 Well Vol | 9.8 | 6.47 | 110.6 | >1000 | 6.20 | 7.48 | 1117 |
| 6 Well Vol | 9.8 | 6.46 | 113.0 | >1000 | 7.44 | 7.31 | 1121 |
| 8 Well Vol | 9.8 | 6.46 | 111.0 | >1000 | 9.92 | 7.79 | 1126 |
| 8 Well Vol | 9.8 | 5.96 | 119.0 | >1000 | 10.00 | 9.65 | 1136 |
| 11.3 Well Vol | 9.7 | 6.38 | 113.8 | slightly cloudy | 14.00 | 9.64 | 1143 |
| 12.3 Well Vol | 9.7 | 6.40 | 111.6 | cloudy | 15.24 | 8.71 | 1147 |
| 13.3 Well Vol | 9.7 | 6.41 | 113.3 | cloudy | 16.48 | 9.37 | 1151 |
| 16.1 Well Vol | 9.7 | 6.07 | 113.5 | cloudy | 20.00 | 10.30 | 1157 |
| 17.1 Well Vol | 9.7 | 6.31 | 111.7 | cloudy | 21.24 | 9.06 | 1201 |
| 18.1 Well Vol | 9.7 | 6.37 | 110.9 | cloudy | 22.48 | 8.97 | 1205 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 19.1 Well Vol | 9.8 | 6.39 | 112.1 | cloudy | 23.72 | 8.26 | 1208 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer)

If pumped, pumping rate:

Well Purged Dry @

Continuous Recharge : yes

NOTES:

temps in low 30's, sunny

Sampler's Signature Dusty Reedy

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ENGINEERING, INC.

# LOG OF BORING P-19D



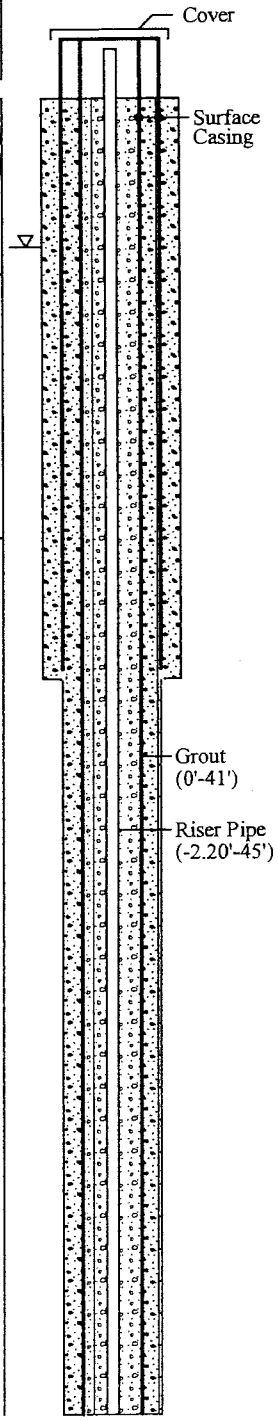
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/18/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/31/02 | Northing Coord. | : 802869.867 |
| Hole Diameter | : 10.25-inch/6.25-inch | Easting Coord. | : 1843148.340 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 569.65 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | | |
| 1 | 569 | 2 2 3 4 | 80 | SC / SP | SANDY CLAY - minimal topsoil (2" thick), orange/brown sandy clay with some quartz grains |
| 2 | 568 | | | SC | POORLY SORTED SAND - brown, coarse-grained |
| 3 | 567 | | | | SANDY CLAY - brown, organic |
| 4 | 566 | | | | |
| 5 | 565 | 2 6 5 5 | 50 | SM | SILTY SAND - gray with ~1" green organic clay layers at ~5.5 ft and 6.5ft, saturated at ~5 ft while clays are dry |
| 6 | 564 | | | | |
| 7 | 563 | | | | |
| 8 | 562 | | | | Coarse grained pwr with large quartz grains with silts and clays still present, iron staining |
| 9 | 561 | | | | |
| 10 | 560 | | | | *Auger refusal at 10 feet* |
| 11 | 559 | 50/1 | 10 | BR | BEDROCK - hard coarse grained granite, cuttings gray with large white quartz grains |
| 12 | 558 | | | | |
| 13 | 557 | | | | |
| 14 | 556 | | | | |
| 15 | 555 | | | | |
| 16 | 554 | | | | |
| 17 | 553 | | | | |
| 18 | 552 | | | | |
| 19 | 551 | | | | |
| 20 | 550 | | | | |
| 21 | 549 | | | | |
| 22 | 548 | | | | |
| 23 | 547 | | | | |
| 24 | 546 | | | | |
| 25 | 545 | | | | |
| 26 | 544 | | | | |
| 27 | 543 | | | | Water-bearing fracture hit at ~27 ft |
| 28 | 542 | | | | |
| 29 | 541 | | | | |
| 30 | 540 | | | | |

Well: P-19D
TOC Elev.: 571.85




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/18/02 |
| Hole Diameter(s) | : 10.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.20-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

SURFACE CSG.

| | |
|---|---|
| Type | : 10.25-inch steel |
| Type | : 6.25-inch PVC |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 2.25-inch ID hollow stem augers to auger refusal. Borehole was overdrilled with an Ingersoll/Rand T-3 air rig utilizing a 10-inch hammer to approximately 13 feet to set 10.25-inch steel surface casing. Borehole was continued to 40 feet to set 6.25-inch PVC surface casing. The annular space was grouted up using No. 1 Portland grout and allowed to set approximately 24 hours. The borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 60 feet.

2. Well was dry at time of drilling. Solid square represents water level ~24 hours after well construction (42.04 feet below TOC). Open triangle represents water level 5 days after well construction (5.59 feet below TOC). Dry cuttings were observed with air rotary drilling from 40-60 feet.

ENGINEERING, INC.

# LOG OF BORING P-19D



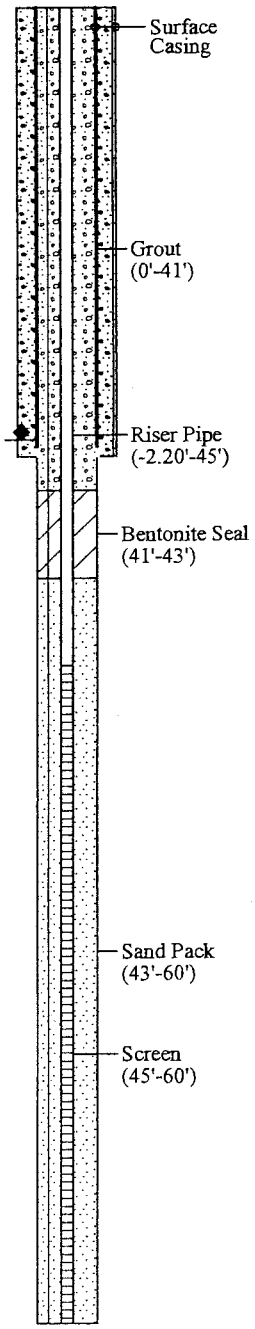
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/18/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/31/02 | Northing Coord. | : 802869.867 |
| Hole Diameter | : 10.25-inch/6.25-inch | Easting Coord. | : 1843148.340 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 569.65 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 30 | | | | | |
| | 539 | | | | |
| 31 | | | | | |
| | 538 | | | | |
| 32 | | | | | |
| | 537 | | | | |
| 33 | | | | | Water-bearing fracture hit at ~33 ft |
| | 536 | | | | |
| 34 | | | | | Hard white granite with quartz fillings and mafic minerals and mica |
| | 535 | | | | |
| 35 | | | | | |
| | 534 | | | | |
| 36 | | | | | |
| | 533 | | | | |
| 37 | | | | | |
| | 532 | | | | |
| 38 | | | | | |
| | 531 | | | | |
| 39 | | | | | |
| | 530 | | | | Terminated drilling with 10" .i.hammer at 40 ft |
| 40 | | | | | |
| | 529 | | | | Grouted in surface casings and waited ~24 hours |
| 41 | | | | | |
| | 528 | | | | Very dry cuttings |
| 42 | | | | | |
| | 527 | | | | |
| 43 | | | | | |
| | 526 | | | | |
| 44 | | | | | |
| | 525 | | | | |
| 45 | | | | BR | |
| | 524 | | | | |
| 46 | | | | | |
| | 523 | | | | |
| 47 | | | | | |
| | 522 | | | | |
| 48 | | | | | Possible fracture at ~48 ft |
| | 521 | | | | |
| 49 | | | | | |
| | 520 | | | | |
| 50 | | | | | |
| | 519 | | | | |
| 51 | | | | | |
| | 518 | | | | |
| 52 | | | | | |
| | 517 | | | | |
| 53 | | | | | |
| | 516 | | | | |
| 54 | | | | | |
| | 515 | | | | |
| 55 | | | | | Possible fracture at ~55 ft |
| | 514 | | | | |
| 56 | | | | | |
| | 513 | | | | |
| 57 | | | | | |
| | 512 | | | | |
| 58 | | | | | |
| | 511 | | | | |
| 59 | | | | | |
| | 510 | | | | Drilling terminated at 60 ft |
| 60 | | | | | |

Well: P-19D
TOC Elev.: 571.85




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/18/02 |
| Hole Diameter(s) | : 10.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.20-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

SURFACE CSG.

| | |
|---|---|
| Type | : 10.25-inch steel |
| Type | : 6.25-inch PVC |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 2.25-inch ID hollow stem augers to auger refusal. Borehole was overdrilled with an Ingersoll/Rand T-3 air rig utilizing a 10-inch hammer to approximately 13 feet to set 10.25-inch steel surface casing. Borehole was continued to 40 feet to set 6.25-inch PVC surface casing. The annular space was grouted up using No. 1 Portland grout and allowed to set approximately 24 hours. The borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 60 feet.

2. Well was dry at time of drilling. Solid square represents water level ~24 hours after well construction (42.04 feet below TOC). Open triangle represents water level 5 days after well construction (5.59 feet below TOC). Dry cuttings were observed with air rotary drilling from 40-60 feet.

P-19D COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael F. Monaghan CERTIFICATION # 2895

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # (540-586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer Installed

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Road 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Cable's Sandrock
Address 5833 Foster Store Rd.
(Street or Route No.)
Liberty NC 27298
City or Town State Zip Code
(336)- 565- 4750
Area code- Phone number

4. DATE DRILLED 1/30/02
5. TOTAL DEPTH: 60'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

| DEPTH From | DEPTH To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 10 | Sandy Clay |
| 10 | 60 | Granite Bedrock |

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

| | Depth | | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| From 0 | To 13 | Ft. | 10" | .250 | Steel |
| From 0 | To 13 | Ft. | 6" | Sch 40 | PVC |
| From +2.5 | To 45 | Ft. | 2" | Sch 40 | PVC |

13. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 41 | Ft. | Bent/Cement | Pumped |
| From 41 | To 43 | Ft. | Bentonite | Poured |

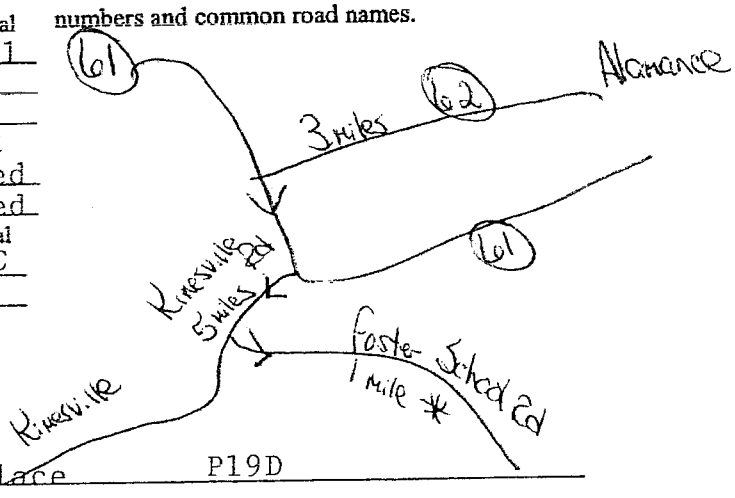
14. SCREEN:

| | Depth | | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| From 45 | To 60 | Ft. | 2 in. | .010 in. | PVC |
| From | To | Ft. | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 43 | To 60 | Ft. | #1 | SAnd |
| From | To | Ft. | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: Outer Casings Grouted in Place P19D

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Michael F. Monaghan 1/30/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

ENGINEERING, INC

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: 419.06 Date: 2/5/02 – 2/6/02

Casing Type: Schedule 40 PVC

Well/Boring Number: P-19D

Casing Diameter (Dr): 2"

Screened Interval: 47.2-62.2

Riser Elevation:

Total Well Depth (Lw): 62.2

Depth to Water (Lf): 5.59

Time of Measurement: 1214

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf) = 56.61 = 9.23$ gal

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|---|
| Before Development | | 13.6 | 6.37 | 245.0 | clear | 0 | 5.59 | 1231 |
| After Purging | | 12.6 | 6.06 | 221.0 | cloudy | 24.00 | dry | 1549 |
| 1 Well Vol | 2/5/02 | 14.1 | 7.13 | 210.0 | clear | 9.23 | 50.45 | 1246 |
| 1.5 Well Vol | | 14.4 | 6.91 | 322.0 | gray >1000 | 13.25 | dry | 1315 |
| 1.5 Well Vol | 2/6/02 | 12.0 | 7.18 | 174.5 | tan cloudy | 13.25 | 35.99 | 1126 |
| 2 Well Vol | | 13.7 | 6.93 | 213.0 | cloudy | 18.25 | | 1148 |
| 2.2 Well Vol | | 13.6 | 6.94 | 209.0 | cloudy | 20.00 | dry | 11.52 |
| 2.2 Well Vol | | 12.3 | 6.04 | 210.0 | clear | 20.00 | 52.40 | 1537 |
| 2.5 Well Vol | | 12.6 | 6.06 | 221.0 | gray cloudy | 24.00 | dry | 1549 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (pump and bailer)

Well Purged Dry @ 13.25, 20.0, and 24.0 gal.

If pumped, pumping rate:

Continuous Recharge: no

NOTES: 2/5/02, temps in low 30's, sunny

2/6/02, temps in low 40's, cloudy

Sampler's Signature Dusty Reedy

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ENGINEERING, INC.

# LOG OF BORING P-20



Coble's Sandrock
C&D Permit Modification
Alamance County, NC

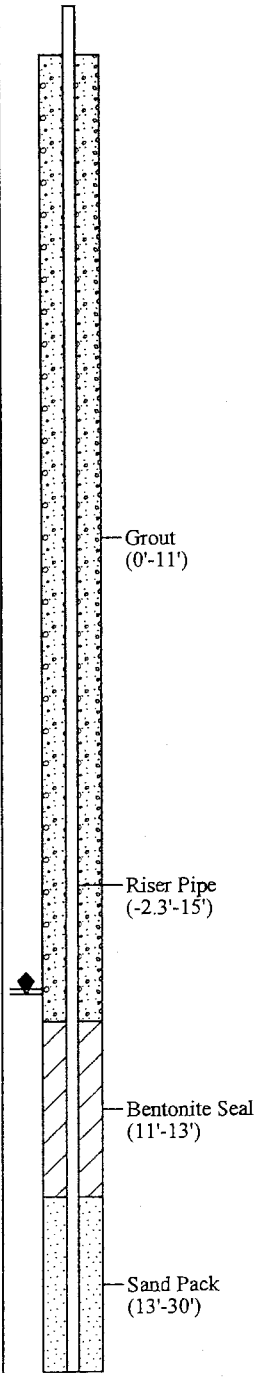
JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/29/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/29/02 | Northing Coord. | : 800650.073 |
| Hole Diameter | : 6.25-inch | Easting Coord. | : 1843430.852 |
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

Surf. Elev. 638.81

| Depth in Feet | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|
| 0 | 1 | | TS | TOPSOIL - light brown, organics |
| 1 (638) | 4, 9, 10 | 60 | SM | SILTY SAND - orange/tan with some clays, becomes very coarse at ~2 ft with pebble sized quartz grains, iron staining in coarse zones |
| 2 (637) | | | | |
| 3 (636) | | | | |
| 4 (635) | | | | |
| 5 (634) | 8, 9, 7, 11 | 85 | | Strong granitic texture, coarse grained silty sand with white quartz crystals with green weathered micas, moist |
| 6 (633) | | | | |
| 7 (632) | | | | |
| 8 (631) | | | | |
| 9 (630) | | | | |
| 10 (629) | 16, 20, 22, 14 | 75 | | Tan medium grained silty sand with some clay, some dark iron staining present |
| 11 (628) | | | | |
| 12 (627) | | | | |
| 13 (626) | | | | |
| 14 (625) | | | | |
| 15 (624) | | | | |

Well: P-20
TOC Elev.: 641.11




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/29/02 |
| Hole Diameter(s) | : 6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.30-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 2.25-inch ID hollow stem augers to auger refusal at approximately 30 feet.

2. Solid triangle represents water level at time of drilling (26.40 feet below TOC). Solid square represents water level ~24 hours afterwell construction (12.93 feet below TOC). Open triangle represents water level 7 days after well construction (12.99 feet below TOC).

JOYCE ENGINEERING, INC.

# LOG OF BORING P-20



Coble's Sandrock
C&D Permit Modification
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/29/02 | Drilling Company | : Bedford Well Drilling, Inc. |
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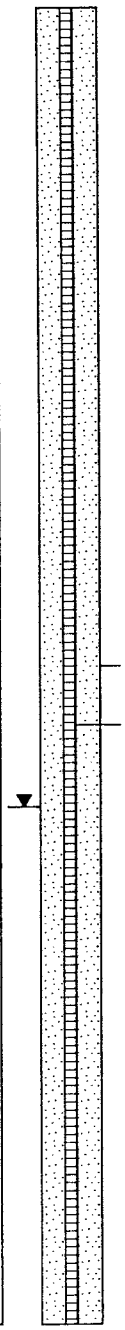
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

Well: P-20
TOC Elev.: 641.11

| Depth in Feet | Surf. Elev. 638.81 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 15 | | 9 | 75 | SM | Tan/brown/white, strong granitic texture, silty sand with coarse grained quartz grains, moist |
| | 623 | 15 | | | |
| 16 | | 17 | | | |
| | 622 | 17 | | | |
| 17 | | | | | |
| | 621 | | | | |
| 18 | | | | | |
| | 620 | | | | |
| 19 | | | | | |
| | 619 | | | | |
| 20 | | 21 | | | |
| | 618 | 38 | 65 | | |
| 21 | | 50/ | | | PARTIALLY WEATHERED ROCK - white/orange/black, coarse grained sandy silt, stong granitic texture, prominant iron staining |
| | 617 | 5.5 | | | |
| 22 | | | | | |
| | 616 | | | | Cuttings become very moist at 23 ft |
| 23 | | | | | |
| | 615 | | | | |
| 24 | | | | | |
| | 614 | | | | Becomes white with orange iron staining, very coarse grained with quartz and feldspar grains, moisture on large grains |
| 25 | | 43 | 50 | PWR | |
| | 613 | 50/5 | | | |
| 26 | | | | | |
| | 612 | | | | |
| 27 | | | | | |
| | 611 | | | | |
| 28 | | | | | Cuttings become saturated at 29 ft tan silty sand with clay, coarse grained quartz mixed in, saturated |
| | 610 | | | | |
| 29 | | | | | |
| | 609 | 50/2 | 25 | | *Auger refusal at 30 ft* |
| 30 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/29/02 |
| Hole Diameter(s) | : 6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.30-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 2.25-inch ID hollow stem augers to auger refusal at approximately 30 feet.

2. Solid triangle represents water level at time of drilling (26.40 feet below TOC). Solid square represents water level ~24 hours afterwell construction (12.93 feet below TOC). Open triangle represents water level 7 days after well construction (12.99 feet below TOC).

P-20

COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael P. Monaghan CERTIFICATION # 2842

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # (540- 586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer Installed

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Road 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock
Address 5833 Foster Store Rd.
(Street or Route No.)
Eden NC 27298
City or Town State Zip Code
(336- 565-4750
Area code- Phone number

4. DATE DRILLED 01/17/02
5. TOTAL DEPTH: 30'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

| DEPTH From | DEPTH To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 20 | Silty Sand |
| 20 | 30 | Partially weathered Rock |

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

| | Depth From | Depth To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | +2.5 | 15 | 2" | Sch 40 | PVC |
| | | | | | |
| | | | | | |

13. GROUT:

| | Depth From | Depth To | Material | Method |
|---|---|---|---|---|
| | 0 | 11 | Bent./Cement | Poured |
| | 11 | 13 | Bent. Chips | Poured |

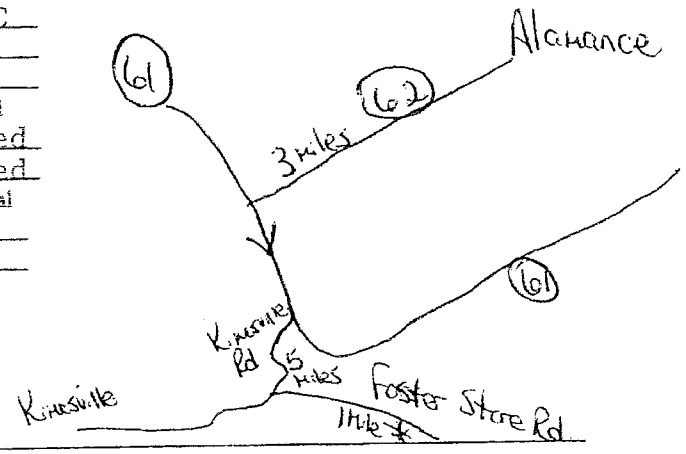
14. SCREEN:

| | Depth From | Depth To | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| | 15 | 30 | 2 in. | .010 in. | PVC |
| | | | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth From | Depth To | Size | Material |
|---|---|---|---|---|
| | 13 | 30 | #1 | Sand |
| | | | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: P-20

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Patrick Monaghan 1/17/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

ENGINEERING, INC.

# LOG OF BORING P-21



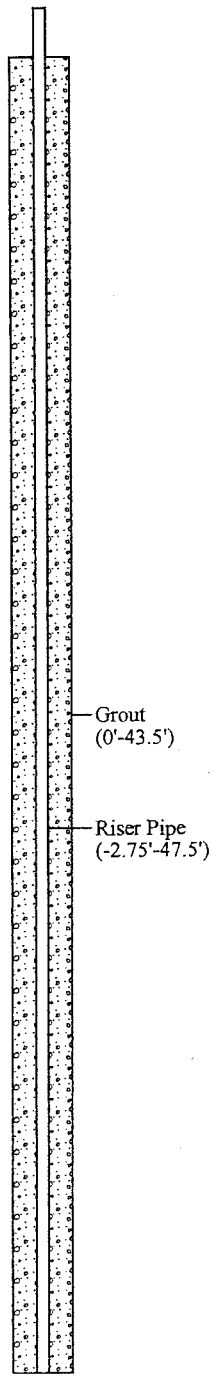
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/17/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/30/02 | Northing Coord. | : 800451.154 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843731.694 |
| Drilling Method | : HSA/Tricone/Core/Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Core/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 665.67 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | | |
| 1 | 665 | 1 2 2 5 | 40 | | TOPSOIL- brown with organics |
| 2 | 664 | | | SC | SANDY CLAY - reddish orange, fine grained sand, no structure, moist |
| 3 | 663 | | | | |
| 4 | 662 | | | | |
| 5 | 661 | | | | |
| 6 | 660 | 13 17 27 50/5.5 | 70 | CH | FAT CLAY - red, rather dry |
| 7 | 659 | | | PWR | PARTIALLY WEATHERED ROCK - red silty clay, dry |
| 8 | 658 | | | | |
| 9 | 657 | | | | |
| 10 | 656 | | | | |
| 11 | 655 | 12 17 50/5.5 | 85 | | White silty sand, contains come clay, changes abruptly, contact in spoon at ~80 degree angle |
| 12 | 654 | | | | Hit hard material at 12 ft, < ft thick |
| 13 | 653 | | | | |
| 14 | 652 | | | | |
| 15 | 651 | | | | Changes to an orange sandy silt, dryer, very hard to drill through |
| 16 | 650 | 12 50/2 | 35 | | |
| 17 | 649 | | | | |
| 18 | 648 | | | | |
| 19 | 647 | | | | |
| 20 | 646 | | | | Orange sandy silt with some clays, rather dry |
| 21 | 645 | 50/5.5 | 30 | | |
| 22 | 644 | | | | *Auger refusal at 23 ft, use tricone bit .i.to* advance |
| 23 | 643 | | | | |
| 24 | 642 | 50/5 | 30 | BR | BEDROCK - orange, hard to drill through, but not solid |
| 25 | 641 | | | | |
| 26 | 640 | | | | |
| 27 | 639 | | | | |
| 28 | 638 | | | | |
| 29 | 637 | | | | Becomes harder at 29 ft, cuttings become lighter in color, tan |
| 30 | 636 | | | | |
| 31 | 635 | | | | |
| 32 | 634 | | | | |

Well: P-21
TOC Elev.: 668.42




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/30/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : HSA/Tricone/Core |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.75-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to auger refusal. Six feet of rock core was obtained using an NQ wire-line rock coring device on an Ingersoll/Rand A-300 rig. Borehole was overdrilled with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 62.5 feet.

2. Solid triangle represents water level at time of drilling (64.56 feet below TOC). Solid square represents water level ~24 hours after well construction (48.50 feet below TOC). Open triangle represents water level 6 days after well construction (48.43 feet below TOC). Dry cuttings were observed with air rotary drilling from 23-62.5 feet.

3. Penetration rate during rock coring was 0.5 ft/195 sec from 44-46 feet; 0.5 ft/165 sec from 46-48 feet; and 0.5 ft/60 sec from 48-50 feet.

JOYCE ENGINEERING, INC.

# LOG OF BORING P-21



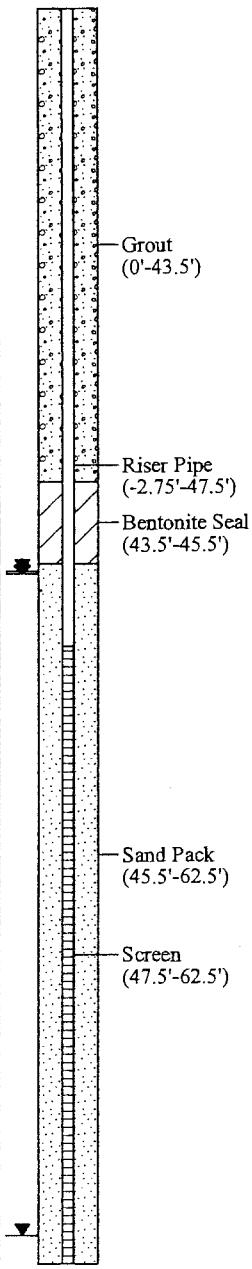
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/17/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/30/02 | Northing Coord. | : 800451.154 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843731.694 |
| Drilling Method | : HSA/Tricone/Core/Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Core/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 665.67 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 32 | | | | | Cuttings begin to look more like weathered rock |
| 33 | 633 | | | | Becomes softer at 33 ft |
| 34 | 632 | | | | |
| 35 | 631 | | | | |
| 36 | 630 | | | | |
| 37 | 629 | | | | |
| 38 | 628 | | | | |
| 39 | 627 | | | | |
| 40 | 626 | | | | |
| 41 | 625 | | | | Still in weathered rock, not very hard, does not seem competant |
| 42 | 624 | | | | Hit possible water bearing fracture at 42 ft |
| 43 | 623 | | | | |
| 44 | 622 | | | | Core: 44-50 ft; Rec = 82%; RQD = 38%; could not add down pressure to rig without stopping up the core barrell; soft, highly weathered, tan, fine to medium grained granite, highly fractured with a lot of iron and magnesium staining |
| 45 | 621 | | | | |
| 46 | 620 | | | | |
| 47 | 619 | | | BR | |
| 48 | 618 | | | | |
| 49 | 617 | | | | |
| 50 | 616 | | | | |
| 51 | 615 | | | | |
| 52 | 614 | | | | |
| 53 | 613 | | | | |
| 54 | 612 | | | | |
| 55 | 611 | | | | Cuttings change to lighter tan |
| 56 | 610 | | | | |
| 57 | 609 | | | | |
| 58 | 608 | | | | |
| 59 | 607 | | | | |
| 60 | 606 | | | | |
| 61 | 605 | | | | |
| 62 | 604 | | | | Terminated boring at 62.5 feet |
| 63 | 603 | | | | |
| 64 | 602 | | | | |

Well: P-21
TOC Elev.: 668.42




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/30/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : HSA/Tricone/Core |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.75-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to auger refusal. Six feet of rock core was obtained using an NQ wire-line rock coring device on an Ingersoll/Rand A-300 rig. Borehole was overdrilled with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 62.5 feet.

2. Solid triangle represents water level at time of drilling (64.56 feet below TOC). Solid square represents water level ~24 hours after well construction (48.50 feet below TOC). Open triangle represents water level 6 days after well construction (48.43 feet below TOC). Dry cuttings were observed with air rotary drilling from 23-62.5 feet.

3. Penetration rate during rock coring was 0.5 ft/195 sec from 44-46 feet; 0.5 ft/165 sec from 46-48 feet; and 0.5 ft/60 sec from 48-50 feet.

P-21

COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael F. Monaghan CERTIFICATION # 2895

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # (540) 586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Road 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock
Address 5833 Foster Store Road
(Street or Route No.)
Liberty NC 27298
City or Town State Zip Code
(336) 565-4750
Area code- Phone number

4. DATE DRILLED 01/16/02
5. TOTAL DEPTH: 62'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

DRILLING LOG

| DEPTH From | DEPTH To | Formation Description |
|---|---|---|
| 0 | 10 | Silt |
| | | Clay |
| | | Saprolite |
| 10 | 29 | Silty Sand / Saprolite |
| 29 | 54 | Partially Weathered Rock |
| 54 | 62 | Granite Bedrock |

11. DISINFECTION: Type N/A Amount N/A

12. CASING:

| | Depth From | Depth To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | +2.5 | 47 | 2" | Sch 40 | PVC |
| | | | | | |
| | | | | | |

13. GROUT:

| Depth From | Depth To | Material | Method |
|---|---|---|---|
| 0 | 43 | Bent/Cement | Poured |
| 43 | 45 | Bent Chips | Poured |

14. SCREEN:

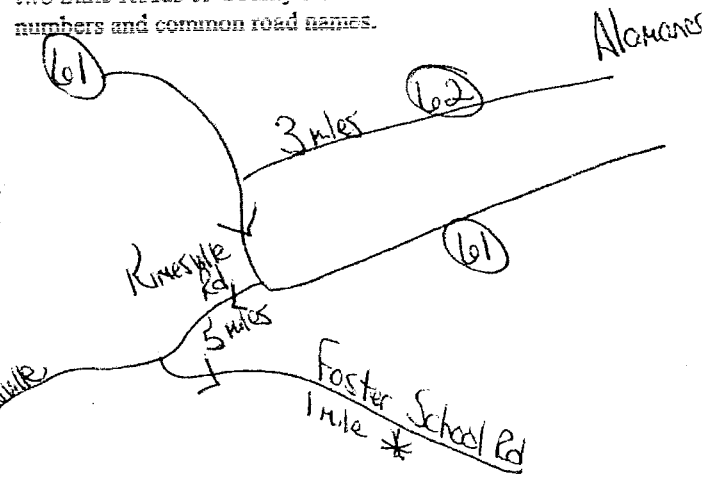
| Depth From | Depth To | Diameter | Slot Size | Material |
|---|---|---|---|---|
| 47 | 62 | 2 in. | .010 in. | PVC |
| | | in. | in. | |

15. SAND/GRAVEL PACK:

| Depth From | Depth To | Size | Material |
|---|---|---|---|
| 45 | 62 | #1 | Sand |
| | | | |

LOCATION SKETCH

Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: P-21

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Michael F. Monaghan 1/16/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

ENGINEERING, INC.

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: 419.06 Date: 2/5/02 – 2/6/02

Casing Type: Schedule 40 PVC

Well/Boring Number: P-21

Casing Diameter (Dr): 2"

Screened Interval: 47.5-62.5

Riser Elevation:

Total Well Depth (Lw): 62.5

Depth to Water (Lf): 48.43

Time of Measurement: 0849

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf) =\ 9.82' = 17.17 = 2.80$ gal

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp ( C) | pH | Conductivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 6.6 | 7.21 | 113.9 | clear | 0 | 48.43 | 0911 |
| After Purging | 14.7 | 6.08 | 138.7 | cloudy | 34.80 | 59.22 | 1526 |
| 1 Well Vol 2/5/02 | 9.0 | 7.10 | 133.3 | clear | 2.80 | | 0917 |
| 2 Well Vol | 7.5 | 6.96 | 123.2 | clear | 5.60 | 53.15 | 0928 |
| 3 Well Vol | 13.1 | 6.72 | 145.3 | brown >1000 | 8.20 | 56.76 | 0948 |
| 3.5 Well Vol | 13.6 | 6.25 | 145.1 | >1000 | 10.00 | dry | 0955 |
| 3.5 Well Vol | 14.1 | 6.35 | 143.2 | clear | 10.00 | 48.40 | 1750 |
| 5.5 Well Vol | 14.3 | 6.33 | 141.1 | >1000 | 15.60 | 56.55 | 1807 |
| 7.5 Well Vol | | | | >1000 | 21.20 | dry | 1819 |
| 7.5 Well Vol 2/6/02 | 12.1 | 6.95 | 135.7 | cloudy | 21.20 | | 1047 |
| 10.5 Well Vol | 13.1 | 6.78 | 133.5 | cloudy | 29.20 | 60.35 | 1104 |
| 10.5 Well Vol | 13.4 | 7.28 | 137.9 | clear | 29.20 | 48.72 | 1506 |
| 11.5 Well Vol | 14.8 | 6.21 | 138.3 | slightly cloudy | 32.00 | | 1515 |
| 12.5 Well Vol | 14.7 | 6.08 | 138.7 | red cloudy | 34.80 | 59.22 | 1526 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (pump and bailer) If pumped, pumping rate:

Well Purged Dry @ 10.0 and 21.2 gal. Continuous Recharge: no

Sampler's Signature

G:\DataShared\Administration\Team 12\blank dev form.doc

ENGINEERING, INC.

# LOG OF BORING P-22



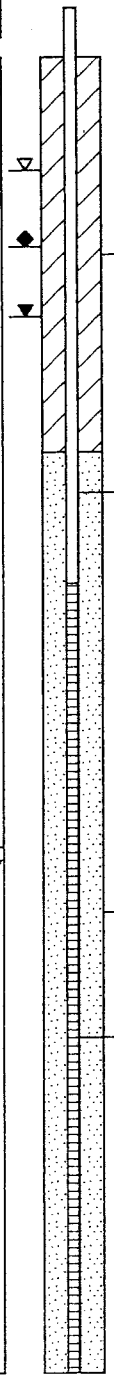
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/17/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/17/02 | Northing Coord. | : 800107.753 |
| Hole Diameter | : 8.25-inch | Easting Coord. | : 1843920.412 |
| Drilling Method | : Hollow Stem Augers | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 627.9 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | 1, 1 | 70 | TS | TOPSOIL- Dark brown with organics |
| 1 | 627 | 2, 2 | | SM | SILTY SAND - tan/yellow, contains minimal clay, fine to medium-grained quartz grains, very wet |
| 2 | 626 | | | | |
| 3 | 625 | | | | |
| 4 | 624 | | | | |
| 5 | 623 | 10 | | | Yellowish silty sand with granitic texture, dry |
| 6 | 622 | 50, 50/4 | 60 | PWR | PARTIALLY WEATHERED ROCK - silty sand with granitic texture |
| 7 | 621 | | | | |
| 8 | 620 | | | | Some course-grained quartz fragments present at 10 feet, dry |
| 9 | 619 | 50/4 | 35 | | *Auger refusal at 10 feet* |
| 10 | 618 | | | | |

Well: P-22
TOC Elev.: 629.90




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/17/02 |
| Hole Diameter(s) | : 8.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.0-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to auger refusal.

2. Solid triangle represents water level at time of drilling (3.97 feet below TOC). Solid square represents water level ~24 hours after well construction (3.44 feet below TOC). Open triangle represents water level 7 days after well construction (2.86 feet below TOC).

P-22

COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael P. Monaghan CERTIFICATION # 2842

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # (540)-586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Rd. 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock
Address 5833 Foster Store Road
(Street or Route No.)
Eden NC 27298
City or Town State Zip Code
(336)- 565-4750
Area code- Phone number

4. DATE DRILLED 01/29/02
5. TOTAL DEPTH: 10'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

| DEPTH From | DEPTH To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 10 | Silty Sand |
| | | Saprolite |

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

| | Depth From | Depth To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | +2.5 | 4 | 2" | Sch 40 | PVC |
| | | | | | |
| | | | | | |

13. GROUT:

| | Depth From | Depth To | Material | Method |
|---|---|---|---|---|
| | 0 | 2 | Bentonite | Poured |
| | | | | |

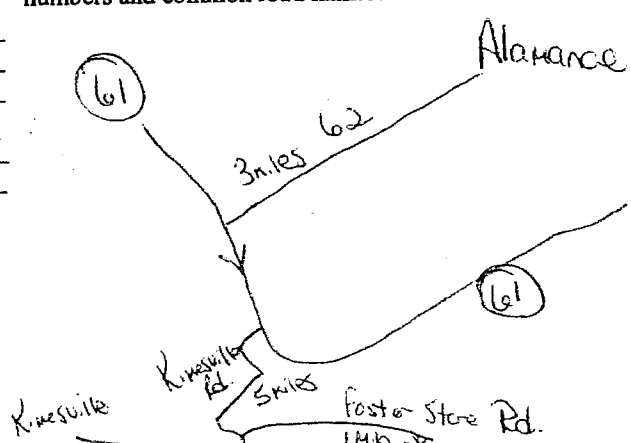
14. SCREEN:

| | Depth From | Depth To | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| | 4 | 10 | 2 in. | .010 in. | PVC |
| | | | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth From | Depth To | Size | Material |
|---|---|---|---|---|
| | 2 | 10 | #1 | Sand |
| | | | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: P-22

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Patrick Monaghan 01/29/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.**

GW-1 REV. 07/2001

ENGINEERING, INC

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: 419.06 Date: 2/5/02 – 2/6/02

Casing Type: Schedule 40 PVC

Well/Boring Number: P-22

Casing Diameter (Dr): 2"

Screened Interval: 6.2-12.2

Riser Elevation:

Total Well Depth (Lw): 12.2

Depth to Water (Lf): 3.18

Time of Measurement: 0815

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf) = 9.02 = 1.47$ gal

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp ( C) | pH | Conductivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 7.4 | 7.44 | 258.0 | clear | 0 | 3.18 | 8.23 |
| After Purging | 10.0 | 6.73 | 252.0 | >1000 tan | 9.72 | dry | 1433 |
| 1 Well Vol 2/5/02 | 7.6 | 7.07 | 255.0 | >1000 | 1.5 | dry | 0835 |
| 1 Well Vol | 8.4 | 7.60 | 257.0 | clear | 1.5 | 3.41 | 1727 |
| 1.8 Well Vol | 9.6 | 7.13 | 256.0 | >1000 | 2.6 | 7.10 | 1732 |
| 3.4 Well Vol | 9.5 | 6.38 | 249.0 | >1000 | 5.0 | dry | 17.8 |
| 3.4 Well Vol 2/6/02 | 8.1 | 7.37 | 250.0 | clear | 5.0 | 3.54 | 1026 |
| 5.1 Well Vol | 8.9 | 7.14 | 255.0 | >1000 | 7.5 | dry | 1031 |
| 5.1 Well Vol | 9.5 | 6.96 | 256.0 | clear | 7.5 | 4.48 | 1428 |
| 5.9 Well Vol | 10.0 | 6.82 | 258.0 | >1000 | 8.61 | 8.42 | 1431 |
| 6.6 Well Vol | 10.0 | 6.73 | 252.0 | >1000 | 9.72 | dry | 1433 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer) If pumped, pumping rate:

Well Purged Dry @ 1.5, 5.0, 7.5, and 9.72 gal. Continuous Recharge: no

NOTES: 2/5/02, temp in mid 20's, sunny 2/6/02, temp in mid 40's, cloudy

Sampler's Signature

G:\DataShared\Administration\Team 12\blank dev form.doc

ENGINEERING, INC.

# LOG OF BORING P-23



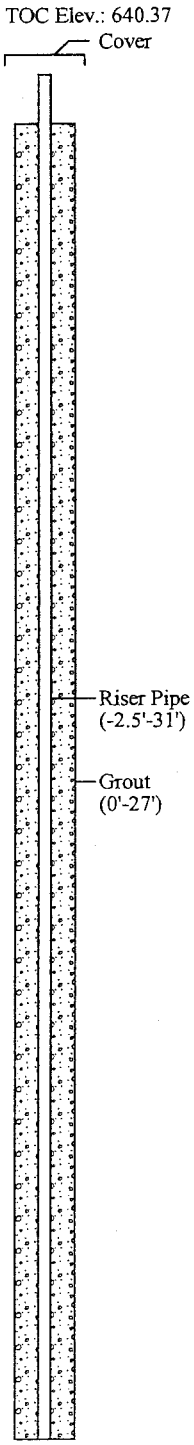
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/16/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/17/02 | Northing Coord. | : 800001.018 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843472.682 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 637.87 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | 2 5 7 10 | 65 | SM | SANDY SILT - reddish orange, quartz grains visible, moist |
| 1 | 637 | | | | |
| 2 | 636 | | | | |
| 3 | 635 | | | | |
| 4 | 634 | | | | |
| 5 | 633 | 6 9 10 11 | 85 | | Tan/orange, faint granitic texture, becoming coarser with depth, slightly moist |
| 6 | 632 | | | | |
| 7 | 631 | | | | |
| 8 | 630 | | | | |
| 9 | 629 | | | | |
| 10 | 628 | 6 6 8 24 | 50 | | Color change to white/orange, higher clay concentration, faint granitic texture, slightly moist |
| 11 | 627 | | | | |
| 12 | 626 | | | | Weathered rock chips in cuttings |
| 13 | 625 | | | | |
| 14 | 624 | | | | |
| 15 | 623 | 6 11 10 9 | 70 | SM | SILTY SAND - fine-grained silty sand with quartz and feldspar grains |
| 16 | 622 | | | | |
| 17 | 621 | | | | Strong granitic texture at 17 feet |
| 18 | 620 | | | | |
| 19 | 619 | | | | |
| 20 | 618 | 17 32 33 25 | 70 | | Fine-grained silty sand, white granitic appearance, coarse-grained quartz grains present, moist at 22 feet |
| 21 | 617 | | | | |

Well: P-23
TOC Elev.: 640.37




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/17/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.50-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to auger refusal. Borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 41.0 feet.

2. Solid triangle represents water level at time of drilling (35.71 feet below TOC). Solid square represents water level ~24 hours after well construction (31.04 feet below TOC). Open triangle represents water level 7 days after well construction (30.60 feet below TOC). Dry cuttings were observed with air rotary drilling from 27-41 feet.

JOYCE ENGINEERING, INC.

# LOG OF BORING P-23



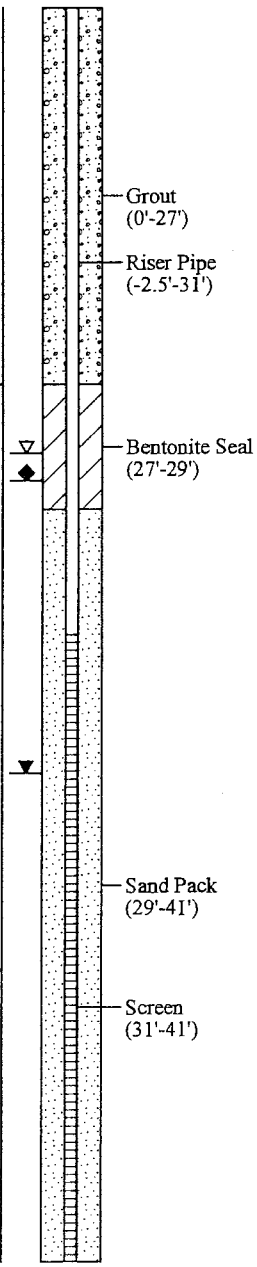
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 06

| | | | |
|---|---|---|---|
| Date Started | : 01/16/02 | Drilling Company | : Bedford Well Drilling, Inc. |
| Date Completed | : 01/17/02 | Northing Coord. | : 800001.018 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843472.682 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 637.87 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 21 | | 17 32 33 25 | 70 | SM | Coarsening to a medium-grained silty sand, much sandier, more prominent granitic texture, slightly moist |
| 22 | 616 | | | | |
| 23 | 615 | | | | |
| 24 | 614 | | | | |
| 25 | 613 | 12 24 37 31 | 85 | | |
| 26 | 612 | | | | *Auger refusal at 27 feet* |
| 27 | 611 | | | BR | BEDROCK - hard weathered rock, yellow cuttings |
| 28 | 610 | | | | |
| 29 | 609 | | | | |
| 30 | 608 | | | | |
| 31 | 607 | | | | |
| 32 | 606 | | | | |
| 33 | 605 | | | | |
| 34 | 604 | | | | |
| 35 | 603 | | | | |
| 36 | 602 | | | | |
| 37 | 601 | | | | |
| 38 | 600 | | | | |
| 39 | 599 | | | | |
| 40 | 598 | | | | |
| 41 | 597 | | | | Drilling terminated at 41 feet |
| 42 | 596 | | | | |

Well: P-23
TOC Elev.: 640.37




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 01/17/02 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Patrick Monaghan |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Mike Monaghan |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.50-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : 4" X 4" Alum., locking |

WELL PAD

| | |
|---|---|
| Type | : 3' X 3' X 6" Concrete |

1. Drilling performed with an Ingersoll/Rand A-300 utilizing 4.25-inch ID hollow stem augers to auger refusal. Borehole was continued with an Ingersoll/Rand T-3 air rig utilizing a 6-inch hammer to approximately 41.0 feet.

2. Solid triangle represents water level at time of drilling (35.71 feet below TOC). Solid square represents water level ~24 hours after well construction (31.04 feet below TOC). Open triangle represents water level 7 days after well construction (30.60 feet below TOC). Dry cuttings were observed with air rotary drilling from 27-41 feet.

P-23

COPY

# WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Michael F. Monaghan CERTIFICATION # 2895

WELL CONTRACTOR COMPANY NAME Bedford Well Drilling, Inc. PHONE # (540-586-1449

STATE WELL CONSTRUCTION PERMIT# 1192 (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☒ If Other, List Use Pizometer Installed

2. WELL LOCATION:
Nearest Town: Liberty County Alamance
5833 Foster Store Road 27298
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock
Address 5833 Foster Store Rd.
(Street or Route No.)
Liberty NC 27298
City or Town State Zip Code
(336) 565-4750
Area code- Phone number

4. DATE DRILLED 01/18/02
5. TOTAL DEPTH: 41'
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A

| DEPTH From | To | DRILLING LOG Formation Description |
|---|---|---|
| 0 | 27 | Sandy Silt |
| | | Saprolite |
| 27 | 41 | Partially |
| | | Weathered |
| | | Rock |

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

| | Depth | | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| From +2.5 | To 31 | Ft. | 2" | Sch 40 | PVC |
| From | To | Ft. | | | |
| From | To | Ft. | | | |

13. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 29 | Ft. | Bent/Cement | Poured |
| From 29 | To 31 | Ft. | Bent. Chips | Poured |

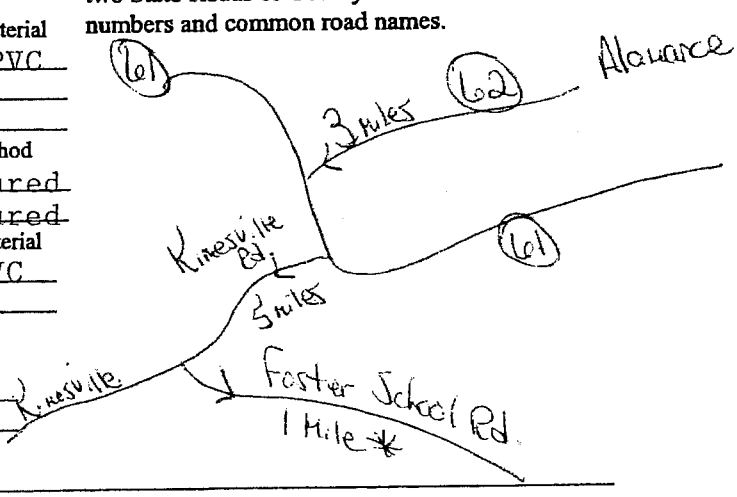
14. SCREEN:

| | Depth | | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| From 31 | To 41 | Ft. | 2 in. | .010 in. | PVC |
| From | To | Ft. | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 29 | To 41 | Ft. | #1 | Sand |
| From | To | Ft. | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.




16. REMARKS: P-23

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Michael F. Monaghan 1/18/02
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

ENGINEERING, INC.

# LOG OF BORING P-24



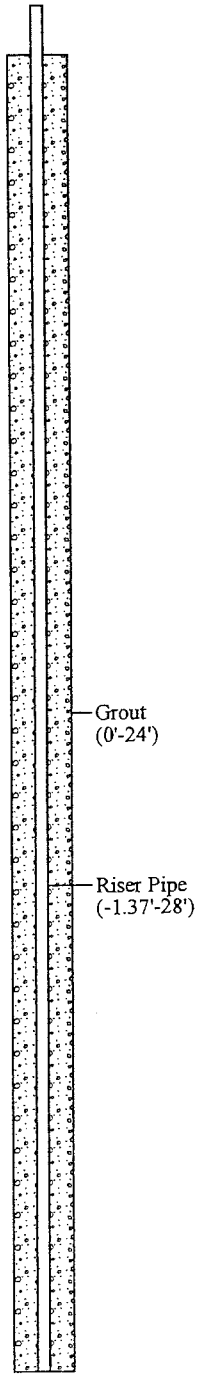
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/22/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/24/05 | Northing Coord. | : 801640.1465480 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843019.3592300 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

Well: P-24
Elev.: 613.89

| Depth in Feet | Surf. Elev. 612.52 | Blow Count | | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 612 | | | | SILTY SAND - dark gray clayey sand |
| 1 | 611 | | | | |
| 2 | 610 | | | | Color changes to tan |
| 3 | 609 | | | | |
| 4 | 608 | | | | |
| 5 | 607 | 6 | | | |
| 6 | 606 | 11 10 13 | 85 | | |
| 7 | 605 | | | | |
| 8 | 604 | | | SM | |
| 9 | 603 | | | | |
| 10 | 602 | 6 | | | Orange and white clayey sand with thin zones of green silt (1 to 2 inches thick) |
| 11 | 601 | 6 7 8 | 85 | | |
| 12 | 600 | | | | |
| 13 | 599 | | | | |
| 14 | 598 | | | | |
| 15 | 597 | 17 | | | White clayey sand with abundant quartz pebbles and iron staining, dry |
| 16 | 596 | 22 27 50/3 | 85 | | |
| 17 | 595 | | | PWR | PARTIALLY WEATHERED ROCK - white clayey sand with abundant quartz pebbles<br>*Auger refusal at 18 feet* |
| 18 | 594 | | | BR | BEDROCK - light tan weathered granitic cuttings, coarse sand to small pebble size cuttings |
| 19 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/24/05 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 1.37-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers to auger refusal. Boring was continued utilizing 6.25-inch downhole hammer.

2. Solid triangle represents water level at time of drilling (26.76 feet below TOC). Open triangle represents water level ~24 hours after well construction (26.44 feet below TOC). Solid square represents water level 11 days after well construction (26.04 feet below TOC).

ENGINEERING, INC.

# LOG OF BORING P-24



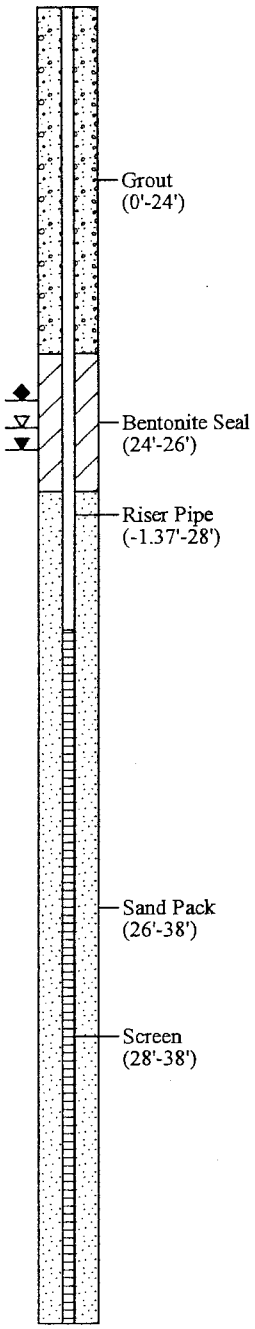
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/22/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/24/05 | Northing Coord. | : 801640.1465480 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843019.3592300 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 612.52 | Blow Count | | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 19 | | | | | |
| | 593 | | | | |
| 20 | | | | | |
| | 592 | | | | |
| 21 | | | | | |
| | 591 | | | | |
| 22 | | | | | |
| | 590 | | | | |
| 23 | | | | | |
| | 589 | | | | |
| 24 | | | | | |
| | 588 | | | | |
| 25 | | | | | |
| | 587 | | | | |
| 26 | | | | | Becomes more competent at 26 feet |
| | 586 | | | | |
| 27 | | | | | |
| | 585 | | | | |
| 28 | | | | | |
| | 584 | | | BR | |
| 29 | | | | | |
| | 583 | | | | |
| 30 | | | | | Water bearing rock encountered at 30 feet |
| | 582 | | | | |
| 31 | | | | | |
| | 581 | | | | |
| 32 | | | | | Wet cuttings at 32 feet, cuttings consist of quartz, feldspar, and hornblend grains |
| | 580 | | | | |
| 33 | | | | | |
| | 579 | | | | |
| 34 | | | | | |
| | 578 | | | | |
| 35 | | | | | |
| | 577 | | | | |
| 36 | | | | | |
| | 576 | | | | |
| 37 | | | | | |
| | 575 | | | | Terminated boring at 38 feet |
| 38 | | | | | |

Well: P-24
Elev.: 613.89




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/24/05 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 1.37-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers to auger refusal. Boring was continued utilizing 6.25-inch downhole hammer.

2. Solid triangle represents water level at time of drilling (26.76 feet below TOC). Open triangle represents water level ~24 hours after well construction (26.44 feet below TOC). Solid square represents water level 11 days after well construction (26.04 feet below TOC).

P-24

# WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources - Division of Water Quality

**WELL CONTRACTOR (INDIVIDUAL) NAME (print)** Robert Miller **CERTIFICATION #** 2675

**WELL CONTRACTOR COMPANY NAME** SAEDACCO **PHONE #** (803) 548-2180

**STATE WELL CONSTRUCTION PERMIT#** _____ (if applicable) **ASSOCIATED WQ PERMIT#** _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
   Nearest Town: Kimesville County Alamance
   _____
   (Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock C & D Lanfill
   Address Foster STore Road
   (Street or Route No.)
   Kimesville NC
   City or Town State Zip Code
   (803)- _____
   Area code- Phone number
4. DATE DRILLED March 24, 2005
5. TOTAL DEPTH: 38 Feet
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☐
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS _____ FT. Above Land Surface*
   ***Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.**
9. YIELD (gpm): _____ METHOD OF TEST _____
10. WATER ZONES (depth): _____
11. DISINFECTION: Type _____ Amount _____
12. CASING:

| | Depth | | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| From 0 | To 28 | Ft. | 2 inch | Sch 40 | PVC |
| From | To | Ft. | | | |
| From | To | Ft. | | | |

13. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 24 | Ft. | Portland Cement | Tremie |
| From 24 | To 26 | Ft. | Bentonite Chips | Pour |

14. SCREEN:

| | Depth | | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| From 28 | To 38 | Ft. | 2 in. | .010 in. | PVC |
| From | To | Ft. | in. | in. | |

15. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 26 | To 38 | Ft. | # 1 | Sand |
| From | To | Ft. | | |

| DEPTH From | DEPTH To | DRILLING LOG Formation Description |
|---|---|---|
| | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.

16. REMARKS: _____

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Robert L. Mi

SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Attn: Information Management, 1617 Mail Service Center - Raleigh, NC 27699-1617, Phone No. (919) 733-7015, within 30 days.**

GW-1 REV. 09/2004

JOYCE ENGINEERING, INC.

# LOG OF BORING P-25



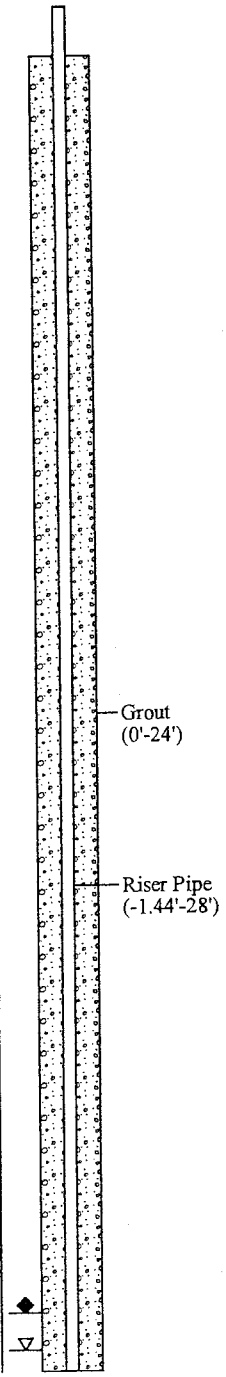
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/22/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/24/05 | Northing Coord. | : 801851.9868760 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843307.8001000 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 616.37 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 616 | | | SM | SILTY SAND - orange/tan silty sand with pebble size rock fragments |
| 1 | 615 | | | | |
| 2 | 614 | | | | |
| 3 | 613 | | | | |
| 4 | 612 | | | | |
| 5 | 611 | 4 | | ML | SILT - grayish tan silt, dry |
| | | 12 | 95 | | |
| 6 | 610 | 50/6 | | PWR | PARTIALLY WEATHERED ROCK - white silty gravel with weathered quartz and mica |
| 7 | 609 | | | | |
| 8 | 608 | | | | |
| 9 | 607 | | | | |
| 10 | 606 | 50/6 | 15 | | |
| 11 | 605 | | | | Moist cuttings at 11 feet |
| 12 | 604 | | | | |
| 13 | 603 | | | | *Auger refusal at 14 feet* |
| 14 | 602 | 50/0 | 0 | BR | BEDROCK - orange and tan, very weathered material |
| 15 | 601 | | | | |
| 16 | 600 | | | | Hammer fires for the first time at 16 feet indicating competent rock, coarse sand size quartz and feldspar cuttings |
| 17 | 599 | | | | |
| 18 | 598 | | | | |
| 19 | | | | | White silt size cuttings by 19 feet |

Well: P-25
Elev.: 617.81




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/24/05 |
| Hole Diameter(s) | : 6.25-inch/8.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 1.44-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers to auger refusal. Boring was continued utilizing 6.25-inch downhole hammer.

2. Solid triangle represents water level at time of drilling (20.70 feet below TOC). Open triangle represents water level ~24 hours after well construction (20.13 feet below TOC). Solid square represents water level 11 days after well construction (19.59 feet below TOC).

ENGINEERING, INC.

# LOG OF BORING P-25



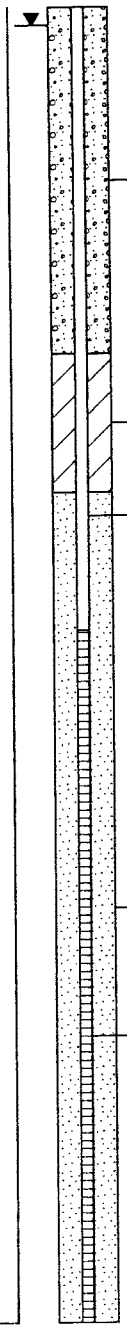
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/22/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/24/05 | Northing Coord. | : 801851.9868760 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843307.8001000 |
| Drilling Method | : HSA/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : David Y. Reedy II |

Well: P-25
Elev.: 617.81

| Depth in Feet | Surf. Elev. 616.37 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 19 | 597 | | | | |
| 20 | 596 | | | | |
| 21 | 595 | | | | |
| 22 | 594 | | | | |
| 23 | 593 | | | | Small pebble size cuttings of quartz, feldspar, and hornblend at 23 feet |
| 24 | 592 | | | | |
| 25 | 591 | | | | |
| 26 | 590 | | | | |
| 27 | 589 | | | | |
| 28 | 588 | | | BR | |
| 29 | 587 | | | | |
| 30 | 586 | | | | Possible small fracture at 30 feet, based on reduction of dust and tan colored cuttings |
| 31 | 585 | | | | |
| 32 | 584 | | | | Possible water bearing fracture at 32 feet based on drilling response and reduction of dust |
| 33 | 583 | | | | |
| 34 | 582 | | | | |
| 35 | 581 | | | | |
| 36 | 580 | | | | |
| 37 | 579 | | | | Terminated boring at 38 feet |
| 38 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/24/05 |
| Hole Diameter(s) | : 6.25-inch/8.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 1.44-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers to auger refusal. Boring was continued utilizing 6.25-inch downhole hammer.

2. Solid triangle represents water level at time of drilling (20.70 feet below TOC). Open triangle represents water level ~24 hours after well construction (20.13 feet below TOC). Solid square represents water level 11 days after well construction (19.59 feet below TOC).

P-25

# WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources - Division of Water Quality

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Robert Miller CERTIFICATION # 2675

WELL CONTRACTOR COMPANY NAME SAEDACCO PHONE # (803) 548-2180

STATE WELL CONSTRUCTION PERMIT# _____ (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
Nearest Town: Kimesville County Alamance
_____
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock C & D Lanfill
Address Foster STore Road
(Street or Route No.)
Kimesville NC
City or Town State Zip Code
(803)- _____
Area code- Phone number

4. DATE DRILLED March 24, 2005
5. TOTAL DEPTH: 38 Feet
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☐
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS _____ FT. Above Land Surface*
***Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.**
9. YIELD (gpm): _____ METHOD OF TEST _____
10. WATER ZONES (depth): _____

| DEPTH From | DEPTH To | DRILLING LOG Formation Description |
|---|---|---|
| | | |

11. DISINFECTION: Type _____ Amount _____
12. CASING:

| | Depth | | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| From 0 | To 28 | Ft. | 2 inch | Sch 40 | PVC |
| From | To | Ft. | | | |
| From | To | Ft. | | | |

13. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 24 | Ft. | Portland Cement | Tremie |
| From 24 | To 26 | Ft. | Bentonite Chips | Pour |

14. SCREEN:

| | Depth | | Diameter | | Slot Size | | Material |
|---|---|---|---|---|---|---|---|
| From 28 | To 38 | Ft. | 2 | in. | .010 | in. | PVC |
| From | To | Ft. | | in. | | in. | |

15. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 26 | To 38 | Ft. | # 1 | Sand |
| From | To | Ft. | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.

16. REMARKS: _____

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Robert L. Miller
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Attn: Information Management, 1617 Mail Service Center - Raleigh, NC 27699-1617, Phone No. (919) 733-7015, within 30 days.**

GW-1 REV. 09/2004

ENGINEERING, INC.

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: Coble's Sandrock
Date: 09/13/05
Casing Type: PVC
Well/Boring Number P-25
Casing Diameter in inches (Dr): 2 inches
Screened Interval: 28-38 feet below TOC
Riser Elevation: 1.44
Total Well Depth (Lw) in feet: 38.00
Depth to Water (Lf) in feet: 22.80
Time of Measurement: 10:54

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw - Lf) =$ 2.5 Gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| **Before Development** | 17.4 | 6.60 | 1488 | 23.3 | 0.0 | 22.80 | 10:58 |
| **After Purging** | | | | | | | |
| **1 Well Vol** | 17.4 | 6.67 | 1556 | >1000 | 2.5 | — | 11:02 |
| **2 Well Vol** | 17.1 | 6.60 | 1530 | >1000 | 5.0 | 30.60 | — |
| **3 Well Vol** | 17.0 | 6.66 | 1504 | >1000 | 7.5 | — | 11:13 |
| **4 Well Vol** | 16.9 | 6.69 | 1499 | >1000 | 10.0 | 32.15 | 11:15 |
| **5 Well Vol** | 17.4 | 6.74 | 1487 | >1000 | 12.5 | — | 11:21 |
| **6 Well Vol** | 16.8 | 6.70 | 1465 | >1000 | 15.0 | 33.12 | 11:28 |
| **7 Well Vol** | 17.5 | 6.72 | 1469 | >1000 | 17.5 | — | 11:37 |
| **8 Well Vol** | 16.8 | 6.71 | 1472 | >1000 | 20.0 | 35.80 | 11:41 |
| **9 Well Vol** | 17.4 | 6.77 | 1432 | >1000 | 22.5 | — | 11:48 |
| **10 Well Vol** | 17.1 | 6.75 | 1445 | >1000 | 25.0 | 36.29 | 11:56 |

*(Fill in one or more of the above columns depending on available equipment)*

Method of purging (bailer or pump) Bailer
If pumped, pumping rate: _____
Well Purged Dry No
Continuous Recharge _____
Notes concerning condition of well, odors, color, etc.:
Cloudy, temps in low 80s

Developer's Signature Rusty Reedy

ENGINEERING, INC.

# MONITORING WELL DEVELOPMENT DATA SHEET

Project: Coble's Sandrock
Date: 09/13/05
Casing Type: PVC
Well/Boring Number P-25
Casing Diameter in inches (Dr): 2 inches
Screened Interval: 28-38 feet below TOC
Riser Elevation: 1.44
Total Well Depth (Lw) in feet: 38.00
Depth to Water (Lf) in feet: 22.80
Time of Measurement: 10:54

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw - Lf) =$ 2.5 Gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp ( C) | pH | Conductivity (µS/cm) | Clarity/ Color | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| **11 Well Vol** | 17.1 | 6.76 | 1415 | >1000 | 27.5 | — | 12:04 |
| **12 Well Vol** | 17.8 | 6.78 | 1460 | >1000 | 30.0 | 36.27 | 12:12 |
| **12 Well Vol** | 17.5 | 6.58 | 1519 | 250 | 30.0 | 23.95 | 14:16 |
| **13 Well Vol** | 17.4 | 6.67 | 1540 | >1000 | 32.5 | — | 14:22 |
| **14 Well Vol** | 17.4 | 6.70 | 1507 | >1000 | 35.0 | 29.64 | 14:29 |
| **15 Well Vol** | 17.4 | 6.67 | 1464 | >1000 | 37.5 | — | 14:38 |
| **16 Well Vol** | 17.3 | 6.63 | 1490 | >1000 | 40.0 | 30.79 | 14:46 |
| **17 Well Vol** | 17.0 | 6.60 | 1437 | >1000 | 42.5 | — | 14:52 |
| **18 Well Vol** | 17.8 | 6.71 | 1476 | >1000 | 45.0 | 31.99 | 15:00 |
| **19 Well Vol** | 17.4 | 6.66 | 1443 | >1000 | 47.5 | — | 15:08 |
| **20 Well Vol** | 17.5 | 6.69 | 1442 | 508 | 50.0 | 35.82 | 15:13 |
| **21 Well Vol** | 17.3 | 6.65 | 1456 | 156 | 52.5 | 34.35 | 15:20 |

*(Fill in one or more of the above columns depending on available equipment)*

Method of purging (bailer or pump) Bailer
If pumped, pumping rate:
Well Purged Dry No
Continuous Recharge
Notes concerning condition of well, odors, color, etc.:
Cloudy, temps in low 80s

Developer's Signature

JOYCE ENGINEERING, INC.

# LOG OF BORING P-26



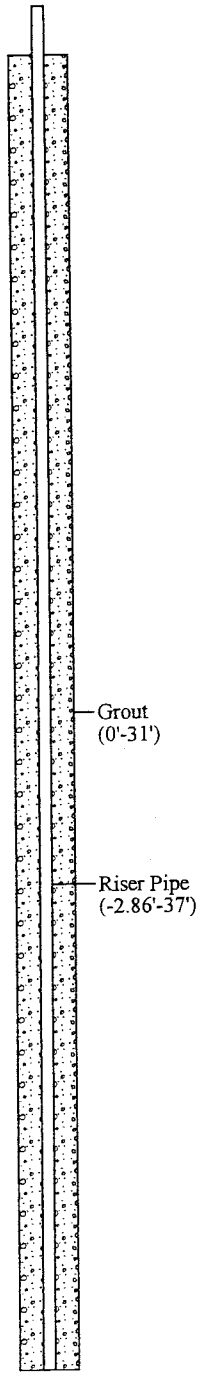
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/21/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/28/05 | Northing Coord. | : 802588.7498230 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842908.6996400 |
| Drilling Method | : HSA/NQ Core/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Core/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 594.27 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | 594 | 1 | 95 | CL | SANDY CLAY - brown |
| 1 | 593 | 2, 2, 3 | | | Changes to orange at 1.5 feet, moist |
| 2 | 592 | | | | |
| 3 | 591 | | | | |
| 4 | 590 | | | | |
| 5 | 589 | 4 | 95 | SM | SILTY SAND - orange and white mottled silty sand. moist |
| 6 | 588 | 5, 5, 10 | | | |
| 7 | 587 | | | | |
| 8 | 586 | | | | |
| 9 | 585 | | | | White coarse grained silty sand, granitic texture with weathered quartz and mica, dry |
| 10 | 584 | 13 | 95 | | |
| 11 | 583 | 32, 50/5 | | PWR | PARTIALLY WEATHERED ROCK - white coarse grained silty sand, granitic texture, weathered quartz and mica, dry |
| 12 | 582 | | | | |
| 13 | 581 | | | | |
| 14 | 580 | | | | |
| 15 | 579 | 33, 50/5 | 40 | | |
| 16 | 578 | | | | |
| 17 | 577 | | | | |
| 18 | | | | | |

Well: P-26
Elev.: 597.13




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/28/05 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : NQ Rock Coring |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.86-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers to auger refusal. Rock coring was performed utilizing a NQ core barrell from 25 to 48.5 feet. Boring was overdrilled utilizing 6.25-inch downhole hammer.

2. Boring was dry at the time of drilling. Solid triangle represents water level 7 days after well construction (26.71 feet below TOC).

JOYCE ENGINEERING, INC.

# LOG OF BORING P-26



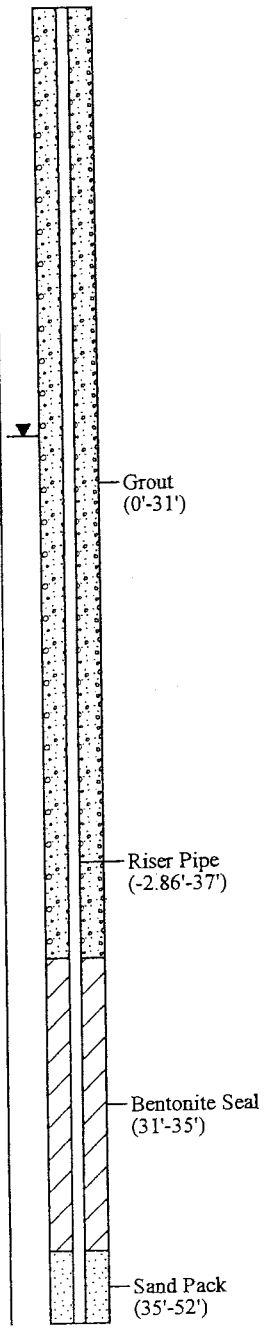
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/21/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/28/05 | Northing Coord. | : 802588.7498230 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842908.6996400 |
| Drilling Method | : HSA/NQ Core/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Core/Cuttings | Logged By | : David Y. Reedy II |

| Depth in Feet | Surf. Elev. 594.27 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 18 | 576 | | | | |
| 19 | 575 | | | | |
| 20 | 574 | 50/5 | 20 | | More weathered mica present at 20 feet |
| 21 | 573 | | | PWR | |
| 22 | 572 | | | | |
| 23 | 571 | | | | |
| 24 | 570 | | | | *Auger refusal at 25 feet* |
| 25 | 569 | 50/5 | 20 | | BEDROCK - 25-30-foot core run: RQD = 28%, Recovery = 85%; Highly fractured weathered granite with quartz, feldspar, and very weathered hornblend crystals. From 25 to 26 feet there is an approximate 2-inch fracture spacing. Fracture spacing decreases to approximately 1.25-inch from 26 to 28 feet. Fracture spacing increases to approximately 4 inches from 28 to 30 feet. Most fractures are near horizontal with some fractures dipping approximately 45 degrees with a 2.5 to 3-foot fracture spacing. |
| 26 | 568 | | | | |
| 27 | 567 | | | | |
| 28 | 566 | | | | |
| 29 | 565 | | | | |
| 30 | 564 | | | BR | 30 to 35-foot core run: RQD = 36%, Recovery = 70%; Highly fractured weathered granite. Fracture spacing ranges from 1 to 6 inches to 33 feet. Approximately 6 inches of metavolcanic rock and 1.5 feet of mud from 33 to 35 feet. |
| 31 | 563 | | | | |
| 32 | 562 | | | | |
| 33 | 561 | | | | |
| 34 | 560 | | | | |
| 35 | 559 | | | | 35 to 40-foot core run: RQD = 0%, Recovery = 38%; Metavolcanic gravel from 35 to 36 feet. Approximately 7 inches of granitic rock follows before |
| 36 | | | | | |

Well: P-26
Elev.: 597.13




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/28/05 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : NQ Rock Coring |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.86-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers to auger refusal. Rock coring was performed utilizing a NQ core barrell from 25 to 48.5 feet. Boring was overdrilled utilizing 6.25-inch downhole hammer.

2. Boring was dry at the time of drilling. Solid triangle represents water level 7 days after well construction (26.71 feet below TOC).

JOYCE ENGINEERING, INC.

# LOG OF BORING P-26



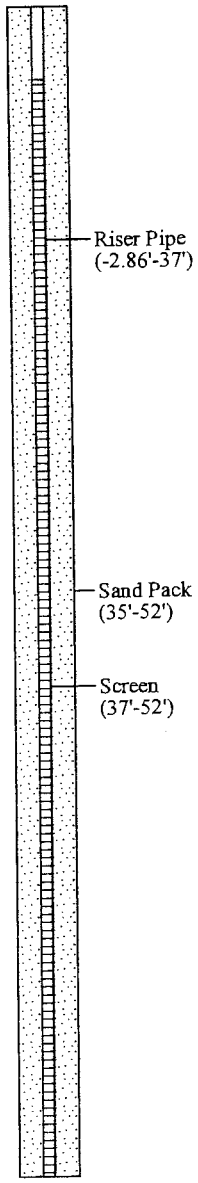
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 03/21/05 | Drilling Company | : SAEDACCO |
| Date Completed | : 03/28/05 | Northing Coord. | : 802588.7498230 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842908.6996400 |
| Drilling Method | : HSA/NQ Core/Downhole Hammer | Survey By | : Tritech Civil Env., P.C. |
| Sampling Method | : Split Spoons/Core/Cuttings | Logged By | : David Y. Reedy II |

Well: P-26
Elev.: 597.13

| Depth in Feet | Surf. Elev. 594.27 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 36 | 558 | | | | changing back to highly fractured metavolvanic rock. Fractures range from nearly horizontal to nearly vertical with no apparent pattern. |
| 37 | 557 | | | | |
| 38 | 556 | | | | |
| 39 | 555 | | | | |
| 40 | 554 | | | | 40 to 45-foot core run: RQD = 62%, Recovery = 94%; Metavolcanic rock continues to 41.5 feet. Weathered granite from 41.5 to 45 feet with very weathered hornblend. Fracture spacing ranges from 4 to 6 inches and dips from approximately 15 to 35 degrees. |
| 41 | 553 | | | | |
| 42 | 552 | | | | |
| 43 | 551 | | | | |
| 44 | 550 | | | BR | |
| 45 | 549 | | | | 40 to 50-foot core run: RQD = 43%, Recovery = 95%; Highly fractured, very weathered granite. Fractures range from nearly horizontal to nearly vertical with a spacing thare ranges from 1 to 9 inches. Coring was stopped at 48.5 feet because core barrell stopped up with small rock fragments. |
| 46 | 548 | | | | |
| 47 | 547 | | | | |
| 48 | 546 | | | | |
| 49 | 545 | | | | |
| 50 | 544 | | | | |
| 51 | 543 | | | | Boring was overdrilled and advanced to 52 feet. |
| 52 | 542 | | | | |
| 53 | 541 | | | | |
| 54 | | | | | |




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 03/28/05 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : NQ Rock Coring |
| Company Rep. | : Robert Miller |
| Drilling Method(s) | : Downhole Hammer |
| Company Rep. | : Robert Miller |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.86-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 1 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

1. Drilling performed with a Gus Pech GP-1100E utilizing 4.25-inch ID hollow stem augers to auger refusal. Rock coring was performed utilizing a NQ core barrell from 25 to 48.5 feet. Boring was overdrilled utilizing 6.25-inch downhole hammer.

2. Boring was dry at the time of drilling. Solid triangle represents water level 7 days after well construction (26.71 feet below TOC).

P-26

# WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources - Division of Water Quality

**WELL CONTRACTOR (INDIVIDUAL) NAME (print)** Robert Miller **CERTIFICATION #** 2675

**WELL CONTRACTOR COMPANY NAME** SAEDACCO **PHONE #** (803) 548-2180

**STATE WELL CONSTRUCTION PERMIT#** _____ (if applicable) **ASSOCIATED WQ PERMIT#** _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
Nearest Town: Kimesville County Alamance
_____
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: Coble's Sandrock C & D Lanfill
Address Foster STore Road
(Street or Route No.)
Kimesville NC
City or Town State Zip Code
(803)-_____
Area code- Phone number

4. DATE DRILLED March 28, 2005
5. TOTAL DEPTH: 52 Feet
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☐
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS _____ FT. Above Land Surface*
***Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.**
9. YIELD (gpm): _____ METHOD OF TEST _____
10. WATER ZONES (depth): _____
_____
11. DISINFECTION: Type _____ Amount _____

| DEPTH From | To | DRILLING LOG Formation Description |
|---|---|---|
| | | |

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.

12. CASING:

| | Depth | | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| From 0 | To 37 | Ft. | 2 inch | Sch 40 | PVC |
| From | To | Ft. | | | |
| From | To | Ft. | | | |

13. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 32 | Ft. | Portland Cement | Tremie |
| From 32 | To 35 | Ft. | Bentonite Chips | Pour |

14. SCREEN:

| | Depth | | Diameter | | Slot Size | | Material |
|---|---|---|---|---|---|---|---|
| From 37 | To 52 | Ft. | 2 | in. | .010 | in. | PVC |
| From | To | Ft. | | in. | | in. | |

15. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 35 | To 52 | Ft. | # 1 | Sand |
| From | To | Ft. | | |

16. REMARKS: _____

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Robert Miller

SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

**Submit the original to the Division of Water Quality, Attn: Information Management, 1617 Mail Service Center - Raleigh, NC 27699-1617, Phone No. (919) 733-7015, within 30 days.**

GW-1 REV. 09/2004

ENGINEERING, INC

# LOG OF BORING P-27



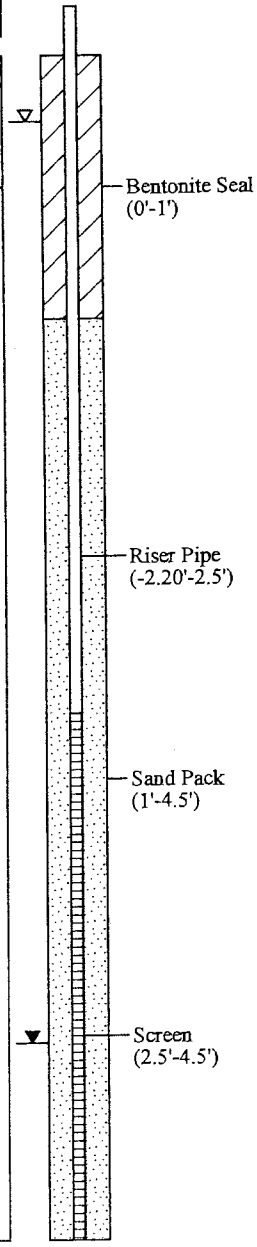
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 04/04/05 | Northing Coord. | : 799415.2582420 |
| Date Completed | : 04/04/05 | Easting Coord. | : 1843889.0495900 |
| Hole Diameter | : 2.5-inch | Survey By | : Tritech Civil Env., P.C. |
| Drilling Method | : Hand Auger | Logged By | : David Y. Reedy II |
| Sampling Method | : Soil Core | | : Ben Draper |

| Depth in Feet | Surf. Elev. 625.25 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | CL | LEAN CLAY - brown with some sand, saturated |
| | 625 | | | SM | SILTY SAND - gray |
| 1 | | | | | |
| | 624 | | | | |
| 2 | | | | | |
| | 623 | | | | |
| 3 | | | | | |
| | 622 | | | | |
| 4 | | | | | |
| | 621 | | | | Terminated boring at 4.5 feet |
| 5 | | | | | |

Well: P-27
Elev.: 627.45




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 04/04/05 |
| Hole Diameter(s) | : 2.5-inch |
| Drilling Method(s) | : Hand Auger |
| Company Rep. | : David Y. Reedy II |
| | : Ben Draper |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.20-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 2 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

1. Piezometer installed with a hand auger.

2. Solid triangle represents water level at time of drilling (5.95 feet below TOC). Open triangle represents water level 15 days after well construction (2.45 feet below TOC).

JOYCE ENGINEERING, INC.

# LOG OF BORING P-28



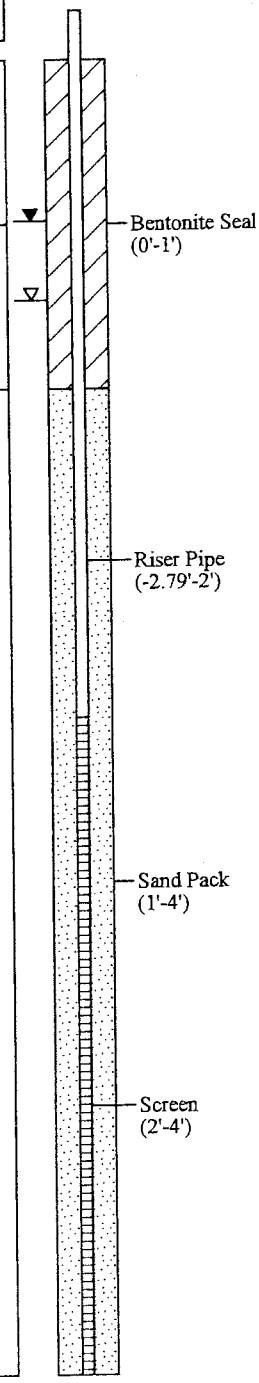
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 04/04/05 | Northing Coord. | : 799572.9421430 |
| Date Completed | : 04/04/05 | Easting Coord. | : 1843510.3166300 |
| Hole Diameter | : 2.5-inch | Survey By | : Tritech Civil Env., P.C. |
| Drilling Method | : Hand Auger | Logged By | : David Y. Reedy II |
| Sampling Method | : Soil Core | | : Ben Draper |

| Depth in Feet | Surf. Elev. 610.36 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | CH | FAT CLAY - brown with yellow sandy zones, saturated |
| | 610 | | | CL | LEAN CLAY - gray sandy lean clay |
| 1 | 609 | | | SM | SILTY SAND - gray and yellow coarse grained silty sand |
| 2 | 608 | | | | |
| 3 | 607 | | | | |
| 4 | | | | | Terminated boring at 4 feet |

Well: P-28
Elev.: 613.15




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 04/04/05 |
| Hole Diameter(s) | : 2.5-inch |
| Drilling Method(s) | : Hand Auger |
| Company Rep. | : David Y. Reedy II |
| | : Ben Draper |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.79-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 2 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

1. Piezometer installed with a hand auger.

2. Solid triangle represents water level at time of drilling (3.28 feet below TOC). Open triangle represents water level 15 days after well construction (3.52 feet below TOC).

JOYCE ENGINEERING, INC.

# LOG OF BORING P-29



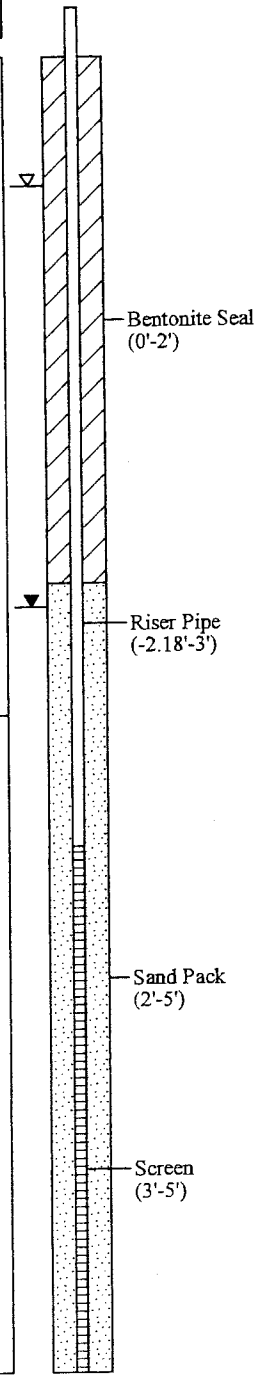
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 04/04/05 | Northing Coord. | : 799763.1042900 |
| Date Completed | : 04/04/05 | Easting Coord. | : 1843747.3543300 |
| Hole Diameter | : 2.5-inch | Survey By | : Tritech Civil Env., P.C. |
| Drilling Method | : Hand Auger | Logged By | : David Y. Reedy II |
| Sampling Method | : Soil Core | | : Ben Draper |

| Depth in Feet | Surf. Elev. 617.31 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | SC | CLAYEY SAND - gray |
| | 617 | | | | |
| 1 | | | | | |
| | 616 | | | | |
| 2 | | | | | |
| | 615 | | | | |
| | | | | SM | SILTY SAND - gray with minor clay lenses |
| 3 | | | | | |
| | 614 | | | | |
| 4 | | | | | |
| | 613 | | | | |
| 5 | | | | | Terminated boring at 5 feet |

Well: P-29
Elev.: 619.49




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 04/04/05 |
| Hole Diameter(s) | : 2.5-inch |
| Drilling Method(s) | : Hand Auger |
| Company Rep. | : David Y. Reedy II |
| | : Ben Draper |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.18-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DS1 # 2 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

1. Piezometer installed with a hand auger.

2. Solid triangle represents water level at time of drilling (4.27 feet below TOC). Open triangle represents water level 15 days after well construction (2.67 feet below TOC).

JOYCE ENGINEERING, INC.

# LOG OF BORING P-30



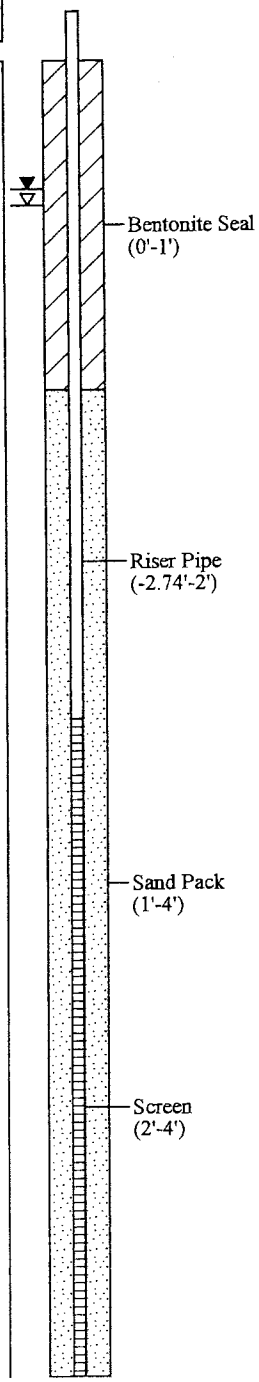
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 19

| | | | |
|---|---|---|---|
| Date Started | : 04/04/05 | Northing Coord. | : 799303.3458790 |
| Date Completed | : 04/04/05 | Easting Coord. | : 1844228.8326400 |
| Hole Diameter | : 2.5-inch | Survey By | : Tritech Civil Env., P.C. |
| Drilling Method | : Hand Auger | Logged By | : David Y. Reedy II |
| Sampling Method | : Soil Core | | : Ben Draper |

| Depth in Feet | Surf. Elev. 634.75 | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | | SILTY SAND - gray |
| | 634 | | | | Changes to yellow medium grained silty sand at 4 inches, saturated |
| 1 | | | | | |
| | 633 | | | | |
| 2 | | | | SM | |
| | 632 | | | | |
| 3 | | | | | |
| | 631 | | | | Terminated boring at 4 feet |
| 4 | | | | | |

Well: P-30
Elev.: 637.49




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 04/04/05 |
| Hole Diameter(s) | : 2.5-inch |
| Drilling Method(s) | : Hand Auger |
| Company Rep. | : David Y. Reedy II |
| | : Ben Draper |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.74-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 2 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

1. Piezometer installed with a hand auger.

2. Solid triangle represents water level at time of drilling (3.13 feet below TOC). Open triangle represents water level 15 days after well construction (3.18 feet below TOC).

JOYCE ENGINEERING, INC.

# LOG OF BORING P-31



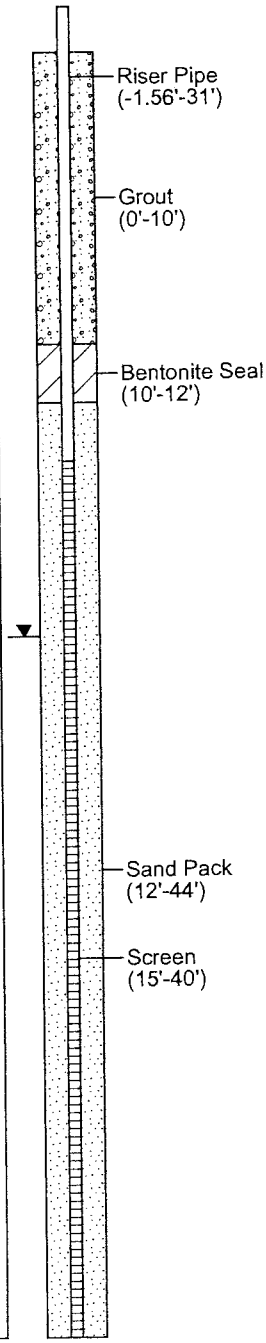
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 27

| | | | |
|---|---|---|---|
| Date Started | : 01/29/07 | Drilling Company | : SAEDACCO |
| Date Completed | : 01/29/07 | Northing Coord. | : 802014.58961 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843227.64678 |
| Drilling Method | : Hollow Stem/Air Rotary | Survey By | : Tritech |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : Jeremy Kerly |

| Depth in Feet | Surf. Elev. | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | PWR | Partially Weathered Rock (PWR), yellowish/tan grading to grey, powder, quartz grains, moist, highly weathered, sapprolitic, slightly clayey |
| 5 | | 41 35 34 37 | | PWR | PWR, weathered, quartz grains, feldspar, coarser-grained, iron staining, relict structure, weathered granite |
| 10 | | 16 50 50/2 | | PWR | PWR, bedrock by split spoon, weathered, soft, relict structure, large grained quartz, feldspar, weathered granite |
| 15 | | 26 50/2 | | PWR | PWR, weathered granite, quartz, feldspar, iron staining, relict structure, small clay layers |
| | | | | | Auger refusal at 15 feet, so switch to air rotary |
| 20 | | | | | Bedrock, grey rock powder, white quartz, feldspar grains, micas |
| | | | | | Possible fracture zone 17 to 20 feet |
| 25 | | | | | |
| 30 | | | | Bedrock | |
| 35 | | | | | |
| 40 | | | | | |
| 45 | | | | | Boring terminated at 44 feet |

Well: P-31
TOC Elev.: 608.56




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 1/29/07 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Burt |
| Drilling Method(s) | : Air Rotary |
| Company Rep. | : Burt |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 1.56-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 2 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : None |

WELL PAD

| | |
|---|---|
| Type | : None |

1. Drilling performed with a GP-1100 E Air Rig, utilizing 8.25-inch ID hollow stem augers to auger refusal. Borehole was continued with a GP-1100 E Air Rig, utilizing a 6-inch hammer to approximately 44.0 feet. Boring backfilled with sand to 40' before installing well.

2. Dry cuttings were observed with air rotary drilling from 15-40 feet.

3. Water level from 03/06/0 = 21.56' below TOC.

05-11-2007 P:\Coble's Sandrock\Environmental\419.00,T5,18,19 - Hydrogeo Phase 3\Hydrogeologic & GMP Reports\Boring Logs 2.07\P-31.BOR

P-31

# NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2675

1. WELL CONTRACTOR:
Robert Lee Miller
Well Contractor (Individual) Name
Saedacco
Well Contractor Company Name
STREET ADDRESS 9088 NORTHFIELD DR.
Ft. Mill SC
City or Town State Zip Code
(803) 548-2180
Area code- Phone number

2. WELL INFORMATION:
SITE WELL ID #(if applicable) P-31
STATE WELL PERMIT#(if applicable)
DWQ or OTHER PERMIT #(if applicable)
WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use) Piezometers
DATE DRILLED 1/29/07
TIME COMPLETED _____ AM ☐ PM ☐

3. WELL LOCATION:
CITY: Liberty COUNTY
5833 Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)
TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)
LATITUDE 3
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format
Latitude/longitude source: ☐ GPS ☐ Topographic map
*(location of well must be shown on a USGS topo map and attached to this form if not using GPS)*

4. FACILITY- is the name of the business where the well is located.
FACILITY ID #(if applicable)
NAME OF FACILITY Cobie's Sandrock C&D LANDFILL
STREET ADDRESS 5833 Foster Store RD.
Liberty NC 27298
City or Town State Zip Code
CONTACT PERSON VAN Burbach
MAILING ADDRESS 2211 W. Meadowview RD.
Greensboro NC 27407 Suite101
City or Town State Zip Code
(336) 707-3874
Area code - Phone number

5. WELL DETAILS:
a. TOTAL DEPTH: 44'
b. DOES WELL REPLACE EXISTING WELL? YES ☒ NO ☐
c. WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3' FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.
e. YIELD (gpm): _____ METHOD OF TEST
f. DISINFECTION: Type _____ Amount
g. WATER ZONES (depth)
From To From To
From To From To
From To From To

6. CASING:

| From | To | Depth Ft. | Diameter | Thickness/ Weight | Material |
|---|---|---|---|---|---|
| 0 | 14' | | 2" | SCH40 | PVC |
| | | | | | |
| | | | | | |

7. GROUT:

| From | To | Depth Ft. | Material | Method |
|---|---|---|---|---|
| 0 | 10' | | Portland | Pour |
| | | | | |
| | | | | |

8. SCREEN:

| From | To | Depth Ft. | Diameter in. | Slot Size in. | Material |
|---|---|---|---|---|---|
| 14' | 44' | | 2" | .010 | PVC |
| | | | | | |
| | | | | | |

9. SAND/GRAVEL PACK:

| From | To | Depth Ft. | Size | Material |
|---|---|---|---|---|
| 12' | 44' | | 20/30 | Silica Sand |
| | | | | |
| | | | | |

10. DRILLING LOG

| From | To | Formation Description |
|---|---|---|
| 0 | 16' | Sand Stone |
| 16' | 44' | Rock |

11. REMARKS:
2' Bentonite Seal 10'+012'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Robert L. M 2/5/07
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

Robert L. Miller
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-2-07

Casing Type _____

Well/Boring Number P-31

Casing Diameter (Dr) 2 inches

Screened Interval 25-40

Riser Elevation _____

Total Well Depth (Lw) 44.00 feet

Depth to Water (Lf) 21.45 feet

Time of Measurement 10:50

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 3.67 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 15.1 | 6.60 | 290 | 22.8 | 0 | 21.45 | 11:01 |
| After Purging 1 Well Vol | 14.8 | 6.60 | 271 | 332 | 3.67 | 26.60 | 11:11 |
| 2 Well Vol | 14.9 | 6.60 | 256 | 207 | 7.34 | 31.16 | 11:20 |
| 3 Well Vol | 14.3 | 6.72 | 259 | 466 | 11.01 | 36.09 | 11:32 |
| 4 Well Vol | 14.1 | 6.67 | 265 | 597 | 14.68 | 40.20 | 11:41 |
| 5 Well Vol | 14.4 | 6.60 | 277 | 584 | 18.35 | Dry | 11:57 |
| 6 Well Vol | | | Dry @ 18.35 gals | | | | |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) Bailer If pumped, pumping rate: _____

Well Purged Dry 18.35 gals Continuous Recharge _____

Notes concerning condition of well, odors, color, etc.:

Developer's Signature [signature]

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ENGINEERING, INC.

# LOG OF BORING P-32



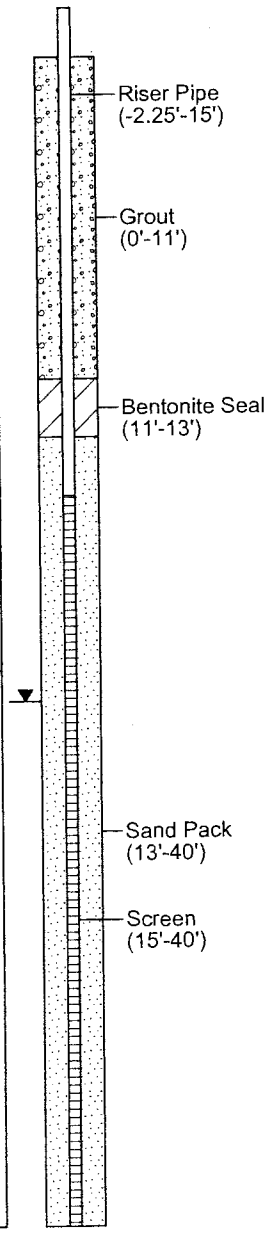
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 27

| | | | |
|---|---|---|---|
| Date Started | : 01/30/07 | Drilling Company | : SAEDACCO |
| Date Completed | : 01/30/07 | Northing Coord. | : 802421.06000 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842969.08000 |
| Drilling Method | : Hollow Stem/Air Rotary | Survey By | : Tritech |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : Sarah McCarthy |

| Depth in Feet | Surf. Elev. | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | SM | SILTY SAND, tan/light brown, powdery with some PWR |
| | | 50/6 | 90 | SM | SILTY SAND, tan/light brown |
| 5 | | 50/2 | | PWR | Partially Weathered Rock (PWR) white feldspar/granite |
| | | 50/5 | 70 | SM | SILTY SAND, light brown |
| | | 50/1 | | PWR | Auger refusal @ 9' - switch to air - see Note # 2. |
| 10 | | | | PWR | PWR, white/light brown feldspar/ quartz with some light brown silty sand |
| | | | | PWR | PWR, white/tan/ligth brown, granitic with feldspar and quartz |
| 15 | | | | | |
| 20 | | | | Bedrock | dark grey to grey weathered granitic rock (feldspar and quartz)<br><br>Rock Core:<br>16-21' - Rec = 7%, RQD = 0%<br>21-26' - Rec = 85%, RQD = 38%<br>26-31' - Rec = 95%, RQD = 70 %<br><br>Water-bearing fractures at 26 feet and 30 feet |
| 25 | | | | | |
| 30 | | | | | |
| 35 | | | | | |
| 40 | | | | | Boring terminated at 40 feet |
| 45 | | | | | |

Well: P-32
TOC Elev.: 608.56




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 1/30/07 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Burt |
| Drilling Method(s) | : Air Rotary |
| Company Rep. | : Burt |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.25-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

Type : DSI # 2 Sand

WELL SCREEN SEAL

Type : 3/8" Bentonite chips

ANNULUS SEAL

Type : No. 1 Portland grout

PROTECTIVE CSG.

Type : None

WELL PAD

Type : None

1. Drilling performed with a GP-1100 E Air Rig, utilizing 8.25-inch ID hollow stem augers to auger refusal. Borehole was continued with a GP-1100 E Air Rig, utilizing a 6-inch air-hammer.

2. Air Drilling encountered very soft conditions and rock core confirmed that there was no competant bedrock to at least 21'. The shallow auger refusal is beleived to be false, probably due to an isolated hard zone within the PWR.

3. Dry cuttings were observed with air rotary drilling from 8-40 feet.

4. Water level from 03/06/07 = 24.30' below TOC.

P-32

# NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2675

1. WELL CONTRACTOR:
Robert Lee Miller
Well Contractor (Individual) Name
Saedacco
Well Contractor Company Name
STREET ADDRESS 9088 NORTHFIELD DR.
Ft. Mill SC
City or Town State Zip Code
(803) 548-2180
Area code- Phone number

2. WELL INFORMATION:
SITE WELL ID #(if applicable) P-32
STATE WELL PERMIT#(if applicable)
DWQ or OTHER PERMIT #(if applicable)
WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use) Piezometers
DATE DRILLED 1/30/07
TIME COMPLETED _____ AM ☐ PM ☐

3. WELL LOCATION:
CITY: Liberty COUNTY
5833 Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)
TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)
LATITUDE 3 __ __
LONGITUDE __ __ __
May be in degrees, minutes, seconds or in a decimal format
Latitude/longitude source: ☐ GPS ☐ Topographic map
*(location of well must be shown on a USGS topo map and attached to this form if not using GPS)*

4. FACILITY - is the name of the business where the well is located.
FACILITY ID #(if applicable)
NAME OF FACILITY Cobie's Sandrock C&D LANDFILL
STREET ADDRESS 5833 Foster Store RD.
Liberty NC 27298
City or Town State Zip Code
CONTACT PERSON VAN Burbach
MAILING ADDRESS 2211 W. Meadowview RD.
Greensboro NC 27407 Suite101
City or Town State Zip Code
(336) 707-3874
Area code - Phone number

5. WELL DETAILS:
a. TOTAL DEPTH: 40'
b. DOES WELL REPLACE EXISTING WELL? YES ☒ NO ☐
c. WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3' FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.
e. YIELD (gpm): _____ METHOD OF TEST
f. DISINFECTION: Type _____ Amount
g. WATER ZONES (depth)
From To From To
From To From To
From To From To

6. CASING:

| | Depth | | Diameter | Thickness/ Weight | Material |
|---|---|---|---|---|---|
| From 0 | To 15' | Ft. | 2" | SCH40 | PVC |
| From | To | Ft. | | | |
| From | To | Ft. | | | |

7. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 11' | Ft. | Portland | Pour |
| From | To | Ft. | | |
| From | To | Ft. | | |

8. SCREEN:

| | Depth | | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| From 15' | To 40' | Ft. | 2" in. | .010 in. | PVC |
| From | To | Ft. | in. | in. | |
| From | To | Ft. | in. | in. | |

9. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 13' | To 40' | Ft. | 20/30 | Silica Sand |
| From | To | Ft. | | |
| From | To | Ft. | | |

10. DRILLING LOG

| From | To | Formation Description |
|---|---|---|
| 0 | 16' | Sandstone |
| 16' | 40' | Rock |

11. REMARKS:
2' Bentonite Seal 11' to 13'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Robert L. Miller 2/5/07
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE
Robert L. Miller
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 414.00.27 Date 2-2-07

Casing Type _____

Well/Boring Number P-32

Casing Diameter (Dr) 2 inches

Screened Interval 24-39

Riser Elevation _____

Total Well Depth (Lw) 40.00 feet

Depth to Water (Lf) 25.00 feet

Time of Measurement 12:24

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 2.44 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 15.1 | 6.61 | 195.6 | 20.5 | 0 | 25.00 | 12:30 |
| After Purging 1 Well Vol | 15.1 | 6.61 | 251 | 342 | 2.44 | 29.81 | 12:43 |
| 2 Well Vol | 14.9 | 6.60 | 205 | ≈1000 | 4.88 | 32.03 | 12:54 |
| 3 Well Vol | 14.0 | 6.60 | 199.4 | ≈1000 | 7.32 | ~~37.62~~ 36.62 | 13:11 |
| 4 Well Vol | 14.8 | 6.60 | 185.4 | ≈1000 | 9.76 | 38.90 | 13:21 |
| 5 Well Vol | | | Dry @ 11.76 gals | | | | |
| 6 Well Vol | | | | | | | |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) bailer If pumped, pumping rate: _____

Well Purged Dry 11.76 gals Continuous Recharge _____

Notes concerning condition of well, odors, color, etc.:

Developer's Signature [signature]

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ENGINEERING, INC

# LOG OF BORING P-33



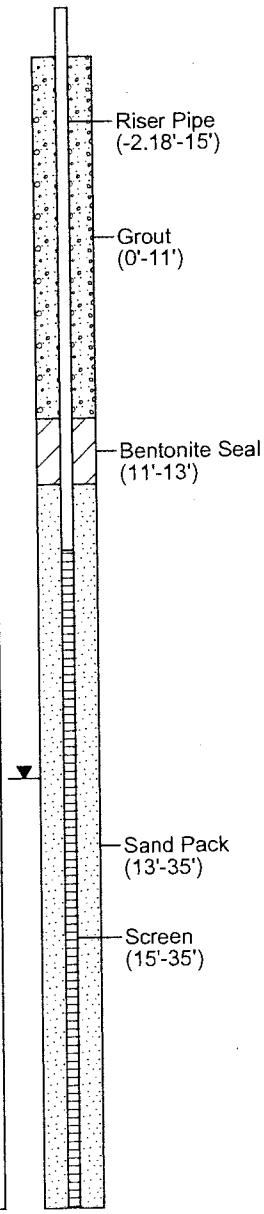
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 27

| | | | |
|---|---|---|---|
| Date Started | : 01/30/07 | Drilling Company | : SAEDACCO |
| Date Completed | : 01/31/07 | Northing Coord. | : 802416.38410 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842804.96743 |
| Drilling Method | : Hollow Stem/Air Rotary | Survey By | : Tritech |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : Sarah McCarthy |

| Depth in Feet | Surf. Elev. | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | SM | SILTY SAND, brown/tan<br>Attempted Shelby tube from 3 to 5 feet failed |
| 5 | | 50/5<br>50/3 | | SM<br>PWR | SILTY SAND, brown with some Partially Weathered Rock (PWR)<br>PWR, white, clear, feldspar/quartz<br>Auger refusal at 5 feet so switch to air rotary - See Note. |
| 10 | | | | PWR | SAND, Poorly Graded, Weathered Bedrock, tan, brown feldspar and quartz. |
| 15 | | | | | |
| 20 | | | | | |
| 25 | | | | | |
| 30 | | | | | |
| 35 | | | | | Boring terminated at 35 feet |
| 40 | | | | | |

Well: P-33
TOC Elev.: 597.68




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 1/31/07 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Burt |
| Drilling Method(s) | : Air Rotary |
| Company Rep. | : Burt |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.18-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

Type : DSI # 2 Sand

WELL SCREEN SEAL

Type : 3/8" Bentonite chips

ANNULUS SEAL

Type : No. 1 Portland grout

PROTECTIVE CSG.

Type : None

WELL PAD

Type : None

1. Drilling performed with a GP-1100 E Air Rig, utilizing 8.25-inch ID hollow stem augers to auger refusal. Borehole was continued with a GP-1100 E Air Rig, utilizing a 6-inch hammer.

2. Shallow auger refusal (5') is beleived to be false, probably due to isolated hard zone within the PWR. Air drilling encountered very soft material, and no definitive depth to bedrock could be determined.

3. Dry cuttings were observed with air rotary drilling from 5-35 feet.

4. Water level from 03/06/07 = 24.10' below TOC.

05-11-2007 P:\Coble's Sandrock\Environmental\419.00.T5,18,19 - Hydrogeo Phase 3\Hydrogeologic & GMP Reports\Boring Logs 2.07\P-33.BOR

P-33

# NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2675

1. WELL CONTRACTOR:
Robert Lee Miller
Well Contractor (Individual) Name
Saedacco
Well Contractor Company Name
STREET ADDRESS 9088 NORTHFIELD DR.
Ft. Mill SC
City or Town State Zip Code
(803) 548-2180
Area code- Phone number

2. WELL INFORMATION:
SITE WELL ID #(if applicable) P-33
STATE WELL PERMIT#(if applicable)
DWQ or OTHER PERMIT #(if applicable)
WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use) Piezometers
DATE DRILLED
TIME COMPLETED AM ☐ PM ☐

3. WELL LOCATION:
CITY: Liberty COUNTY
5833 Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)
TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)
LATITUDE 3
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format
Latitude/longitude source: ☐ GPS ☐ Topographic map
*(location of well must be shown on a USGS topo map and attached to this form if not using GPS)*

4. FACILITY- is the name of the business where the well is located.
FACILITY ID #(if applicable)
NAME OF FACILITY Cobie's Sandrock C&D LANDFILL
STREET ADDRESS 5833 Foster Store RD
Liberty NC 27298
City or Town State Zip Code
CONTACT PERSON VAN Burbach
MAILING ADDRESS 2211 W. Meadowview RD.
Greensboro NC 27407 Suite101
City or Town State Zip Code
(336) 707-3874
Area code - Phone number

5. WELL DETAILS:
a. TOTAL DEPTH: 35'
b. DOES WELL REPLACE EXISTING WELL? YES ☒ NO ☐
c. WATER LEVEL Below Top of Casing: FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3' FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.
e. YIELD (gpm): METHOD OF TEST
f. DISINFECTION: Type Amount
g. WATER ZONES (depth).
From To From To
From To From To
From To From To

6. CASING:

| From | To | Depth Ft. | Diameter | Thickness/ Weight | Material |
|---|---|---|---|---|---|
| 0 | 15' | | 2" | SCH40 | PVC |
| | | | | | |
| | | | | | |

7. GROUT:

| From | To | Depth Ft. | Material | Method |
|---|---|---|---|---|
| 0 | 11' | | Portland | Pour |
| | | | | |
| | | | | |

8. SCREEN:

| From | To | Depth Ft. | Diameter in. | Slot Size in. | Material |
|---|---|---|---|---|---|
| 15' | 35' | | 2" | .010 | PVC |
| | | | | | |
| | | | | | |

9. SAND/GRAVEL PACK:

| From | To | Depth Ft. | Size | Material |
|---|---|---|---|---|
| 13' | 35' | | 20/30 | Silica Sand |
| | | | | |
| | | | | |

10. DRILLING LOG

| From | To | Formation Description |
|---|---|---|
| 0 | 6' | Sand Stone |
| 6' | 35' | Rock |

11. REMARKS:
2' Bentonite Seal 11' to 13'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Robert L. M 2/5/07
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE
Robert L. Miller
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 414.00.27 Date 2-2-07

Casing Type _____

Well/Boring Number P-33

Casing Diameter (Dr) 2 inches

Screened Interval 13-28

Riser Elevation _____

Total Well Depth (Lw) 35.00 feet

Depth to Water (Lf) 24.98 feet

Time of Measurement 13:46

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 1.63 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 14.8 | 6.62 | 105.0 | 126 | 0 | 24.98 | 13:46 |
| After Purging 1 Well Vol | 14.9 | 6.54 | 96.9 | +1000 | 1.63 | 27.37 | 13:58 |
| 2 Well Vol | 15.4 | 6.28 | 92.5 | +1000 | 3.26 | 29.20 | 14:02 |
| 3 Well Vol | 15.0 | 6.35 | 94.0 | +1000 | 4.89 | 31.54 | 14:09 |
| 4 Well Vol | 15.0 | 6.36 | 96.2 | +1000 | 6.52 | 33.02 | 14:14 |
| 5 Well Vol | 14.9 | 6.43 | 98.2 | +1000 | 8.15 | 34.80 | 14:20 |
| 6 Well Vol | 14.8 | 6.45 | 93.4 | +1000 | 9.78 | 34.85 | 14:27 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) bailer If pumped, pumping rate: _____

Well Purged Dry _____ Continuous Recharge yes

Notes concerning condition of well, odors, color, etc.:

Developer's Signature [signature]

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JOYCE ENGINEERING, INC.

# LOG OF BORING P-34



Coble's Sandrock
C&D Permit Application
Alamance County, NC

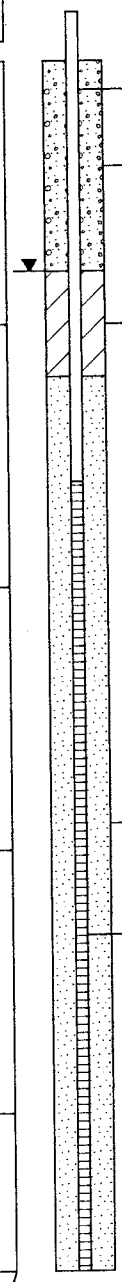
JEI Project No. 419.00,Task 27

| | | | |
|---|---|---|---|
| Date Started | : 01/31/07 | Drilling Company | : SAEDACCO |
| Date Completed | : 01/31/07 | Northing Coord. | : 801298.59726 |
| Hole Diameter | : 8.25-inch | Easting Coord. | : 1844106.87978 |
| Drilling Method | : Hollow Stem | Survey By | : Tritech |
| Sampling Method | : Split Spoons | Logged By | : Sarah McCarthy |

| Depth in Feet | Surf. Elev. | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | CL | SANDY CLAY, light brown/dark brown/ brown |
| 5 | | 6 5 7 6 | 60 | CL | SANDY CLAY, light brown/ dark brown/ orange |
| 10 | | 2 2 1 3 | 100 | CL | SANDY CLAY, moist mottled grey/red/orange/brown |
| 15 | | 3 3 4 8 | 20 | | SANDY CLAY, very moist red/brown |
| 20 | | 12 13 7 7 | 0 | CL | SANDY CLAY, very moist brown |
| | | 50/1" | 0 | | Bedrock |
| 25 | | | | | |

Boring terminated at 23 feet

Well: P-34
TOC Elev.: 629.73




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 1/31/07 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Burt |
| Drilling Method(s) | : Air Rotary |
| Company Rep. | : Burt |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.93-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

Type : DSI # 2 Sand

WELL SCREEN SEAL

Type : 3/8" Bentonite chips

ANNULUS SEAL

Type : No. 1 Portland grout

PROTECTIVE CSG.

Type : None

WELL PAD

Type : None

1. Drilling performed with a GP-1100 E Air Rig, utilizing 8.25-inch ID hollow stem augers to approximately 23.0 feet.

2. Water level from 03/06/07 = 6.92' below TOC.

P-34

# NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2675

1. WELL CONTRACTOR:
Robert Lee Miller
Well Contractor (Individual) Name
Saedacco
Well Contractor Company Name
STREET ADDRESS 9088 NORTHFIELD DR.
Ft. Mill SC
City or Town State Zip Code
(803) 548-2180
Area code- Phone number

2. WELL INFORMATION:
SITE WELL ID #(if applicable) P-34
STATE WELL PERMIT#(if applicable)
DWQ or OTHER PERMIT #(if applicable)
WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use) Piezometers
DATE DRILLED 1/31/07
TIME COMPLETED _____ AM ☐ PM ☐

3. WELL LOCATION:
CITY: Liberty COUNTY
5833 Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)
TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)
LATITUDE 3
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format
Latitude/longitude source: ☐ GPS ☐ Topographic map
*(location of well must be shown on a USGS topo map and attached to this form if not using GPS)*

4. FACILITY- is the name of the business where the well is located.
FACILITY ID #(if applicable)
NAME OF FACILITY Cobie's Sandrock C&D LANDFILL
STREET ADDRESS 5833 Foster Store RD.
Liberty NC 27298
City or Town State Zip Code
CONTACT PERSON VAN Burbach
MAILING ADDRESS 2211 W. Meadowview RD.
Greensboro NC 27407 Suite101
City or Town State Zip Code
(336) 707-3874
Area code - Phone number

5. WELL DETAILS:
a. TOTAL DEPTH: 22'
b. DOES WELL REPLACE EXISTING WELL? YES ☒ NO ☐
c. WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3' FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.
e. YIELD (gpm): _____ METHOD OF TEST
f. DISINFECTION: Type _____ Amount
g. WATER ZONES (depth)
From To From To
From To From To
From To From To

6. CASING:

| From | To | Ft. | Diameter | Thickness/ Weight | Material |
|---|---|---|---|---|---|
| 0 | 7' | | 2" | Sch 40 | PVC |
| | | | | | |
| | | | | | |

7. GROUT:

| From | To | Ft. | Material | Method |
|---|---|---|---|---|
| 0 | 3' | | Portland | Pour |
| | | | | |
| | | | | |

8. SCREEN:

| From | To | Ft. | Diameter in. | Slot Size in. | Material |
|---|---|---|---|---|---|
| 7' | 22' | | 2" | .010 | PVC |
| | | | | | |
| | | | | | |

9. SAND/GRAVEL PACK:

| From | To | Ft. | Size | Material |
|---|---|---|---|---|
| 5' | 22' | | 20/30 | Silica Sand |
| | | | | |
| | | | | |

10. DRILLING LOG

| From | To | Formation Description |
|---|---|---|
| 0 | 22' | TN Silty Sand |

11. REMARKS:
2' Bentonite Seal 3'+05'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Robert L. Miller 2/5/07
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE
Robert L. Miller
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-5-07

Casing Type

Well/Boring Number P-34

Casing Diameter (Dr) 2 inches

Screened Interval 4-19

Riser Elevation

Total Well Depth (Lw) 23.00 feet

Depth to Water (Lf) 7.16 feet

Time of Measurement 10:12

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 2.60 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 11.7 | 5.88 | 138.5 | 26.8 | 0 | 7.16 | 10:17 |
| After Purging 1 Well Vol | 11.5 | 5.73 | 139.2 | +1000 | 2.60 | — | 10:20 |
| 2 Well Vol | 11.7 | 5.76 | 172.0 | +1000 | 5.20 | 9.84 | 10:24 |
| 3 Well Vol | 11.6 | 5.92 | 215 | +1000 | 7.80 | — | 10:26 |
| 4 Well Vol | 12.1 | 5.88 | 190.7 | +1000 | 10.40 | 11.06 | 10:29 |
| 5 Well Vol | 12.8 | 5.91 | 190 | +1000 | 13.00 | — | 10:33 |
| 6 Well Vol | 12.4 | 6.00 | 194 | +1000 | 15.60 | 12.17 | 10:36 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) bailer If pumped, pumping rate:

Well Purged Dry Continuous Recharge

Notes concerning condition of well, odors, color, etc.:

Developer's Signature

E:\DATASH~1\ADMINI~1\TEAM12~1\WELLDE~1.FRM

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-5-07

Casing Type _____

Well/Boring Number P-34

Casing Diameter (Dr) 2 inches

Screened Interval 4-19

Riser Elevation _____

Total Well Depth (Lw) 23.00 feet

Depth to Water (Lf) 7.16 feet

Time of Measurement _____

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 2.60 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| 7 Well Vols ~~Before Development~~ | 12.0 | 6.07 | 190 | >1000 | 18.20 | — | 10:42 |
| After Purging 8 ~~1~~ Well Vol | 12.6 | 6.10 | 193.5 | " | 20.80 | 12.78 | 10:44 |
| 9 ~~2~~ Well Vol | 12.6 | 6.12 | 196.2 | " | 23.40 | — | 10:48 |
| 10 ~~3~~ Well Vol | 12.8 | 6.11 | 195.8 | " | 26.00 | 13.32 | 10:54 |
| 11 ~~4~~ Well Vol | 12.9 | 6.13 | 193.8 | " | 28.60 | — | 10:58 |
| 12 ~~5~~ Well Vol | 13.1 | 6.60 | 197.5 | " | 31.20 | 14.25 | 11:01 |
| 13 ~~6~~ Well Vol | 13.8 | 6.66 | 195.2 | " | 33.80 | — | 11:05 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) _____ If pumped, pumping rate: _____

Well Purged Dry _____ Continuous Recharge _____

Notes concerning condition of well, odors, color, etc.:

Page 2

Developer's Signature [signature]

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# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-5-07

Casing Type _____

Well/Boring Number D-34

Casing Diameter (Dr) 2 inches

Screened Interval 4-19

Riser Elevation _____

Total Well Depth (Lw) 23.00 feet

Depth to Water (Lf) 7.16 feet

Time of Measurement _____

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 2.60 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| 14 well vols ~~Before Development~~ | 13.9 | 6.60 | 199.0 | +1000 | 36.40 | 15.14 | 11:10 |
| After Purging 15 1 Well Vol | 13.7 | 6.60 | 193.4 | " | 39.00 | — | 11:13 |
| 16 2 Well Vol | 13.4 | " | 197.8 | " | 41.60 | 15.50 | 11:16 |
| 17 3 Well Vol | 13.8 | " | 196.9 | " | 44.20 | — | 11:18 |
| 18 4 Well Vol | 13.3 | " | 198.8 | " | 46.80 | 16.05 | 11:22 |
| 19 5 Well Vol | 13.3 | " | 197.3 | " | 49.40 | — | 11:26 |
| 20 6 Well Vol | 13.3 | " | 197.8 | " | 52.00 | 16.10 | 11:30 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) _____ If pumped, pumping rate: _____

Well Purged Dry _____ Continuous Recharge _____

Notes concerning condition of well, odors, color, etc.: Parameters stabilized

Developer's Signature [signature]

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ENGINEERING, INC.

# LOG OF BORING P-35



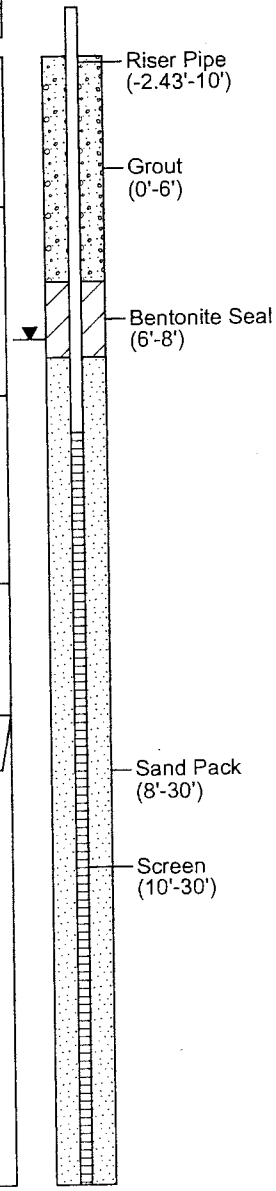
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 27

| | | | |
|---|---|---|---|
| Date Started | : 02/01/07 | Drilling Company | : SAEDACCO |
| Date Completed | : 02/02/07 | Northing Coord. | : 801086.73662 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843001.82813 |
| Drilling Method | : Hollow Stem/Air Rotary | Survey By | : Tritech |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : Sarah McCarthy |

| Depth in Feet | Surf. Elev. | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | CL | SANDY CLAY, orange tan grading into a dark brown<br>Take a Shelby tube at 2-4 feet |
| 5 | | 6<br>7<br>12<br>14 | 60 | PWR | Partially Weathered Rock (PWR), feldspar, quartz, tan/white/orange/brown/grey, coarse-grained |
| 10 | | 2<br>6<br>50/2 | 50 | PWR | PWR, feldspar, quartz, coarse-grained, tan/white/orange/brown/grey |
| 15 | | 41<br>50/3 | 40 | | PWR, feldspar, quartz, coarse-grained, tan/while/orange/brown/grey |
| | | 50/1 | 0 | | Auger refusal at 17.5, so switch to air rotary |
| 20 | | | | Bedrock | Bedrock, blue/green feldspar and quartz |
| 25 | | | | | |
| 30 | | | | | Boring terminated at 30 feet |
| 35 | | | | | |

Well: P-35
TOC Elev.: 616.33




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 2/2/07 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Burt |
| Drilling Method(s) | : Air Rotary |
| Company Rep. | : Burt |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.43-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

Type : DSI # 2 Sand

WELL SCREEN SEAL

Type : 3/8" Bentonite chips

ANNULUS SEAL

Type : No. 1 Portland grout

PROTECTIVE CSG.

Type : None

WELL PAD

Type : None

1. Drilling performed with a GP-1100 E Air Rig, utilizing 8.25-inch ID hollow stem augers to auger refusal. Borehole was continued with a GP-1100 E Air Rig, utilizing a 6-inch hammer to approximately 30.0 feet.

2. Dry cuttings were observed with air rotary drilling from 17-30 feet.

3. Water Level from 03/06/07 = 9.94' below TOC.

P-35

# NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2675

1. WELL CONTRACTOR:
Robert Lee Miller
Well Contractor (Individual) Name
Saedacco
Well Contractor Company Name
STREET ADDRESS 9088 NORTHFIELD DR.
Ft. Mill SC
City or Town State Zip Code
(803) 548-2180
Area code- Phone number

2. WELL INFORMATION:
SITE WELL ID #(if applicable) P-35
STATE WELL PERMIT#(if applicable)
DWQ or OTHER PERMIT #(if applicable)
WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ ☒ther ☐ (list use) Piezometers
DATE DRILLED 2/1/07
TIME COMPLETED _____ AM ☐ PM ☐

3. WELL LOCATION:
CITY: Liberty COUNTY
5833 Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)
TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☒ Flat ☐ Ridge ☐ Other
(check appropriate box)
LATITUDE 3 __ __
LONGITUDE __ __ __
May be in degrees, minutes, seconds or in a decimal format
Latitude/longitude source: ☐ GPS ☐ Topographic map
*(location of well must be shown on a USGS topo map and attached to this form if not using GPS)*

4. FACILITY- is the name of the business where the well is located.
FACILITY ID #(if applicable)
NAME OF FACILITY Cobie's Sandrock C&D LANDFILL
STREET ADDRESS 5833 Foster Store RD.
Liberty NC 27298
City or Town State Zip Code
CONTACT PERSON VAN Burbach
MAILING ADDRESS 2211 W. Meadowview RD.
Greensboro NC 27407 Suite101
City or Town State Zip Code
(336) 707-3874
Area code - Phone number

5. WELL DETAILS:
a. TOTAL DEPTH: 30'
b. DOES WELL REPLACE EXISTING WELL? YES ☒ NO ☐
c. WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3' FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.
e. YIELD (gpm): _____ METHOD OF TEST
f. DISINFECTION: Type _____ Amount
g. WATER ZONES (depth):
From To From To
From To From To
From To From To

6. CASING:

| | Depth | | Diameter | Thickness/ Weight | Material |
|---|---|---|---|---|---|
| From 0 | To 10' | Ft. | 2" | SCH 40 | PVC |
| From | To | Ft. | | | |
| From | To | Ft. | | | |

7. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 6' | Ft. | Portland | Pour |
| From | To | Ft. | | |
| From | To | Ft. | | |

8. SCREEN:

| | Depth | | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| From 10' | To 30' | Ft. | 2" in. | .010 in. | PVC |
| From | To | Ft. | in. | in. | |
| From | To | Ft. | in. | in. | |

9. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 8' | To 30' | Ft. | 20/30 | Silica Sand |
| From | To | Ft. | | |
| From | To | Ft. | | |

10. DRILLING LOG

| From | To | Formation Description |
|---|---|---|
| 0 | 20' | TN Sand Stone |
| 20' | 30' | Rock |

11. REMARKS:
2' Bentonite Seal 6'-8'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Robert L. M 2/5/07
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE
Robert L. Miller
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-8-07

Casing Type _____

Well/Boring Number P-35

Casing Diameter (Dr) 2 inches

Screened Interval 14-29

Riser Elevation _____

Total Well Depth (Lw) 30.00 feet

Depth to Water (Lf) 11.12 feet

Time of Measurement 10.33

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 3.07 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 7.9 | 5.70 | 55.3 | 160 | 0 | 11.12 | 10:57 |
| After Purging 1 Well Vol | 11.5 | 7.71 | 629 | +1000 | 3.07 | — | 10:00 |
| 2 Well Vol | 12.2 | 7.65 | 422 | " | 6.14 | — | 11:03 |
| 3 Well Vol | 12.4 | 7.50 | 405 | " | 9.21 | — | 11:06 |
| 4 Well Vol | 12.6 | 7.43 | 374 | " | 12.28 | — | 11:09 |
| 5 Well Vol | 12.6 | 7.41 | 365 | " | 15.35 | — | 11:12 |
| 6 Well Vol | 12.8 | 7.36 | 376 | " | 18.42 | — | 11:15 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) pump If pumped, pumping rate: 1 gal per min

Well Purged Dry 52.19 Continuous Recharge _____

Notes concerning condition of well, odors, color, etc.:

Developer's Signature [signature]

E:\DATASH~1\ADMINI~1\TEAM12~1\WELLDE~1.FRM

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-8-07

Casing Type _____

Well/Boring Number P-35

Casing Diameter (Dr) 2 inches

Screened Interval 14-29

Riser Elevation _____

Total Well Depth (Lw) 30.00 feet

Depth to Water (Lf) 11.12 feet

Time of Measurement _____

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 3.07 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| 7 well vols ~~Before Development~~ | 13.4 | 7.38 | 409 | +1000 | 21.49 | | 11:18 |
| After Purging 8 1 Well Vol | 12.9 | 7.48 | 447 | " | 24.56 | | 11:21 |
| 9 2 Well Vol | 13.4 | 7.48 | 550 | " | 27.63 | | 11:24 |
| 10 3 Well Vol | 13.4 | 7.53 | 629 | " | 30.70 | | 11:27 |
| 11 4 Well Vol | 13.5 | 7.59 | 831 | " | 33.77 | | 11:30 |
| 12 5 Well Vol | 13.7 | 7.63 | 917 | " | 36.84 | | 11:33 |
| 13 6 Well Vol | 13.7 | 7.72 | 868 | " | 39.91 | | 11:36 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) Pump If pumped, pumping rate: _____

Well Purged Dry _____ Continuous Recharge _____

Notes concerning condition of well, odors, color, etc.:

Developer's Signature [signature]

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# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-8-07

Casing Type _____

Well/Boring Number P-35

Casing Diameter (Dr) 2 inches

Screened Interval _____

Riser Elevation _____

Total Well Depth (Lw) 30.00 feet

Depth to Water (Lf) 11.12 feet

Time of Measurement _____

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 3.07 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| 14 well vols ~~Before Development~~ | 13.1 | 7.80 | 847 | ~~1000~~ | 42.98 | | 11:39 |
| After Purging 15 ~~1~~ Well Vol | 13.3 | 7.81 | 749 | " | 46.05 | | 11:42 |
| 16 ~~2~~ Well Vol | 14.0 | 7.67 | 586 | " | 49.12 | | 11:45 |
| 17 ~~3~~ Well Vol | 14.0 | 7.56 | 475 | " | 52.19 | | 11:48 |
| 4 Well Vol | | | Dry @ 52.19 | | | | |
| 5 Well Vol | | | | | | | |
| 6 Well Vol | | | | | | | |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) pump If pumped, pumping rate: _____

Well Purged Dry 52.19 Continuous Recharge _____

Notes concerning condition of well, odors, color, etc.:

Developer's Signature [signature]

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ENGINEERING, INC.

# LOG OF BORING P-36



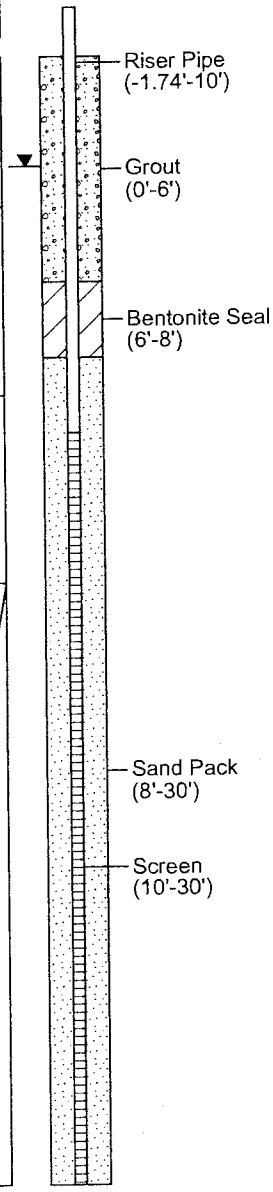
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 27

| | | | |
|---|---|---|---|
| Date Started | : 02/01/07 | Drilling Company | : SAEDACCO |
| Date Completed | : 02/01/07 | Northing Coord. | : 800808.66526 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1843297.97220 |
| Drilling Method | : Hollow Stem/Air Rotary | Survey By | : Tritech |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : Sarah McCarthy |

| Depth in Feet | Surf. Elev. | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | ML | SANDY SILT, dark brown/grey grading to at light brown silty sand |
| 5 | | 24 37 41 34 | 70 | PWR | Partially Weathered Rock (PWR), mottled, feldspar and quartz, white/grey/tan/light brown |
| 10 | | 50/2 | 25 | PWR | PWR, mottled, feldspar and quartz, white/tan/light brown/grey |
| 15 | | 50/1 | 0 | | Auger refusal @ 14', switch to air rotary<br>Bedrock, quartz and feldspar |
| 30 | | | | | Boring terminated at 30 feet |
| 35 | | | | | |

Well: P-36
TOC Elev.: 624.84




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 2/1/07 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Burt |
| Drilling Method(s) | : Air Rotary |
| Company Rep. | : Burt |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 1.74-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 2 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : None |

WELL PAD

| | |
|---|---|
| Type | : None |

1. Drilling performed with a GP-1100 E Air Rig, utilizing 8.25-inch ID hollow stem augers to auger refusal. Borehole was continued with a GP-1100 E Air Rig, utilizing a 6-inch hammer to approximately 30.0 feet.

2. Dry cuttings were observed with air rotary drilling from 14-30 feet.

3. Water level from 03/06/07 = 4.66' below TOC.

05-11-2007 P:\Coble's Sandrock\Environmental\419.00.T5,18,19 - Hydrogeo Phase 3\Hydrogeologic & GMP Reports\Boring Logs 2.07\P-36.BOR

P-36

# NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2675

1. WELL CONTRACTOR:
Robert Lee Miller
Well Contractor (Individual) Name
Saedacco
Well Contractor Company Name
STREET ADDRESS 9088 NORTHFIELD DR.
Ft. Mill SC
City or Town State Zip Code
(803) 548-2180
Area code- Phone number

2. WELL INFORMATION:
SITE WELL ID #(if applicable) P-36
STATE WELL PERMIT#(if applicable)
DWQ or OTHER PERMIT #(if applicable)
WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use) Piezometers
DATE DRILLED 2/1/07
TIME COMPLETED _____ AM ☐ PM ☐

3. WELL LOCATION:
CITY: Liberty COUNTY
5833 Foster Store RD
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)
TOPOGRAPHIC / LAND SETTING:
☐ Slope ☒ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)
LATITUDE 3
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format
Latitude/longitude source: ☐ GPS ☐ Topographic map
*(location of well must be shown on a USGS topo map and attached to this form if not using GPS)*

4. FACILITY- is the name of the business where the well is located.
FACILITY ID #(if applicable)
NAME OF FACILITY Cobie's Sandrock C&D LANDFILL
STREET ADDRESS 5833 Foster Store RD.
Liberty NC 27298
City or Town State Zip Code
CONTACT PERSON VAN Burbach
MAILING ADDRESS 2211 W. Meadowview RD.
Greensboro NC 27407 Suite101
City or Town State Zip Code
(336) 707-3874
Area code - Phone number

5. WELL DETAILS:
a. TOTAL DEPTH: 30'
b. DOES WELL REPLACE EXISTING WELL? YES ☒ NO ☐
c. WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3' FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.
e. YIELD (gpm): _____ METHOD OF TEST
f. DISINFECTION: Type _____ Amount
g. WATER ZONES (depth)
From To From To
From To From To
From To From To

6. CASING:

| From | To (Depth) | Ft. | Diameter | Thickness/Weight | Material |
|---|---|---|---|---|---|
| 0 | 6' | | 2" | SCH 40 | PVC |
| | | | | | |
| | | | | | |

7. GROUT:

| From | To (Depth) | Ft. | Material | Method |
|---|---|---|---|---|
| 0 | 6' | | Portland | Pour |
| | | | | |
| | | | | |

8. SCREEN:

| From | To (Depth) | Ft. | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| 10' | 30' | | 2" in. | .010 in. | PVC |
| | | | in. | in. | |
| | | | in. | in. | |

9. SAND/GRAVEL PACK:

| From (Depth) | To | Ft. | Size | Material |
|---|---|---|---|---|
| 8' | 30' | | 20/30 | Silica Sand |
| | | | | |
| | | | | |

10. DRILLING LOG

| From | To | Formation Description |
|---|---|---|
| 0 | 15' | Sand Stone |
| 15' | 30' | Rock |

11. REMARKS:
2' Bentonite Seal 6' to 8'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Robert L. M 2/5/07
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE
Robert L. Miller
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-5-07

Casing Type

Well/Boring Number P-36

Casing Diameter (Dr) 2 inches

Screened Interval 17-30

Riser Elevation

Total Well Depth (Lw) 30.00 feet

Depth to Water (Lf) 4.91 feet

Time of Measurement 11:47

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 4.09 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 12.5 | — | 228 | 14.8 Clear | 0 | 4.91 | 1149 |
| After Purging 1 Well Vol | 14.2 | — | 234 | +1000 | 4.09 | — | 11:57 |
| 2 Well Vol | 14.8 | — | 242 | +1000 | 8.18 | 8.50 | 12:04 |
| 3 Well Vol | 14.8 | 6.22 | 241 | Brown/Gray +1000 | 12.27 | 5.29 | 1210 |
| 4 Well Vol | 14.8 | 6.17 | 237 | Brown/Gray +1000 | 16.36 | 5.39 | 1218 |
| 5 Well Vol | 15.1 | 6.14 | 236 | " +1000 | 20.45 | — | 12:24 |
| 6 Well Vol | 14.9 | 6.21 | 234 | +1000 | 24.54 | 5.40 | 12:30 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) bailer If pumped, pumping rate:

Well Purged Dry Continuous Recharge yes

Notes concerning condition of well, odors, color, etc.:

Developer's Signature

E:\DATASH~1\ADMINI~1\TEAM12~1\WELLDE~1.FRM

2 of 2

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-5-07

Casing Type _____

Well/Boring Number D-36

Casing Diameter (Dr) _____ inches

Screened Interval _____

Riser Elevation _____

Total Well Depth (Lw) _____ feet

Depth to Water (Lf) _____ feet

Time of Measurement _____

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf) =$ _____ gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| ~~Before Development~~ Well Vol 7 | 14.1 | 6.16 | 237 | +1000 | 28.63 | — | 12:39 |
| After Purging 8 ~~4~~ Well Vol | 14.5 | 6.14 | 237 | +1000 | 32.72 | 5.61 | 12:44 |
| 9 ~~2~~ Well Vol | 14.7 | 6.20 | 237 | +1000 | 36.81 | — | 12:52 |
| 10 ~~3~~ Well Vol | 14.6 | 2.23 | 235 | +1000 | 40.90 | 5.75 | 12:59 |
| 4 Well Vol | | | | | | | |
| 5 Well Vol | | | | | | | |
| 6 Well Vol | | | | | | | |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) bailer If pumped, pumping rate: _____

Well Purged Dry _____ Continuous Recharge yes

Notes concerning condition of well, odors, color, etc.: Parameters Stabilized

Developer's Signature [signature]

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ENGINEERING, INC.

# LOG OF BORING P-37



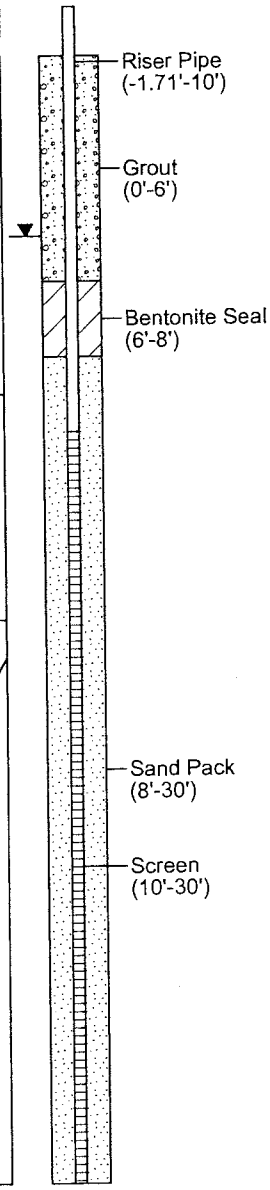
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 27

| | | | |
|---|---|---|---|
| Date Started | : 02/01/07 | Drilling Company | : SAEDACCO |
| Date Completed | : 02/01/07 | Northing Coord. | : 800909.52629 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842877.05974 |
| Drilling Method | : Hollow Stem/Air Rotary | Survey By | : Tritech |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : Sarah McCarthy |

| Depth in Feet | Surf. Elev. | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | CL | SANDY CLAY, brown/tan/orange<br>Take Shelby tube at 2-4 feet |
| 5 | | 6<br>8<br>8<br>13 | 60 | SM | SILTY SAND, with some Partially Weathered Rock (PWR), feldspar and quartz, brown/orange/tan/white |
| 10 | | 20<br>50/4<br>50/2 | 60 | PWR | PWR, feldspar and quartz, white/dark brown/tan/orange |
| | | 50/2 | 15 | | |
| 15 | | | | | Auger refusal @ 15' - switch to air rotary |
| | | | | Bedrock | Bedrock, blue/green, quartz and feldspar<br><br>Rock Core:<br>16-21' - REC = 95%, RQD = 86%<br>21-26' - REC = 94%, RQD = 82%<br>26-31' - REC = 43%, RQD = 80% |
| 20 | | | | | |
| 25 | | | | | |
| 30 | | | | | Boring terminated at 30 feet |
| 35 | | | | | |

Well: P-37
TOC Elev.: 613.61




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 2/2/07 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Burt |
| Drilling Method(s) | : Air Rotary |
| Company Rep. | : Burt |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 1.71-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

| | |
|---|---|
| Type | : DSI # 2 Sand |

WELL SCREEN SEAL

| | |
|---|---|
| Type | : 3/8" Bentonite chips |

ANNULUS SEAL

| | |
|---|---|
| Type | : No. 1 Portland grout |

PROTECTIVE CSG.

| | |
|---|---|
| Type | : None |

WELL PAD

| | |
|---|---|
| Type | : None |

1. Drilling performed with a GP-1100 E Air Rig, utilizing 8.25-inch ID hollow stem augers to auger refusal. Borehole was continued with a GP-1100 E Air Rig, utilizing a 6-inch hammer to approximately 30.0 feet.

2. Dry cuttings were observed with air rotary drilling from 15-30 feet.

3. Water Level from 03/06/07 = 6.50' below TOC.

05-16-2007 P:\Coble's Sandrock\Environmental\419.00.T5.18.19 - Hydrogeo Phase 3\Hydrogeologic & GMP Reports\Boring Logs 2.07\P-37.BOR

P-37

# NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2675

1. WELL CONTRACTOR:
Robert Lee Miller
Well Contractor (Individual) Name
Saedacco
Well Contractor Company Name
STREET ADDRESS 9088 NORTHFIELD DR.
Fort Mill SC
City or Town State Zip Code
803 548-7180
Area code- Phone number

2. WELL INFORMATION:
SITE WELL ID #(if applicable) P-37
STATE WELL PERMIT#(if applicable)
DWQ or OTHER PERMIT #(if applicable)
WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use) Piezometers
DATE DRILLED 2/5/07
TIME COMPLETED 1:00 AM ☐ PM ☑

3. WELL LOCATION:
CITY: Liberty COUNTY
5833 Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)
TOPOGRAPHIC / LAND SETTING:
☒ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)
LATITUDE 3
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format
Latitude/longitude source: ☐ GPS ☐ Topographic map
*(location of well must be shown on a USGS topo map and attached to this form if not using GPS)*

4. FACILITY- is the name of the business where the well is located.
FACILITY ID #(if applicable)
NAME OF FACILITY Cobie's Sandrock C&D LANDFILL
STREET ADDRESS 5833 Foster Store RD.
Liberty NC 27298
City or Town State Zip Code
CONTACT PERSON VAN Burbach
MAILING ADDRESS 2211 W. Meadowview RD.
Greensboro NC 27407 Suite101
City or Town State Zip Code
(336) 707-3874
Area code - Phone number

5. WELL DETAILS:
a. TOTAL DEPTH: 23'
b. DOES WELL REPLACE EXISTING WELL? YES ☒ NO ☐
c. WATER LEVEL Below Top of Casing: FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3' FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.
e. YIELD (gpm): METHOD OF TEST
f. DISINFECTION: Type Amount
g. WATER ZONES (depth):
From To From To
From To From To
From To From To

6. CASING:

| | Depth | | Diameter | Thickness/ Weight | Material |
|---|---|---|---|---|---|
| From 0 | To 8' | Ft. | 2" | SCH40 | PVC |
| From | To | Ft. | | | |
| From | To | Ft. | | | |

7. GROUT:

| | Depth | | Material | Method |
|---|---|---|---|---|
| From 0 | To 4' | Ft. | Portland | Pour |
| From | To | Ft. | | |
| From | To | Ft. | | |

8. SCREEN:

| | Depth | | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| From 8' | To 23' | Ft. | 2" in. | .010 in. | PVC |
| From | To | Ft. | in. | in. | |
| From | To | Ft. | in. | in. | |

9. SAND/GRAVEL PACK:

| | Depth | | Size | Material |
|---|---|---|---|---|
| From 6' | To 23' | Ft. | 20/30 | Silica Sand |
| From | To | Ft. | | |
| From | To | Ft. | | |

10. DRILLING LOG

| From | To | Formation Description |
|---|---|---|
| 0 | 10' | TN Silt |
| 10' | 16' | TN Sand Stone |
| 16' | 23' | Rock |

11. REMARKS:
2' Bentonite Seal 4' to 6'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Robert L. Miller 2/5/07
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE
Robert L. Miller
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

1 of 2

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-8-07

Casing Type _____

Well/Boring Number D-37

Casing Diameter (Dr) 2 inches

Screened Interval 8-23

Riser Elevation _____

Total Well Depth (Lw) 23.00 feet

Depth to Water (Lf) 8.09 feet

Time of Measurement 12:26

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 2.43 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 12.8 | 7.33 | 185 | Clear 206 | 0 | 8.09 | 12:52 |
| After Purging 1 Well Vol | 12.8 | 6.63 | 160.5 | 240 | 2.43 | — | 12:55 |
| 2 Well Vol | 12.7 | 6.07 | 160.8 | 368 | 4.86 | 10.03 | 13:00 |
| 3 Well Vol | 12.6 | 5.96 | 162.8 | lightbrown 836 | 7.29 | — | 13:04 |
| 4 Well Vol | 12.7 | 5.91 | 173.8 | +1000 | 9.72 | 11.05 | 13:10 |
| 5 Well Vol | 13.0 | 5.83 | 178.4 | +1000 | 12.15 | — | 13:14 |
| 6 Well Vol | 13.1 | 6.02 | 177.8 | +1000 | 14.58 | 11.49 | 13:21 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) bailer If pumped, pumping rate: _____

Well Purged Dry _____ Continuous Recharge yes

Notes concerning condition of well, odors, color, etc.:

Developer's Signature [signature]

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# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-8-07

Casing Type

Well/Boring Number P-37

Casing Diameter (Dr) 2 inches

Screened Interval

Riser Elevation

Total Well Depth (Lw) 23.00 feet

Depth to Water (Lf) 8.09 feet

Time of Measurement

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 2.43 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| 7 well/vol ✓ | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| ~~Before Development~~ | 13.3 | 6.11 | 122.0 | +1000 | 17.01 | — | 13:25 |
| After Purging | | | | | | | |
| 8 ~~1~~ Well Vol | 13.6 | 6.03 | 180.8 | +1000 | 19.44 | 12.05 | 13:30 |
| 9 ~~2~~ Well Vol | 13.4 | 6.10 | 180.8 | +1000 | 21.87 | — | 13:34 |
| 10 ~~3~~ Well Vol | 13.6 | 6.12 | 182.2 | +1000 | 24.30 | 12.59 | 13:38 |
| 11 ~~4~~ Well Vol | 13.4 | 6.14 | 182.7 | +1000 | 26.73 | — | 13:41 |
| 12 ~~5~~ Well Vol | 13.5 | 6.17 | 179.4 | +1000 | 29.16 | 13:07 | 13:45 |
| 13 ~~6~~ Well Vol | 13.5 | 6.19 | 180.0 | +1000 | 31.59 | 13:48 | 13:48 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) bailer If pumped, pumping rate:

Well Purged Dry Continuous Recharge yes

Notes concerning condition of well, odors, color, etc.: Parameter Stabilized

Developer's Signature

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JOYCE ENGINEERING, INC.

# LOG OF BORING P-38



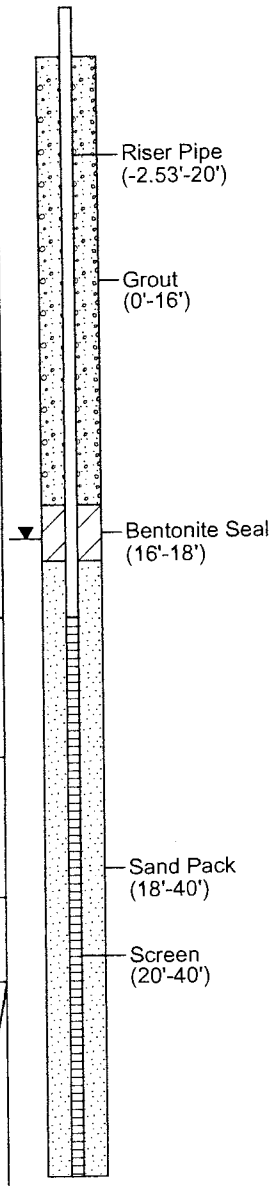
Coble's Sandrock
C&D Permit Application
Alamance County, NC

JEI Project No. 419.00,Task 27

| | | | |
|---|---|---|---|
| Date Started | : 01/31/07 | Drilling Company | : SAEDACCO |
| Date Completed | : 01/31/07 | Northing Coord. | : 800535.14194 |
| Hole Diameter | : 8.25-inch/6.25-inch | Easting Coord. | : 1842942.67219 |
| Drilling Method | : Hollow Stem/Air Rotary | Survey By | : Tritech |
| Sampling Method | : Split Spoons/Cuttings | Logged By | : Sarah McCarthy |

| Depth in Feet | Surf. Elev. | Blow Count | % Rec. | USCS | DESCRIPTION |
|---|---|---|---|---|---|
| 0 | | | | CL | SANDY CLAY, brown/orange/tan |
| 5 | | 5 6 6 12 | 100 | SC | CLAYEY SAND, mottled orange/white/tan |
| 10 | | 9 16 18 24 | 100 | SC | CLAYEY SAND, mottled orange/white/black/tan |
| 15 | | 45 50/3 | 25 | PWR | Partially Weathered Rock (PWR), feldspar and quartz with iron staining, coarse-grained, white/red/tan |
| 20 | | 13 15 28 18 | 80 | PWR | PWR, feldspar and quartz, iron staining, white/red/tan |
| 25 | | 50/3 | 25 | PWR | PWR, feldspar and quartz, white/tan/red |
| 30 | | 50/3 | 15 | PWR | PWR, feldspar and quartz, white/tan/red |
| 35 | | 50/1 | 0 | Bedrock | Auger refusal at 33 feet, so switch to air rig<br>Bedrock, blue/green grading into a pink/tan/white |
| 40 | | | | | |
| 45 | | | | | Boring terminated at 45 feet. Backfilled with sand to 40 feet to set the well. |

Well: P-38
TOC Elev.: 631.33




## Well Construction Information

WELL CONSTRUCTION

| | |
|---|---|
| Date Compl. | : 1/31/07 |
| Hole Diameter(s) | : 8.25-inch/6.25-inch |
| Drilling Method(s) | : Hollow Stem Augers |
| Company Rep. | : Burt |
| Drilling Method(s) | : Air Rotary |
| Company Rep. | : Burt |

WELL CASING

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Threaded, flush-coupled |
| Approx. Csg. Stickup | : 2.53-feet |

WELL SCREEN

| | |
|---|---|
| Material | : Schedule 40 PVC |
| Diameter | : 2-inch |
| Joints | : Thredded, flush-coupled |
| Opening | : 0.010 inch, slotted |

GRAVEL PACK

Type : DSI # 2 Sand

WELL SCREEN SEAL

Type : 3/8" Bentonite chips

ANNULUS SEAL

Type : No. 1 Portland grout

PROTECTIVE CSG.

Type : None

WELL PAD

Type : None

1. Drilling performed with a GP-1100 E Air Rig, utilizing 8.25-inch ID hollow stem augers to auger refusal. Borehole was continued with a GP-1100 E Air Rig, utilizing a 6-inch hammer to approximately 40.0 feet.

2. Dry cuttings were observed with air rotary drilling from 33-40 feet.

3. Water level from 03/06/07 = 19.74' below TOC.

P-38

# NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2675

1. WELL CONTRACTOR:
Robert Lee Miller
Well Contractor (Individual) Name
Saedacco
Well Contractor Company Name
STREET ADDRESS 9088 NORTHFIELD DR.
Ft. Mill SC
City or Town State Zip Code
(803) 548-2180
Area code- Phone number

2. WELL INFORMATION:
SITE WELL ID #(if applicable) P-38
STATE WELL PERMIT#(if applicable)
DWQ or OTHER PERMIT #(if applicable)
WELL USE (Check Applicable Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use) Piezometers
DATE DRILLED 1/31/07
TIME COMPLETED _____ AM ☐ PM ☐

3. WELL LOCATION:
CITY: Liberty COUNTY
5833 Foster Store RD.
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)
TOPOGRAPHIC / LAND SETTING:
☒ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)
LATITUDE 3
LONGITUDE
May be in degrees, minutes, seconds or in a decimal format
Latitude/longitude source: ☐ GPS ☐ Topographic map
*(location of well must be shown on a USGS topo map and attached to this form if not using GPS)*

4. FACILITY - is the name of the business where the well is located.
FACILITY ID #(if applicable)
NAME OF FACILITY Cobie's Sandrock C&D LANDFILL
STREET ADDRESS 5833 Foster Store RD.
Liberty NC 27298
City or Town State Zip Code
CONTACT PERSON VAN Burbach
MAILING ADDRESS 2211 W. Meadowview RD.
Greensboro NC 27407 Suite101
City or Town State Zip Code
(336) 707-3874
Area code - Phone number

5. WELL DETAILS:
a. TOTAL DEPTH: 40'
b. DOES WELL REPLACE EXISTING WELL? YES ☒ NO ☐
c. WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3' FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.
e. YIELD (gpm): _____ METHOD OF TEST
f. DISINFECTION: Type _____ Amount
g. WATER ZONES (depth)
From To From To
From To From To
From To From To

6. CASING:

| From | To | Depth Ft. | Diameter | Thickness/ Weight | Material |
|---|---|---|---|---|---|
| 0 | 20' | | 2" | SCH40 | PVC |
| | | | | | |
| | | | | | |

7. GROUT:

| From | To | Depth Ft. | Material | Method |
|---|---|---|---|---|
| 0 | 16' | | Portland | Pour |
| | | | | |
| | | | | |

8. SCREEN:

| From | To | Depth Ft. | Diameter in. | Slot Size in. | Material |
|---|---|---|---|---|---|
| 20' | 40' | | 2" | .010 | PVC |
| | | | | | |
| | | | | | |

9. SAND/GRAVEL PACK:

| From | To | Depth Ft. | Size | Material |
|---|---|---|---|---|
| 18' | 40' | | 20/30 | Silica Sand |
| | | | | |
| | | | | |

10. DRILLING LOG

| From | To | Formation Description |
|---|---|---|
| 0 | 20' | TN Silt |
| 20' | 30' | Sand Stone |
| 30' | 40' | Rock |

11. REMARKS:
2' Bentonite Seal 16' to 18'

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Robert L. M 2/5/07
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE
Robert L. Miller
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev. 7/05

1 of 2

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-5-07

Casing Type ~~PVC~~ EMF

Well/Boring Number P-38

Casing Diameter (Dr) 2 inches

Screened Interval 12-27

Riser Elevation

Total Well Depth (Lw) 40.00 feet

Depth to Water (Lf) 19.97 feet

Time of Measurement 13:18

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 3.26 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| Before Development | 13.6 | 6.54 | 191 | light brown 253 | 0 | 19.97 | 13:20 |
| After Purging 1 Well Vol | 14.0 | 6.56 | 186 | +1000 | 3.26 | — | 13:34 |
| 2 Well Vol | 13.8 | 6.54 | 184.5 | +1000 | 6.52 | 26.06 | 13:42 |
| 3 Well Vol | 13.8 | 6.56 | 175.6 | " | 9.78 | — | 13:51 |
| 4 Well Vol | 14.0 | — | 170.0 | " | 13.04 | 29.65 | 14:00 |
| 5 Well Vol | 13.9 | — | 169.5 | " | 16.30 | — | 14:06 |
| 6 Well Vol | 12.9 | 6.80 | 166.5 | " | 19.56 | 35.26 | 14:17 |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) bailer If pumped, pumping rate:

Well Purged Dry 23.00 gals Continuous Recharge

Notes concerning condition of well, odors, color, etc.:

Developer's Signature

E:\DATASH~1\ADMINI~1\TEAM12~1\WELLDE~1.FRM

# MONITORING WELL DEVELOPMENT DATA SHEET

Project 419.00.27 Date 2-5-07

Casing Type

Well/Boring Number P-38

Casing Diameter (Dr) 2 inches

Screened Interval

Riser Elevation

Total Well Depth (Lw) 40.00 feet

Depth to Water (Lf) ~~X~~ 19.97 feet

Time of Measurement

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = 3.26 gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

| | Temp (C) | pH | Conductivity (µS/cm) | Clarity/ Color/ Turbidity | Volume (gallons) | Water Level (ft) | Time |
|---|---|---|---|---|---|---|---|
| ~~Before Development~~ Well Vol 7 | 13.5 | — | 165.4 | >1000 | 22.82 | — | 14.25 |
| After Purging 1 Well Vol | | | Dry @ 23.00 gals | | | | |
| 2 Well Vol | | | | | | | |
| 3 Well Vol | | | | | | | |
| 4 Well Vol | | | | | | | |
| 5 Well Vol | | | | | | | |
| 6 Well Vol | | | | | | | |

(Fill in one or more of the above columns depending on available equipment)

Method of purging (bailer or pump) bailer If pumped, pumping rate:

Well Purged Dry 23.00 gals Continuous Recharge

Notes concerning condition of well, odors, color, etc.:

Developer's Signature

E:\DATASH~1\ADMINI~1\TEAM12~1\WELLDE~1.FRM

# APPENDIX DH-3

## Surveys of Piezometer and Monitoring Well Locations

Coble Sandrock C&D Landfill
Monitoring Well & Piezometer Survey
*Tritech Civil Environmental, P.C.*
*Project No. 07532-28*

Note: Coordinates (X,Y,Z) Are N.C. Grid - NAD '83 Based Upon Control Established By Suttle's Surveying, P.A.

Field Surveys Performed 2/15 & 2/22 2007
Elevations Determined By Closed-Loop Differential Leveling

| POINT | NORTHING (Y) | EASTING (X) | ELEV. | DESCRIPTION |
|---|---|---|---|---|
| 553 | 801298.59726 | 1844106.87978 | 626.8<br>629.73 | P-34 Ground<br>P-34 TOC |
| 555 | 800906.52629 | 1842877.05974 | 611.9<br>613.61 | P-37 Ground<br>P-37 TOC |
| 556 | 801086.73662 | 1843001.82813 | 613.9<br>616.33 | P-35 Ground<br>P-35 TOC |
| 558 | 800535.14194 | 1842942.67219 | 628.8<br>631.33 | P-38 Ground<br>P-38 TOC |
| 559 | 800808.66526 | 1843297.97220 | 623.1<br>624.84 | P-36 Ground<br>P-36 TOC |
| 560 | 802014.58961 | 1843227.64678 | 607.0<br>608.56 | P-31 Ground<br>P-31 TOC |
| 561 | 802421.06000 | 1842969.08000 | 598.1<br>600.35 | P-32 Ground<br>P-32 TOC |
| 562 | 802416.38410 | 1842804.98743 | 595.5<br>597.68 | P-33 Ground<br>P-33 TOC |

NORTH CAROLINA PROFESSIONAL SEAL L-3492 LAND SURVEYOR MICHAEL R. STOUT

2/23/2007

Coble Sandrock C&D Landfill
Monitoring Well & Piezometer Survey
Project No. 05532-24
Tritech Civil Environmental, P.C.

Note: Coordinates (X,Y,Z) Are N.C. Grid - NAD '83 Based Upon Control Established By Suttle's Surveying, P.A.

Field Surveys Performed 4/11 & 4/18 2005
Elevations Determined By Closed-Loop Differential Leveling

| POINT | NORTHING (Y) | EASTING (X) | ELEV. | DESCRIPTION |
|---|---|---|---|---|
| 484 | 799303.3458790 | 1844228.8326400 | 637.49 | PZ-30 |
| | | | 634.75 | GROUND |
| 485 | 799415.2582420 | 1843889.0495900 | 627.45 | PZ-27 |
| | | | 625.25 | GROUND |
| 486 | 799763.1042900 | 1843747.3543300 | 619.49 | PZ-29 |
| | | | 617.31 | GROUND |
| 488 | 799572.9421430 | 1843510.3166300 | 613.15 | PZ-28 |
| | | | 610.36 | GROUND |
| 490 | 799656.9271540 | 1843260.6948800 | 625.20 | WW-2 |
| | | | 622.83 | GROUND |
| 491 | 801640.1465480 | 1843019.3592300 | 613.89 | PZ-24 |
| | | | 612.52 | GROUND |
| 492 | 801851.9868760 | 1843307.8001000 | 617.81 | PZ-25 |
| | | | 616.37 | GROUND |
| 494 | 802741.0630780 | 1843102.1614300 | 589.09 | MW-9 PVC |
| | | | 586.43 | P-K |
| 496 | 802580.8073020 | 1842586.6295300 | 574.26 | MW-8 PVC |
| | | | 571.50 | P-K |
| 497 | 802588.7498230 | 1842908.6996400 | 597.13 | PZ-26 |
| | | | 594.27 | GROUND |
| 498 | 802197.9668300 | 1843379.0247800 | 592.46 | MW-10S PVC |
| | | | 589.62 | P-K |
| 499 | 802203.6444670 | 1843369.3340900 | 592.76 | MW-10D PVC |
| | | | 589.90 | P-K |

NORTH CAROLINA PROFESSIONAL SEAL L-2402 LAND SURVEYOR MICHAEL R. STOUT

4/19/2005

| | | | | |
|---|---|---|---|---|
| 864 | 800927.820 | 1843019.175 | 611.91 | M WELL P5 |
| 866 | 800451.154 | 1843731.694 | 668.42 | M WELL P21 |
| 868 | 800107.753 | 1843920.412 | 629.90 | M.WELL P22 |
| 874 | 800650.073 | 1843430.852 | 641.11 | P20 |
| 881 | 802873.387 | 1843159.210 | 572.18 | P19S |
| 882 | 802873.295 | 1843159.058 | 569.15 | PK |
| 883 | 802869.867 | 1843148.340 | 571.85 | P19D |
| 884 | 802869.552 | 1843148.214 | 569.57 | PK |
| 887 | 801773.030 | 1842527.075 | 577.41 | MW5 |
| 888 | 801773.547 | 1842526.961 | 574.91 | PK |
| 892 | 800605.058 | 1844289.782 | 651.76 | P~~15~~18 |
| 893 | 800605.106 | 1844289.155 | 651.75 | PK |
| 897 | 800001.018 | 1843472.682 | 640.37 | P23 |
| 898 | 800001.403 | 1843472.858 | 638.01 | PK |
| 900 | 799910.089 | 1842914.445 | 651.22 | P15 |
| 901 | 799910.310 | 1842914.625 | 649.01 | PK |
| 904 | 799356.506 | 1844577.645 | 646.28 | P17 |
| 905 | 799356.404 | 1844578.130 | 643.76 | PK |
| 907 | 800591.064 | 1842674.247 | 612.05 | P16 |
| 908 | 800591.396 | 1842674.174 | 609.57 | PK |

# APPENDIX DH-4

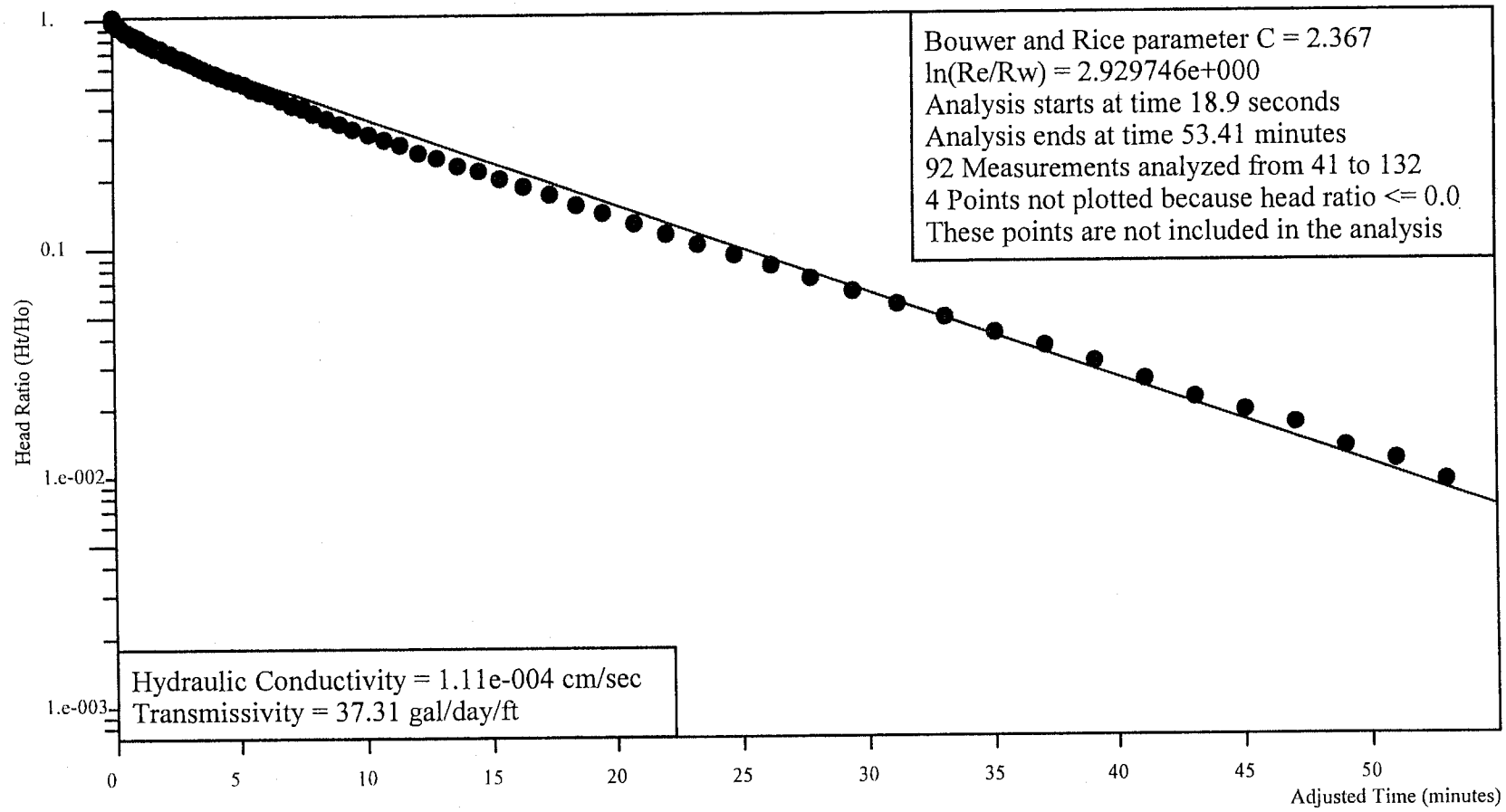
## Aquifer Slug Test Results from the Current Investigation

# Aquifer Analysis September 16, 2005

Coble's Sandrock

## Bouwer and Rice Graph

MW-9 (Falling)




Ho is 1.403 feet at 18.9 seconds

Project Number 419.19

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | September 16, 2005 |
| Project Number: | 419.19 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\0905 Slug Test |

| | |
|---|---|
| Well Label: | MW-9 (Falling) |
| Aquifer Thickness: | 15.86 feet |
| Screen Length: | 15. feet |
| Casing Radius: | 1.888 inches |
| Effective Radius: | 4.125 inches |
| Static Water Level: | 24.29 feet |
| Water Table to Screen Bottom: | 15.86 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 18.9 Seconds |

Test starts with trial 19
There are 140 time and drawdown measurements
Maximum head is 3.086 feet
Minimum head is -4.e-003 feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -18.9 | 24.29 | -1.e-003 | -3.24e-004 |
| 2 | 0.3 | -18.6 | 24.29 | 1.e-003 | 3.24e-004 |
| 3 | 0.6 | -18.3 | 24.29 | 3.e-003 | 9.721e-004 |
| 4 | 0.9 | -18. | 24.29 | 2.e-003 | 6.481e-004 |
| 5 | 1.2 | -17.7 | 24.28 | 6.e-003 | 1.944e-003 |
| 6 | 1.5 | -17.4 | 24.28 | 1.2e-002 | 3.889e-003 |
| 7 | 1.8 | -17.1 | 24.27 | 1.7e-002 | 5.509e-003 |
| 8 | 2.1 | -16.8 | 24.29 | -4.e-003 | -1.296e-003 |
| 9 | 2.4 | -16.5 | 24.28 | 1.e-002 | 3.24e-003 |
| 10 | 2.7 | -16.2 | 24.28 | 1.2e-002 | 3.889e-003 |
| 11 | 3. | -15.9 | 23.81 | 0.477 | 0.1546 |
| 12 | 3.3 | -15.6 | 23.89 | 0.399 | 0.1293 |
| 13 | 3.6 | -15.3 | 23.16 | 1.132 | 0.3668 |
| 14 | 3.9 | -15. | 23.2 | 1.086 | 0.3519 |
| 15 | 4.2 | -14.7 | 22.05 | 2.241 | 0.7262 |
| 16 | 4.5 | -14.4 | 22.86 | 1.431 | 0.4637 |
| 17 | 4.8 | -14.1 | 22.82 | 1.471 | 0.4767 |
| 18 | 5.1 | -13.8 | 22.62 | 1.671 | 0.5415 |
| 19 | 5.4 | -13.5 | 21.55 | 2.74 | 0.8879 |
| 20 | 5.7 | -13.2 | 21.2 | 3.086 | 1. |
| 21 | 6. | -12.9 | 23.2 | 1.094 | 0.3545 |
| 22 | 6.4 | -12.5 | 23.67 | 0.619 | 0.2006 |
| 23 | 6.7 | -12.2 | 23.18 | 1.11 | 0.3597 |
| 24 | 7.1 | -11.8 | 21.77 | 2.521 | 0.8169 |
| 25 | 7.5 | -11.4 | 22.15 | 2.142 | 0.6941 |
| 26 | 8. | -10.9 | 23.25 | 1.042 | 0.3377 |
| 27 | 8.4 | -10.5 | 23.04 | 1.25 | 0.4051 |
| 28 | 8.9 | -10. | 22.23 | 2.056 | 0.6662 |
| 29 | 9.5 | -9.4 | 22.67 | 1.617 | 0.524 |
| 30 | 10. | -8.9 | 23.07 | 1.217 | 0.3944 |
| 31 | 10.6 | -8.3 | 22.53 | 1.76 | 0.5703 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 11.3 | -7.6 | 22.73 | 1.555 | 0.5039 |
| 33 | 11.9 | -7. | 22.93 | 1.365 | 0.4423 |
| 34 | 12.6 | -6.3 | 22.63 | 1.659 | 0.5376 |
| 35 | 13.4 | -5.5 | 22.9 | 1.387 | 0.4494 |
| 36 | 14.2 | -4.7 | 22.75 | 1.541 | 0.4994 |
| 37 | 15. | -3.9 | 22.86 | 1.429 | 0.4631 |
| 38 | 15.9 | -3. | 22.81 | 1.485 | 0.4812 |
| 39 | 16.8 | -2.1 | 22.87 | 1.417 | 0.4592 |
| 40 | 17.8 | -1.1 | 22.83 | 1.459 | 0.4728 |
| 41 | 18.9 | 0. | 22.89 | 1.403 | 0.4546 |
| 42 | 20. | 1.1 | 22.87 | 1.417 | 0.4592 |
| 43 | 21.2 | 2.3 | 22.89 | 1.405 | 0.4553 |
| 44 | 22.4 | 3.5 | 22.91 | 1.381 | 0.4475 |
| 45 | 23.8 | 4.9 | 22.91 | 1.375 | 0.4456 |
| 46 | 25.2 | 6.3 | 22.92 | 1.369 | 0.4436 |
| 47 | 26.7 | 7.8 | 22.93 | 1.359 | 0.4404 |
| 48 | 28.2 | 9.3 | 22.94 | 1.349 | 0.4371 |
| 49 | 29.8 | 10.9 | 22.95 | 1.337 | 0.4332 |
| 50 | 31.5 | 12.6 | 22.96 | 1.329 | 0.4307 |
| 51 | 33.3 | 14.4 | 22.97 | 1.319 | 0.4274 |
| 52 | 35.2 | 16.3 | 22.98 | 1.309 | 0.4242 |
| 53 | 37.3 | 18.4 | 22.99 | 1.299 | 0.4209 |
| 54 | 39.5 | 20.6 | 23. | 1.289 | 0.4177 |
| 55 | 41.8 | 22.9 | 23.01 | 1.279 | 0.4145 |
| 56 | 44.3 | 25.4 | 23.02 | 1.272 | 0.4122 |
| 57 | 46.9 | 28. | 23.03 | 1.259 | 0.408 |
| 58 | 49.7 | 30.8 | 23.04 | 1.249 | 0.4047 |
| 59 | 52.6 | 33.7 | 23.05 | 1.239 | 0.4015 |
| 60 | 55.7 | 36.8 | 23.06 | 1.231 | 0.3989 |
| 61 | 59. | 40.1 | 23.07 | 1.219 | 0.395 |
| 62 | 62.5 | 43.6 | 23.08 | 1.209 | 0.3918 |
| 63 | 66.2 | 47.3 | 23.09 | 1.197 | 0.3879 |
| 64 | 70.1 | 51.2 | 23.11 | 1.185 | 0.384 |
| 65 | 74.3 | 55.4 | 23.11 | 1.175 | 0.3808 |
| 66 | 78.7 | 59.8 | 23.13 | 1.163 | 0.3769 |
| 67 | 83.4 | 64.5 | 23.14 | 1.151 | 0.373 |
| 68 | 88.4 | 69.5 | 23.15 | 1.137 | 0.3684 |
| 69 | 93.7 | 74.8 | 23.16 | 1.125 | 0.3645 |
| 70 | 99.3 | 80.4 | 23.18 | 1.109 | 0.3594 |
| 71 | 105.2 | 86.3 | 23.19 | 1.097 | 0.3555 |
| 72 | 111.5 | 92.6 | 23.21 | 1.081 | 0.3503 |
| 73 | 118.1 | 99.2 | 23.22 | 1.068 | 0.3461 |
| 74 | 125.1 | 106.2 | 23.24 | 1.052 | 0.3409 |
| 75 | 132.6 | 113.7 | 23.25 | 1.035 | 0.3354 |
| 76 | 140.5 | 121.6 | 23.27 | 1.019 | 0.3302 |
| 77 | 148.9 | 130. | 23.29 | 0.999 | 0.3237 |
| 78 | 157.8 | 138.9 | 23.31 | 0.985 | 0.3192 |
| 79 | 167.2 | 148.3 | 23.32 | 0.967 | 0.3134 |
| 80 | 177.2 | 158.3 | 23.34 | 0.947 | 0.3069 |
| 81 | 187.8 | 168.9 | 23.36 | 0.929 | 0.301 |
| 82 | 199. | 180.1 | 23.38 | 0.909 | 0.2946 |
| 83 | 210.9 | 192. | 23.4 | 0.889 | 0.2881 |
| 84 | 223.5 | 204.6 | 23.42 | 0.869 | 0.2816 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 236.8 | 217.9 | 23.44 | 0.847 | 0.2745 |
| 86 | 250.9 | 232. | 23.47 | 0.825 | 0.2673 |
| 87 | 265.8 | 246.9 | 23.49 | 0.803 | 0.2602 |
| 88 | 281.6 | 262.7 | 23.51 | 0.781 | 0.2531 |
| 89 | 298.4 | 279.5 | 23.53 | 0.759 | 0.2459 |
| 90 | 316.2 | 297.3 | 23.56 | 0.735 | 0.2382 |
| 91 | 335. | 316.1 | 23.58 | 0.713 | 0.231 |
| 92 | 354.9 | 336. | 23.6 | 0.689 | 0.2233 |
| 93 | 376. | 357.1 | 23.63 | 0.663 | 0.2148 |
| 94 | 398.4 | 379.5 | 23.65 | 0.641 | 0.2077 |
| 95 | 422.1 | 403.2 | 23.68 | 0.613 | 0.1986 |
| 96 | 447.2 | 428.3 | 23.7 | 0.591 | 0.1915 |
| 97 | 473.8 | 454.9 | 23.73 | 0.565 | 0.1831 |
| 98 | 502. | 483.1 | 23.75 | 0.539 | 0.1747 |
| 99 | 531.9 | 513. | 23.77 | 0.515 | 0.1669 |
| 100 | 563.5 | 544.6 | 23.81 | 0.479 | 0.1552 |
| 101 | 597. | 578.1 | 23.82 | 0.465 | 0.1507 |
| 102 | 632.5 | 613.6 | 23.85 | 0.441 | 0.1429 |
| 103 | 670.1 | 651.2 | 23.88 | 0.415 | 0.1345 |
| 104 | 709.9 | 691. | 23.9 | 0.391 | 0.1267 |
| 105 | 752.1 | 733.2 | 23.92 | 0.367 | 0.1189 |
| 106 | 796.8 | 777.9 | 23.95 | 0.343 | 0.1111 |
| 107 | 844.2 | 825.3 | 23.97 | 0.32 | 0.1037 |
| 108 | 894.4 | 875.5 | 23.99 | 0.299 | 9.689e-002 |
| 109 | 947.5 | 928.6 | 24.01 | 0.277 | 8.976e-002 |
| 110 | 1004 | 984.9 | 24.04 | 0.255 | 8.263e-002 |
| 111 | 1063 | 1045 | 24.06 | 0.235 | 7.615e-002 |
| 112 | 1127 | 1108 | 24.07 | 0.215 | 6.967e-002 |
| 113 | 1194 | 1175 | 24.09 | 0.197 | 6.384e-002 |
| 114 | 1264 | 1246 | 24.11 | 0.179 | 5.8e-002 |
| 115 | 1340 | 1321 | 24.13 | 0.161 | 5.217e-002 |
| 116 | 1419 | 1400 | 24.15 | 0.145 | 4.699e-002 |
| 117 | 1503 | 1484 | 24.16 | 0.129 | 4.18e-002 |
| 118 | 1593 | 1574 | 24.18 | 0.115 | 3.727e-002 |
| 119 | 1687 | 1668 | 24.19 | 0.102 | 3.305e-002 |
| 120 | 1787 | 1768 | 24.2 | 8.8e-002 | 2.852e-002 |
| 121 | 1893 | 1874 | 24.21 | 7.8e-002 | 2.528e-002 |
| 122 | 2006 | 1987 | 24.22 | 6.8e-002 | 2.203e-002 |
| 123 | 2125 | 2106 | 24.23 | 5.8e-002 | 1.879e-002 |
| 124 | 2245 | 2226 | 24.24 | 5.1e-002 | 1.653e-002 |
| 125 | 2365 | 2346 | 24.25 | 4.3e-002 | 1.393e-002 |
| 126 | 2485 | 2466 | 24.25 | 3.6e-002 | 1.167e-002 |
| 127 | 2605 | 2586 | 24.26 | 3.e-002 | 9.721e-003 |
| 128 | 2725 | 2706 | 24.26 | 2.6e-002 | 8.425e-003 |
| 129 | 2845 | 2826 | 24.27 | 2.3e-002 | 7.453e-003 |
| 130 | 2965 | 2946 | 24.27 | 1.8e-002 | 5.833e-003 |
| 131 | 3085 | 3066 | 24.27 | 1.6e-002 | 5.185e-003 |
| 132 | 3205 | 3186 | 24.28 | 1.3e-002 | 4.213e-003 |
| 133 | 3325 | 3306 | 24.28 | 9.e-003 | 2.916e-003 |
| 134 | 3445 | 3426 | 24.28 | 7.e-003 | 2.268e-003 |
| 135 | 3565 | 3546 | 24.28 | 7.e-003 | 2.268e-003 |
| 136 | 3685 | 3666 | 24.29 | 3.e-003 | 9.721e-004 |
| 137 | 3805 | 3786 | 24.29 | 1.e-003 | 3.24e-004 |

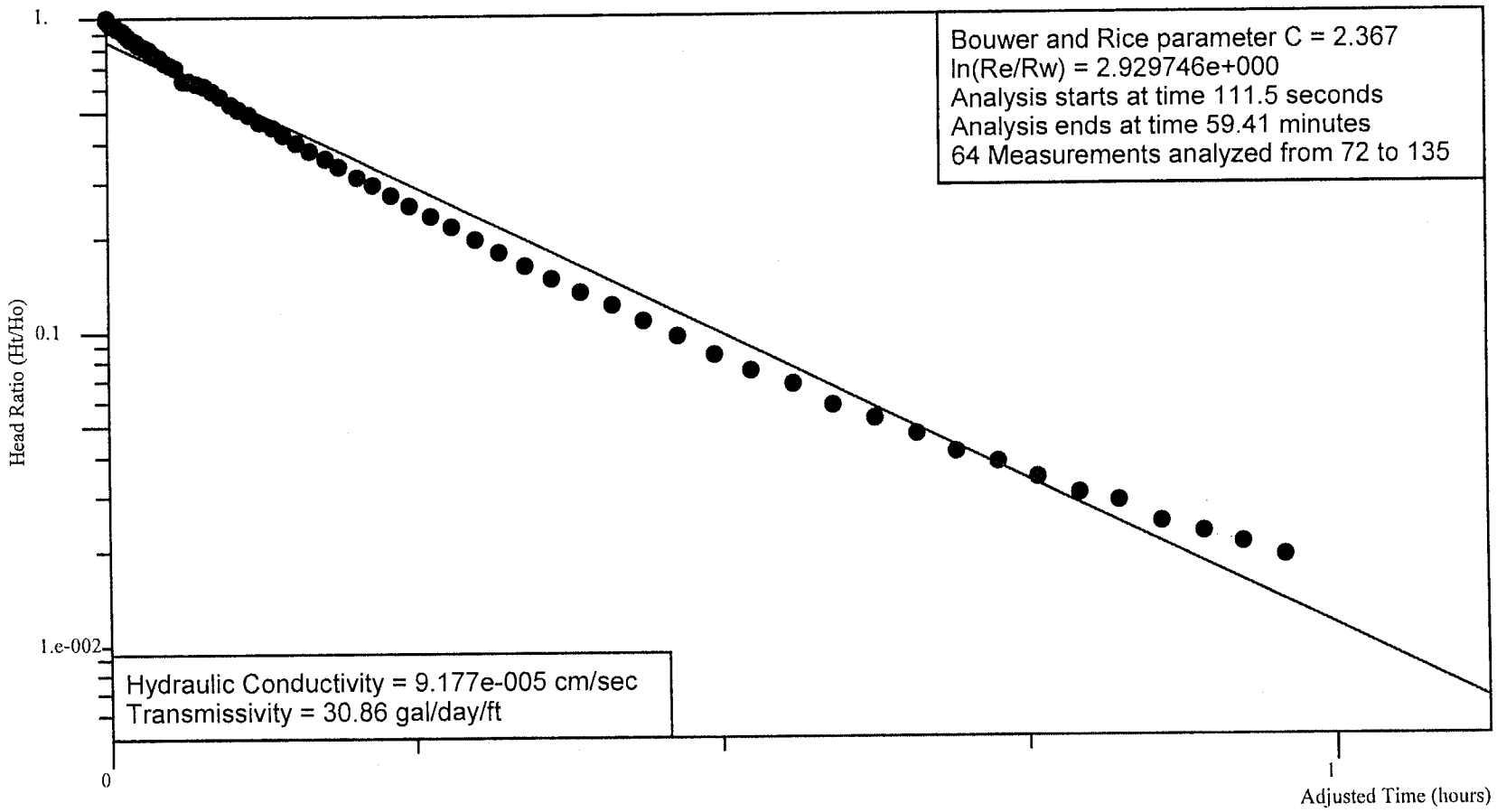
| | | | | | |
|---|---|---|---|---|---|
| 138 | 3925 | 3906 | 24.29 | -1.e-003 | -3.24e-004 |
| 139 | 4045 | 4026 | 24.29 | -1.e-003 | -3.24e-004 |
| 140 | 4165 | 4146 | 24.29 | -3.e-003 | -9.721e-004 |

# Aquifer Analysis September 16, 2005

Coble's Sandrock

## Bouwer and Rice Graph

MW-9 (Rising)




Ho is 1.07 feet at 111.5 seconds

Project Number 419.19

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

Site Name: Coble's Sandrock
Test Date: September 16, 2005
Project Number: 419.19
Import File: P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\0905 Slug Tes

Well Label: MW-9 (Rising)
Aquifer Thickness: 15.86 feet
Screen Length: 15. feet
Casing Radius: 1.888 inches
Effective Radius: 4.125 inches
Static Water Level: 24.3 feet
Water Table to Screen Bottom: 15.86 feet
Anisotropy Ratio: 1.
Time Adjustment: 111.5 Seconds
Test starts with trial 13
There are 139 time and drawdown measurements
Maximum head is 1.881 feet
Minimum head is -4.1e-002 feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -111.5 | 24.27 | -3.2e-002 | -1.701e-002 |
| 2 | 0.3 | -111.2 | 24.26 | -3.8e-002 | -2.02e-002 |
| 3 | 0.6 | -110.9 | 24.26 | -4.e-002 | -2.127e-002 |
| 4 | 0.9 | -110.6 | 24.26 | -4.1e-002 | -2.18e-002 |
| 5 | 1.2 | -110.3 | 24.26 | -4.1e-002 | -2.18e-002 |
| 6 | 1.5 | -110. | 24.41 | 0.107 | 5.688e-002 |
| 7 | 1.8 | -109.7 | 25.02 | 0.724 | 0.3849 |
| 8 | 2.1 | -109.4 | 24.29 | -1.3e-002 | -6.911e-003 |
| 9 | 2.4 | -109.1 | 24.65 | 0.352 | 0.1871 |
| 10 | 2.7 | -108.8 | 25.38 | 1.084 | 0.5763 |
| 11 | 3. | -108.5 | 25.46 | 1.164 | 0.6188 |
| 12 | 3.3 | -108.2 | 25.83 | 1.527 | 0.8118 |
| 13 | 3.6 | -107.9 | 26.05 | 1.751 | 0.9309 |
| 14 | 3.9 | -107.6 | 26.18 | 1.881 | 1. |
| 15 | 4.2 | -107.3 | 25.84 | 1.537 | 0.8171 |
| 16 | 4.5 | -107. | 25.82 | 1.519 | 0.8075 |
| 17 | 4.8 | -106.7 | 25.98 | 1.685 | 0.8958 |
| 18 | 5.1 | -106.4 | 26.04 | 1.737 | 0.9234 |
| 19 | 5.4 | -106.1 | 25.9 | 1.597 | 0.849 |
| 20 | 5.7 | -105.8 | 25.82 | 1.517 | 0.8065 |
| 21 | 6. | -105.5 | 25.91 | 1.609 | 0.8554 |
| 22 | 6.4 | -105.1 | 25.97 | 1.673 | 0.8894 |
| 23 | 6.7 | -104.8 | 25.85 | 1.551 | 0.8246 |
| 24 | 7.1 | -104.4 | 25.82 | 1.523 | 0.8097 |
| 25 | 7.5 | -104. | 25.92 | 1.621 | 0.8618 |
| 26 | 8. | -103.5 | 25.86 | 1.555 | 0.8267 |
| 27 | 8.4 | -103.1 | 25.88 | 1.583 | 0.8416 |
| 28 | 8.9 | -102.6 | 26.01 | 1.712 | 0.9102 |
| 29 | 9.5 | -102. | 25.89 | 1.587 | 0.8437 |
| 30 | 10. | -101.5 | 25.86 | 1.559 | 0.8288 |
| 31 | 10.6 | -100.9 | 25.8 | 1.501 | 0.798 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 11.3 | -100.2 | 25.82 | 1.521 | 0.8086 |
| 33 | 11.9 | -99.6 | 25.79 | 1.489 | 0.7916 |
| 34 | 12.6 | -98.9 | 25.8 | 1.501 | 0.798 |
| 35 | 13.4 | -98.1 | 25.78 | 1.484 | 0.7889 |
| 36 | 14.2 | -97.3 | 25.77 | 1.472 | 0.7826 |
| 37 | 15. | -96.5 | 25.77 | 1.474 | 0.7836 |
| 38 | 15.9 | -95.6 | 25.76 | 1.458 | 0.7751 |
| 39 | 16.8 | -94.7 | 25.75 | 1.448 | 0.7698 |
| 40 | 17.8 | -93.7 | 25.74 | 1.442 | 0.7666 |
| 41 | 18.9 | -92.6 | 25.73 | 1.434 | 0.7624 |
| 42 | 20. | -91.5 | 25.72 | 1.424 | 0.757 |
| 43 | 21.2 | -90.3 | 25.71 | 1.414 | 0.7517 |
| 44 | 22.4 | -89.1 | 25.7 | 1.404 | 0.7464 |
| 45 | 23.8 | -87.7 | 25.69 | 1.394 | 0.7411 |
| 46 | 25.2 | -86.3 | 25.68 | 1.384 | 0.7358 |
| 47 | 26.7 | -84.8 | 25.67 | 1.374 | 0.7305 |
| 48 | 28.2 | -83.3 | 25.66 | 1.364 | 0.7251 |
| 49 | 29.8 | -81.7 | 25.65 | 1.354 | 0.7198 |
| 50 | 31.5 | -80. | 25.64 | 1.342 | 0.7135 |
| 51 | 33.3 | -78.2 | 25.63 | 1.332 | 0.7081 |
| 52 | 35.2 | -76.3 | 25.62 | 1.322 | 0.7028 |
| 53 | 37.3 | -74.2 | 25.61 | 1.31 | 0.6964 |
| 54 | 39.5 | -72. | 25.6 | 1.298 | 0.6901 |
| 55 | 41.8 | -69.7 | 25.59 | 1.288 | 0.6847 |
| 56 | 44.3 | -67.2 | 25.58 | 1.276 | 0.6784 |
| 57 | 46.9 | -64.6 | 25.56 | 1.263 | 0.6715 |
| 58 | 49.7 | -61.8 | 25.55 | 1.253 | 0.6661 |
| 59 | 52.6 | -58.9 | 25.54 | 1.239 | 0.6587 |
| 60 | 55.7 | -55.8 | 25.53 | 1.227 | 0.6523 |
| 61 | 59. | -52.5 | 25.52 | 1.215 | 0.6459 |
| 62 | 62.5 | -49. | 25.5 | 1.203 | 0.6396 |
| 63 | 66.2 | -45.3 | 25.49 | 1.191 | 0.6332 |
| 64 | 70.1 | -41.4 | 25.48 | 1.177 | 0.6257 |
| 65 | 74.3 | -37.2 | 25.47 | 1.165 | 0.6194 |
| 66 | 78.7 | -32.8 | 25.45 | 1.153 | 0.613 |
| 67 | 83.4 | -28.1 | 25.44 | 1.138 | 0.605 |
| 68 | 88.4 | -23.1 | 25.43 | 1.125 | 0.5981 |
| 69 | 93.7 | -17.8 | 25.41 | 1.11 | 0.5901 |
| 70 | 99.3 | -12.2 | 25.4 | 1.098 | 0.5837 |
| 71 | 105.2 | -6.3 | 25.38 | 1.084 | 0.5763 |
| 72 | 111.5 | 0. | 25.37 | 1.07 | 0.5688 |
| 73 | 118.1 | 6.6 | 25.35 | 1.054 | 0.5603 |
| 74 | 125.1 | 13.6 | 25.34 | 1.04 | 0.5529 |
| 75 | 132.6 | 21.1 | 25.33 | 1.026 | 0.5455 |
| 76 | 140.5 | 29. | 25.31 | 1.01 | 0.5369 |
| 77 | 148.9 | 37.4 | 25.29 | 0.994 | 0.5284 |
| 78 | 157.8 | 46.3 | 25.28 | 0.978 | 0.5199 |
| 79 | 167.2 | 55.7 | 25.26 | 0.962 | 0.5114 |
| 80 | 177.2 | 65.7 | 25.24 | 0.942 | 0.5008 |
| 81 | 187.8 | 76.3 | 25.22 | 0.924 | 0.4912 |
| 82 | 199. | 87.5 | 25.21 | 0.906 | 0.4817 |
| 83 | 210.9 | 99.4 | 25.19 | 0.888 | 0.4721 |
| 84 | 223.5 | 112. | 25.17 | 0.867 | 0.4609 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 236.8 | 125.3 | 25.15 | 0.849 | 0.4514 |
| 86 | 250.9 | 139.4 | 25.13 | 0.828 | 0.4402 |
| 87 | 265.8 | 154.3 | 25.11 | 0.811 | 0.4312 |
| 88 | 281.6 | 170.1 | 25.09 | 0.785 | 0.4173 |
| 89 | 298.4 | 186.9 | 25.06 | 0.764 | 0.4062 |
| 90 | 316.2 | 204.7 | 25.04 | 0.742 | 0.3945 |
| 91 | 335. | 223.5 | 24.98 | 0.682 | 0.3626 |
| 92 | 354.9 | 243.4 | 24.97 | 0.674 | 0.3583 |
| 93 | 376. | 264.5 | 24.97 | 0.672 | 0.3573 |
| 94 | 398.4 | 286.9 | 24.95 | 0.648 | 0.3445 |
| 95 | 422.1 | 310.6 | 24.92 | 0.624 | 0.3317 |
| 96 | 447.2 | 335.7 | 24.9 | 0.6 | 0.319 |
| 97 | 473.8 | 362.3 | 24.88 | 0.576 | 0.3062 |
| 98 | 502. | 390.5 | 24.85 | 0.55 | 0.2924 |
| 99 | 531.9 | 420.4 | 24.83 | 0.527 | 0.2802 |
| 100 | 563.5 | 452. | 24.8 | 0.501 | 0.2663 |
| 101 | 597. | 485.5 | 24.78 | 0.477 | 0.2536 |
| 102 | 632.5 | 521. | 24.75 | 0.453 | 0.2408 |
| 103 | 670.1 | 558.6 | 24.73 | 0.429 | 0.2281 |
| 104 | 709.9 | 598.4 | 24.7 | 0.404 | 0.2148 |
| 105 | 752.1 | 640.6 | 24.68 | 0.38 | 0.202 |
| 106 | 796.8 | 685.3 | 24.66 | 0.356 | 0.1893 |
| 107 | 844.2 | 732.7 | 24.63 | 0.334 | 0.1776 |
| 108 | 894.4 | 782.9 | 24.61 | 0.312 | 0.1659 |
| 109 | 947.5 | 836. | 24.59 | 0.29 | 0.1542 |
| 110 | 1004 | 892.3 | 24.57 | 0.268 | 0.1425 |
| 111 | 1063 | 951.9 | 24.55 | 0.248 | 0.1318 |
| 112 | 1127 | 1015 | 24.53 | 0.228 | 0.1212 |
| 113 | 1194 | 1082 | 24.51 | 0.208 | 0.1106 |
| 114 | 1264 | 1153 | 24.49 | 0.19 | 0.101 |
| 115 | 1340 | 1228 | 24.47 | 0.172 | 9.144e-002 |
| 116 | 1419 | 1308 | 24.46 | 0.156 | 8.293e-002 |
| 117 | 1503 | 1392 | 24.44 | 0.142 | 7.549e-002 |
| 118 | 1593 | 1481 | 24.43 | 0.128 | 6.805e-002 |
| 119 | 1687 | 1576 | 24.41 | 0.114 | 6.061e-002 |
| 120 | 1787 | 1676 | 24.4 | 0.102 | 5.423e-002 |
| 121 | 1893 | 1782 | 24.39 | 9.e-002 | 4.785e-002 |
| 122 | 2006 | 1894 | 24.38 | 8.e-002 | 4.253e-002 |
| 123 | 2125 | 2013 | 24.37 | 7.2e-002 | 3.828e-002 |
| 124 | 2245 | 2133 | 24.36 | 6.2e-002 | 3.296e-002 |
| 125 | 2365 | 2253 | 24.36 | 5.6e-002 | 2.977e-002 |
| 126 | 2485 | 2373 | 24.35 | 5.e-002 | 2.658e-002 |
| 127 | 2605 | 2493 | 24.34 | 4.4e-002 | 2.339e-002 |
| 128 | 2725 | 2613 | 24.34 | 4.e-002 | 2.127e-002 |
| 129 | 2845 | 2733 | 24.34 | 3.6e-002 | 1.914e-002 |
| 130 | 2965 | 2853 | 24.33 | 3.2e-002 | 1.701e-002 |
| 131 | 3085 | 2973 | 24.33 | 3.e-002 | 1.595e-002 |
| 132 | 3205 | 3093 | 24.33 | 2.6e-002 | 1.382e-002 |
| 133 | 3325 | 3213 | 24.32 | 2.4e-002 | 1.276e-002 |
| 134 | 3445 | 3333 | 24.32 | 2.2e-002 | 1.17e-002 |
| 135 | 3565 | 3453 | 24.32 | 2.e-002 | 1.063e-002 |
| 136 | 3685 | 3573 | 24.31 | 1.4e-002 | 7.443e-003 |
| 137 | 3805 | 3693 | 24.31 | 1.e-002 | 5.316e-003 |

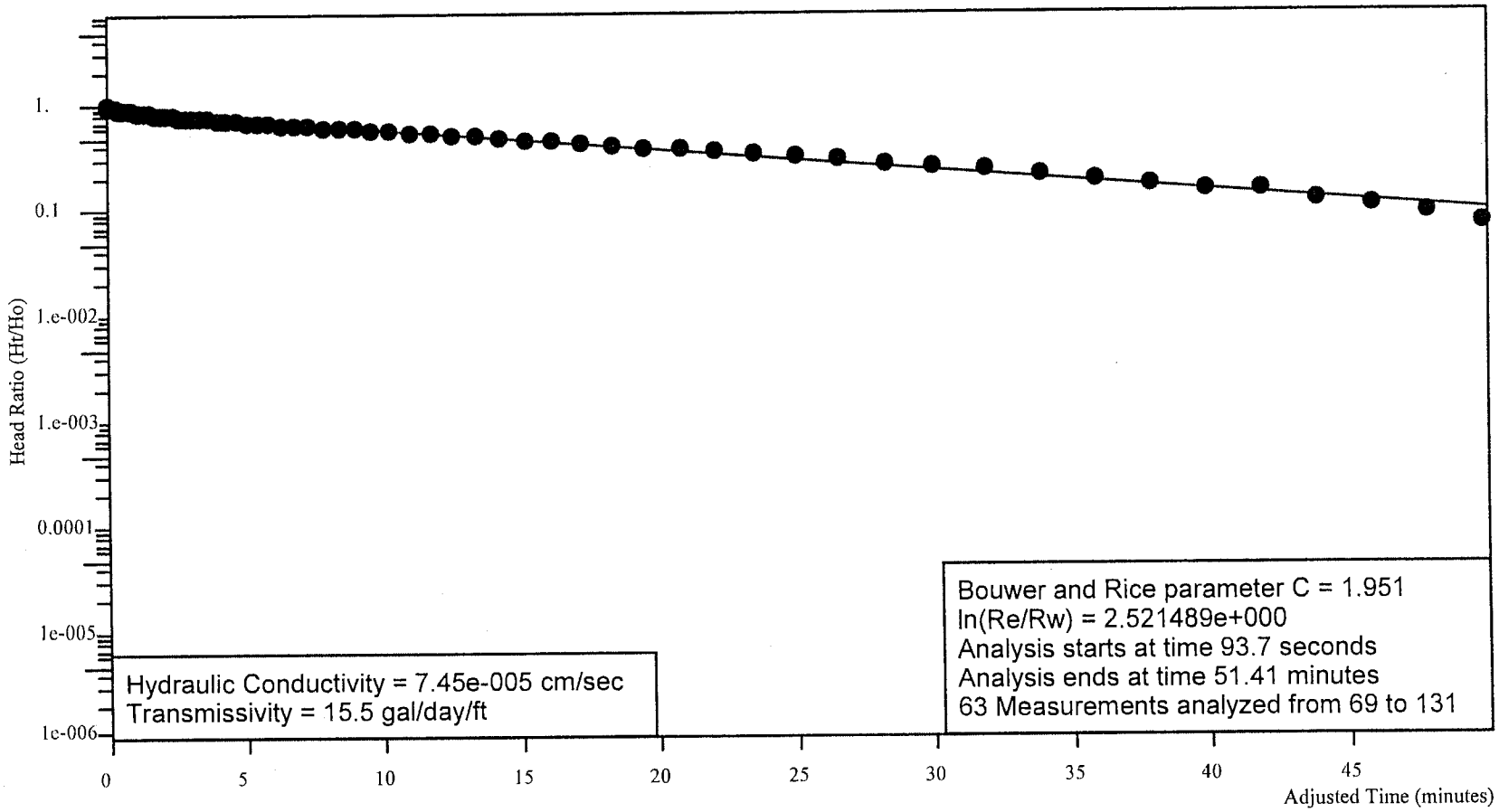
| | | | | | |
|---|---|---|---|---|---|
| 138 | 3925 | 3813 | 24.31 | 8.e-003 | 4.253e-003 |
| 139 | 4045 | 3933 | 24.31 | 1.1e-002 | 5.848e-003 |

# Aquifer Analysis September 16, 2005

Coble's Sandrock

## Bouwer and Rice Graph

P-18 (Rising)




Ho is 0.679 feet at 93.7 seconds

Project Number 419.19

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

Site Name: Coble's Sandrock
Test Date: September 16, 2005
Project Number: 419.19
Import File: P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\0905 Slug Tes

Well Label: P-18 (Rising)
Aquifer Thickness: 9.81 feet
Screen Length: 15. feet
Casing Radius: 1.888 inches
Effective Radius: 4.125 inches
Static Water Level: 22.84 feet
Water Table to Screen Bottom: 9.81 feet
Anisotropy Ratio: 1.
Time Adjustment: 93.7 Seconds
Test starts with trial 4
There are 136 time and drawdown measurements
Maximum head is 3.423 feet
Minimum head is -1.381 feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -93.7 | 23.52 | 0.682 | 0.1992 |
| 2 | 0.3 | -93.4 | 21.46 | -1.381 | -0.4034 |
| 3 | 0.6 | -93.1 | 25.74 | 2.897 | 0.8463 |
| 4 | 0.9 | -92.8 | 21.49 | -1.352 | -0.395 |
| 5 | 1.2 | -92.5 | 26.26 | 3.423 | 1. |
| 6 | 1.5 | -92.2 | 22.47 | -0.371 | -0.1084 |
| 7 | 1.8 | -91.9 | 25.89 | 3.054 | 0.8922 |
| 8 | 2.1 | -91.6 | 24.11 | 1.269 | 0.3707 |
| 9 | 2.4 | -91.3 | 24.73 | 1.891 | 0.5524 |
| 10 | 2.7 | -91. | 24.84 | 1.997 | 0.5834 |
| 11 | 3. | -90.7 | 24.38 | 1.542 | 0.4505 |
| 12 | 3.3 | -90.4 | 24.82 | 1.977 | 0.5776 |
| 13 | 3.6 | -90.1 | 24.47 | 1.626 | 0.475 |
| 14 | 3.9 | -89.8 | 24.66 | 1.821 | 0.532 |
| 15 | 4.2 | -89.5 | 24.57 | 1.729 | 0.5051 |
| 16 | 4.5 | -89.2 | 24.57 | 1.73 | 0.5054 |
| 17 | 4.8 | -88.9 | 24.58 | 1.737 | 0.5074 |
| 18 | 5.1 | -88.6 | 24.54 | 1.701 | 0.4969 |
| 19 | 5.4 | -88.3 | 24.55 | 1.707 | 0.4987 |
| 20 | 5.7 | -88. | 24.53 | 1.687 | 0.4928 |
| 21 | 6. | -87.7 | 24.53 | 1.687 | 0.4928 |
| 22 | 6.4 | -87.3 | 24.51 | 1.667 | 0.487 |
| 23 | 6.7 | -87. | 24.5 | 1.655 | 0.4835 |
| 24 | 7.1 | -86.6 | 24.48 | 1.643 | 0.48 |
| 25 | 7.5 | -86.2 | 24.47 | 1.633 | 0.4771 |
| 26 | 8. | -85.7 | 24.46 | 1.623 | 0.4741 |
| 27 | 8.4 | -85.3 | 24.45 | 1.607 | 0.4695 |
| 28 | 8.9 | -84.8 | 24.43 | 1.59 | 0.4645 |
| 29 | 9.5 | -84.2 | 24.41 | 1.574 | 0.4598 |
| 30 | 10. | -83.7 | 24.4 | 1.56 | 0.4557 |
| 31 | 10.6 | -83.1 | 24.38 | 1.544 | 0.4511 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 11.3 | -82.4 | 24.37 | 1.526 | 0.4458 |
| 33 | 11.9 | -81.8 | 24.35 | 1.508 | 0.4405 |
| 34 | 12.6 | -81.1 | 24.33 | 1.488 | 0.4347 |
| 35 | 13.4 | -80.3 | 24.31 | 1.468 | 0.4289 |
| 36 | 14.2 | -79.5 | 24.29 | 1.446 | 0.4224 |
| 37 | 15. | -78.7 | 24.26 | 1.424 | 0.416 |
| 38 | 15.9 | -77.8 | 24.24 | 1.4 | 0.409 |
| 39 | 16.8 | -76.9 | 24.22 | 1.375 | 0.4017 |
| 40 | 17.8 | -75.9 | 24.19 | 1.349 | 0.3941 |
| 41 | 18.9 | -74.8 | 24.16 | 1.325 | 0.3871 |
| 42 | 20. | -73.7 | 24.14 | 1.297 | 0.3789 |
| 43 | 21.2 | -72.5 | 24.11 | 1.269 | 0.3707 |
| 44 | 22.4 | -71.3 | 24.08 | 1.239 | 0.362 |
| 45 | 23.8 | -69.9 | 24.05 | 1.209 | 0.3532 |
| 46 | 25.2 | -68.5 | 24.02 | 1.179 | 0.3444 |
| 47 | 26.7 | -67. | 23.99 | 1.147 | 0.3351 |
| 48 | 28.2 | -65.5 | 23.96 | 1.117 | 0.3263 |
| 49 | 29.8 | -63.9 | 23.93 | 1.086 | 0.3173 |
| 50 | 31.5 | -62.2 | 23.9 | 1.055 | 0.3082 |
| 51 | 33.3 | -60.4 | 23.86 | 1.024 | 0.2992 |
| 52 | 35.2 | -58.5 | 23.83 | 0.992 | 0.2898 |
| 53 | 37.3 | -56.4 | 23.8 | 0.962 | 0.281 |
| 54 | 39.5 | -54.2 | 23.77 | 0.932 | 0.2723 |
| 55 | 41.8 | -51.9 | 23.74 | 0.904 | 0.2641 |
| 56 | 44.3 | -49.4 | 23.72 | 0.876 | 0.2559 |
| 57 | 46.9 | -46.8 | 23.69 | 0.854 | 0.2495 |
| 58 | 49.7 | -44. | 23.67 | 0.83 | 0.2425 |
| 59 | 52.6 | -41.1 | 23.65 | 0.81 | 0.2366 |
| 60 | 55.7 | -38. | 23.63 | 0.791 | 0.2311 |
| 61 | 59. | -34.7 | 23.61 | 0.775 | 0.2264 |
| 62 | 62.5 | -31.2 | 23.6 | 0.761 | 0.2223 |
| 63 | 66.2 | -27.5 | 23.59 | 0.747 | 0.2182 |
| 64 | 70.1 | -23.6 | 23.57 | 0.735 | 0.2147 |
| 65 | 74.3 | -19.4 | 23.56 | 0.723 | 0.2112 |
| 66 | 78.7 | -15. | 23.55 | 0.711 | 0.2077 |
| 67 | 83.4 | -10.3 | 23.54 | 0.701 | 0.2048 |
| 68 | 88.4 | -5.3 | 23.53 | 0.689 | 0.2013 |
| 69 | 93.7 | 0. | 23.52 | 0.679 | 0.1984 |
| 70 | 99.3 | 5.6 | 23.51 | 0.669 | 0.1954 |
| 71 | 105.2 | 11.5 | 23.5 | 0.661 | 0.1931 |
| 72 | 111.5 | 17.8 | 23.49 | 0.65 | 0.1899 |
| 73 | 118.1 | 24.4 | 23.48 | 0.64 | 0.187 |
| 74 | 125.1 | 31.4 | 23.47 | 0.632 | 0.1846 |
| 75 | 132.6 | 38.9 | 23.46 | 0.624 | 0.1823 |
| 76 | 140.5 | 46.8 | 23.46 | 0.616 | 0.18 |
| 77 | 148.9 | 55.2 | 23.45 | 0.608 | 0.1776 |
| 78 | 157.8 | 64.1 | 23.44 | 0.6 | 0.1753 |
| 79 | 167.2 | 73.5 | 23.43 | 0.592 | 0.1729 |
| 80 | 177.2 | 83.5 | 23.42 | 0.584 | 0.1706 |
| 81 | 187.8 | 94.1 | 23.42 | 0.576 | 0.1683 |
| 82 | 199. | 105.3 | 23.41 | 0.57 | 0.1665 |
| 83 | 210.9 | 117.2 | 23.4 | 0.562 | 0.1642 |
| 84 | 223.5 | 129.8 | 23.39 | 0.554 | 0.1618 |

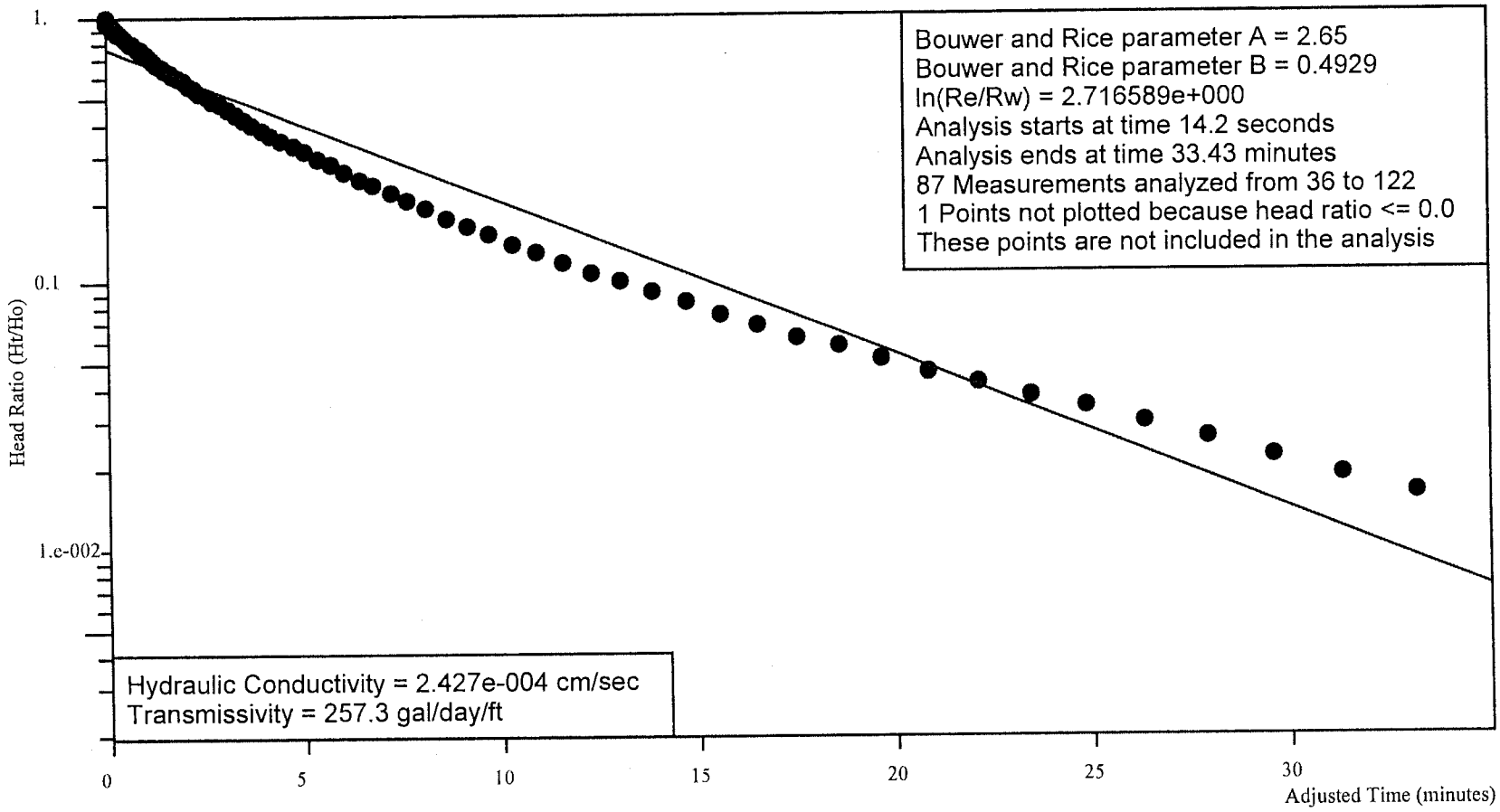
| | | | | | |
|---|---|---|---|---|---|
| 85 | 236.8 | 143.1 | 23.39 | 0.547 | 0.1598 |
| 86 | 250.9 | 157.2 | 23.38 | 0.539 | 0.1575 |
| 87 | 265.8 | 172.1 | 23.37 | 0.531 | 0.1551 |
| 88 | 281.6 | 187.9 | 23.36 | 0.525 | 0.1534 |
| 89 | 298.4 | 204.7 | 23.36 | 0.521 | 0.1522 |
| 90 | 316.2 | 222.5 | 23.36 | 0.515 | 0.1505 |
| 91 | 335. | 241.3 | 23.34 | 0.501 | 0.1464 |
| 92 | 354.9 | 261.2 | 23.33 | 0.494 | 0.1443 |
| 93 | 376. | 282.3 | 23.33 | 0.486 | 0.142 |
| 94 | 398.4 | 304.7 | 23.31 | 0.47 | 0.1373 |
| 95 | 422.1 | 328.4 | 23.31 | 0.466 | 0.1361 |
| 96 | 447.2 | 353.5 | 23.3 | 0.462 | 0.135 |
| 97 | 473.8 | 380.1 | 23.29 | 0.453 | 0.1323 |
| 98 | 502. | 408.3 | 23.29 | 0.445 | 0.13 |
| 99 | 531.9 | 438.2 | 23.27 | 0.434 | 0.1268 |
| 100 | 563.5 | 469.8 | 23.27 | 0.426 | 0.1245 |
| 101 | 597. | 503.3 | 23.26 | 0.416 | 0.1215 |
| 102 | 632.5 | 538.8 | 23.25 | 0.407 | 0.1189 |
| 103 | 670.1 | 576.4 | 23.23 | 0.395 | 0.1154 |
| 104 | 709.9 | 616.2 | 23.23 | 0.385 | 0.1125 |
| 105 | 752.1 | 658.4 | 23.22 | 0.375 | 0.1096 |
| 106 | 796.8 | 703.1 | 23.2 | 0.365 | 0.1066 |
| 107 | 844.2 | 750.5 | 23.19 | 0.353 | 0.1031 |
| 108 | 894.4 | 800.7 | 23.18 | 0.343 | 0.1002 |
| 109 | 947.5 | 853.8 | 23.17 | 0.33 | 9.641e-002 |
| 110 | 1004 | 910.1 | 23.16 | 0.32 | 9.349e-002 |
| 111 | 1063 | 969.7 | 23.15 | 0.308 | 8.998e-002 |
| 112 | 1127 | 1033 | 23.14 | 0.296 | 8.647e-002 |
| 113 | 1194 | 1100 | 23.12 | 0.284 | 8.297e-002 |
| 114 | 1264 | 1171 | 23.11 | 0.27 | 7.888e-002 |
| 115 | 1340 | 1246 | 23.1 | 0.258 | 7.537e-002 |
| 116 | 1419 | 1325 | 23.09 | 0.246 | 7.187e-002 |
| 117 | 1503 | 1410 | 23.07 | 0.232 | 6.778e-002 |
| 118 | 1593 | 1499 | 23.06 | 0.218 | 6.369e-002 |
| 119 | 1687 | 1593 | 23.04 | 0.204 | 5.96e-002 |
| 120 | 1787 | 1694 | 23.03 | 0.19 | 5.551e-002 |
| 121 | 1893 | 1800 | 23.02 | 0.178 | 5.2e-002 |
| 122 | 2006 | 1912 | 23. | 0.162 | 4.733e-002 |
| 123 | 2125 | 2031 | 22.99 | 0.148 | 4.324e-002 |
| 124 | 2245 | 2151 | 22.97 | 0.134 | 3.915e-002 |
| 125 | 2365 | 2271 | 22.96 | 0.12 | 3.506e-002 |
| 126 | 2485 | 2391 | 22.95 | 0.106 | 3.097e-002 |
| 127 | 2605 | 2511 | 22.94 | 0.102 | 2.98e-002 |
| 128 | 2725 | 2631 | 22.92 | 8.3e-002 | 2.425e-002 |
| 129 | 2845 | 2751 | 22.91 | 7.2e-002 | 2.103e-002 |
| 130 | 2965 | 2871 | 22.9 | 6.2e-002 | 1.811e-002 |
| 131 | 3085 | 2991 | 22.89 | 5.e-002 | 1.461e-002 |
| 132 | 3205 | 3111 | 22.88 | 4.e-002 | 1.169e-002 |
| 133 | 3325 | 3231 | 22.87 | 3.e-002 | 8.764e-003 |
| 134 | 3445 | 3351 | 22.86 | 2.2e-002 | 6.427e-003 |
| 135 | 3565 | 3471 | 22.85 | 1.2e-002 | 3.506e-003 |
| 136 | 3685 | 3591 | 22.84 | 4.e-003 | 1.169e-003 |

# Aquifer Analysis September 16, 2005

Coble's Sandrock

## Bouwer and Rice Graph

P-25 (Rising)




Ho is 1.556 feet at 14.2 seconds

Project Number 419.19

Analysis by D. Reedy of Joyce Engineering, Inc.

# Aquifer Analysis

Site Name: Coble's Sandrock
Test Date: September 16, 2005
Project Number: 419.19
Import File: P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\0905 Slug Tes

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Well Label: P-25 (Rising)
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 23.75 feet
Water Table to Screen Bottom: 25.19 feet
Anisotropy Ratio: 1.
Time Adjustment: 14.2 Seconds
Test starts with trial 8
There are 130 time and drawdown measurements
Maximum head is 2.159 feet
Minimum head is -0.382 feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -14.2 | 24.25 | 0.495 | 0.2293 |
| 2 | 0.3 | -13.9 | 23.97 | 0.216 | 0.1 |
| 3 | 0.6 | -13.6 | 24.64 | 0.886 | 0.4104 |
| 4 | 0.9 | -13.3 | 23.37 | -0.382 | -0.1769 |
| 5 | 1.2 | -13. | 24.65 | 0.9 | 0.4169 |
| 6 | 1.5 | -12.7 | 24.45 | 0.702 | 0.3252 |
| 7 | 1.8 | -12.4 | 24.79 | 1.041 | 0.4822 |
| 8 | 2.1 | -12.1 | 25.37 | 1.62 | 0.7503 |
| 9 | 2.4 | -11.8 | 25.91 | 2.159 | 1. |
| 10 | 2.7 | -11.5 | 25.73 | 1.977 | 0.9157 |
| 11 | 3. | -11.2 | 25.64 | 1.891 | 0.8759 |
| 12 | 3.3 | -10.9 | 25.63 | 1.875 | 0.8685 |
| 13 | 3.6 | -10.6 | 25.61 | 1.861 | 0.862 |
| 14 | 3.9 | -10.3 | 25.58 | 1.833 | 0.849 |
| 15 | 4.2 | -10. | 25.57 | 1.821 | 0.8434 |
| 16 | 4.5 | -9.7 | 25.56 | 1.811 | 0.8388 |
| 17 | 4.8 | -9.4 | 25.54 | 1.791 | 0.8296 |
| 18 | 5.1 | -9.1 | 25.52 | 1.773 | 0.8212 |
| 19 | 5.4 | -8.8 | 25.52 | 1.769 | 0.8194 |
| 20 | 5.7 | -8.5 | 25.53 | 1.777 | 0.8231 |
| 21 | 6. | -8.2 | 25.48 | 1.729 | 0.8008 |
| 22 | 6.4 | -7.8 | 25.46 | 1.712 | 0.793 |
| 23 | 6.7 | -7.5 | 25.45 | 1.699 | 0.7869 |
| 24 | 7.1 | -7.1 | 25.44 | 1.689 | 0.7823 |
| 25 | 7.5 | -6.7 | 25.43 | 1.679 | 0.7777 |
| 26 | 8. | -6.2 | 25.47 | 1.717 | 0.7953 |
| 27 | 8.4 | -5.8 | 25.45 | 1.703 | 0.7888 |
| 28 | 8.9 | -5.3 | 25.39 | 1.639 | 0.7591 |
| 29 | 9.5 | -4.7 | 25.37 | 1.623 | 0.7517 |
| 30 | 10. | -4.2 | 25.4 | 1.646 | 0.7624 |
| 31 | 10.6 | -3.6 | 25.36 | 1.608 | 0.7448 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 11.3 | -2.9 | 25.35 | 1.596 | 0.7392 |
| 33 | 11.9 | -2.3 | 25.33 | 1.584 | 0.7337 |
| 34 | 12.6 | -1.6 | 25.32 | 1.574 | 0.729 |
| 35 | 13.4 | -0.8 | 25.31 | 1.564 | 0.7244 |
| 36 | 14.2 | 0. | 25.31 | 1.556 | 0.7207 |
| 37 | 15. | 0.8 | 25.3 | 1.546 | 0.7161 |
| 38 | 15.9 | 1.7 | 25.28 | 1.534 | 0.7105 |
| 39 | 16.8 | 2.6 | 25.28 | 1.526 | 0.7068 |
| 40 | 17.8 | 3.6 | 25.26 | 1.514 | 0.7013 |
| 41 | 18.9 | 4.7 | 25.25 | 1.504 | 0.6966 |
| 42 | 20. | 5.8 | 25.24 | 1.494 | 0.692 |
| 43 | 21.2 | 7. | 25.23 | 1.482 | 0.6864 |
| 44 | 22.4 | 8.2 | 25.22 | 1.469 | 0.6804 |
| 45 | 23.8 | 9.6 | 25.21 | 1.457 | 0.6748 |
| 46 | 25.2 | 11. | 25.2 | 1.447 | 0.6702 |
| 47 | 26.7 | 12.5 | 25.18 | 1.433 | 0.6637 |
| 48 | 28.2 | 14. | 25.17 | 1.423 | 0.6591 |
| 49 | 29.8 | 15.6 | 25.16 | 1.409 | 0.6526 |
| 50 | 31.5 | 17.3 | 25.15 | 1.397 | 0.6471 |
| 51 | 33.3 | 19.1 | 25.14 | 1.385 | 0.6415 |
| 52 | 35.2 | 21. | 25.12 | 1.371 | 0.635 |
| 53 | 37.3 | 23.1 | 25.11 | 1.357 | 0.6285 |
| 54 | 39.5 | 25.3 | 25.09 | 1.343 | 0.622 |
| 55 | 41.8 | 27.6 | 25.08 | 1.327 | 0.6146 |
| 56 | 44.3 | 30.1 | 25.06 | 1.311 | 0.6072 |
| 57 | 46.9 | 32.7 | 25.05 | 1.295 | 0.5998 |
| 58 | 49.7 | 35.5 | 25.03 | 1.279 | 0.5924 |
| 59 | 52.6 | 38.4 | 25.01 | 1.261 | 0.5841 |
| 60 | 55.7 | 41.5 | 24.99 | 1.241 | 0.5748 |
| 61 | 59. | 44.8 | 24.97 | 1.223 | 0.5665 |
| 62 | 62.5 | 48.3 | 24.95 | 1.202 | 0.5567 |
| 63 | 66.2 | 52. | 24.93 | 1.184 | 0.5484 |
| 64 | 70.1 | 55.9 | 24.91 | 1.164 | 0.5391 |
| 65 | 74.3 | 60.1 | 24.89 | 1.142 | 0.5289 |
| 66 | 78.7 | 64.5 | 24.87 | 1.122 | 0.5197 |
| 67 | 83.4 | 69.2 | 24.85 | 1.1 | 0.5095 |
| 68 | 88.4 | 74.2 | 24.83 | 1.076 | 0.4984 |
| 69 | 93.7 | 79.5 | 24.8 | 1.054 | 0.4882 |
| 70 | 99.3 | 85.1 | 24.78 | 1.028 | 0.4761 |
| 71 | 105.2 | 91. | 24.75 | 1.004 | 0.465 |
| 72 | 111.5 | 97.3 | 24.73 | 0.98 | 0.4539 |
| 73 | 118.1 | 103.9 | 24.7 | 0.954 | 0.4419 |
| 74 | 125.1 | 110.9 | 24.68 | 0.927 | 0.4294 |
| 75 | 132.6 | 118.4 | 24.65 | 0.901 | 0.4173 |
| 76 | 140.5 | 126.3 | 24.62 | 0.873 | 0.4044 |
| 77 | 148.9 | 134.7 | 24.6 | 0.847 | 0.3923 |
| 78 | 157.8 | 143.6 | 24.57 | 0.821 | 0.3803 |
| 79 | 167.2 | 153. | 24.55 | 0.795 | 0.3682 |
| 80 | 177.2 | 163. | 24.52 | 0.765 | 0.3543 |
| 81 | 187.8 | 173.6 | 24.49 | 0.737 | 0.3414 |
| 82 | 199. | 184.8 | 24.46 | 0.711 | 0.3293 |
| 83 | 210.9 | 196.7 | 24.43 | 0.683 | 0.3164 |
| 84 | 223.5 | 209.3 | 24.4 | 0.652 | 0.302 |

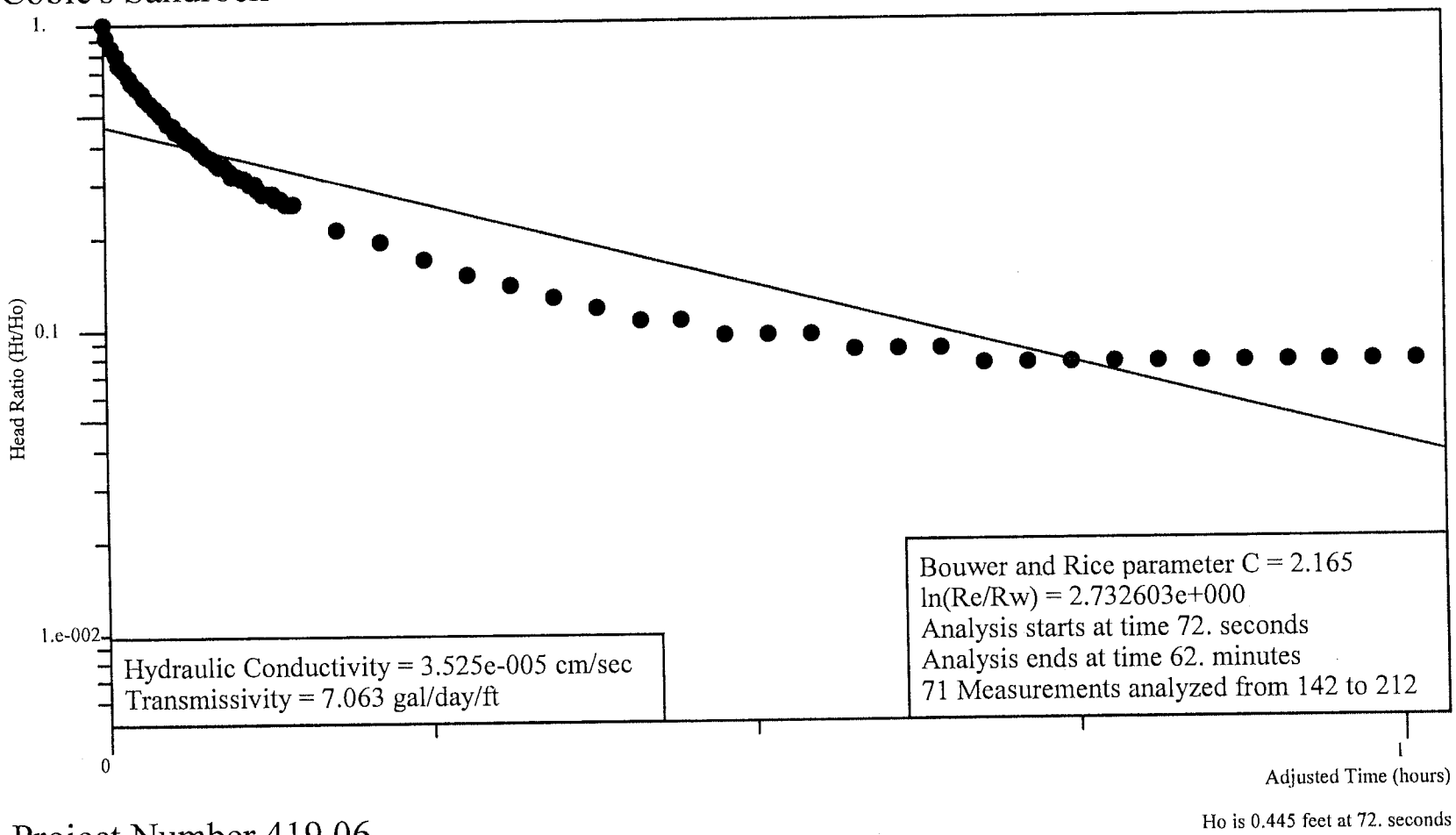
| | | | | | |
|---|---|---|---|---|---|
| 85 | 236.8 | 222.6 | 24.37 | 0.624 | 0.289 |
| 86 | 250.9 | 236.7 | 24.35 | 0.596 | 0.2761 |
| 87 | 265.8 | 251.6 | 24.32 | 0.568 | 0.2631 |
| 88 | 281.6 | 267.4 | 24.29 | 0.542 | 0.251 |
| 89 | 298.4 | 284.2 | 24.26 | 0.514 | 0.2381 |
| 90 | 316.2 | 302. | 24.24 | 0.49 | 0.227 |
| 91 | 335. | 320.8 | 24.21 | 0.462 | 0.214 |
| 92 | 354.9 | 340.7 | 24.19 | 0.436 | 0.2019 |
| 93 | 376. | 361.8 | 24.16 | 0.412 | 0.1908 |
| 94 | 398.4 | 384.2 | 24.14 | 0.386 | 0.1788 |
| 95 | 422.1 | 407.9 | 24.11 | 0.362 | 0.1677 |
| 96 | 447.2 | 433. | 24.09 | 0.34 | 0.1575 |
| 97 | 473.8 | 459.6 | 24.07 | 0.318 | 0.1473 |
| 98 | 502. | 487.8 | 24.05 | 0.296 | 0.1371 |
| 99 | 531.9 | 517.7 | 24.02 | 0.274 | 0.1269 |
| 100 | 563.5 | 549.3 | 24. | 0.254 | 0.1176 |
| 101 | 597. | 582.8 | 23.99 | 0.236 | 0.1093 |
| 102 | 632.5 | 618.3 | 23.97 | 0.218 | 0.101 |
| 103 | 670.1 | 655.9 | 23.95 | 0.202 | 9.356e-002 |
| 104 | 709.9 | 695.7 | 23.93 | 0.184 | 8.522e-002 |
| 105 | 752.1 | 737.9 | 23.92 | 0.169 | 7.828e-002 |
| 106 | 796.8 | 782.6 | 23.91 | 0.156 | 7.226e-002 |
| 107 | 844.2 | 830. | 23.89 | 0.142 | 6.577e-002 |
| 108 | 894.4 | 880.2 | 23.88 | 0.132 | 6.114e-002 |
| 109 | 947.5 | 933.3 | 23.87 | 0.118 | 5.465e-002 |
| 110 | 1004 | 989.6 | 23.86 | 0.106 | 4.91e-002 |
| 111 | 1063 | 1049 | 23.85 | 9.6e-002 | 4.447e-002 |
| 112 | 1127 | 1112 | 23.84 | 8.8e-002 | 4.076e-002 |
| 113 | 1194 | 1179 | 23.83 | 8.e-002 | 3.705e-002 |
| 114 | 1264 | 1250 | 23.82 | 7.e-002 | 3.242e-002 |
| 115 | 1340 | 1325 | 23.81 | 6.4e-002 | 2.964e-002 |
| 116 | 1419 | 1405 | 23.81 | 5.8e-002 | 2.686e-002 |
| 117 | 1503 | 1489 | 23.8 | 5.2e-002 | 2.409e-002 |
| 118 | 1593 | 1578 | 23.8 | 4.6e-002 | 2.131e-002 |
| 119 | 1687 | 1673 | 23.79 | 4.e-002 | 1.853e-002 |
| 120 | 1787 | 1773 | 23.78 | 3.4e-002 | 1.575e-002 |
| 121 | 1893 | 1879 | 23.78 | 2.9e-002 | 1.343e-002 |
| 122 | 2006 | 1992 | 23.77 | 2.5e-002 | 1.158e-002 |
| 123 | 2125 | 2110 | 23.77 | 1.9e-002 | 8.8e-003 |
| 124 | 2245 | 2230 | 23.77 | 1.8e-002 | 8.337e-003 |
| 125 | 2365 | 2350 | 23.77 | 1.6e-002 | 7.411e-003 |
| 126 | 2485 | 2471 | 23.75 | 4.e-003 | 1.853e-003 |
| 127 | 2605 | 2590 | 23.76 | 9.e-003 | 4.169e-003 |
| 128 | 2725 | 2711 | 23.76 | 7.e-003 | 3.242e-003 |
| 129 | 2845 | 2831 | 23.75 | 3.e-003 | 1.39e-003 |
| 130 | 2965 | 2950 | 23.76 | 8.e-003 | 3.705e-003 |

**Aquifer Analysis February 13, 2002**

Coble's Sandrock

**Bouwer and Rice Graph**

MW-5 (Rising)




Ho is 0.445 feet at 72. seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 13, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\MW5RISIN |

| | |
|---|---|
| Well Label: | MW-5 (Rising) |
| Aquifer Thickness: | 9.45 feet |
| Screen Length: | 10. feet |
| Casing Radius: | 1.188 inches |
| Effective Radius: | 3.125 inches |
| Static Water Level: | 7.75 feet |
| Water Table to Screen Bottom: | 9.45 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 72. Seconds |

Test starts with trial 28
There are 212 time and drawdown measurements
Maximum head is 1.962 feet
Minimum head is -1.e-002 feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -72. | 7.754 | 4.e-003 | 2.039e-003 |
| 2 | 0.198 | -71.8 | 7.75 | 0. | 0. |
| 3 | 0.396 | -71.6 | 7.75 | 0. | 0. |
| 4 | 0.6 | -71.4 | 7.75 | 0. | 0. |
| 5 | 0.798 | -71.2 | 7.75 | 0. | 0. |
| 6 | 0.996 | -71. | 7.75 | 0. | 0. |
| 7 | 1.2 | -70.8 | 7.75 | 0. | 0. |
| 8 | 1.398 | -70.6 | 7.745 | -5.e-003 | -2.548e-003 |
| 9 | 1.596 | -70.4 | 7.75 | 0. | 0. |
| 10 | 1.8 | -70.2 | 7.75 | 0. | 0. |
| 11 | 1.998 | -70. | 7.75 | 0. | 0. |
| 12 | 2.196 | -69.8 | 7.745 | -5.e-003 | -2.548e-003 |
| 13 | 2.4 | -69.6 | 7.75 | 0. | 0. |
| 14 | 2.598 | -69.4 | 7.75 | 0. | 0. |
| 15 | 2.796 | -69.2 | 7.75 | 0. | 0. |
| 16 | 3. | -69. | 7.754 | 4.e-003 | 2.039e-003 |
| 17 | 3.198 | -68.8 | 7.745 | -5.e-003 | -2.548e-003 |
| 18 | 3.396 | -68.6 | 7.745 | -5.e-003 | -2.548e-003 |
| 19 | 3.6 | -68.4 | 7.75 | 0. | 0. |
| 20 | 3.798 | -68.2 | 7.75 | 0. | 0. |
| 21 | 3.996 | -68. | 7.745 | -5.e-003 | -2.548e-003 |
| 22 | 4.2 | -67.8 | 7.75 | 0. | 0. |
| 23 | 4.398 | -67.6 | 7.74 | -1.e-002 | -5.097e-003 |
| 24 | 4.596 | -67.4 | 7.745 | -5.e-003 | -2.548e-003 |
| 25 | 4.8 | -67.2 | 7.792 | 4.2e-002 | 2.141e-002 |
| 26 | 4.998 | -67. | 9.48 | 1.73 | 0.8818 |
| 27 | 5.196 | -66.8 | 8.835 | 1.085 | 0.553 |
| 28 | 5.4 | -66.6 | 7.806 | 5.6e-002 | 2.854e-002 |
| 29 | 5.598 | -66.4 | 9.712 | 1.962 | 1. |
| 30 | 5.796 | -66.2 | 9.238 | 1.488 | 0.7584 |
| 31 | 6. | -66. | 9.385 | 1.635 | 0.8333 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -65.8 | 9.214 | 1.464 | 0.7462 |
| 33 | 6.396 | -65.6 | 9.319 | 1.569 | 0.7997 |
| 34 | 6.6 | -65.4 | 9.338 | 1.588 | 0.8094 |
| 35 | 6.798 | -65.2 | 9.072 | 1.322 | 0.6738 |
| 36 | 6.996 | -65. | 9.12 | 1.37 | 0.6983 |
| 37 | 7.2 | -64.8 | 9.162 | 1.412 | 0.7197 |
| 38 | 7.398 | -64.6 | 9.238 | 1.488 | 0.7584 |
| 39 | 7.596 | -64.4 | 9.195 | 1.445 | 0.7365 |
| 40 | 7.8 | -64.2 | 9.172 | 1.422 | 0.7248 |
| 41 | 7.998 | -64. | 9.191 | 1.441 | 0.7345 |
| 42 | 8.196 | -63.8 | 9.176 | 1.426 | 0.7268 |
| 43 | 8.4 | -63.6 | 9.176 | 1.426 | 0.7268 |
| 44 | 8.598 | -63.4 | 9.162 | 1.412 | 0.7197 |
| 45 | 8.796 | -63.2 | 9.158 | 1.408 | 0.7176 |
| 46 | 9. | -63. | 9.148 | 1.398 | 0.7125 |
| 47 | 9.198 | -62.8 | 9.143 | 1.393 | 0.71 |
| 48 | 9.396 | -62.6 | 9.139 | 1.389 | 0.708 |
| 49 | 9.6 | -62.4 | 9.129 | 1.379 | 0.7029 |
| 50 | 9.798 | -62.2 | 9.12 | 1.37 | 0.6983 |
| 51 | 9.996 | -62. | 9.115 | 1.365 | 0.6957 |
| 52 | 10.2 | -61.8 | 9.105 | 1.355 | 0.6906 |
| 53 | 10.4 | -61.6 | 9.101 | 1.351 | 0.6886 |
| 54 | 10.6 | -61.4 | 9.091 | 1.341 | 0.6835 |
| 55 | 10.8 | -61.2 | 9.086 | 1.336 | 0.6809 |
| 56 | 11. | -61. | 9.082 | 1.332 | 0.6789 |
| 57 | 11.2 | -60.8 | 9.072 | 1.322 | 0.6738 |
| 58 | 11.4 | -60.6 | 9.067 | 1.317 | 0.6713 |
| 59 | 11.6 | -60.4 | 9.063 | 1.313 | 0.6692 |
| 60 | 11.8 | -60.2 | 9.053 | 1.303 | 0.6641 |
| 61 | 12. | -60. | 9.049 | 1.299 | 0.6621 |
| 62 | 12.2 | -59.8 | 9.044 | 1.294 | 0.6595 |
| 63 | 12.4 | -59.6 | 9.039 | 1.289 | 0.657 |
| 64 | 12.6 | -59.4 | 9.03 | 1.28 | 0.6524 |
| 65 | 12.8 | -59.2 | 9.025 | 1.275 | 0.6498 |
| 66 | 13. | -59. | 9.015 | 1.265 | 0.6448 |
| 67 | 13.2 | -58.8 | 9.011 | 1.261 | 0.6427 |
| 68 | 13.4 | -58.6 | 9.006 | 1.256 | 0.6402 |
| 69 | 13.6 | -58.4 | 9.001 | 1.251 | 0.6376 |
| 70 | 13.8 | -58.2 | 8.992 | 1.242 | 0.633 |
| 71 | 14. | -58. | 8.987 | 1.237 | 0.6305 |
| 72 | 14.2 | -57.8 | 8.982 | 1.232 | 0.6279 |
| 73 | 14.4 | -57.6 | 8.977 | 1.227 | 0.6254 |
| 74 | 14.6 | -57.4 | 8.973 | 1.223 | 0.6233 |
| 75 | 14.8 | -57.2 | 8.963 | 1.213 | 0.6182 |
| 76 | 15. | -57. | 8.958 | 1.208 | 0.6157 |
| 77 | 15.2 | -56.8 | 8.954 | 1.204 | 0.6137 |
| 78 | 15.4 | -56.6 | 8.949 | 1.199 | 0.6111 |
| 79 | 15.6 | -56.4 | 8.944 | 1.194 | 0.6086 |
| 80 | 15.8 | -56.2 | 8.935 | 1.185 | 0.604 |
| 81 | 16. | -56. | 8.93 | 1.18 | 0.6014 |
| 82 | 16.2 | -55.8 | 8.925 | 1.175 | 0.5989 |
| 83 | 16.4 | -55.6 | 8.921 | 1.171 | 0.5968 |
| 84 | 16.6 | -55.4 | 8.916 | 1.166 | 0.5943 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | -55.2 | 8.911 | 1.161 | 0.5917 |
| 86 | 17. | -55. | 8.906 | 1.156 | 0.5892 |
| 87 | 17.2 | -54.8 | 8.897 | 1.147 | 0.5846 |
| 88 | 17.4 | -54.6 | 8.892 | 1.142 | 0.5821 |
| 89 | 17.6 | -54.4 | 8.887 | 1.137 | 0.5795 |
| 90 | 17.8 | -54.2 | 8.883 | 1.133 | 0.5775 |
| 91 | 18. | -54. | 8.878 | 1.128 | 0.5749 |
| 92 | 18.2 | -53.8 | 8.873 | 1.123 | 0.5724 |
| 93 | 18.4 | -53.6 | 8.868 | 1.118 | 0.5698 |
| 94 | 18.6 | -53.4 | 8.864 | 1.114 | 0.5678 |
| 95 | 18.8 | -53.2 | 8.859 | 1.109 | 0.5652 |
| 96 | 19. | -53. | 8.854 | 1.104 | 0.5627 |
| 97 | 19.2 | -52.8 | 8.845 | 1.095 | 0.5581 |
| 98 | 19.4 | -52.6 | 8.845 | 1.095 | 0.5581 |
| 99 | 19.6 | -52.4 | 8.835 | 1.085 | 0.553 |
| 100 | 19.8 | -52.2 | 8.835 | 1.085 | 0.553 |
| 101 | 20. | -52. | 8.83 | 1.08 | 0.5505 |
| 102 | 21. | -51. | 8.802 | 1.052 | 0.5362 |
| 103 | 22. | -50. | 8.778 | 1.028 | 0.524 |
| 104 | 23. | -49. | 8.755 | 1.005 | 0.5122 |
| 105 | 24. | -48. | 8.731 | 0.981 | 0.5 |
| 106 | 25. | -47. | 8.707 | 0.957 | 0.4878 |
| 107 | 26. | -46. | 8.684 | 0.934 | 0.476 |
| 108 | 27. | -45. | 8.665 | 0.915 | 0.4664 |
| 109 | 28. | -44. | 8.641 | 0.891 | 0.4541 |
| 110 | 29. | -43. | 8.622 | 0.872 | 0.4444 |
| 111 | 30. | -42. | 8.603 | 0.853 | 0.4348 |
| 112 | 31. | -41. | 8.584 | 0.834 | 0.4251 |
| 113 | 32. | -40. | 8.565 | 0.815 | 0.4154 |
| 114 | 33. | -39. | 8.551 | 0.801 | 0.4083 |
| 115 | 34. | -38. | 8.532 | 0.782 | 0.3986 |
| 116 | 35. | -37. | 8.518 | 0.768 | 0.3914 |
| 117 | 36. | -36. | 8.499 | 0.749 | 0.3818 |
| 118 | 37. | -35. | 8.484 | 0.734 | 0.3741 |
| 119 | 38. | -34. | 8.47 | 0.72 | 0.367 |
| 120 | 39. | -33. | 8.456 | 0.706 | 0.3598 |
| 121 | 40. | -32. | 8.442 | 0.692 | 0.3527 |
| 122 | 41. | -31. | 8.428 | 0.678 | 0.3456 |
| 123 | 42. | -30. | 8.418 | 0.668 | 0.3405 |
| 124 | 43. | -29. | 8.404 | 0.654 | 0.3333 |
| 125 | 44. | -28. | 8.394 | 0.644 | 0.3282 |
| 126 | 45. | -27. | 8.385 | 0.635 | 0.3236 |
| 127 | 46. | -26. | 8.371 | 0.621 | 0.3165 |
| 128 | 47. | -25. | 8.361 | 0.611 | 0.3114 |
| 129 | 48. | -24. | 8.352 | 0.602 | 0.3068 |
| 130 | 49. | -23. | 8.342 | 0.592 | 0.3017 |
| 131 | 50. | -22. | 8.333 | 0.583 | 0.2971 |
| 132 | 51. | -21. | 8.328 | 0.578 | 0.2946 |
| 133 | 52. | -20. | 8.319 | 0.569 | 0.29 |
| 134 | 53. | -19. | 8.309 | 0.559 | 0.2849 |
| 135 | 54. | -18. | 8.304 | 0.554 | 0.2824 |
| 136 | 55. | -17. | 8.295 | 0.545 | 0.2778 |
| 137 | 56. | -16. | 8.29 | 0.54 | 0.2752 |

| | | | | | |
|---|---|---|---|---|---|
| 138 | 57. | -15. | 8.281 | 0.531 | 0.2706 |
| 139 | 58. | -14. | 8.276 | 0.526 | 0.2681 |
| 140 | 59. | -13. | 8.271 | 0.521 | 0.2655 |
| 141 | 60. | -12. | 8.262 | 0.512 | 0.261 |
| 142 | 72. | 0. | 8.195 | 0.445 | 0.2268 |
| 143 | 84. | 12. | 8.157 | 0.407 | 0.2074 |
| 144 | 96. | 24. | 8.129 | 0.379 | 0.1932 |
| 145 | 108. | 36. | 8.105 | 0.355 | 0.1809 |
| 146 | 120. | 48. | 8.081 | 0.331 | 0.1687 |
| 147 | 132. | 60. | 8.067 | 0.317 | 0.1616 |
| 148 | 144. | 72. | 8.048 | 0.298 | 0.1519 |
| 149 | 156. | 84. | 8.039 | 0.289 | 0.1473 |
| 150 | 168. | 96. | 8.025 | 0.275 | 0.1402 |
| 151 | 180. | 108. | 8.015 | 0.265 | 0.1351 |
| 152 | 192. | 120. | 8.006 | 0.256 | 0.1305 |
| 153 | 204. | 132. | 7.996 | 0.246 | 0.1254 |
| 154 | 216. | 144. | 7.987 | 0.237 | 0.1208 |
| 155 | 228. | 156. | 7.977 | 0.227 | 0.1157 |
| 156 | 240. | 168. | 7.972 | 0.222 | 0.1131 |
| 157 | 252. | 180. | 7.963 | 0.213 | 0.1086 |
| 158 | 264. | 192. | 7.958 | 0.208 | 0.106 |
| 159 | 276. | 204. | 7.949 | 0.199 | 0.1014 |
| 160 | 288. | 216. | 7.944 | 0.194 | 9.888e-002 |
| 161 | 300. | 228. | 7.939 | 0.189 | 9.633e-002 |
| 162 | 312. | 240. | 7.934 | 0.184 | 9.378e-002 |
| 163 | 324. | 252. | 7.93 | 0.18 | 9.174e-002 |
| 164 | 336. | 264. | 7.925 | 0.175 | 8.919e-002 |
| 165 | 348. | 276. | 7.92 | 0.17 | 8.665e-002 |
| 166 | 360. | 288. | 7.915 | 0.165 | 8.41e-002 |
| 167 | 372. | 300. | 7.911 | 0.161 | 8.206e-002 |
| 168 | 384. | 312. | 7.906 | 0.156 | 7.951e-002 |
| 169 | 396. | 324. | 7.901 | 0.151 | 7.696e-002 |
| 170 | 408. | 336. | 7.901 | 0.151 | 7.696e-002 |
| 171 | 420. | 348. | 7.896 | 0.146 | 7.441e-002 |
| 172 | 432. | 360. | 7.892 | 0.142 | 7.238e-002 |
| 173 | 444. | 372. | 7.892 | 0.142 | 7.238e-002 |
| 174 | 456. | 384. | 7.887 | 0.137 | 6.983e-002 |
| 175 | 468. | 396. | 7.887 | 0.137 | 6.983e-002 |
| 176 | 480. | 408. | 7.882 | 0.132 | 6.728e-002 |
| 177 | 492. | 420. | 7.882 | 0.132 | 6.728e-002 |
| 178 | 504. | 432. | 7.878 | 0.128 | 6.524e-002 |
| 179 | 516. | 444. | 7.873 | 0.123 | 6.269e-002 |
| 180 | 528. | 456. | 7.873 | 0.123 | 6.269e-002 |
| 181 | 540. | 468. | 7.873 | 0.123 | 6.269e-002 |
| 182 | 552. | 480. | 7.868 | 0.118 | 6.014e-002 |
| 183 | 564. | 492. | 7.868 | 0.118 | 6.014e-002 |
| 184 | 576. | 504. | 7.863 | 0.113 | 5.759e-002 |
| 185 | 588. | 516. | 7.863 | 0.113 | 5.759e-002 |
| 186 | 600. | 528. | 7.863 | 0.113 | 5.759e-002 |
| 187 | 720. | 648. | 7.844 | 9.4e-002 | 4.791e-002 |
| 188 | 840. | 768. | 7.835 | 8.5e-002 | 4.332e-002 |
| 189 | 960. | 888. | 7.825 | 7.5e-002 | 3.823e-002 |
| 190 | 1080 | 1008 | 7.816 | 6.6e-002 | 3.364e-002 |

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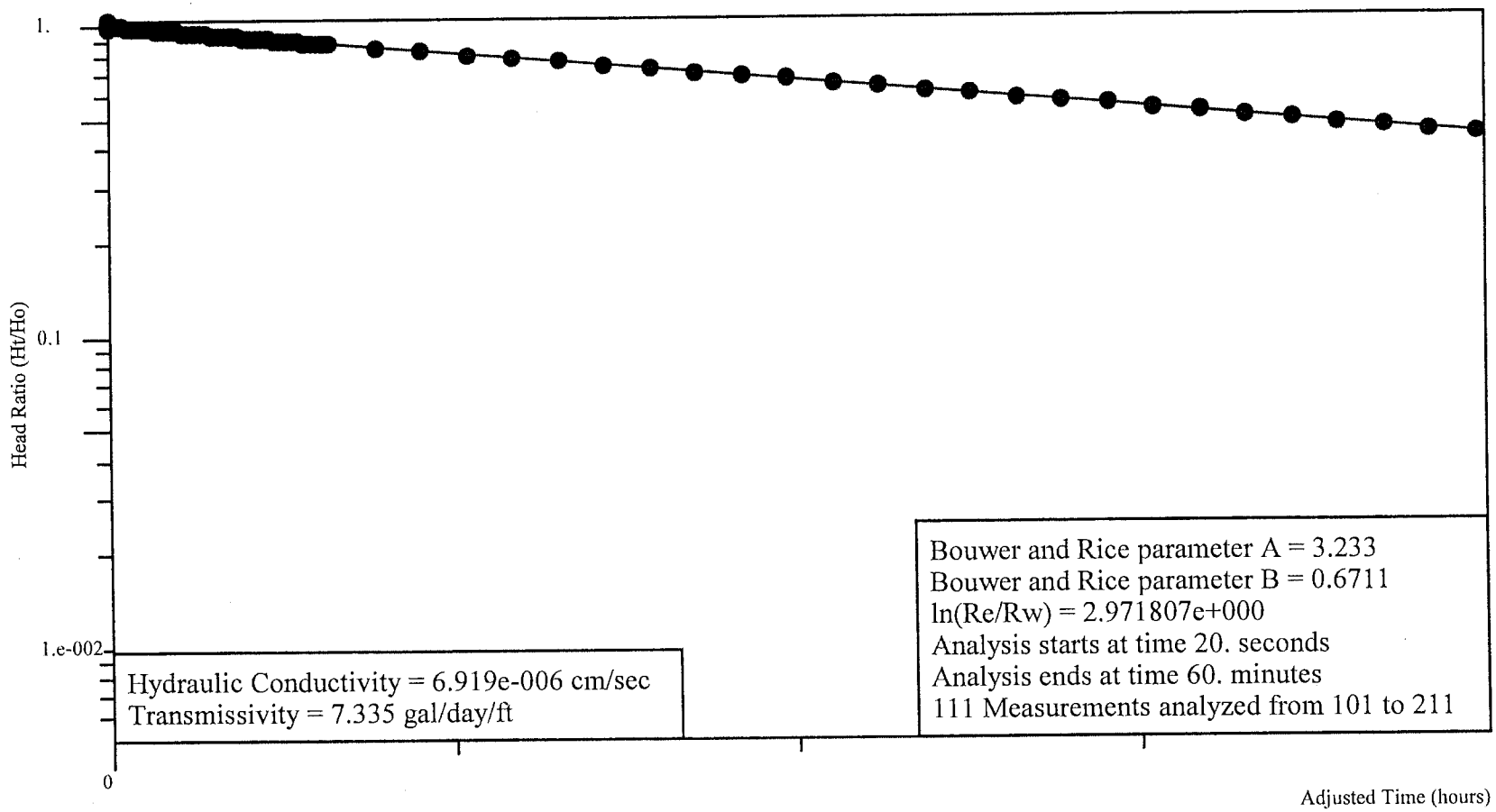
|---|---|---|---|---|---|
| 191 | 1200 | 1128 | 7.811 | 6.1e-002 | 3.109e-002 |
| 192 | 1320 | 1248 | 7.806 | 5.6e-002 | 2.854e-002 |
| 193 | 1440 | 1368 | 7.802 | 5.2e-002 | 2.65e-002 |
| 194 | 1560 | 1488 | 7.797 | 4.7e-002 | 2.396e-002 |
| 195 | 1680 | 1608 | 7.797 | 4.7e-002 | 2.396e-002 |
| 196 | 1800 | 1728 | 7.792 | 4.2e-002 | 2.141e-002 |
| 197 | 1920 | 1848 | 7.792 | 4.2e-002 | 2.141e-002 |
| 198 | 2040 | 1968 | 7.792 | 4.2e-002 | 2.141e-002 |
| 199 | 2160 | 2088 | 7.787 | 3.7e-002 | 1.886e-002 |
| 200 | 2280 | 2208 | 7.787 | 3.7e-002 | 1.886e-002 |
| 201 | 2400 | 2328 | 7.787 | 3.7e-002 | 1.886e-002 |
| 202 | 2520 | 2448 | 7.783 | 3.3e-002 | 1.682e-002 |
| 203 | 2640 | 2568 | 7.783 | 3.3e-002 | 1.682e-002 |
| 204 | 2760 | 2688 | 7.783 | 3.3e-002 | 1.682e-002 |
| 205 | 2880 | 2808 | 7.783 | 3.3e-002 | 1.682e-002 |
| 206 | 3000 | 2928 | 7.783 | 3.3e-002 | 1.682e-002 |
| 207 | 3120 | 3048 | 7.783 | 3.3e-002 | 1.682e-002 |
| 208 | 3240 | 3168 | 7.783 | 3.3e-002 | 1.682e-002 |
| 209 | 3360 | 3288 | 7.783 | 3.3e-002 | 1.682e-002 |
| 210 | 3480 | 3408 | 7.783 | 3.3e-002 | 1.682e-002 |
| 211 | 3600 | 3528 | 7.783 | 3.3e-002 | 1.682e-002 |
| 212 | 3720 | 3648 | 7.783 | 3.3e-002 | 1.682e-002 |

**Aquifer Analysis February 13, 2002**

Coble's Sandrock

**Bouwer and Rice Graph**

P-16 (Falling)




Ho is 1.996 feet at 20. seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 13, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P16FALLI |

| | |
|---|---|
| Well Label: | P-16 (Falling) |
| Aquifer Thickness: | 50. feet |
| Screen Length: | 15. feet |
| Casing Radius: | 1.188 inches |
| Effective Radius: | 3.125 inches |
| Static Water Level: | 12.31 feet |
| Water Table to Screen Bottom: | 30.89 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 20. Seconds |

Test starts with trial 21
There are 211 time and drawdown measurements
Maximum head is 2.469 feet
Minimum head is -4.e-003 feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -20. | 12.31 | -4.e-003 | -1.62e-003 |
| 2 | 0.198 | -19.8 | 12.31 | -4.e-003 | -1.62e-003 |
| 3 | 0.396 | -19.6 | 12.31 | -4.e-003 | -1.62e-003 |
| 4 | 0.6 | -19.4 | 12.31 | -4.e-003 | -1.62e-003 |
| 5 | 0.798 | -19.2 | 12.31 | -4.e-003 | -1.62e-003 |
| 6 | 0.996 | -19. | 12.31 | -4.e-003 | -1.62e-003 |
| 7 | 1.2 | -18.8 | 12.31 | -4.e-003 | -1.62e-003 |
| 8 | 1.398 | -18.6 | 12.3 | 1.5e-002 | 6.075e-003 |
| 9 | 1.596 | -18.4 | 12.31 | -4.e-003 | -1.62e-003 |
| 10 | 1.8 | -18.2 | 12.31 | 0. | 0. |
| 11 | 1.998 | -18. | 12.31 | -4.e-003 | -1.62e-003 |
| 12 | 2.196 | -17.8 | 12.31 | -4.e-003 | -1.62e-003 |
| 13 | 2.4 | -17.6 | 12.31 | -4.e-003 | -1.62e-003 |
| 14 | 2.598 | -17.4 | 12.17 | 0.143 | 5.792e-002 |
| 15 | 2.796 | -17.2 | 11.94 | 0.373 | 0.1511 |
| 16 | 3. | -17. | 11.56 | 0.754 | 0.3054 |
| 17 | 3.198 | -16.8 | 11.17 | 1.141 | 0.4621 |
| 18 | 3.396 | -16.6 | 10.89 | 1.423 | 0.5763 |
| 19 | 3.6 | -16.4 | 10.43 | 1.876 | 0.7598 |
| 20 | 3.798 | -16.2 | 10.22 | 2.087 | 0.8453 |
| 21 | 3.996 | -16. | 9.951 | 2.359 | 0.9554 |
| 22 | 4.2 | -15.8 | 9.841 | 2.469 | 1. |
| 23 | 4.398 | -15.6 | 9.932 | 2.378 | 0.9631 |
| 24 | 4.596 | -15.4 | 10.15 | 2.158 | 0.874 |
| 25 | 4.8 | -15.2 | 10.47 | 1.838 | 0.7444 |
| 26 | 4.998 | -15. | 10.73 | 1.576 | 0.6383 |
| 27 | 5.196 | -14.8 | 10.72 | 1.595 | 0.646 |
| 28 | 5.4 | -14.6 | 10.17 | 2.139 | 0.8663 |
| 29 | 5.598 | -14.4 | 9.932 | 2.378 | 0.9631 |
| 30 | 5.796 | -14.2 | 10.11 | 2.196 | 0.8894 |
| 31 | 6. | -14. | 10.3 | 2.015 | 0.8161 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -13.8 | 10.47 | 1.838 | 0.7444 |
| 33 | 6.396 | -13.6 | 10.52 | 1.79 | 0.725 |
| 34 | 6.6 | -13.4 | 10.46 | 1.848 | 0.7485 |
| 35 | 6.798 | -13.2 | 10.32 | 1.986 | 0.8044 |
| 36 | 6.996 | -13. | 10.19 | 2.125 | 0.8607 |
| 37 | 7.2 | -12.8 | 10.1 | 2.211 | 0.8955 |
| 38 | 7.398 | -12.6 | 10.11 | 2.201 | 0.8915 |
| 39 | 7.596 | -12.4 | 10.19 | 2.12 | 0.8586 |
| 40 | 7.8 | -12.2 | 10.31 | 2.005 | 0.8121 |
| 41 | 7.998 | -12. | 10.39 | 1.919 | 0.7772 |
| 42 | 8.196 | -11.8 | 10.42 | 1.891 | 0.7659 |
| 43 | 8.4 | -11.6 | 10.39 | 1.924 | 0.7793 |
| 44 | 8.598 | -11.4 | 10.31 | 2.005 | 0.8121 |
| 45 | 8.796 | -11.2 | 10.23 | 2.082 | 0.8433 |
| 46 | 9. | -11. | 10.18 | 2.129 | 0.8623 |
| 47 | 9.198 | -10.8 | 10.19 | 2.12 | 0.8586 |
| 48 | 9.396 | -10.6 | 10.24 | 2.072 | 0.8392 |
| 49 | 9.6 | -10.4 | 10.3 | 2.01 | 0.8141 |
| 50 | 9.798 | -10.2 | 10.35 | 1.962 | 0.7947 |
| 51 | 9.996 | -10. | 10.36 | 1.948 | 0.789 |
| 52 | 10.2 | -9.798 | 10.34 | 1.967 | 0.7967 |
| 53 | 10.4 | -9.6 | 10.3 | 2.015 | 0.8161 |
| 54 | 10.6 | -9.402 | 10.25 | 2.058 | 0.8335 |
| 55 | 10.8 | -9.198 | 10.23 | 2.082 | 0.8433 |
| 56 | 11. | -9. | 10.23 | 2.077 | 0.8412 |
| 57 | 11.2 | -8.802 | 10.26 | 2.048 | 0.8295 |
| 58 | 11.4 | -8.598 | 10.3 | 2.01 | 0.8141 |
| 59 | 11.6 | -8.4 | 10.33 | 1.982 | 0.8028 |
| 60 | 11.8 | -8.202 | 10.33 | 1.977 | 0.8007 |
| 61 | 12. | -7.998 | 10.32 | 1.991 | 0.8064 |
| 62 | 12.2 | -7.8 | 10.29 | 2.02 | 0.8181 |
| 63 | 12.4 | -7.602 | 10.27 | 2.044 | 0.8279 |
| 64 | 12.6 | -7.398 | 10.26 | 2.053 | 0.8315 |
| 65 | 12.8 | -7.2 | 10.26 | 2.048 | 0.8295 |
| 66 | 13. | -7.002 | 10.28 | 2.034 | 0.8238 |
| 67 | 13.2 | -6.798 | 10.3 | 2.01 | 0.8141 |
| 68 | 13.4 | -6.6 | 10.31 | 1.996 | 0.8084 |
| 69 | 13.6 | -6.402 | 10.31 | 1.996 | 0.8084 |
| 70 | 13.8 | -6.198 | 10.31 | 2.005 | 0.8121 |
| 71 | 14. | -6. | 10.29 | 2.02 | 0.8181 |
| 72 | 14.2 | -5.802 | 10.28 | 2.034 | 0.8238 |
| 73 | 14.4 | -5.598 | 10.27 | 2.039 | 0.8258 |
| 74 | 14.6 | -5.4 | 10.28 | 2.034 | 0.8238 |
| 75 | 14.8 | -5.202 | 10.29 | 2.025 | 0.8202 |
| 76 | 15. | -4.998 | 10.3 | 2.01 | 0.8141 |
| 77 | 15.2 | -4.8 | 10.31 | 2.005 | 0.8121 |
| 78 | 15.4 | -4.602 | 10.31 | 2.005 | 0.8121 |
| 79 | 15.6 | -4.398 | 10.3 | 2.01 | 0.8141 |
| 80 | 15.8 | -4.2 | 10.29 | 2.02 | 0.8181 |
| 81 | 16. | -4.002 | 10.29 | 2.025 | 0.8202 |
| 82 | 16.2 | -3.798 | 10.28 | 2.029 | 0.8218 |
| 83 | 16.4 | -3.6 | 10.29 | 2.025 | 0.8202 |
| 84 | 16.6 | -3.402 | 10.29 | 2.02 | 0.8181 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | -3.198 | 10.3 | 2.01 | 0.8141 |
| 86 | 17. | -3. | 10.31 | 2.005 | 0.8121 |
| 87 | 17.2 | -2.802 | 10.3 | 2.01 | 0.8141 |
| 88 | 17.4 | -2.598 | 10.3 | 2.01 | 0.8141 |
| 89 | 17.6 | -2.4 | 10.29 | 2.02 | 0.8181 |
| 90 | 17.8 | -2.202 | 10.29 | 2.025 | 0.8202 |
| 91 | 18. | -1.998 | 10.29 | 2.025 | 0.8202 |
| 92 | 18.2 | -1.8 | 10.29 | 2.02 | 0.8181 |
| 93 | 18.4 | -1.602 | 10.3 | 2.015 | 0.8161 |
| 94 | 18.6 | -1.398 | 10.3 | 2.01 | 0.8141 |
| 95 | 18.8 | -1.2 | 10.3 | 2.01 | 0.8141 |
| 96 | 19. | -1.002 | 10.28 | 2.029 | 0.8218 |
| 97 | 19.2 | -0.798 | 10.18 | 2.135 | 0.8647 |
| 98 | 19.4 | -0.6 | 10.18 | 2.135 | 0.8647 |
| 99 | 19.6 | -0.402 | 10.23 | 2.082 | 0.8433 |
| 100 | 19.8 | -0.198 | 10.27 | 2.044 | 0.8279 |
| 101 | 20. | 0. | 10.31 | 1.996 | 0.8084 |
| 102 | 21. | 1.002 | 10.33 | 1.977 | 0.8007 |
| 103 | 22. | 1.998 | 10.24 | 2.068 | 0.8376 |
| 104 | 23. | 3. | 10.33 | 1.977 | 0.8007 |
| 105 | 24. | 4.002 | 10.28 | 2.029 | 0.8218 |
| 106 | 25. | 4.998 | 10.29 | 2.02 | 0.8181 |
| 107 | 26. | 6. | 10.31 | 2.001 | 0.8104 |
| 108 | 27. | 7.002 | 10.3 | 2.015 | 0.8161 |
| 109 | 28. | 7.998 | 10.3 | 2.015 | 0.8161 |
| 110 | 29. | 9. | 10.31 | 2.005 | 0.8121 |
| 111 | 30. | 10. | 10.3 | 2.015 | 0.8161 |
| 112 | 31. | 11. | 10.3 | 2.01 | 0.8141 |
| 113 | 32. | 12. | 10.31 | 2.005 | 0.8121 |
| 114 | 33. | 13. | 10.3 | 2.01 | 0.8141 |
| 115 | 34. | 14. | 10.31 | 2.005 | 0.8121 |
| 116 | 35. | 15. | 10.3 | 2.01 | 0.8141 |
| 117 | 36. | 16. | 10.3 | 2.01 | 0.8141 |
| 118 | 37. | 17. | 10.31 | 2.005 | 0.8121 |
| 119 | 38. | 18. | 10.31 | 2.005 | 0.8121 |
| 120 | 39. | 19. | 10.31 | 2.005 | 0.8121 |
| 121 | 40. | 20. | 10.31 | 2.005 | 0.8121 |
| 122 | 41. | 21. | 10.31 | 2.005 | 0.8121 |
| 123 | 42. | 22. | 10.31 | 2.005 | 0.8121 |
| 124 | 43. | 23. | 10.31 | 2.005 | 0.8121 |
| 125 | 44. | 24. | 10.31 | 2.001 | 0.8104 |
| 126 | 45. | 25. | 10.31 | 2.001 | 0.8104 |
| 127 | 46. | 26. | 10.31 | 2.001 | 0.8104 |
| 128 | 47. | 27. | 10.31 | 2.001 | 0.8104 |
| 129 | 48. | 28. | 10.31 | 2.001 | 0.8104 |
| 130 | 49. | 29. | 10.31 | 2.001 | 0.8104 |
| 131 | 50. | 30. | 10.31 | 2.001 | 0.8104 |
| 132 | 51. | 31. | 10.31 | 1.996 | 0.8084 |
| 133 | 52. | 32. | 10.31 | 1.996 | 0.8084 |
| 134 | 53. | 33. | 10.31 | 1.996 | 0.8084 |
| 135 | 54. | 34. | 10.31 | 1.996 | 0.8084 |
| 136 | 55. | 35. | 10.31 | 1.996 | 0.8084 |
| 137 | 56. | 36. | 10.31 | 1.996 | 0.8084 |

| | | | | | |
|---|---|---|---|---|---|
| 138 | 57. | 37. | 10.31 | 1.996 | 0.8084 |
| 139 | 58. | 38. | 10.32 | 1.991 | 0.8064 |
| 140 | 59. | 39. | 10.32 | 1.991 | 0.8064 |
| 141 | 60. | 40. | 10.32 | 1.991 | 0.8064 |
| 142 | 72. | 52. | 10.32 | 1.986 | 0.8044 |
| 143 | 84. | 64. | 10.33 | 1.977 | 0.8007 |
| 144 | 96. | 76. | 10.34 | 1.972 | 0.7987 |
| 145 | 108. | 88. | 10.35 | 1.962 | 0.7947 |
| 146 | 120. | 100. | 10.35 | 1.958 | 0.793 |
| 147 | 132. | 112. | 10.36 | 1.953 | 0.791 |
| 148 | 144. | 124. | 10.37 | 1.943 | 0.787 |
| 149 | 156. | 136. | 10.37 | 1.939 | 0.7853 |
| 150 | 168. | 148. | 10.38 | 1.934 | 0.7833 |
| 151 | 180. | 160. | 10.38 | 1.929 | 0.7813 |
| 152 | 192. | 172. | 10.39 | 1.919 | 0.7772 |
| 153 | 204. | 184. | 10.4 | 1.915 | 0.7756 |
| 154 | 216. | 196. | 10.4 | 1.91 | 0.7736 |
| 155 | 228. | 208. | 10.4 | 1.905 | 0.7716 |
| 156 | 240. | 220. | 10.41 | 1.895 | 0.7675 |
| 157 | 252. | 232. | 10.42 | 1.891 | 0.7659 |
| 158 | 264. | 244. | 10.42 | 1.886 | 0.7639 |
| 159 | 276. | 256. | 10.43 | 1.881 | 0.7618 |
| 160 | 288. | 268. | 10.43 | 1.876 | 0.7598 |
| 161 | 300. | 280. | 10.44 | 1.872 | 0.7582 |
| 162 | 312. | 292. | 10.45 | 1.862 | 0.7542 |
| 163 | 324. | 304. | 10.45 | 1.857 | 0.7521 |
| 164 | 336. | 316. | 10.46 | 1.852 | 0.7501 |
| 165 | 348. | 328. | 10.46 | 1.848 | 0.7485 |
| 166 | 360. | 340. | 10.47 | 1.843 | 0.7465 |
| 167 | 372. | 352. | 10.47 | 1.838 | 0.7444 |
| 168 | 384. | 364. | 10.48 | 1.834 | 0.7428 |
| 169 | 396. | 376. | 10.49 | 1.824 | 0.7388 |
| 170 | 408. | 388. | 10.49 | 1.819 | 0.7367 |
| 171 | 420. | 400. | 10.5 | 1.814 | 0.7347 |
| 172 | 432. | 412. | 10.5 | 1.81 | 0.7331 |
| 173 | 444. | 424. | 10.51 | 1.805 | 0.7311 |
| 174 | 456. | 436. | 10.51 | 1.8 | 0.729 |
| 175 | 468. | 448. | 10.52 | 1.795 | 0.727 |
| 176 | 480. | 460. | 10.52 | 1.79 | 0.725 |
| 177 | 492. | 472. | 10.52 | 1.786 | 0.7234 |
| 178 | 504. | 484. | 10.53 | 1.776 | 0.7193 |
| 179 | 516. | 496. | 10.53 | 1.776 | 0.7193 |
| 180 | 528. | 508. | 10.54 | 1.767 | 0.7157 |
| 181 | 540. | 520. | 10.55 | 1.762 | 0.7136 |
| 182 | 552. | 532. | 10.55 | 1.757 | 0.7116 |
| 183 | 564. | 544. | 10.55 | 1.757 | 0.7116 |
| 184 | 576. | 556. | 10.56 | 1.747 | 0.7076 |
| 185 | 588. | 568. | 10.57 | 1.743 | 0.706 |
| 186 | 600. | 580. | 10.57 | 1.738 | 0.7039 |
| 187 | 720. | 700. | 10.62 | 1.69 | 0.6845 |
| 188 | 840. | 820. | 10.66 | 1.647 | 0.6671 |
| 189 | 960. | 940. | 10.71 | 1.599 | 0.6476 |
| 190 | 1080 | 1060 | 10.75 | 1.557 | 0.6306 |

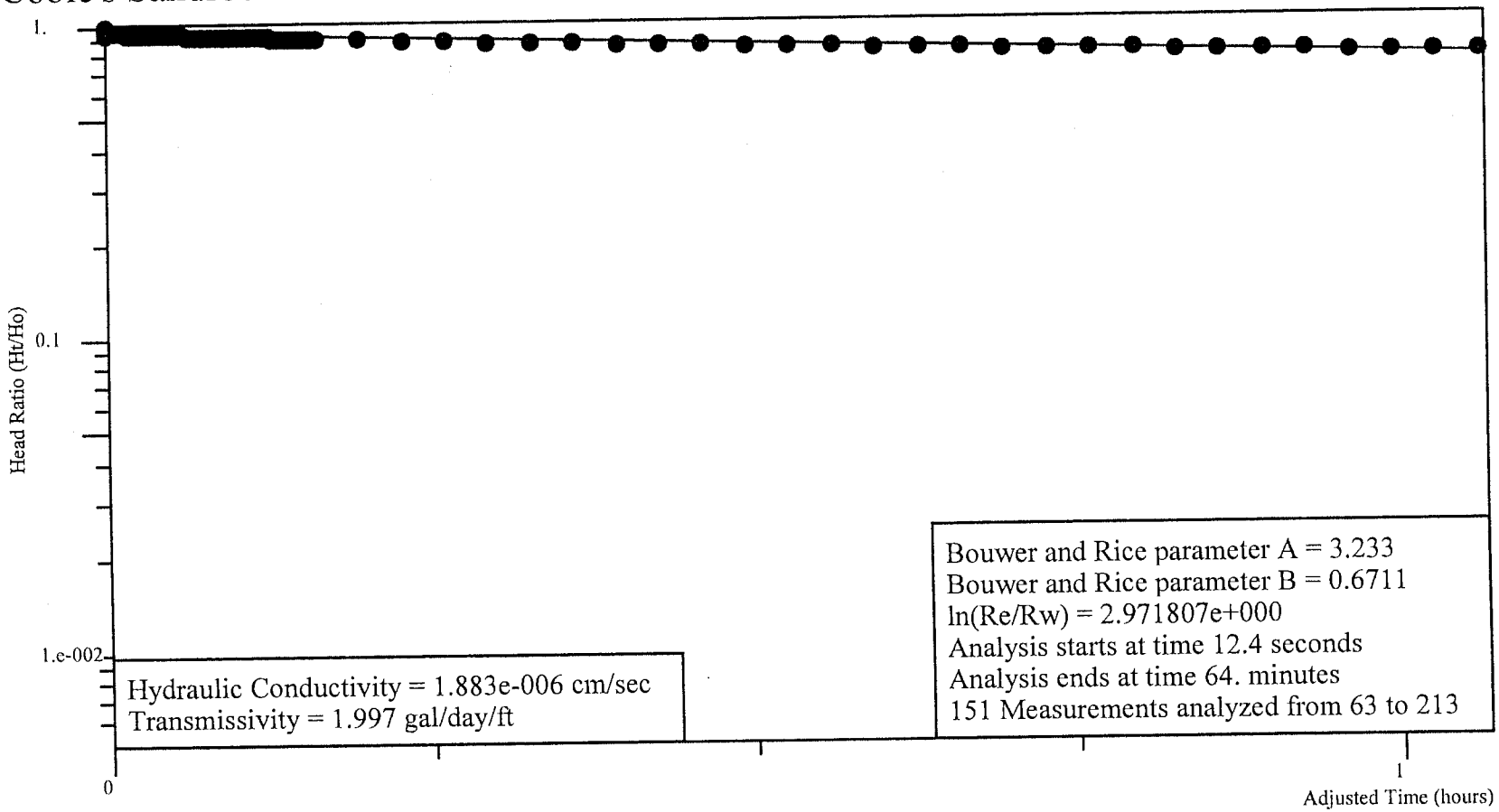
| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1180 | 10.79 | 1.518 | 0.6148 |
| 192 | 1320 | 1300 | 10.83 | 1.476 | 0.5978 |
| 193 | 1440 | 1420 | 10.87 | 1.437 | 0.582 |
| 194 | 1560 | 1540 | 10.91 | 1.399 | 0.5666 |
| 195 | 1680 | 1660 | 10.95 | 1.361 | 0.5512 |
| 196 | 1800 | 1780 | 10.98 | 1.327 | 0.5375 |
| 197 | 1920 | 1900 | 11.02 | 1.289 | 0.5221 |
| 198 | 2040 | 2020 | 11.06 | 1.255 | 0.5083 |
| 199 | 2160 | 2140 | 11.09 | 1.217 | 0.4929 |
| 200 | 2280 | 2260 | 11.12 | 1.189 | 0.4816 |
| 201 | 2400 | 2380 | 11.16 | 1.151 | 0.4662 |
| 202 | 2520 | 2500 | 11.19 | 1.117 | 0.4524 |
| 203 | 2640 | 2620 | 11.22 | 1.089 | 0.4411 |
| 204 | 2760 | 2740 | 11.25 | 1.06 | 0.4293 |
| 205 | 2880 | 2860 | 11.28 | 1.031 | 0.4176 |
| 206 | 3000 | 2980 | 11.31 | 1.003 | 0.4062 |
| 207 | 3120 | 3100 | 11.34 | 0.974 | 0.3945 |
| 208 | 3240 | 3220 | 11.37 | 0.945 | 0.3827 |
| 209 | 3360 | 3340 | 11.39 | 0.917 | 0.3714 |
| 210 | 3480 | 3460 | 11.42 | 0.893 | 0.3617 |
| 211 | 3600 | 3580 | 11.45 | 0.864 | 0.3499 |

# Aquifer Analysis February 13, 2002

Coble's Sandrock

## Bouwer and Rice Graph

P-16 (Rising)




Bouwer and Rice parameter A = 3.233
Bouwer and Rice parameter B = 0.6711
ln(Re/Rw) = 2.971807e+000
Analysis starts at time 12.4 seconds
Analysis ends at time 64. minutes
151 Measurements analyzed from 63 to 213

Hydraulic Conductivity = 1.883e-006 cm/sec
Transmissivity = 1.997 gal/day/ft

Ho is 2.156 feet at 12.4 seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

Site Name: Coble's Sandrock
Test Date: February 13, 2002
Project Number: 419.06
Import File: P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P16RISIN

Well Label: P-16 (Rising)
Aquifer Thickness: 50. feet
Screen Length: 15. feet
Casing Radius: 1.188 inches
Effective Radius: 3.125 inches
Static Water Level: 11.44 feet
Water Table to Screen Bottom: 30.89 feet
Anisotropy Ratio: 1.
Time Adjustment: 12.4 Seconds
Test starts with trial 14
There are 213 time and drawdown measurements
Maximum head is 2.881 feet
Minimum head is 0. feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -12.4 | 11.44 | 4.e-003 | 1.388e-003 |
| 2 | 0.198 | -12.2 | 11.44 | 4.e-003 | 1.388e-003 |
| 3 | 0.396 | -12. | 11.44 | 4.e-003 | 1.388e-003 |
| 4 | 0.6 | -11.8 | 11.45 | 9.e-003 | 3.124e-003 |
| 5 | 0.798 | -11.6 | 11.47 | 3.3e-002 | 1.145e-002 |
| 6 | 0.996 | -11.4 | 11.85 | 0.405 | 0.1406 |
| 7 | 1.2 | -11.2 | 12.91 | 1.469 | 0.5099 |
| 8 | 1.398 | -11. | 13.7 | 2.261 | 0.7848 |
| 9 | 1.596 | -10.8 | 13.8 | 2.357 | 0.8181 |
| 10 | 1.8 | -10.6 | 13.32 | 1.884 | 0.6539 |
| 11 | 1.998 | -10.4 | 12.79 | 1.35 | 0.4686 |
| 12 | 2.196 | -10.2 | 12.78 | 1.341 | 0.4655 |
| 13 | 2.4 | -9.996 | 13.29 | 1.851 | 0.6425 |
| 14 | 2.598 | -9.798 | 13.91 | 2.466 | 0.856 |
| 15 | 2.796 | -9.6 | 14.32 | 2.881 | 1. |
| 16 | 3. | -9.396 | 14.29 | 2.853 | 0.9903 |
| 17 | 3.198 | -9.198 | 13.9 | 2.457 | 0.8528 |
| 18 | 3.396 | -9. | 13.36 | 1.918 | 0.6657 |
| 19 | 3.6 | -8.796 | 12.99 | 1.555 | 0.5397 |
| 20 | 3.798 | -8.598 | 12.98 | 1.541 | 0.5349 |
| 21 | 3.996 | -8.4 | 13.32 | 1.875 | 0.6508 |
| 22 | 4.2 | -8.196 | 13.76 | 2.318 | 0.8046 |
| 23 | 4.398 | -7.998 | 14.05 | 2.609 | 0.9056 |
| 24 | 4.596 | -7.8 | 14.05 | 2.614 | 0.9073 |
| 25 | 4.8 | -7.596 | 13.77 | 2.333 | 0.8098 |
| 26 | 4.998 | -7.398 | 13.4 | 1.961 | 0.6807 |
| 27 | 5.196 | -7.2 | 13.14 | 1.703 | 0.5911 |
| 28 | 5.4 | -6.996 | 13.14 | 1.703 | 0.5911 |
| 29 | 5.598 | -6.798 | 13.37 | 1.927 | 0.6689 |
| 30 | 5.796 | -6.6 | 13.68 | 2.242 | 0.7782 |
| 31 | 6. | -6.396 | 13.89 | 2.447 | 0.8494 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -6.198 | 13.89 | 2.447 | 0.8494 |
| 33 | 6.396 | -6. | 13.7 | 2.256 | 0.7831 |
| 34 | 6.6 | -5.796 | 13.44 | 1.999 | 0.6939 |
| 35 | 6.798 | -5.598 | 13.26 | 1.818 | 0.631 |
| 36 | 6.996 | -5.4 | 13.25 | 1.808 | 0.6276 |
| 37 | 7.2 | -5.196 | 13.41 | 1.97 | 0.6838 |
| 38 | 7.398 | -4.998 | 13.63 | 2.185 | 0.7584 |
| 39 | 7.596 | -4.8 | 13.77 | 2.333 | 0.8098 |
| 40 | 7.8 | -4.596 | 13.78 | 2.338 | 0.8115 |
| 41 | 7.998 | -4.398 | 13.65 | 2.209 | 0.7667 |
| 42 | 8.196 | -4.2 | 13.47 | 2.028 | 0.7039 |
| 43 | 8.4 | -3.996 | 13.33 | 1.894 | 0.6574 |
| 44 | 8.598 | -3.798 | 13.33 | 1.889 | 0.6557 |
| 45 | 8.796 | -3.6 | 13.43 | 1.994 | 0.6921 |
| 46 | 9. | -3.396 | 13.58 | 2.142 | 0.7435 |
| 47 | 9.198 | -3.198 | 13.69 | 2.247 | 0.7799 |
| 48 | 9.396 | -3. | 13.7 | 2.256 | 0.7831 |
| 49 | 9.6 | -2.796 | 13.61 | 2.166 | 0.7518 |
| 50 | 9.798 | -2.598 | 13.48 | 2.042 | 0.7088 |
| 51 | 9.996 | -2.4 | 13.39 | 1.951 | 0.6772 |
| 52 | 10.2 | -2.196 | 13.38 | 1.942 | 0.6741 |
| 53 | 10.4 | -1.998 | 13.45 | 2.013 | 0.6987 |
| 54 | 10.6 | -1.8 | 13.56 | 2.118 | 0.7352 |
| 55 | 10.8 | -1.596 | 13.64 | 2.195 | 0.7619 |
| 56 | 11. | -1.398 | 13.64 | 2.199 | 0.7633 |
| 57 | 11.2 | -1.2 | 13.58 | 2.142 | 0.7435 |
| 58 | 11.4 | -0.996 | 13.49 | 2.052 | 0.7123 |
| 59 | 11.6 | -0.798 | 13.43 | 1.989 | 0.6904 |
| 60 | 11.8 | -0.6 | 13.42 | 1.98 | 0.6873 |
| 61 | 12. | -0.396 | 13.47 | 2.032 | 0.7053 |
| 62 | 12.2 | -0.198 | 13.54 | 2.104 | 0.7303 |
| 63 | 12.4 | 0. | 13.6 | 2.156 | 0.7484 |
| 64 | 12.6 | 0.204 | 13.6 | 2.161 | 0.7501 |
| 65 | 12.8 | 0.402 | 13.56 | 2.118 | 0.7352 |
| 66 | 13. | 0.6 | 13.5 | 2.061 | 0.7154 |
| 67 | 13.2 | 0.804 | 13.45 | 2.013 | 0.6987 |
| 68 | 13.4 | 1.002 | 13.45 | 2.009 | 0.6973 |
| 69 | 13.6 | 1.2 | 13.48 | 2.042 | 0.7088 |
| 70 | 13.8 | 1.404 | 13.53 | 2.09 | 0.7254 |
| 71 | 14. | 1.602 | 13.57 | 2.128 | 0.7386 |
| 72 | 14.2 | 1.8 | 13.57 | 2.133 | 0.7404 |
| 73 | 14.4 | 2.004 | 13.54 | 2.104 | 0.7303 |
| 74 | 14.6 | 2.202 | 13.5 | 2.061 | 0.7154 |
| 75 | 14.8 | 2.4 | 13.47 | 2.032 | 0.7053 |
| 76 | 15. | 2.604 | 13.47 | 2.028 | 0.7039 |
| 77 | 15.2 | 2.802 | 13.49 | 2.047 | 0.7105 |
| 78 | 15.4 | 3. | 13.53 | 2.085 | 0.7237 |
| 79 | 15.6 | 3.204 | 13.55 | 2.109 | 0.732 |
| 80 | 15.8 | 3.402 | 13.55 | 2.113 | 0.7334 |
| 81 | 16. | 3.6 | 13.53 | 2.094 | 0.7268 |
| 82 | 16.2 | 3.804 | 13.51 | 2.066 | 0.7171 |
| 83 | 16.4 | 4.002 | 13.48 | 2.042 | 0.7088 |
| 84 | 16.6 | 4.2 | 13.48 | 2.037 | 0.707 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | 4.404 | 13.49 | 2.052 | 0.7123 |
| 86 | 17. | 4.602 | 13.52 | 2.075 | 0.7202 |
| 87 | 17.2 | 4.8 | 13.53 | 2.094 | 0.7268 |
| 88 | 17.4 | 5.004 | 13.54 | 2.099 | 0.7286 |
| 89 | 17.6 | 5.202 | 13.53 | 2.085 | 0.7237 |
| 90 | 17.8 | 5.4 | 13.51 | 2.066 | 0.7171 |
| 91 | 18. | 5.604 | 13.49 | 2.047 | 0.7105 |
| 92 | 18.2 | 5.802 | 13.49 | 2.047 | 0.7105 |
| 93 | 18.4 | 6. | 13.5 | 2.056 | 0.7136 |
| 94 | 18.6 | 6.204 | 13.51 | 2.07 | 0.7185 |
| 95 | 18.8 | 6.402 | 13.53 | 2.085 | 0.7237 |
| 96 | 19. | 6.6 | 13.53 | 2.09 | 0.7254 |
| 97 | 19.2 | 6.804 | 13.52 | 2.08 | 0.722 |
| 98 | 19.4 | 7.002 | 13.51 | 2.066 | 0.7171 |
| 99 | 19.6 | 7.2 | 13.49 | 2.052 | 0.7123 |
| 100 | 19.8 | 7.404 | 13.49 | 2.052 | 0.7123 |
| 101 | 20. | 7.602 | 13.5 | 2.056 | 0.7136 |
| 102 | 21. | 8.604 | 13.5 | 2.056 | 0.7136 |
| 103 | 22. | 9.6 | 13.51 | 2.07 | 0.7185 |
| 104 | 23. | 10.6 | 13.5 | 2.061 | 0.7154 |
| 105 | 24. | 11.6 | 13.5 | 2.056 | 0.7136 |
| 106 | 25. | 12.6 | 13.51 | 2.066 | 0.7171 |
| 107 | 26. | 13.6 | 13.5 | 2.061 | 0.7154 |
| 108 | 27. | 14.6 | 13.5 | 2.056 | 0.7136 |
| 109 | 28. | 15.6 | 13.5 | 2.061 | 0.7154 |
| 110 | 29. | 16.6 | 13.5 | 2.056 | 0.7136 |
| 111 | 30. | 17.6 | 13.5 | 2.056 | 0.7136 |
| 112 | 31. | 18.6 | 13.5 | 2.056 | 0.7136 |
| 113 | 32. | 19.6 | 13.5 | 2.056 | 0.7136 |
| 114 | 33. | 20.6 | 13.5 | 2.056 | 0.7136 |
| 115 | 34. | 21.6 | 13.5 | 2.056 | 0.7136 |
| 116 | 35. | 22.6 | 13.49 | 2.052 | 0.7123 |
| 117 | 36. | 23.6 | 13.49 | 2.052 | 0.7123 |
| 118 | 37. | 24.6 | 13.49 | 2.052 | 0.7123 |
| 119 | 38. | 25.6 | 13.49 | 2.052 | 0.7123 |
| 120 | 39. | 26.6 | 13.49 | 2.052 | 0.7123 |
| 121 | 40. | 27.6 | 13.49 | 2.052 | 0.7123 |
| 122 | 41. | 28.6 | 13.49 | 2.052 | 0.7123 |
| 123 | 42. | 29.6 | 13.49 | 2.052 | 0.7123 |
| 124 | 43. | 30.6 | 13.49 | 2.052 | 0.7123 |
| 125 | 44. | 31.6 | 13.49 | 2.052 | 0.7123 |
| 126 | 45. | 32.6 | 13.49 | 2.047 | 0.7105 |
| 127 | 46. | 33.6 | 13.49 | 2.047 | 0.7105 |
| 128 | 47. | 34.6 | 13.49 | 2.047 | 0.7105 |
| 129 | 48. | 35.6 | 13.49 | 2.047 | 0.7105 |
| 130 | 49. | 36.6 | 13.49 | 2.047 | 0.7105 |
| 131 | 50. | 37.6 | 13.49 | 2.047 | 0.7105 |
| 132 | 51. | 38.6 | 13.49 | 2.047 | 0.7105 |
| 133 | 52. | 39.6 | 13.49 | 2.047 | 0.7105 |
| 134 | 53. | 40.6 | 13.49 | 2.047 | 0.7105 |
| 135 | 54. | 41.6 | 13.49 | 2.047 | 0.7105 |
| 136 | 55. | 42.6 | 13.49 | 2.047 | 0.7105 |
| 137 | 56. | 43.6 | 13.49 | 2.047 | 0.7105 |

| | | | | | |
|---|---|---|---|---|---|
| 138 | 57. | 44.6 | 13.49 | 2.047 | 0.7105 |
| 139 | 58. | 45.6 | 13.49 | 2.047 | 0.7105 |
| 140 | 59. | 46.6 | 13.48 | 2.042 | 0.7088 |
| 141 | 60. | 47.6 | 13.48 | 2.042 | 0.7088 |
| 142 | 72. | 59.6 | 13.48 | 2.037 | 0.707 |
| 143 | 84. | 71.6 | 13.48 | 2.037 | 0.707 |
| 144 | 96. | 83.6 | 13.47 | 2.032 | 0.7053 |
| 145 | 108. | 95.6 | 13.47 | 2.028 | 0.7039 |
| 146 | 120. | 107.6 | 13.47 | 2.028 | 0.7039 |
| 147 | 132. | 119.6 | 13.46 | 2.023 | 0.7022 |
| 148 | 144. | 131.6 | 13.46 | 2.018 | 0.7005 |
| 149 | 156. | 143.6 | 13.46 | 2.018 | 0.7005 |
| 150 | 168. | 155.6 | 13.46 | 2.018 | 0.7005 |
| 151 | 180. | 167.6 | 13.45 | 2.013 | 0.6987 |
| 152 | 192. | 179.6 | 13.45 | 2.009 | 0.6973 |
| 153 | 204. | 191.6 | 13.45 | 2.009 | 0.6973 |
| 154 | 216. | 203.6 | 13.44 | 2.004 | 0.6956 |
| 155 | 228. | 215.6 | 13.44 | 2.004 | 0.6956 |
| 156 | 240. | 227.6 | 13.44 | 1.999 | 0.6939 |
| 157 | 252. | 239.6 | 13.44 | 1.999 | 0.6939 |
| 158 | 264. | 251.6 | 13.43 | 1.994 | 0.6921 |
| 159 | 276. | 263.6 | 13.43 | 1.994 | 0.6921 |
| 160 | 288. | 275.6 | 13.43 | 1.994 | 0.6921 |
| 161 | 300. | 287.6 | 13.43 | 1.989 | 0.6904 |
| 162 | 312. | 299.6 | 13.43 | 1.989 | 0.6904 |
| 163 | 324. | 311.6 | 13.43 | 1.985 | 0.689 |
| 164 | 336. | 323.6 | 13.43 | 1.985 | 0.689 |
| 165 | 348. | 335.6 | 13.43 | 1.985 | 0.689 |
| 166 | 360. | 347.6 | 13.42 | 1.98 | 0.6873 |
| 167 | 372. | 359.6 | 13.42 | 1.98 | 0.6873 |
| 168 | 384. | 371.6 | 13.41 | 1.975 | 0.6855 |
| 169 | 396. | 383.6 | 13.41 | 1.975 | 0.6855 |
| 170 | 408. | 395.6 | 13.41 | 1.97 | 0.6838 |
| 171 | 420. | 407.6 | 13.41 | 1.97 | 0.6838 |
| 172 | 432. | 419.6 | 13.41 | 1.97 | 0.6838 |
| 173 | 444. | 431.6 | 13.41 | 1.966 | 0.6824 |
| 174 | 456. | 443.6 | 13.41 | 1.966 | 0.6824 |
| 175 | 468. | 455.6 | 13.41 | 1.966 | 0.6824 |
| 176 | 480. | 467.6 | 13.4 | 1.961 | 0.6807 |
| 177 | 492. | 479.6 | 13.4 | 1.961 | 0.6807 |
| 178 | 504. | 491.6 | 13.4 | 1.956 | 0.6789 |
| 179 | 516. | 503.6 | 13.4 | 1.956 | 0.6789 |
| 180 | 528. | 515.6 | 13.4 | 1.956 | 0.6789 |
| 181 | 540. | 527.6 | 13.39 | 1.951 | 0.6772 |
| 182 | 552. | 539.6 | 13.39 | 1.951 | 0.6772 |
| 183 | 564. | 551.6 | 13.39 | 1.951 | 0.6772 |
| 184 | 576. | 563.6 | 13.39 | 1.947 | 0.6758 |
| 185 | 588. | 575.6 | 13.39 | 1.947 | 0.6758 |
| 186 | 600. | 587.6 | 13.39 | 1.947 | 0.6758 |
| 187 | 720. | 707.6 | 13.37 | 1.927 | 0.6689 |
| 188 | 840. | 827.6 | 13.35 | 1.913 | 0.664 |
| 189 | 960. | 947.6 | 13.34 | 1.899 | 0.6591 |
| 190 | 1080 | 1068 | 13.32 | 1.884 | 0.6539 |

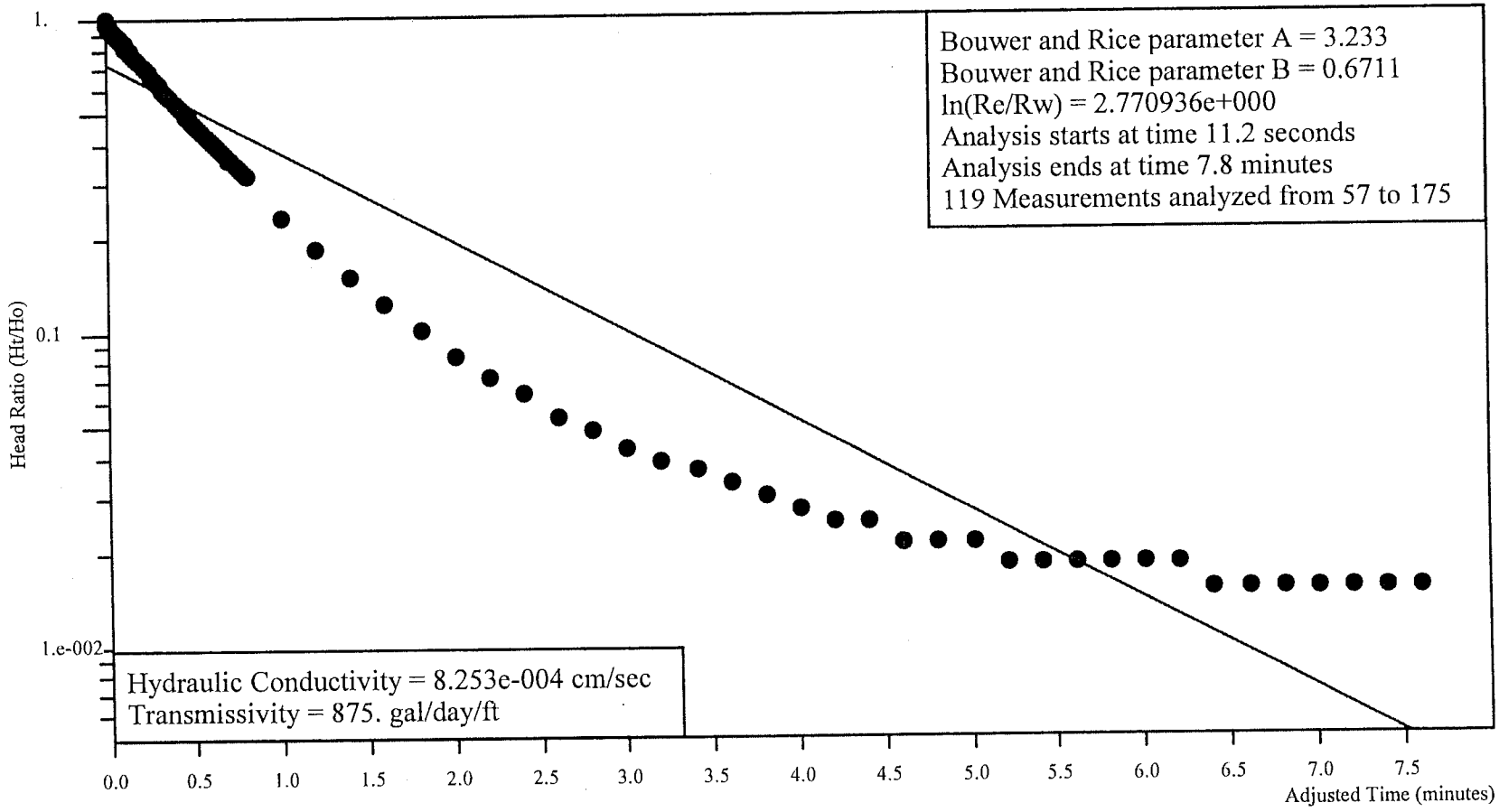
| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1188 | 13.31 | 1.87 | 0.6491 |
| 192 | 1320 | 1308 | 13.3 | 1.856 | 0.6442 |
| 193 | 1440 | 1428 | 13.29 | 1.846 | 0.6407 |
| 194 | 1560 | 1548 | 13.27 | 1.832 | 0.6359 |
| 195 | 1680 | 1668 | 13.26 | 1.822 | 0.6324 |
| 196 | 1800 | 1788 | 13.25 | 1.808 | 0.6276 |
| 197 | 1920 | 1908 | 13.24 | 1.799 | 0.6244 |
| 198 | 2040 | 2028 | 13.23 | 1.789 | 0.621 |
| 199 | 2160 | 2148 | 13.22 | 1.78 | 0.6178 |
| 200 | 2280 | 2268 | 13.21 | 1.765 | 0.6126 |
| 201 | 2400 | 2388 | 13.2 | 1.756 | 0.6095 |
| 202 | 2520 | 2508 | 13.19 | 1.746 | 0.606 |
| 203 | 2640 | 2628 | 13.18 | 1.737 | 0.6029 |
| 204 | 2760 | 2748 | 13.17 | 1.727 | 0.5994 |
| 205 | 2880 | 2868 | 13.16 | 1.717 | 0.596 |
| 206 | 3000 | 2988 | 13.15 | 1.708 | 0.5928 |
| 207 | 3120 | 3108 | 13.14 | 1.703 | 0.5911 |
| 208 | 3240 | 3228 | 13.13 | 1.694 | 0.588 |
| 209 | 3360 | 3348 | 13.12 | 1.684 | 0.5845 |
| 210 | 3480 | 3468 | 13.12 | 1.675 | 0.5814 |
| 211 | 3600 | 3588 | 13.11 | 1.67 | 0.5797 |
| 212 | 3720 | 3708 | 13.1 | 1.66 | 0.5762 |
| 213 | 3840 | 3828 | 13.1 | 1.656 | 0.5748 |

**Aquifer Analysis February 18, 2002**

Coble's Sandrock

**Bouwer and Rice Graph**

P-17 (Falling)




Ho is 1.597 feet at 11.2 seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

Site Name: Coble's Sandrock
Test Date: February 18, 2002
Project Number: 419.06
Import File: P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P17FALL

Well Label: P-17 (Falling)
Aquifer Thickness: 50. feet
Screen Length: 15. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 17.27 feet
Water Table to Screen Bottom: 21.23 feet
Anisotropy Ratio: 1.
Time Adjustment: 11.2 Seconds
Test starts with trial 30
There are 198 time and drawdown measurements
Maximum head is 2.933 feet
Minimum head is 0. feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -11.2 | 17.26 | 1.e-002 | 3.409e-003 |
| 2 | 0.198 | -11. | 17.26 | 1.e-002 | 3.409e-003 |
| 3 | 0.396 | -10.8 | 17.26 | 1.e-002 | 3.409e-003 |
| 4 | 0.6 | -10.6 | 17.26 | 1.e-002 | 3.409e-003 |
| 5 | 0.798 | -10.4 | 17.26 | 1.e-002 | 3.409e-003 |
| 6 | 0.996 | -10.2 | 17.26 | 1.e-002 | 3.409e-003 |
| 7 | 1.2 | -9.996 | 17.25 | 1.5e-002 | 5.114e-003 |
| 8 | 1.398 | -9.798 | 17.25 | 1.5e-002 | 5.114e-003 |
| 9 | 1.596 | -9.6 | 17.25 | 1.5e-002 | 5.114e-003 |
| 10 | 1.8 | -9.396 | 17.27 | 5.e-003 | 1.705e-003 |
| 11 | 1.998 | -9.198 | 17.26 | 1.e-002 | 3.409e-003 |
| 12 | 2.196 | -9. | 17.26 | 1.e-002 | 3.409e-003 |
| 13 | 2.4 | -8.796 | 17.26 | 1.e-002 | 3.409e-003 |
| 14 | 2.598 | -8.598 | 16.77 | 0.501 | 0.1708 |
| 15 | 2.796 | -8.4 | 16.83 | 0.439 | 0.1497 |
| 16 | 3. | -8.196 | 16.43 | 0.844 | 0.2878 |
| 17 | 3.198 | -7.998 | 16.06 | 1.206 | 0.4112 |
| 18 | 3.396 | -7.8 | 16.73 | 0.544 | 0.1855 |
| 19 | 3.6 | -7.596 | 16.68 | 0.587 | 0.2001 |
| 20 | 3.798 | -7.398 | 16.39 | 0.882 | 0.3007 |
| 21 | 3.996 | -7.2 | 15.51 | 1.759 | 0.5997 |
| 22 | 4.2 | -6.996 | 15.62 | 1.65 | 0.5626 |
| 23 | 4.398 | -6.798 | 16.32 | 0.954 | 0.3253 |
| 24 | 4.596 | -6.6 | 16.5 | 0.772 | 0.2632 |
| 25 | 4.8 | -6.396 | 16.08 | 1.187 | 0.4047 |
| 26 | 4.998 | -6.198 | 15.11 | 2.165 | 0.7382 |
| 27 | 5.196 | -6. | 15.41 | 1.855 | 0.6325 |
| 28 | 5.4 | -5.796 | 15.91 | 1.359 | 0.4633 |
| 29 | 5.598 | -5.598 | 15.87 | 1.397 | 0.4763 |
| 30 | 5.796 | -5.4 | 15.17 | 2.098 | 0.7153 |
| 31 | 6. | -5.196 | 14.34 | 2.933 | 1. |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -4.998 | 14.85 | 2.418 | 0.8244 |
| 33 | 6.396 | -4.8 | 15.46 | 1.807 | 0.6161 |
| 34 | 6.6 | -4.596 | 15.85 | 1.416 | 0.4828 |
| 35 | 6.798 | -4.398 | 15.87 | 1.397 | 0.4763 |
| 36 | 6.996 | -4.2 | 15.53 | 1.74 | 0.5932 |
| 37 | 7.2 | -3.996 | 15.18 | 2.089 | 0.7122 |
| 38 | 7.398 | -3.798 | 15.13 | 2.141 | 0.73 |
| 39 | 7.596 | -3.6 | 15.41 | 1.855 | 0.6325 |
| 40 | 7.8 | -3.396 | 15.49 | 1.783 | 0.6079 |
| 41 | 7.998 | -3.198 | 15.58 | 1.688 | 0.5755 |
| 42 | 8.196 | -3. | 15.45 | 1.817 | 0.6195 |
| 43 | 8.4 | -2.796 | 15.58 | 1.693 | 0.5772 |
| 44 | 8.598 | -2.598 | 15.47 | 1.798 | 0.613 |
| 45 | 8.796 | -2.4 | 15.55 | 1.716 | 0.5851 |
| 46 | 9. | -2.196 | 15.91 | 1.359 | 0.4633 |
| 47 | 9.198 | -1.998 | 15.54 | 1.726 | 0.5885 |
| 48 | 9.396 | -1.8 | 15.64 | 1.626 | 0.5544 |
| 49 | 9.6 | -1.596 | 15.82 | 1.454 | 0.4957 |
| 50 | 9.798 | -1.398 | 15.47 | 1.798 | 0.613 |
| 51 | 9.996 | -1.2 | 15.58 | 1.693 | 0.5772 |
| 52 | 10.2 | -0.996 | 15.72 | 1.55 | 0.5285 |
| 53 | 10.4 | -0.798 | 15.76 | 1.511 | 0.5152 |
| 54 | 10.6 | -0.6 | 15.68 | 1.593 | 0.5431 |
| 55 | 10.8 | -0.396 | 15.63 | 1.645 | 0.5609 |
| 56 | 11. | -0.198 | 15.62 | 1.65 | 0.5626 |
| 57 | 11.2 | 0. | 15.67 | 1.597 | 0.5445 |
| 58 | 11.4 | 0.204 | 15.72 | 1.55 | 0.5285 |
| 59 | 11.6 | 0.402 | 15.73 | 1.54 | 0.5251 |
| 60 | 11.8 | 0.6 | 15.73 | 1.545 | 0.5268 |
| 61 | 12. | 0.804 | 15.71 | 1.559 | 0.5315 |
| 62 | 12.2 | 1.002 | 15.73 | 1.545 | 0.5268 |
| 63 | 12.4 | 1.2 | 15.73 | 1.545 | 0.5268 |
| 64 | 12.6 | 1.404 | 15.77 | 1.502 | 0.5121 |
| 65 | 12.8 | 1.602 | 15.77 | 1.497 | 0.5104 |
| 66 | 13. | 1.8 | 15.74 | 1.526 | 0.5203 |
| 67 | 13.2 | 2.004 | 15.78 | 1.492 | 0.5087 |
| 68 | 13.4 | 2.202 | 15.77 | 1.497 | 0.5104 |
| 69 | 13.6 | 2.4 | 15.79 | 1.483 | 0.5056 |
| 70 | 13.8 | 2.604 | 15.79 | 1.478 | 0.5039 |
| 71 | 14. | 2.802 | 15.81 | 1.464 | 0.4991 |
| 72 | 14.2 | 3. | 15.82 | 1.45 | 0.4944 |
| 73 | 14.4 | 3.204 | 15.79 | 1.478 | 0.5039 |
| 74 | 14.6 | 3.402 | 15.82 | 1.45 | 0.4944 |
| 75 | 14.8 | 3.6 | 15.83 | 1.435 | 0.4893 |
| 76 | 15. | 3.804 | 15.84 | 1.43 | 0.4876 |
| 77 | 15.2 | 4.002 | 15.86 | 1.411 | 0.4811 |
| 78 | 15.4 | 4.2 | 15.83 | 1.435 | 0.4893 |
| 79 | 15.6 | 4.404 | 15.86 | 1.406 | 0.4794 |
| 80 | 15.8 | 4.602 | 15.87 | 1.402 | 0.478 |
| 81 | 16. | 4.8 | 15.87 | 1.397 | 0.4763 |
| 82 | 16.2 | 5.004 | 15.88 | 1.392 | 0.4746 |
| 83 | 16.4 | 5.202 | 15.89 | 1.383 | 0.4715 |
| 84 | 16.6 | 5.4 | 15.9 | 1.373 | 0.4681 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | 5.604 | 15.9 | 1.368 | 0.4664 |
| 86 | 17. | 5.802 | 15.91 | 1.359 | 0.4633 |
| 87 | 17.2 | 6. | 15.91 | 1.359 | 0.4633 |
| 88 | 17.4 | 6.204 | 15.92 | 1.349 | 0.4599 |
| 89 | 17.6 | 6.402 | 15.92 | 1.349 | 0.4599 |
| 90 | 17.8 | 6.6 | 15.94 | 1.33 | 0.4535 |
| 91 | 18. | 6.804 | 15.93 | 1.34 | 0.4569 |
| 92 | 18.2 | 7.002 | 15.94 | 1.33 | 0.4535 |
| 93 | 18.4 | 7.2 | 15.95 | 1.316 | 0.4487 |
| 94 | 18.6 | 7.404 | 15.97 | 1.302 | 0.4439 |
| 95 | 18.8 | 7.602 | 15.98 | 1.292 | 0.4405 |
| 96 | 19. | 7.8 | 15.98 | 1.292 | 0.4405 |
| 97 | 19.2 | 8.004 | 15.98 | 1.292 | 0.4405 |
| 98 | 19.4 | 8.202 | 15.98 | 1.292 | 0.4405 |
| 99 | 19.6 | 8.4 | 15.99 | 1.283 | 0.4374 |
| 100 | 19.8 | 8.604 | 16. | 1.273 | 0.434 |
| 101 | 20. | 8.802 | 16.01 | 1.263 | 0.4306 |
| 102 | 21. | 9.804 | 16.04 | 1.235 | 0.4211 |
| 103 | 22. | 10.8 | 16.07 | 1.202 | 0.4098 |
| 104 | 23. | 11.8 | 16.1 | 1.173 | 0.3999 |
| 105 | 24. | 12.8 | 16.13 | 1.14 | 0.3887 |
| 106 | 25. | 13.8 | 16.15 | 1.116 | 0.3805 |
| 107 | 26. | 14.8 | 16.18 | 1.087 | 0.3706 |
| 108 | 27. | 15.8 | 16.21 | 1.063 | 0.3624 |
| 109 | 28. | 16.8 | 16.23 | 1.035 | 0.3529 |
| 110 | 29. | 17.8 | 16.26 | 1.011 | 0.3447 |
| 111 | 30. | 18.8 | 16.28 | 0.992 | 0.3382 |
| 112 | 31. | 19.8 | 16.31 | 0.963 | 0.3283 |
| 113 | 32. | 20.8 | 16.33 | 0.939 | 0.3202 |
| 114 | 33. | 21.8 | 16.35 | 0.92 | 0.3137 |
| 115 | 34. | 22.8 | 16.37 | 0.896 | 0.3055 |
| 116 | 35. | 23.8 | 16.4 | 0.873 | 0.2976 |
| 117 | 36. | 24.8 | 16.42 | 0.854 | 0.2912 |
| 118 | 37. | 25.8 | 16.44 | 0.834 | 0.2844 |
| 119 | 38. | 26.8 | 16.45 | 0.815 | 0.2779 |
| 120 | 39. | 27.8 | 16.47 | 0.796 | 0.2714 |
| 121 | 40. | 28.8 | 16.49 | 0.782 | 0.2666 |
| 122 | 41. | 29.8 | 16.51 | 0.763 | 0.2601 |
| 123 | 42. | 30.8 | 16.53 | 0.744 | 0.2537 |
| 124 | 43. | 31.8 | 16.54 | 0.73 | 0.2489 |
| 125 | 44. | 32.8 | 16.56 | 0.715 | 0.2438 |
| 126 | 45. | 33.8 | 16.57 | 0.696 | 0.2373 |
| 127 | 46. | 34.8 | 16.59 | 0.682 | 0.2325 |
| 128 | 47. | 35.8 | 16.6 | 0.668 | 0.2278 |
| 129 | 48. | 36.8 | 16.62 | 0.653 | 0.2226 |
| 130 | 49. | 37.8 | 16.63 | 0.639 | 0.2179 |
| 131 | 50. | 38.8 | 16.65 | 0.625 | 0.2131 |
| 132 | 51. | 39.8 | 16.66 | 0.61 | 0.208 |
| 133 | 52. | 40.8 | 16.67 | 0.601 | 0.2049 |
| 134 | 53. | 41.8 | 16.68 | 0.587 | 0.2001 |
| 135 | 54. | 42.8 | 16.7 | 0.572 | 0.195 |
| 136 | 55. | 43.8 | 16.71 | 0.563 | 0.192 |
| 137 | 56. | 44.8 | 16.72 | 0.548 | 0.1868 |

| | | | | | |
|---|---|---|---|---|---|
| 138 | 57. | 45.8 | 16.73 | 0.539 | 0.1838 |
| 139 | 58. | 46.8 | 16.74 | 0.529 | 0.1804 |
| 140 | 59. | 47.8 | 16.75 | 0.515 | 0.1756 |
| 141 | 60. | 48.8 | 16.76 | 0.506 | 0.1725 |
| 142 | 72. | 60.8 | 16.9 | 0.372 | 0.1268 |
| 143 | 84. | 72.8 | 16.97 | 0.296 | 0.1009 |
| 144 | 96. | 84.8 | 17.03 | 0.239 | 8.149e-002 |
| 145 | 108. | 96.8 | 17.07 | 0.196 | 6.683e-002 |
| 146 | 120. | 108.8 | 17.11 | 0.162 | 5.523e-002 |
| 147 | 132. | 120.8 | 17.14 | 0.134 | 4.569e-002 |
| 148 | 144. | 132.8 | 17.16 | 0.115 | 3.921e-002 |
| 149 | 156. | 144.8 | 17.17 | 0.101 | 3.444e-002 |
| 150 | 168. | 156.8 | 17.18 | 8.6e-002 | 2.932e-002 |
| 151 | 180. | 168.8 | 17.19 | 7.7e-002 | 2.625e-002 |
| 152 | 192. | 180.8 | 17.2 | 6.7e-002 | 2.284e-002 |
| 153 | 204. | 192.8 | 17.21 | 6.2e-002 | 2.114e-002 |
| 154 | 216. | 204.8 | 17.21 | 5.8e-002 | 1.977e-002 |
| 155 | 228. | 216.8 | 17.22 | 5.3e-002 | 1.807e-002 |
| 156 | 240. | 228.8 | 17.22 | 4.8e-002 | 1.637e-002 |
| 157 | 252. | 240.8 | 17.23 | 4.3e-002 | 1.466e-002 |
| 158 | 264. | 252.8 | 17.23 | 3.9e-002 | 1.33e-002 |
| 159 | 276. | 264.8 | 17.23 | 3.9e-002 | 1.33e-002 |
| 160 | 288. | 276.8 | 17.24 | 3.4e-002 | 1.159e-002 |
| 161 | 300. | 288.8 | 17.24 | 3.4e-002 | 1.159e-002 |
| 162 | 312. | 300.8 | 17.24 | 3.4e-002 | 1.159e-002 |
| 163 | 324. | 312.8 | 17.24 | 2.9e-002 | 9.887e-003 |
| 164 | 336. | 324.8 | 17.24 | 2.9e-002 | 9.887e-003 |
| 165 | 348. | 336.8 | 17.24 | 2.9e-002 | 9.887e-003 |
| 166 | 360. | 348.8 | 17.24 | 2.9e-002 | 9.887e-003 |
| 167 | 372. | 360.8 | 17.24 | 2.9e-002 | 9.887e-003 |
| 168 | 384. | 372.8 | 17.24 | 2.9e-002 | 9.887e-003 |
| 169 | 396. | 384.8 | 17.25 | 2.4e-002 | 8.183e-003 |
| 170 | 408. | 396.8 | 17.25 | 2.4e-002 | 8.183e-003 |
| 171 | 420. | 408.8 | 17.25 | 2.4e-002 | 8.183e-003 |
| 172 | 432. | 420.8 | 17.25 | 2.4e-002 | 8.183e-003 |
| 173 | 444. | 432.8 | 17.25 | 2.4e-002 | 8.183e-003 |
| 174 | 456. | 444.8 | 17.25 | 2.4e-002 | 8.183e-003 |
| 175 | 468. | 456.8 | 17.25 | 2.4e-002 | 8.183e-003 |
| 176 | 480. | 468.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 177 | 492. | 480.8 | 17.25 | 2.4e-002 | 8.183e-003 |
| 178 | 504. | 492.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 179 | 516. | 504.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 180 | 528. | 516.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 181 | 540. | 528.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 182 | 552. | 540.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 183 | 564. | 552.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 184 | 576. | 564.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 185 | 588. | 576.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 186 | 600. | 588.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 187 | 720. | 708.8 | 17.25 | 2.e-002 | 6.819e-003 |
| 188 | 840. | 828.8 | 17.25 | 1.5e-002 | 5.114e-003 |
| 189 | 960. | 948.8 | 17.25 | 1.5e-002 | 5.114e-003 |
| 190 | 1080 | 1069 | 17.25 | 1.5e-002 | 5.114e-003 |

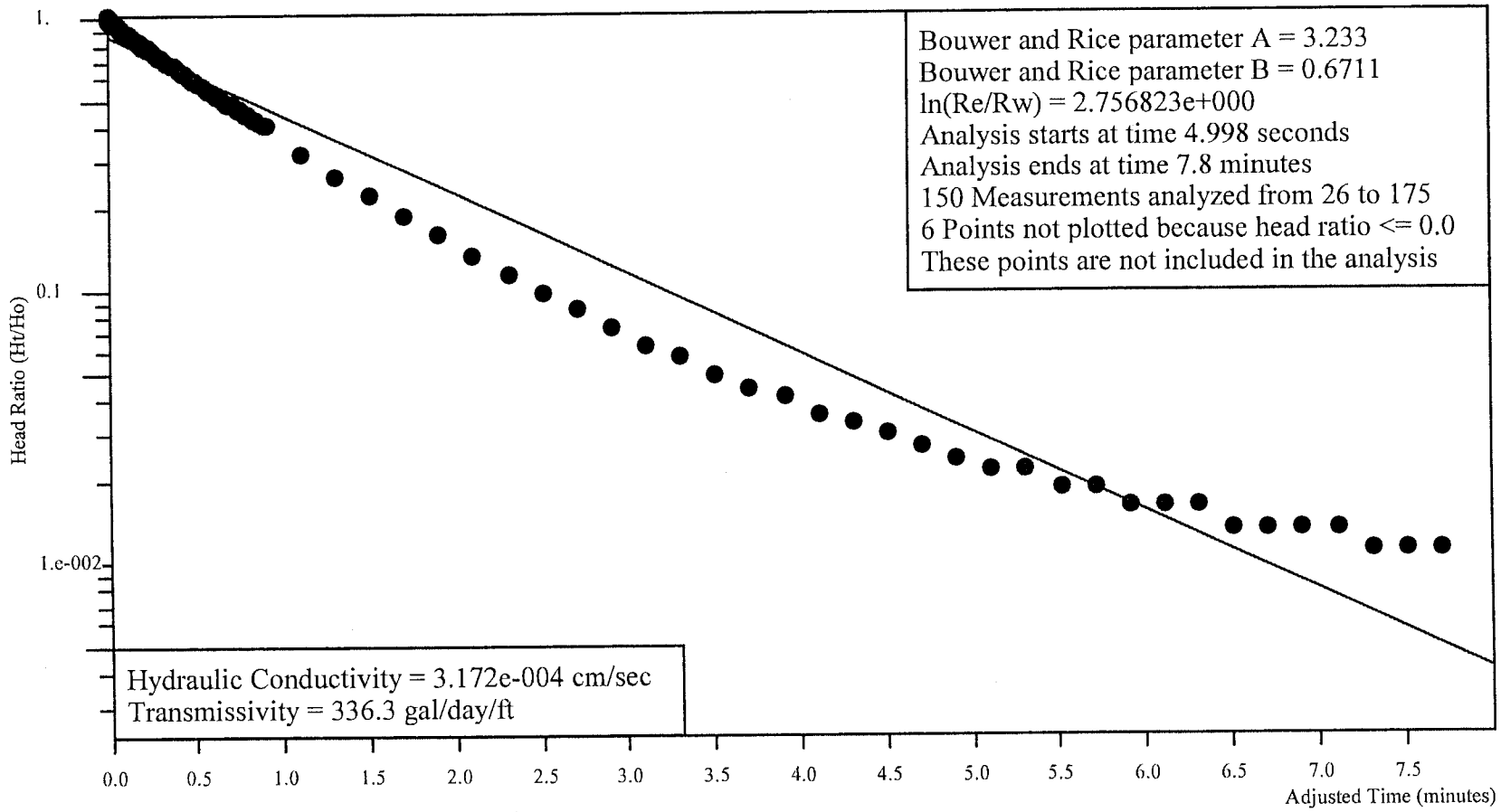
| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1189 | 17.25 | 1.5e-002 | 5.114e-003 |
| 192 | 1320 | 1309 | 17.25 | 1.5e-002 | 5.114e-003 |
| 193 | 1440 | 1429 | 17.25 | 1.5e-002 | 5.114e-003 |
| 194 | 1560 | 1549 | 17.25 | 1.5e-002 | 5.114e-003 |
| 195 | 1680 | 1669 | 17.25 | 1.5e-002 | 5.114e-003 |
| 196 | 1800 | 1789 | 17.25 | 1.5e-002 | 5.114e-003 |
| 197 | 1920 | 1909 | 17.26 | 1.e-002 | 3.409e-003 |
| 198 | 2040 | 2029 | 17.25 | 1.5e-002 | 5.114e-003 |

**Aquifer Analysis February 5, 2002**

Coble's Sandrock

**Bouwer and Rice Graph**

P-17 (Rising)




Ho is 1.738 feet at 4.998 seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 5, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P17RISIN |

| | |
|---|---|
| Well Label: | P-17 (Rising) |
| Aquifer Thickness: | 50. feet |
| Screen Length: | 15. feet |
| Casing Radius: | 1.188 inches |
| Effective Radius: | 3.125 inches |
| Static Water Level: | 17.86 feet |
| Water Table to Screen Bottom: | 20.64 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 4.998 Seconds |

Test starts with trial 9
There are 200 time and drawdown measurements
Maximum head is 2.971 feet
Minimum head is 0. feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -4.998 | 19.6 | 1.738 | 0.585 |
| 2 | 0.198 | -4.8 | 19.08 | 1.224 | 0.412 |
| 3 | 0.396 | -4.602 | 18.36 | 0.505 | 0.17 |
| 4 | 0.6 | -4.398 | 18.06 | 0.195 | 6.563e-002 |
| 5 | 0.798 | -4.2 | 19.6 | 1.743 | 0.5867 |
| 6 | 0.996 | -4.002 | 19.21 | 1.352 | 0.4551 |
| 7 | 1.2 | -3.798 | 19.45 | 1.595 | 0.5369 |
| 8 | 1.398 | -3.6 | 18.67 | 0.814 | 0.274 |
| 9 | 1.596 | -3.402 | 19.72 | 1.862 | 0.6267 |
| 10 | 1.8 | -3.198 | 20.83 | 2.971 | 1. |
| 11 | 1.998 | -3. | 20.2 | 2.342 | 0.7883 |
| 12 | 2.196 | -2.802 | 19.37 | 1.509 | 0.5079 |
| 13 | 2.4 | -2.598 | 19.44 | 1.576 | 0.5305 |
| 14 | 2.598 | -2.4 | 19.99 | 2.128 | 0.7163 |
| 15 | 2.796 | -2.202 | 20.1 | 2.238 | 0.7533 |
| 16 | 3. | -1.998 | 19.73 | 1.866 | 0.6281 |
| 17 | 3.198 | -1.8 | 19.53 | 1.666 | 0.5608 |
| 18 | 3.396 | -1.602 | 19.68 | 1.824 | 0.6139 |
| 19 | 3.6 | -1.398 | 19.85 | 1.99 | 0.6698 |
| 20 | 3.798 | -1.2 | 19.77 | 1.914 | 0.6442 |
| 21 | 3.996 | -1.002 | 19.63 | 1.771 | 0.5961 |
| 22 | 4.2 | -0.798 | 19.61 | 1.752 | 0.5897 |
| 23 | 4.398 | -0.6 | 19.69 | 1.833 | 0.617 |
| 24 | 4.596 | -0.402 | 19.72 | 1.857 | 0.625 |
| 25 | 4.8 | -0.198 | 19.66 | 1.8 | 0.6059 |
| 26 | 4.998 | 0. | 19.6 | 1.738 | 0.585 |
| 27 | 5.196 | 0.198 | 19.62 | 1.757 | 0.5914 |
| 28 | 5.4 | 0.402 | 19.64 | 1.776 | 0.5978 |
| 29 | 5.598 | 0.6 | 19.63 | 1.766 | 0.5944 |
| 30 | 5.796 | 0.798 | 19.58 | 1.719 | 0.5786 |
| 31 | 6. | 1.002 | 19.57 | 1.714 | 0.5769 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | 1.2 | 19.6 | 1.738 | 0.585 |
| 33 | 6.396 | 1.398 | 19.59 | 1.728 | 0.5816 |
| 34 | 6.6 | 1.602 | 19.57 | 1.714 | 0.5769 |
| 35 | 6.798 | 1.8 | 19.56 | 1.7 | 0.5722 |
| 36 | 6.996 | 1.998 | 19.56 | 1.695 | 0.5705 |
| 37 | 7.2 | 2.202 | 19.55 | 1.69 | 0.5688 |
| 38 | 7.398 | 2.4 | 19.55 | 1.686 | 0.5675 |
| 39 | 7.596 | 2.598 | 19.52 | 1.662 | 0.5594 |
| 40 | 7.8 | 2.802 | 19.53 | 1.666 | 0.5608 |
| 41 | 7.998 | 3. | 19.52 | 1.662 | 0.5594 |
| 42 | 8.196 | 3.198 | 19.51 | 1.652 | 0.556 |
| 43 | 8.4 | 3.402 | 19.5 | 1.643 | 0.553 |
| 44 | 8.598 | 3.6 | 19.49 | 1.633 | 0.5496 |
| 45 | 8.796 | 3.798 | 19.5 | 1.638 | 0.5513 |
| 46 | 9. | 4.002 | 19.49 | 1.628 | 0.548 |
| 47 | 9.198 | 4.2 | 19.48 | 1.619 | 0.5449 |
| 48 | 9.396 | 4.398 | 19.47 | 1.609 | 0.5416 |
| 49 | 9.6 | 4.602 | 19.47 | 1.605 | 0.5402 |
| 50 | 9.798 | 4.8 | 19.46 | 1.6 | 0.5385 |
| 51 | 9.996 | 4.998 | 19.45 | 1.595 | 0.5369 |
| 52 | 10.2 | 5.202 | 19.45 | 1.586 | 0.5338 |
| 53 | 10.4 | 5.4 | 19.44 | 1.581 | 0.5321 |
| 54 | 10.6 | 5.598 | 19.44 | 1.576 | 0.5305 |
| 55 | 10.8 | 5.802 | 19.43 | 1.571 | 0.5288 |
| 56 | 11. | 6. | 19.43 | 1.566 | 0.5271 |
| 57 | 11.2 | 6.198 | 19.42 | 1.557 | 0.5241 |
| 58 | 11.4 | 6.402 | 19.41 | 1.552 | 0.5224 |
| 59 | 11.6 | 6.6 | 19.41 | 1.547 | 0.5207 |
| 60 | 11.8 | 6.798 | 19.4 | 1.543 | 0.5194 |
| 61 | 12. | 7.002 | 19.4 | 1.538 | 0.5177 |
| 62 | 12.2 | 7.2 | 19.39 | 1.528 | 0.5143 |
| 63 | 12.4 | 7.398 | 19.38 | 1.524 | 0.513 |
| 64 | 12.6 | 7.602 | 19.38 | 1.519 | 0.5113 |
| 65 | 12.8 | 7.8 | 19.37 | 1.514 | 0.5096 |
| 66 | 13. | 7.998 | 19.37 | 1.509 | 0.5079 |
| 67 | 13.2 | 8.202 | 19.36 | 1.505 | 0.5066 |
| 68 | 13.4 | 8.4 | 19.36 | 1.5 | 0.5049 |
| 69 | 13.6 | 8.598 | 19.36 | 1.495 | 0.5032 |
| 70 | 13.8 | 8.802 | 19.35 | 1.486 | 0.5002 |
| 71 | 14. | 9. | 19.34 | 1.481 | 0.4985 |
| 72 | 14.2 | 9.198 | 19.34 | 1.476 | 0.4968 |
| 73 | 14.4 | 9.402 | 19.33 | 1.471 | 0.4951 |
| 74 | 14.6 | 9.6 | 19.33 | 1.466 | 0.4934 |
| 75 | 14.8 | 9.798 | 19.32 | 1.462 | 0.4921 |
| 76 | 15. | 10. | 19.32 | 1.457 | 0.4904 |
| 77 | 15.2 | 10.2 | 19.31 | 1.452 | 0.4887 |
| 78 | 15.4 | 10.4 | 19.31 | 1.447 | 0.487 |
| 79 | 15.6 | 10.6 | 19.3 | 1.443 | 0.4857 |
| 80 | 15.8 | 10.8 | 19.3 | 1.438 | 0.484 |
| 81 | 16. | 11. | 19.29 | 1.433 | 0.4823 |
| 82 | 16.2 | 11.2 | 19.29 | 1.428 | 0.4806 |
| 83 | 16.4 | 11.4 | 19.28 | 1.424 | 0.4793 |
| 84 | 16.6 | 11.6 | 19.28 | 1.419 | 0.4776 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | 11.8 | 19.27 | 1.414 | 0.4759 |
| 86 | 17. | 12. | 19.27 | 1.409 | 0.4743 |
| 87 | 17.2 | 12.2 | 19.27 | 1.405 | 0.4729 |
| 88 | 17.4 | 12.4 | 19.26 | 1.4 | 0.4712 |
| 89 | 17.6 | 12.6 | 19.25 | 1.395 | 0.4695 |
| 90 | 17.8 | 12.8 | 19.25 | 1.39 | 0.4679 |
| 91 | 18. | 13. | 19.25 | 1.386 | 0.4665 |
| 92 | 18.2 | 13.2 | 19.24 | 1.381 | 0.4648 |
| 93 | 18.4 | 13.4 | 19.24 | 1.376 | 0.4631 |
| 94 | 18.6 | 13.6 | 19.23 | 1.371 | 0.4615 |
| 95 | 18.8 | 13.8 | 19.23 | 1.366 | 0.4598 |
| 96 | 19. | 14. | 19.22 | 1.362 | 0.4584 |
| 97 | 19.2 | 14.2 | 19.22 | 1.357 | 0.4567 |
| 98 | 19.4 | 14.4 | 19.21 | 1.352 | 0.4551 |
| 99 | 19.6 | 14.6 | 19.21 | 1.347 | 0.4534 |
| 100 | 19.8 | 14.8 | 19.21 | 1.347 | 0.4534 |
| 101 | 20. | 15. | 19.2 | 1.343 | 0.452 |
| 102 | 21. | 16. | 19.17 | 1.314 | 0.4423 |
| 103 | 22. | 17. | 19.15 | 1.29 | 0.4342 |
| 104 | 23. | 18. | 19.13 | 1.271 | 0.4278 |
| 105 | 24. | 19. | 19.11 | 1.247 | 0.4197 |
| 106 | 25. | 20. | 19.08 | 1.224 | 0.412 |
| 107 | 26. | 21. | 19.07 | 1.205 | 0.4056 |
| 108 | 27. | 22. | 19.05 | 1.186 | 0.3992 |
| 109 | 28. | 23. | 19.03 | 1.166 | 0.3925 |
| 110 | 29. | 24. | 19.01 | 1.147 | 0.3861 |
| 111 | 30. | 25. | 18.98 | 1.124 | 0.3783 |
| 112 | 31. | 26. | 18.97 | 1.109 | 0.3733 |
| 113 | 32. | 27. | 18.95 | 1.09 | 0.3669 |
| 114 | 33. | 28. | 18.93 | 1.071 | 0.3605 |
| 115 | 34. | 29. | 18.91 | 1.052 | 0.3541 |
| 116 | 35. | 30. | 18.9 | 1.038 | 0.3494 |
| 117 | 36. | 31. | 18.88 | 1.019 | 0.343 |
| 118 | 37. | 32. | 18.86 | 1. | 0.3366 |
| 119 | 38. | 33. | 18.85 | 0.986 | 0.3319 |
| 120 | 39. | 34. | 18.83 | 0.971 | 0.3268 |
| 121 | 40. | 35. | 18.81 | 0.952 | 0.3204 |
| 122 | 41. | 36. | 18.8 | 0.938 | 0.3157 |
| 123 | 42. | 37. | 18.78 | 0.924 | 0.311 |
| 124 | 43. | 38. | 18.77 | 0.909 | 0.306 |
| 125 | 44. | 39. | 18.75 | 0.895 | 0.3012 |
| 126 | 45. | 40. | 18.74 | 0.881 | 0.2965 |
| 127 | 46. | 41. | 18.73 | 0.866 | 0.2915 |
| 128 | 47. | 42. | 18.71 | 0.852 | 0.2868 |
| 129 | 48. | 43. | 18.7 | 0.843 | 0.2837 |
| 130 | 49. | 44. | 18.69 | 0.828 | 0.2787 |
| 131 | 50. | 45. | 18.67 | 0.814 | 0.274 |
| 132 | 51. | 46. | 18.66 | 0.805 | 0.271 |
| 133 | 52. | 47. | 18.65 | 0.79 | 0.2659 |
| 134 | 53. | 48. | 18.64 | 0.776 | 0.2612 |
| 135 | 54. | 49. | 18.63 | 0.766 | 0.2578 |
| 136 | 55. | 50. | 18.61 | 0.752 | 0.2531 |
| 137 | 56. | 51. | 18.6 | 0.743 | 0.2501 |

| | | | | | |
|---|---|---|---|---|---|
| 138 | 57. | 52. | 18.59 | 0.733 | 0.2467 |
| 139 | 58. | 53. | 18.58 | 0.719 | 0.242 |
| 140 | 59. | 54. | 18.57 | 0.709 | 0.2386 |
| 141 | 60. | 55. | 18.56 | 0.7 | 0.2356 |
| 142 | 72. | 67. | 18.41 | 0.547 | 0.1841 |
| 143 | 84. | 79. | 18.32 | 0.457 | 0.1538 |
| 144 | 96. | 91. | 18.25 | 0.385 | 0.1296 |
| 145 | 108. | 103. | 18.18 | 0.323 | 0.1087 |
| 146 | 120. | 115. | 18.14 | 0.276 | 9.29e-002 |
| 147 | 132. | 127. | 18.09 | 0.233 | 7.842e-002 |
| 148 | 144. | 139. | 18.06 | 0.2 | 6.732e-002 |
| 149 | 156. | 151. | 18.03 | 0.171 | 5.756e-002 |
| 150 | 168. | 163. | 18.01 | 0.147 | 4.948e-002 |
| 151 | 180. | 175. | 17.99 | 0.128 | 4.308e-002 |
| 152 | 192. | 187. | 17.97 | 0.109 | 3.669e-002 |
| 153 | 204. | 199. | 17.96 | 0.1 | 3.366e-002 |
| 154 | 216. | 211. | 17.95 | 8.5e-002 | 2.861e-002 |
| 155 | 228. | 223. | 17.94 | 7.6e-002 | 2.558e-002 |
| 156 | 240. | 235. | 17.93 | 7.1e-002 | 2.39e-002 |
| 157 | 252. | 247. | 17.92 | 6.1e-002 | 2.053e-002 |
| 158 | 264. | 259. | 17.92 | 5.7e-002 | 1.919e-002 |
| 159 | 276. | 271. | 17.91 | 5.2e-002 | 1.75e-002 |
| 160 | 288. | 283. | 17.91 | 4.7e-002 | 1.582e-002 |
| 161 | 300. | 295. | 17.9 | 4.2e-002 | 1.414e-002 |
| 162 | 312. | 307. | 17.9 | 3.8e-002 | 1.279e-002 |
| 163 | 324. | 319. | 17.9 | 3.8e-002 | 1.279e-002 |
| 164 | 336. | 331. | 17.89 | 3.3e-002 | 1.111e-002 |
| 165 | 348. | 343. | 17.89 | 3.3e-002 | 1.111e-002 |
| 166 | 360. | 355. | 17.89 | 2.8e-002 | 9.424e-003 |
| 167 | 372. | 367. | 17.89 | 2.8e-002 | 9.424e-003 |
| 168 | 384. | 379. | 17.89 | 2.8e-002 | 9.424e-003 |
| 169 | 396. | 391. | 17.88 | 2.3e-002 | 7.742e-003 |
| 170 | 408. | 403. | 17.88 | 2.3e-002 | 7.742e-003 |
| 171 | 420. | 415. | 17.88 | 2.3e-002 | 7.742e-003 |
| 172 | 432. | 427. | 17.88 | 2.3e-002 | 7.742e-003 |
| 173 | 444. | 439. | 17.88 | 1.9e-002 | 6.395e-003 |
| 174 | 456. | 451. | 17.88 | 1.9e-002 | 6.395e-003 |
| 175 | 468. | 463. | 17.88 | 1.9e-002 | 6.395e-003 |
| 176 | 480. | 475. | 17.88 | 1.9e-002 | 6.395e-003 |
| 177 | 492. | 487. | 17.88 | 1.9e-002 | 6.395e-003 |
| 178 | 504. | 499. | 17.88 | 1.9e-002 | 6.395e-003 |
| 179 | 516. | 511. | 17.88 | 1.9e-002 | 6.395e-003 |
| 180 | 528. | 523. | 17.88 | 1.9e-002 | 6.395e-003 |
| 181 | 540. | 535. | 17.88 | 1.9e-002 | 6.395e-003 |
| 182 | 552. | 547. | 17.88 | 1.9e-002 | 6.395e-003 |
| 183 | 564. | 559. | 17.88 | 1.9e-002 | 6.395e-003 |
| 184 | 576. | 571. | 17.88 | 1.9e-002 | 6.395e-003 |
| 185 | 588. | 583. | 17.87 | 1.4e-002 | 4.712e-003 |
| 186 | 600. | 595. | 17.87 | 1.4e-002 | 4.712e-003 |
| 187 | 720. | 715. | 17.87 | 1.4e-002 | 4.712e-003 |
| 188 | 840. | 835. | 17.87 | 1.4e-002 | 4.712e-003 |
| 189 | 960. | 955. | 17.87 | 9.e-003 | 3.029e-003 |
| 190 | 1080 | 1075 | 17.87 | 9.e-003 | 3.029e-003 |

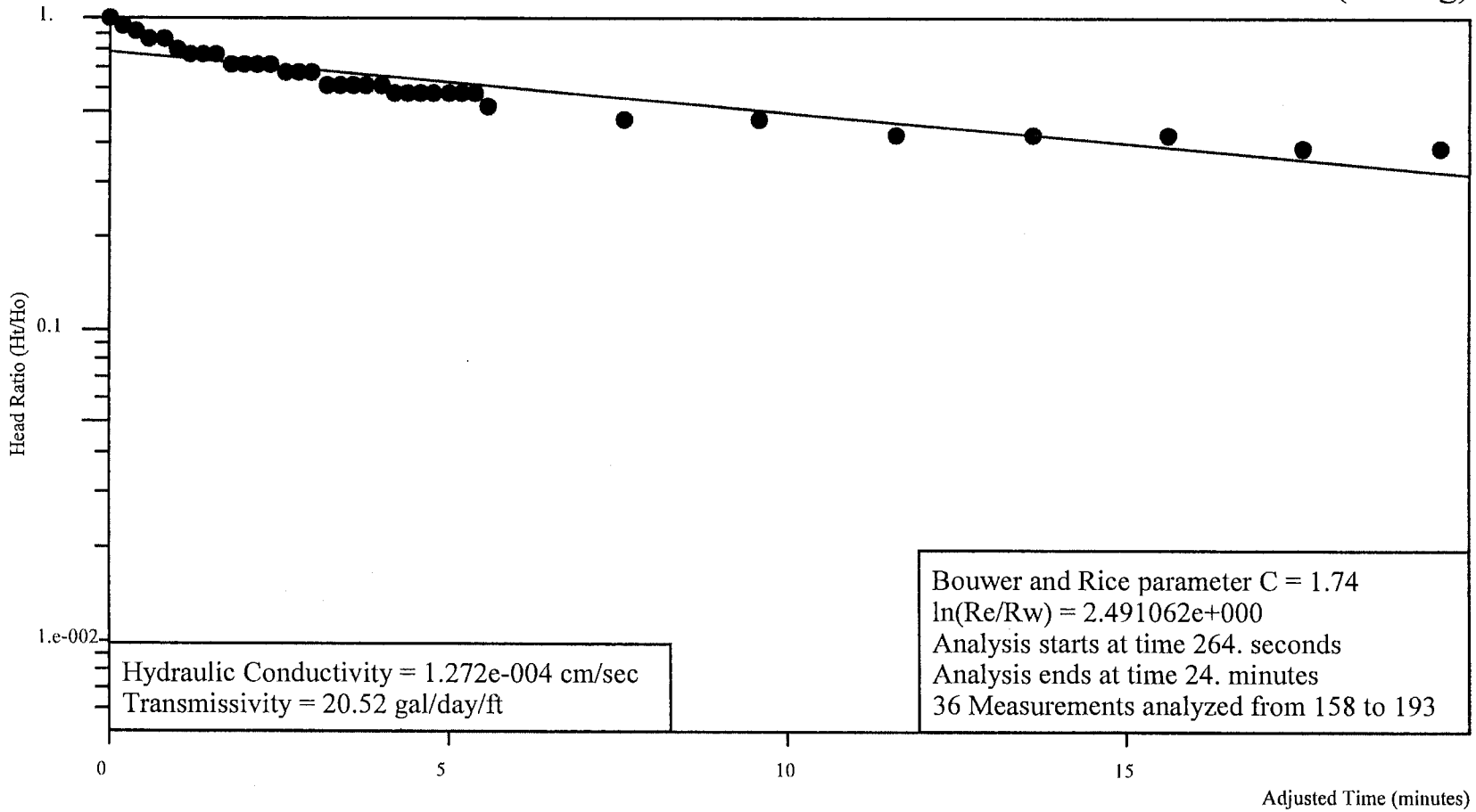
| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1195 | 17.87 | 9.e-003 | 3.029e-003 |
| 192 | 1320 | 1315 | 17.87 | 9.e-003 | 3.029e-003 |
| 193 | 1440 | 1435 | 17.87 | 1.4e-002 | 4.712e-003 |
| 194 | 1560 | 1555 | 17.86 | 4.e-003 | 1.346e-003 |
| 195 | 1680 | 1675 | 17.86 | 4.e-003 | 1.346e-003 |
| 196 | 1800 | 1795 | 17.86 | 4.e-003 | 1.346e-003 |
| 197 | 1920 | 1915 | 17.86 | 4.e-003 | 1.346e-003 |
| 198 | 2040 | 2035 | 17.86 | 4.e-003 | 1.346e-003 |
| 199 | 2160 | 2155 | 17.86 | 4.e-003 | 1.346e-003 |
| 200 | 2280 | 2275 | 17.87 | 9.e-003 | 3.029e-003 |

**Aquifer Analysis February 18, 2002**

Coble's Sandrock

**Bouwer and Rice Graph**

P-19S (Falling)




Ho is 9.9e-002 feet at 264. seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 18, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P19SFALL |

| | |
|---|---|
| Well Label: | P-19S (Falling) |
| Aquifer Thickness: | 7.61 feet |
| Screen Length: | 6. feet |
| Casing Radius: | 1.888 inches |
| Effective Radius: | 3.125 inches |
| Static Water Level: | 5.394 feet |
| Water Table to Screen Bottom: | 7.61 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 264. Seconds |

Test starts with trial 28
There are 212 time and drawdown measurements
Maximum head is 1.74 feet
Minimum head is 0. feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -264. | 5.371 | 2.3e-002 | 1.322e-002 |
| 2 | 0.198 | -263.8 | 5.371 | 2.3e-002 | 1.322e-002 |
| 3 | 0.396 | -263.6 | 5.366 | 2.8e-002 | 1.609e-002 |
| 4 | 0.6 | -263.4 | 5.371 | 2.3e-002 | 1.322e-002 |
| 5 | 0.798 | -263.2 | 5.366 | 2.8e-002 | 1.609e-002 |
| 6 | 0.996 | -263. | 5.366 | 2.8e-002 | 1.609e-002 |
| 7 | 1.2 | -262.8 | 5.38 | 1.4e-002 | 8.046e-003 |
| 8 | 1.398 | -262.6 | 5.361 | 3.3e-002 | 1.897e-002 |
| 9 | 1.596 | -262.4 | 5.38 | 1.4e-002 | 8.046e-003 |
| 10 | 1.8 | -262.2 | 5.366 | 2.8e-002 | 1.609e-002 |
| 11 | 1.998 | -262. | 5.371 | 2.3e-002 | 1.322e-002 |
| 12 | 2.196 | -261.8 | 5.366 | 2.8e-002 | 1.609e-002 |
| 13 | 2.4 | -261.6 | 5.394 | 0. | 0. |
| 14 | 2.598 | -261.4 | 5.304 | 9.e-002 | 5.172e-002 |
| 15 | 2.796 | -261.2 | 5.053 | 0.341 | 0.196 |
| 16 | 3. | -261. | 4.83 | 0.564 | 0.3241 |
| 17 | 3.198 | -260.8 | 4.679 | 0.715 | 0.4109 |
| 18 | 3.396 | -260.6 | 4.413 | 0.981 | 0.5638 |
| 19 | 3.6 | -260.4 | 4.299 | 1.095 | 0.6293 |
| 20 | 3.798 | -260.2 | 4.356 | 1.038 | 0.5966 |
| 21 | 3.996 | -260. | 4.19 | 1.204 | 0.692 |
| 22 | 4.2 | -259.8 | 4.029 | 1.365 | 0.7845 |
| 23 | 4.398 | -259.6 | 4.067 | 1.327 | 0.7626 |
| 24 | 4.596 | -259.4 | 4.256 | 1.138 | 0.654 |
| 25 | 4.8 | -259.2 | 3.91 | 1.484 | 0.8529 |
| 26 | 4.998 | -259. | 3.778 | 1.616 | 0.9287 |
| 27 | 5.196 | -258.8 | 3.782 | 1.612 | 0.9264 |
| 28 | 5.4 | -258.6 | 3.706 | 1.688 | 0.9701 |
| 29 | 5.598 | -258.4 | 3.654 | 1.74 | 1. |
| 30 | 5.796 | -258.2 | 3.697 | 1.697 | 0.9753 |
| 31 | 6. | -258. | 4.005 | 1.389 | 0.7983 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -257.8 | 3.962 | 1.432 | 0.823 |
| 33 | 6.396 | -257.6 | 3.901 | 1.493 | 0.858 |
| 34 | 6.6 | -257.4 | 4.015 | 1.379 | 0.7925 |
| 35 | 6.798 | -257.2 | 4.038 | 1.356 | 0.7793 |
| 36 | 6.996 | -257. | 3.91 | 1.484 | 0.8529 |
| 37 | 7.2 | -256.8 | 3.934 | 1.46 | 0.8391 |
| 38 | 7.398 | -256.6 | 3.958 | 1.436 | 0.8253 |
| 39 | 7.596 | -256.4 | 3.815 | 1.579 | 0.9075 |
| 40 | 7.8 | -256.2 | 3.806 | 1.588 | 0.9126 |
| 41 | 7.998 | -256. | 3.896 | 1.498 | 0.8609 |
| 42 | 8.196 | -255.8 | 4.086 | 1.308 | 0.7517 |
| 43 | 8.4 | -255.6 | 4.114 | 1.28 | 0.7356 |
| 44 | 8.598 | -255.4 | 4.062 | 1.332 | 0.7655 |
| 45 | 8.796 | -255.2 | 4.053 | 1.341 | 0.7707 |
| 46 | 9. | -255. | 4.053 | 1.341 | 0.7707 |
| 47 | 9.198 | -254.8 | 4.019 | 1.375 | 0.7902 |
| 48 | 9.396 | -254.6 | 3.991 | 1.403 | 0.8063 |
| 49 | 9.6 | -254.4 | 4.024 | 1.37 | 0.7874 |
| 50 | 9.798 | -254.2 | 4.067 | 1.327 | 0.7626 |
| 51 | 9.996 | -254. | 4.057 | 1.337 | 0.7684 |
| 52 | 10.2 | -253.8 | 4.038 | 1.356 | 0.7793 |
| 53 | 10.4 | -253.6 | 4.1 | 1.294 | 0.7437 |
| 54 | 10.6 | -253.4 | 4.143 | 1.251 | 0.719 |
| 55 | 10.8 | -253.2 | 4.114 | 1.28 | 0.7356 |
| 56 | 11. | -253. | 4.105 | 1.289 | 0.7408 |
| 57 | 11.2 | -252.8 | 4.119 | 1.275 | 0.7328 |
| 58 | 11.4 | -252.6 | 4.143 | 1.251 | 0.719 |
| 59 | 11.6 | -252.4 | 4.034 | 1.36 | 0.7816 |
| 60 | 11.8 | -252.2 | 4.005 | 1.389 | 0.7983 |
| 61 | 12. | -252. | 4.294 | 1.1 | 0.6322 |
| 62 | 12.2 | -251.8 | 4.266 | 1.128 | 0.6483 |
| 63 | 12.4 | -251.6 | 4.147 | 1.247 | 0.7167 |
| 64 | 12.6 | -251.4 | 4.128 | 1.266 | 0.7276 |
| 65 | 12.8 | -251.2 | 4.152 | 1.242 | 0.7138 |
| 66 | 13. | -251. | 4.181 | 1.213 | 0.6971 |
| 67 | 13.2 | -250.8 | 4.19 | 1.204 | 0.692 |
| 68 | 13.4 | -250.6 | 4.195 | 1.199 | 0.6891 |
| 69 | 13.6 | -250.4 | 4.2 | 1.194 | 0.6862 |
| 70 | 13.8 | -250.2 | 4.204 | 1.19 | 0.6839 |
| 71 | 14. | -250. | 4.209 | 1.185 | 0.681 |
| 72 | 14.2 | -249.8 | 4.214 | 1.18 | 0.6782 |
| 73 | 14.4 | -249.6 | 4.209 | 1.185 | 0.681 |
| 74 | 14.6 | -249.4 | 4.228 | 1.166 | 0.6701 |
| 75 | 14.8 | -249.2 | 4.233 | 1.161 | 0.6672 |
| 76 | 15. | -249. | 4.242 | 1.152 | 0.6621 |
| 77 | 15.2 | -248.8 | 4.266 | 1.128 | 0.6483 |
| 78 | 15.4 | -248.6 | 4.256 | 1.138 | 0.654 |
| 79 | 15.6 | -248.4 | 4.109 | 1.285 | 0.7385 |
| 80 | 15.8 | -248.2 | 4.238 | 1.156 | 0.6644 |
| 81 | 16. | -248. | 4.266 | 1.128 | 0.6483 |
| 82 | 16.2 | -247.8 | 4.275 | 1.119 | 0.6431 |
| 83 | 16.4 | -247.6 | 4.275 | 1.119 | 0.6431 |
| 84 | 16.6 | -247.4 | 4.28 | 1.114 | 0.6402 |

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|---|---|---|---|---|---|
| 85 | 16.8 | -247.2 | 4.285 | 1.109 | 0.6374 |
| 86 | 17. | -247. | 4.294 | 1.1 | 0.6322 |
| 87 | 17.2 | -246.8 | 4.299 | 1.095 | 0.6293 |
| 88 | 17.4 | -246.6 | 4.304 | 1.09 | 0.6264 |
| 89 | 17.6 | -246.4 | 4.309 | 1.085 | 0.6236 |
| 90 | 17.8 | -246.2 | 4.313 | 1.081 | 0.6213 |
| 91 | 18. | -246. | 4.318 | 1.076 | 0.6184 |
| 92 | 18.2 | -245.8 | 4.323 | 1.071 | 0.6155 |
| 93 | 18.4 | -245.6 | 4.328 | 1.066 | 0.6126 |
| 94 | 18.6 | -245.4 | 4.332 | 1.062 | 0.6103 |
| 95 | 18.8 | -245.2 | 4.337 | 1.057 | 0.6075 |
| 96 | 19. | -245. | 4.342 | 1.052 | 0.6046 |
| 97 | 19.2 | -244.8 | 4.347 | 1.047 | 0.6017 |
| 98 | 19.4 | -244.6 | 4.351 | 1.043 | 0.5994 |
| 99 | 19.6 | -244.4 | 4.356 | 1.038 | 0.5966 |
| 100 | 19.8 | -244.2 | 4.361 | 1.033 | 0.5937 |
| 101 | 20. | -244. | 4.366 | 1.028 | 0.5908 |
| 102 | 21. | -243. | 4.389 | 1.005 | 0.5776 |
| 103 | 22. | -242. | 4.413 | 0.981 | 0.5638 |
| 104 | 23. | -241. | 4.422 | 0.972 | 0.5586 |
| 105 | 24. | -240. | 4.46 | 0.934 | 0.5368 |
| 106 | 25. | -239. | 4.475 | 0.919 | 0.5282 |
| 107 | 26. | -238. | 4.475 | 0.919 | 0.5282 |
| 108 | 27. | -237. | 4.513 | 0.881 | 0.5063 |
| 109 | 28. | -236. | 4.531 | 0.863 | 0.496 |
| 110 | 29. | -235. | 4.546 | 0.848 | 0.4874 |
| 111 | 30. | -234. | 4.565 | 0.829 | 0.4764 |
| 112 | 31. | -233. | 4.584 | 0.81 | 0.4655 |
| 113 | 32. | -232. | 4.598 | 0.796 | 0.4575 |
| 114 | 33. | -231. | 4.612 | 0.782 | 0.4494 |
| 115 | 34. | -230. | 4.636 | 0.758 | 0.4356 |
| 116 | 35. | -229. | 4.641 | 0.753 | 0.4328 |
| 117 | 36. | -228. | 4.66 | 0.734 | 0.4218 |
| 118 | 37. | -227. | 4.674 | 0.72 | 0.4138 |
| 119 | 38. | -226. | 4.683 | 0.711 | 0.4086 |
| 120 | 39. | -225. | 4.697 | 0.697 | 0.4006 |
| 121 | 40. | -224. | 4.712 | 0.682 | 0.392 |
| 122 | 41. | -223. | 4.721 | 0.673 | 0.3868 |
| 123 | 42. | -222. | 4.735 | 0.659 | 0.3787 |
| 124 | 43. | -221. | 4.745 | 0.649 | 0.373 |
| 125 | 44. | -220. | 4.754 | 0.64 | 0.3678 |
| 126 | 45. | -219. | 4.769 | 0.625 | 0.3592 |
| 127 | 46. | -218. | 4.778 | 0.616 | 0.354 |
| 128 | 47. | -217. | 4.788 | 0.606 | 0.3483 |
| 129 | 48. | -216. | 4.802 | 0.592 | 0.3402 |
| 130 | 49. | -215. | 4.811 | 0.583 | 0.3351 |
| 131 | 50. | -214. | 4.821 | 0.573 | 0.3293 |
| 132 | 51. | -213. | 4.83 | 0.564 | 0.3241 |
| 133 | 52. | -212. | 4.84 | 0.554 | 0.3184 |
| 134 | 53. | -211. | 4.844 | 0.55 | 0.3161 |
| 135 | 54. | -210. | 4.854 | 0.54 | 0.3103 |
| 136 | 55. | -209. | 4.863 | 0.531 | 0.3052 |
| 137 | 56. | -208. | 4.873 | 0.521 | 0.2994 |

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|---|---|---|---|---|---|
| 138 | 57. | -207. | 4.878 | 0.516 | 0.2966 |
| 139 | 58. | -206. | 4.887 | 0.507 | 0.2914 |
| 140 | 59. | -205. | 4.897 | 0.497 | 0.2856 |
| 141 | 60. | -204. | 4.906 | 0.488 | 0.2805 |
| 142 | 72. | -192. | 4.996 | 0.398 | 0.2287 |
| 143 | 84. | -180. | 5.053 | 0.341 | 0.196 |
| 144 | 96. | -168. | 5.1 | 0.294 | 0.169 |
| 145 | 108. | -156. | 5.138 | 0.256 | 0.1471 |
| 146 | 120. | -144. | 5.167 | 0.227 | 0.1305 |
| 147 | 132. | -132. | 5.19 | 0.204 | 0.1172 |
| 148 | 144. | -120. | 5.209 | 0.185 | 0.1063 |
| 149 | 156. | -108. | 5.228 | 0.166 | 9.54e-002 |
| 150 | 168. | -96. | 5.238 | 0.156 | 8.966e-002 |
| 151 | 180. | -84. | 5.252 | 0.142 | 8.161e-002 |
| 152 | 192. | -72. | 5.262 | 0.132 | 7.586e-002 |
| 153 | 204. | -60. | 5.271 | 0.123 | 7.069e-002 |
| 154 | 216. | -48. | 5.276 | 0.118 | 6.782e-002 |
| 155 | 228. | -36. | 5.281 | 0.113 | 6.494e-002 |
| 156 | 240. | -24. | 5.285 | 0.109 | 6.264e-002 |
| 157 | 252. | -12. | 5.295 | 9.9e-002 | 5.69e-002 |
| 158 | 264. | 0. | 5.295 | 9.9e-002 | 5.69e-002 |
| 159 | 276. | 12. | 5.299 | 9.5e-002 | 5.46e-002 |
| 160 | 288. | 24. | 5.304 | 9.e-002 | 5.172e-002 |
| 161 | 300. | 36. | 5.309 | 8.5e-002 | 4.885e-002 |
| 162 | 312. | 48. | 5.309 | 8.5e-002 | 4.885e-002 |
| 163 | 324. | 60. | 5.314 | 8.e-002 | 4.598e-002 |
| 164 | 336. | 72. | 5.318 | 7.6e-002 | 4.368e-002 |
| 165 | 348. | 84. | 5.318 | 7.6e-002 | 4.368e-002 |
| 166 | 360. | 96. | 5.318 | 7.6e-002 | 4.368e-002 |
| 167 | 372. | 108. | 5.323 | 7.1e-002 | 4.08e-002 |
| 168 | 384. | 120. | 5.323 | 7.1e-002 | 4.08e-002 |
| 169 | 396. | 132. | 5.323 | 7.1e-002 | 4.08e-002 |
| 170 | 408. | 144. | 5.323 | 7.1e-002 | 4.08e-002 |
| 171 | 420. | 156. | 5.328 | 6.6e-002 | 3.793e-002 |
| 172 | 432. | 168. | 5.328 | 6.6e-002 | 3.793e-002 |
| 173 | 444. | 180. | 5.328 | 6.6e-002 | 3.793e-002 |
| 174 | 456. | 192. | 5.333 | 6.1e-002 | 3.506e-002 |
| 175 | 468. | 204. | 5.333 | 6.1e-002 | 3.506e-002 |
| 176 | 480. | 216. | 5.333 | 6.1e-002 | 3.506e-002 |
| 177 | 492. | 228. | 5.333 | 6.1e-002 | 3.506e-002 |
| 178 | 504. | 240. | 5.333 | 6.1e-002 | 3.506e-002 |
| 179 | 516. | 252. | 5.337 | 5.7e-002 | 3.276e-002 |
| 180 | 528. | 264. | 5.337 | 5.7e-002 | 3.276e-002 |
| 181 | 540. | 276. | 5.337 | 5.7e-002 | 3.276e-002 |
| 182 | 552. | 288. | 5.337 | 5.7e-002 | 3.276e-002 |
| 183 | 564. | 300. | 5.337 | 5.7e-002 | 3.276e-002 |
| 184 | 576. | 312. | 5.337 | 5.7e-002 | 3.276e-002 |
| 185 | 588. | 324. | 5.337 | 5.7e-002 | 3.276e-002 |
| 186 | 600. | 336. | 5.342 | 5.2e-002 | 2.989e-002 |
| 187 | 720. | 456. | 5.347 | 4.7e-002 | 2.701e-002 |
| 188 | 840. | 576. | 5.347 | 4.7e-002 | 2.701e-002 |
| 189 | 960. | 696. | 5.352 | 4.2e-002 | 2.414e-002 |
| 190 | 1080 | 816. | 5.352 | 4.2e-002 | 2.414e-002 |

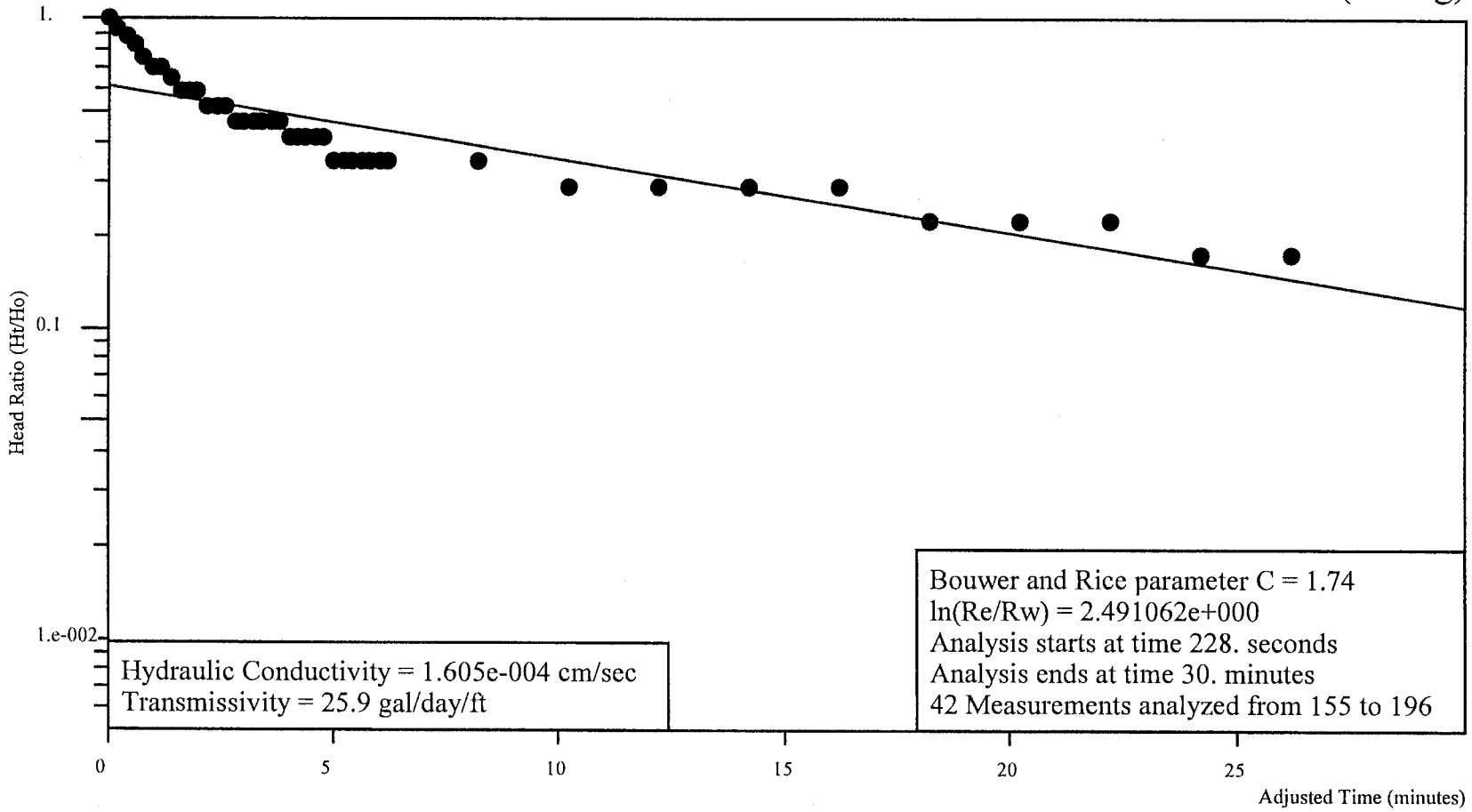
| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 936. | 5.352 | 4.2e-002 | 2.414e-002 |
| 192 | 1320 | 1056 | 5.356 | 3.8e-002 | 2.184e-002 |
| 193 | 1440 | 1176 | 5.356 | 3.8e-002 | 2.184e-002 |
| 194 | 1560 | 1296 | 5.356 | 3.8e-002 | 2.184e-002 |
| 195 | 1680 | 1416 | 5.356 | 3.8e-002 | 2.184e-002 |
| 196 | 1800 | 1536 | 5.356 | 3.8e-002 | 2.184e-002 |
| 197 | 1920 | 1656 | 5.356 | 3.8e-002 | 2.184e-002 |
| 198 | 2040 | 1776 | 5.356 | 3.8e-002 | 2.184e-002 |
| 199 | 2160 | 1896 | 5.356 | 3.8e-002 | 2.184e-002 |
| 200 | 2280 | 2016 | 5.356 | 3.8e-002 | 2.184e-002 |
| 201 | 2400 | 2136 | 5.356 | 3.8e-002 | 2.184e-002 |
| 202 | 2520 | 2256 | 5.356 | 3.8e-002 | 2.184e-002 |
| 203 | 2640 | 2376 | 5.356 | 3.8e-002 | 2.184e-002 |
| 204 | 2760 | 2496 | 5.356 | 3.8e-002 | 2.184e-002 |
| 205 | 2880 | 2616 | 5.356 | 3.8e-002 | 2.184e-002 |
| 206 | 3000 | 2736 | 5.356 | 3.8e-002 | 2.184e-002 |
| 207 | 3120 | 2856 | 5.356 | 3.8e-002 | 2.184e-002 |
| 208 | 3240 | 2976 | 5.356 | 3.8e-002 | 2.184e-002 |
| 209 | 3360 | 3096 | 5.356 | 3.8e-002 | 2.184e-002 |
| 210 | 3480 | 3216 | 5.356 | 3.8e-002 | 2.184e-002 |
| 211 | 3600 | 3336 | 5.356 | 3.8e-002 | 2.184e-002 |
| 212 | 3720 | 3456 | 5.356 | 3.8e-002 | 2.184e-002 |

**Aquifer Analysis March 6, 2002**

Coble's Sandrock

**Bouwer and Rice Graph**

P-19S (Rising)




Ho is 8.e-002 feet at 228. seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | March 6, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P19SRIS |

| | |
|---|---|
| Well Label: | P-19S (Rising) |
| Aquifer Thickness: | 7.61 feet |
| Screen Length: | 6. feet |
| Casing Radius: | 1.888 inches |
| Effective Radius: | 3.125 inches |
| Static Water Level: | 5.15 feet |
| Water Table to Screen Bottom: | 7.61 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 228. Seconds |

Test starts with trial 9
There are 218 time and drawdown measurements
Maximum head is 1.819 feet
Minimum head is -5.e-003 feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -228. | 5.15 | 0. | 0. |
| 2 | 0.198 | -227.8 | 5.145 | -5.e-003 | -2.749e-003 |
| 3 | 0.396 | -227.6 | 6.789 | 1.639 | 0.901 |
| 4 | 0.6 | -227.4 | 6.869 | 1.719 | 0.945 |
| 5 | 0.798 | -227.2 | 5.628 | 0.478 | 0.2628 |
| 6 | 0.996 | -227. | 5.59 | 0.44 | 0.2419 |
| 7 | 1.2 | -226.8 | 6.557 | 1.407 | 0.7735 |
| 8 | 1.398 | -226.6 | 6.737 | 1.587 | 0.8725 |
| 9 | 1.596 | -226.4 | 6.779 | 1.629 | 0.8955 |
| 10 | 1.8 | -226.2 | 6.969 | 1.819 | 1. |
| 11 | 1.998 | -226. | 6.94 | 1.79 | 0.9841 |
| 12 | 2.196 | -225.8 | 6.931 | 1.781 | 0.9791 |
| 13 | 2.4 | -225.6 | 6.926 | 1.776 | 0.9764 |
| 14 | 2.598 | -225.4 | 6.921 | 1.771 | 0.9736 |
| 15 | 2.796 | -225.2 | 6.921 | 1.771 | 0.9736 |
| 16 | 3. | -225. | 6.917 | 1.767 | 0.9714 |
| 17 | 3.198 | -224.8 | 6.912 | 1.762 | 0.9687 |
| 18 | 3.396 | -224.6 | 6.907 | 1.757 | 0.9659 |
| 19 | 3.6 | -224.4 | 6.903 | 1.753 | 0.9637 |
| 20 | 3.798 | -224.2 | 6.879 | 1.729 | 0.9505 |
| 21 | 3.996 | -224. | 6.888 | 1.738 | 0.9555 |
| 22 | 4.2 | -223.8 | 6.879 | 1.729 | 0.9505 |
| 23 | 4.398 | -223.6 | 6.879 | 1.729 | 0.9505 |
| 24 | 4.596 | -223.4 | 6.865 | 1.715 | 0.9428 |
| 25 | 4.8 | -223.2 | 6.855 | 1.705 | 0.9373 |
| 26 | 4.998 | -223. | 6.846 | 1.696 | 0.9324 |
| 27 | 5.196 | -222.8 | 6.836 | 1.686 | 0.9269 |
| 28 | 5.4 | -222.6 | 6.827 | 1.677 | 0.9219 |
| 29 | 5.598 | -222.4 | 6.817 | 1.667 | 0.9164 |
| 30 | 5.796 | -222.2 | 6.808 | 1.658 | 0.9115 |
| 31 | 6. | -222. | 6.798 | 1.648 | 0.906 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -221.8 | 6.789 | 1.639 | 0.901 |
| 33 | 6.396 | -221.6 | 6.779 | 1.629 | 0.8955 |
| 34 | 6.6 | -221.4 | 6.77 | 1.62 | 0.8906 |
| 35 | 6.798 | -221.2 | 6.76 | 1.61 | 0.8851 |
| 36 | 6.996 | -221. | 6.751 | 1.601 | 0.8802 |
| 37 | 7.2 | -220.8 | 6.742 | 1.592 | 0.8752 |
| 38 | 7.398 | -220.6 | 6.732 | 1.582 | 0.8697 |
| 39 | 7.596 | -220.4 | 6.727 | 1.577 | 0.867 |
| 40 | 7.8 | -220.2 | 6.718 | 1.568 | 0.862 |
| 41 | 7.998 | -220. | 6.708 | 1.558 | 0.8565 |
| 42 | 8.196 | -219.8 | 6.699 | 1.549 | 0.8516 |
| 43 | 8.4 | -219.6 | 6.689 | 1.539 | 0.8461 |
| 44 | 8.598 | -219.4 | 6.685 | 1.535 | 0.8439 |
| 45 | 8.796 | -219.2 | 6.675 | 1.525 | 0.8384 |
| 46 | 9. | -219. | 6.666 | 1.516 | 0.8334 |
| 47 | 9.198 | -218.8 | 6.656 | 1.506 | 0.8279 |
| 48 | 9.396 | -218.6 | 6.652 | 1.502 | 0.8257 |
| 49 | 9.6 | -218.4 | 6.642 | 1.492 | 0.8202 |
| 50 | 9.798 | -218.2 | 6.633 | 1.483 | 0.8153 |
| 51 | 9.996 | -218. | 6.628 | 1.478 | 0.8125 |
| 52 | 10.2 | -217.8 | 6.618 | 1.468 | 0.807 |
| 53 | 10.4 | -217.6 | 6.609 | 1.459 | 0.8021 |
| 54 | 10.6 | -217.4 | 6.604 | 1.454 | 0.7993 |
| 55 | 10.8 | -217.2 | 6.595 | 1.445 | 0.7944 |
| 56 | 11. | -217. | 6.59 | 1.44 | 0.7916 |
| 57 | 11.2 | -216.8 | 6.58 | 1.43 | 0.7861 |
| 58 | 11.4 | -216.6 | 6.571 | 1.421 | 0.7812 |
| 59 | 11.6 | -216.4 | 6.566 | 1.416 | 0.7784 |
| 60 | 11.8 | -216.2 | 6.557 | 1.407 | 0.7735 |
| 61 | 12. | -216. | 6.552 | 1.402 | 0.7708 |
| 62 | 12.2 | -215.8 | 6.543 | 1.393 | 0.7658 |
| 63 | 12.4 | -215.6 | 6.538 | 1.388 | 0.7631 |
| 64 | 12.6 | -215.4 | 6.528 | 1.378 | 0.7576 |
| 65 | 12.8 | -215.2 | 6.524 | 1.374 | 0.7554 |
| 66 | 13. | -215. | 6.519 | 1.369 | 0.7526 |
| 67 | 13.2 | -214.8 | 6.509 | 1.359 | 0.7471 |
| 68 | 13.4 | -214.6 | 6.505 | 1.355 | 0.7449 |
| 69 | 13.6 | -214.4 | 6.5 | 1.35 | 0.7422 |
| 70 | 13.8 | -214.2 | 6.49 | 1.34 | 0.7367 |
| 71 | 14. | -214. | 6.481 | 1.331 | 0.7317 |
| 72 | 14.2 | -213.8 | 6.476 | 1.326 | 0.729 |
| 73 | 14.4 | -213.6 | 6.472 | 1.322 | 0.7268 |
| 74 | 14.6 | -213.4 | 6.467 | 1.317 | 0.724 |
| 75 | 14.8 | -213.2 | 6.457 | 1.307 | 0.7185 |
| 76 | 15. | -213. | 6.453 | 1.303 | 0.7163 |
| 77 | 15.2 | -212.8 | 6.448 | 1.298 | 0.7136 |
| 78 | 15.4 | -212.6 | 6.438 | 1.288 | 0.7081 |
| 79 | 15.6 | -212.4 | 6.434 | 1.284 | 0.7059 |
| 80 | 15.8 | -212.2 | 6.429 | 1.279 | 0.7031 |
| 81 | 16. | -212. | 6.419 | 1.269 | 0.6976 |
| 82 | 16.2 | -211.8 | 6.415 | 1.265 | 0.6954 |
| 83 | 16.4 | -211.6 | 6.41 | 1.26 | 0.6927 |
| 84 | 16.6 | -211.4 | 6.405 | 1.255 | 0.6899 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | -211.2 | 6.4 | 1.25 | 0.6872 |
| 86 | 17. | -211. | 6.391 | 1.241 | 0.6822 |
| 87 | 17.2 | -210.8 | 6.386 | 1.236 | 0.6795 |
| 88 | 17.4 | -210.6 | 6.382 | 1.232 | 0.6773 |
| 89 | 17.6 | -210.4 | 6.377 | 1.227 | 0.6745 |
| 90 | 17.8 | -210.2 | 6.367 | 1.217 | 0.669 |
| 91 | 18. | -210. | 6.363 | 1.213 | 0.6668 |
| 92 | 18.2 | -209.8 | 6.358 | 1.208 | 0.6641 |
| 93 | 18.4 | -209.6 | 6.353 | 1.203 | 0.6614 |
| 94 | 18.6 | -209.4 | 6.348 | 1.198 | 0.6586 |
| 95 | 18.8 | -209.2 | 6.339 | 1.189 | 0.6537 |
| 96 | 19. | -209. | 6.334 | 1.184 | 0.6509 |
| 97 | 19.2 | -208.8 | 6.329 | 1.179 | 0.6482 |
| 98 | 19.4 | -208.6 | 6.325 | 1.175 | 0.646 |
| 99 | 19.6 | -208.4 | 6.32 | 1.17 | 0.6432 |
| 100 | 19.8 | -208.2 | 6.315 | 1.165 | 0.6405 |
| 101 | 20. | -208. | 6.31 | 1.16 | 0.6377 |
| 102 | 21. | -207. | 6.282 | 1.132 | 0.6223 |
| 103 | 22. | -206. | 6.258 | 1.108 | 0.6091 |
| 104 | 23. | -205. | 6.23 | 1.08 | 0.5937 |
| 105 | 24. | -204. | 6.206 | 1.056 | 0.5805 |
| 106 | 25. | -203. | 6.183 | 1.033 | 0.5679 |
| 107 | 26. | -202. | 6.159 | 1.009 | 0.5547 |
| 108 | 27. | -201. | 6.135 | 0.985 | 0.5415 |
| 109 | 28. | -200. | 6.116 | 0.966 | 0.5311 |
| 110 | 29. | -199. | 6.093 | 0.943 | 0.5184 |
| 111 | 30. | -198. | 6.074 | 0.924 | 0.508 |
| 112 | 31. | -197. | 6.055 | 0.905 | 0.4975 |
| 113 | 32. | -196. | 6.036 | 0.886 | 0.4871 |
| 114 | 33. | -195. | 6.017 | 0.867 | 0.4766 |
| 115 | 34. | -194. | 5.998 | 0.848 | 0.4662 |
| 116 | 35. | -193. | 5.979 | 0.829 | 0.4557 |
| 117 | 36. | -192. | 5.965 | 0.815 | 0.448 |
| 118 | 37. | -191. | 5.946 | 0.796 | 0.4376 |
| 119 | 38. | -190. | 5.931 | 0.781 | 0.4294 |
| 120 | 39. | -189. | 5.917 | 0.767 | 0.4217 |
| 121 | 40. | -188. | 5.898 | 0.748 | 0.4112 |
| 122 | 41. | -187. | 5.884 | 0.734 | 0.4035 |
| 123 | 42. | -186. | 5.875 | 0.725 | 0.3986 |
| 124 | 43. | -185. | 5.86 | 0.71 | 0.3903 |
| 125 | 44. | -184. | 5.846 | 0.696 | 0.3826 |
| 126 | 45. | -183. | 5.832 | 0.682 | 0.3749 |
| 127 | 46. | -182. | 5.818 | 0.668 | 0.3672 |
| 128 | 47. | -181. | 5.808 | 0.658 | 0.3617 |
| 129 | 48. | -180. | 5.794 | 0.644 | 0.354 |
| 130 | 49. | -179. | 5.785 | 0.635 | 0.3491 |
| 131 | 50. | -178. | 5.77 | 0.62 | 0.3408 |
| 132 | 51. | -177. | 5.761 | 0.611 | 0.3359 |
| 133 | 52. | -176. | 5.751 | 0.601 | 0.3304 |
| 134 | 53. | -175. | 5.737 | 0.587 | 0.3227 |
| 135 | 54. | -174. | 5.728 | 0.578 | 0.3178 |
| 136 | 55. | -173. | 5.718 | 0.568 | 0.3123 |
| 137 | 56. | -172. | 5.709 | 0.559 | 0.3073 |

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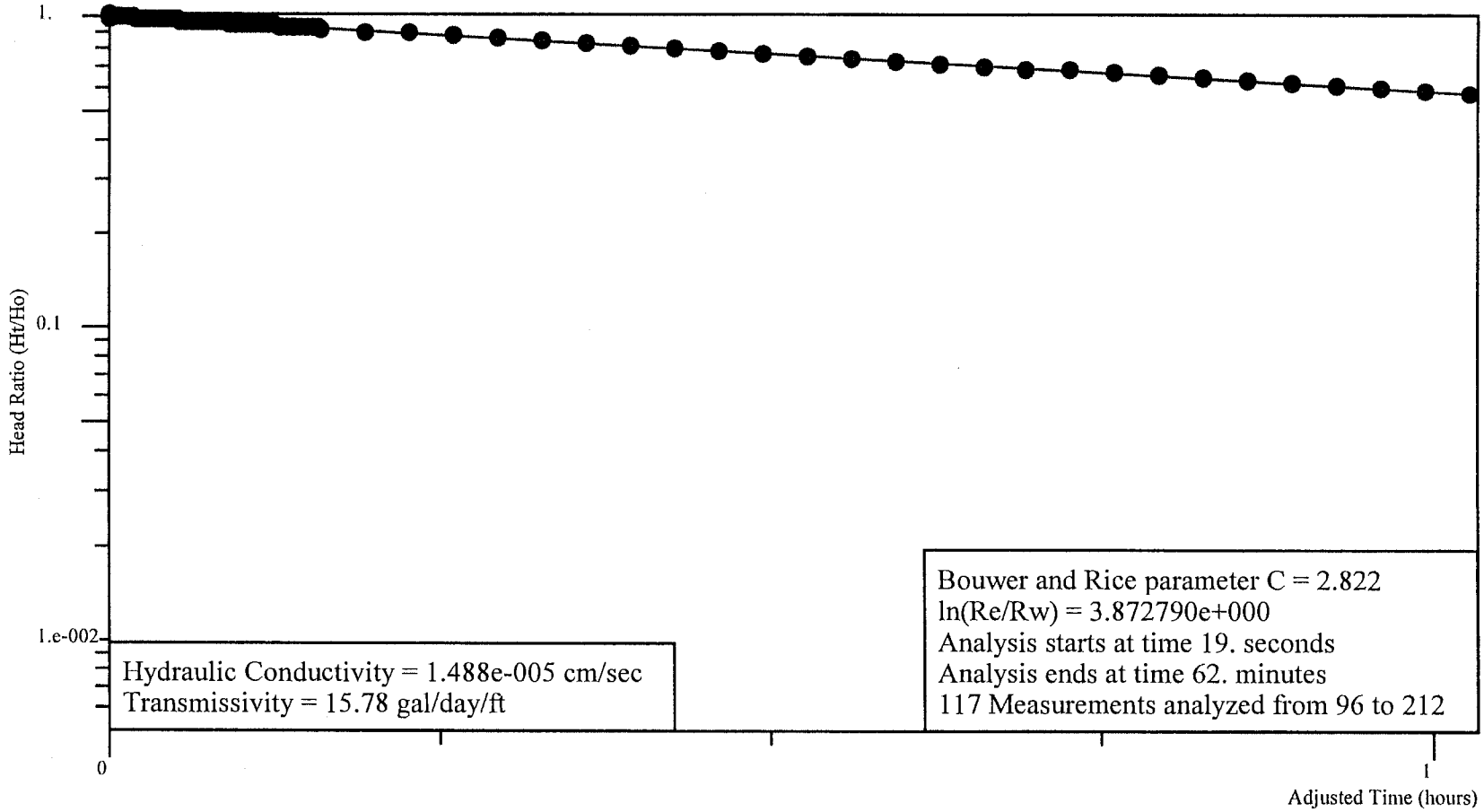
|---|---|---|---|---|---|
| 138 | 57. | -171. | 5.699 | 0.549 | 0.3018 |
| 139 | 58. | -170. | 5.69 | 0.54 | 0.2969 |
| 140 | 59. | -169. | 5.68 | 0.53 | 0.2914 |
| 141 | 60. | -168. | 5.671 | 0.521 | 0.2864 |
| 142 | 72. | -156. | 5.567 | 0.417 | 0.2292 |
| 143 | 84. | -144. | 5.5 | 0.35 | 0.1924 |
| 144 | 96. | -132. | 5.443 | 0.293 | 0.1611 |
| 145 | 108. | -120. | 5.401 | 0.251 | 0.138 |
| 146 | 120. | -108. | 5.368 | 0.218 | 0.1198 |
| 147 | 132. | -96. | 5.339 | 0.189 | 0.1039 |
| 148 | 144. | -84. | 5.315 | 0.165 | 9.071e-002 |
| 149 | 156. | -72. | 5.296 | 0.146 | 8.026e-002 |
| 150 | 168. | -60. | 5.277 | 0.127 | 6.982e-002 |
| 151 | 180. | -48. | 5.268 | 0.118 | 6.487e-002 |
| 152 | 192. | -36. | 5.254 | 0.104 | 5.717e-002 |
| 153 | 204. | -24. | 5.244 | 9.4e-002 | 5.168e-002 |
| 154 | 216. | -12. | 5.24 | 9.e-002 | 4.948e-002 |
| 155 | 228. | 0. | 5.23 | 8.e-002 | 4.398e-002 |
| 156 | 240. | 12. | 5.225 | 7.5e-002 | 4.123e-002 |
| 157 | 252. | 24. | 5.221 | 7.1e-002 | 3.903e-002 |
| 158 | 264. | 36. | 5.216 | 6.6e-002 | 3.628e-002 |
| 159 | 276. | 48. | 5.211 | 6.1e-002 | 3.353e-002 |
| 160 | 288. | 60. | 5.206 | 5.6e-002 | 3.079e-002 |
| 161 | 300. | 72. | 5.206 | 5.6e-002 | 3.079e-002 |
| 162 | 312. | 84. | 5.202 | 5.2e-002 | 2.859e-002 |
| 163 | 324. | 96. | 5.197 | 4.7e-002 | 2.584e-002 |
| 164 | 336. | 108. | 5.197 | 4.7e-002 | 2.584e-002 |
| 165 | 348. | 120. | 5.197 | 4.7e-002 | 2.584e-002 |
| 166 | 360. | 132. | 5.192 | 4.2e-002 | 2.309e-002 |
| 167 | 372. | 144. | 5.192 | 4.2e-002 | 2.309e-002 |
| 168 | 384. | 156. | 5.192 | 4.2e-002 | 2.309e-002 |
| 169 | 396. | 168. | 5.187 | 3.7e-002 | 2.034e-002 |
| 170 | 408. | 180. | 5.187 | 3.7e-002 | 2.034e-002 |
| 171 | 420. | 192. | 5.187 | 3.7e-002 | 2.034e-002 |
| 172 | 432. | 204. | 5.187 | 3.7e-002 | 2.034e-002 |
| 173 | 444. | 216. | 5.187 | 3.7e-002 | 2.034e-002 |
| 174 | 456. | 228. | 5.187 | 3.7e-002 | 2.034e-002 |
| 175 | 468. | 240. | 5.183 | 3.3e-002 | 1.814e-002 |
| 176 | 480. | 252. | 5.183 | 3.3e-002 | 1.814e-002 |
| 177 | 492. | 264. | 5.183 | 3.3e-002 | 1.814e-002 |
| 178 | 504. | 276. | 5.183 | 3.3e-002 | 1.814e-002 |
| 179 | 516. | 288. | 5.183 | 3.3e-002 | 1.814e-002 |
| 180 | 528. | 300. | 5.178 | 2.8e-002 | 1.539e-002 |
| 181 | 540. | 312. | 5.178 | 2.8e-002 | 1.539e-002 |
| 182 | 552. | 324. | 5.178 | 2.8e-002 | 1.539e-002 |
| 183 | 564. | 336. | 5.178 | 2.8e-002 | 1.539e-002 |
| 184 | 576. | 348. | 5.178 | 2.8e-002 | 1.539e-002 |
| 185 | 588. | 360. | 5.178 | 2.8e-002 | 1.539e-002 |
| 186 | 600. | 372. | 5.178 | 2.8e-002 | 1.539e-002 |
| 187 | 720. | 492. | 5.178 | 2.8e-002 | 1.539e-002 |
| 188 | 840. | 612. | 5.173 | 2.3e-002 | 1.264e-002 |
| 189 | 960. | 732. | 5.173 | 2.3e-002 | 1.264e-002 |
| 190 | 1080 | 852. | 5.173 | 2.3e-002 | 1.264e-002 |

| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 972. | 5.173 | 2.3e-002 | 1.264e-002 |
| 192 | 1320 | 1092 | 5.168 | 1.8e-002 | 9.896e-003 |
| 193 | 1440 | 1212 | 5.168 | 1.8e-002 | 9.896e-003 |
| 194 | 1560 | 1332 | 5.168 | 1.8e-002 | 9.896e-003 |
| 195 | 1680 | 1452 | 5.164 | 1.4e-002 | 7.697e-003 |
| 196 | 1800 | 1572 | 5.164 | 1.4e-002 | 7.697e-003 |
| 197 | 1920 | 1692 | 5.164 | 1.4e-002 | 7.697e-003 |
| 198 | 2040 | 1812 | 5.164 | 1.4e-002 | 7.697e-003 |
| 199 | 2160 | 1932 | 5.164 | 1.4e-002 | 7.697e-003 |
| 200 | 2280 | 2052 | 5.164 | 1.4e-002 | 7.697e-003 |
| 201 | 2400 | 2172 | 5.164 | 1.4e-002 | 7.697e-003 |
| 202 | 2520 | 2292 | 5.164 | 1.4e-002 | 7.697e-003 |
| 203 | 2640 | 2412 | 5.164 | 1.4e-002 | 7.697e-003 |
| 204 | 2760 | 2532 | 5.164 | 1.4e-002 | 7.697e-003 |
| 205 | 2880 | 2652 | 5.164 | 1.4e-002 | 7.697e-003 |
| 206 | 3000 | 2772 | 5.164 | 1.4e-002 | 7.697e-003 |
| 207 | 3120 | 2892 | 5.164 | 1.4e-002 | 7.697e-003 |
| 208 | 3240 | 3012 | 5.164 | 1.4e-002 | 7.697e-003 |
| 209 | 3360 | 3132 | 5.164 | 1.4e-002 | 7.697e-003 |
| 210 | 3480 | 3252 | 5.159 | 9.e-003 | 4.948e-003 |
| 211 | 3600 | 3372 | 5.164 | 1.4e-002 | 7.697e-003 |
| 212 | 3720 | 3492 | 5.164 | 1.4e-002 | 7.697e-003 |
| 213 | 3840 | 3612 | 5.164 | 1.4e-002 | 7.697e-003 |
| 214 | 3960 | 3732 | 5.164 | 1.4e-002 | 7.697e-003 |
| 215 | 4080 | 3852 | 5.159 | 9.e-003 | 4.948e-003 |
| 216 | 4200 | 3972 | 5.159 | 9.e-003 | 4.948e-003 |
| 217 | 4320 | 4092 | 5.159 | 9.e-003 | 4.948e-003 |
| 218 | 4440 | 4212 | 5.159 | 9.e-003 | 4.948e-003 |

**Aquifer Analysis February 18, 2002** **Bouwer and Rice Graph**

Coble's Sandrock P-19D (Falling)




Ho is 2.085 feet at 19. seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 18, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P19DFALL |

| | |
|---|---|
| Well Label: | P-19D (Falling) |
| Aquifer Thickness: | 50. feet |
| Screen Length: | 15. feet |
| Casing Radius: | 1.888 inches |
| Effective Radius: | 3.125 inches |
| Static Water Level: | 4.59 feet |
| Water Table to Screen Bottom: | 57.61 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 19. Seconds |

Test starts with trial 23
There are 212 time and drawdown measurements
Maximum head is 2.877 feet
Minimum head is -0.166 feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -19. | 4.575 | 1.5e-002 | 5.214e-003 |
| 2 | 0.198 | -18.8 | 4.575 | 1.5e-002 | 5.214e-003 |
| 3 | 0.396 | -18.6 | 4.556 | 3.4e-002 | 1.182e-002 |
| 4 | 0.6 | -18.4 | 4.59 | 0. | 0. |
| 5 | 0.798 | -18.2 | 4.575 | 1.5e-002 | 5.214e-003 |
| 6 | 0.996 | -18. | 3.979 | 0.611 | 0.2124 |
| 7 | 1.2 | -17.8 | 4.451 | 0.139 | 4.831e-002 |
| 8 | 1.398 | -17.6 | 4.065 | 0.525 | 0.1825 |
| 9 | 1.596 | -17.4 | 4.17 | 0.42 | 0.146 |
| 10 | 1.8 | -17.2 | 3.345 | 1.245 | 0.4327 |
| 11 | 1.998 | -17. | 3.765 | 0.825 | 0.2868 |
| 12 | 2.196 | -16.8 | 3.311 | 1.279 | 0.4446 |
| 13 | 2.4 | -16.6 | 2.882 | 1.708 | 0.5937 |
| 14 | 2.598 | -16.4 | 2.567 | 2.023 | 0.7032 |
| 15 | 2.796 | -16.2 | 1.937 | 2.653 | 0.9221 |
| 16 | 3. | -16. | 1.832 | 2.758 | 0.9586 |
| 17 | 3.198 | -15.8 | 1.775 | 2.815 | 0.9784 |
| 18 | 3.396 | -15.6 | 2.038 | 2.552 | 0.887 |
| 19 | 3.6 | -15.4 | 1.866 | 2.724 | 0.9468 |
| 20 | 3.798 | -15.2 | 1.837 | 2.753 | 0.9569 |
| 21 | 3.996 | -15. | 2.057 | 2.533 | 0.8804 |
| 22 | 4.2 | -14.8 | 1.918 | 2.672 | 0.9287 |
| 23 | 4.398 | -14.6 | 1.89 | 2.7 | 0.9385 |
| 24 | 4.596 | -14.4 | 1.713 | 2.877 | 1. |
| 25 | 4.8 | -14.2 | 1.727 | 2.863 | 0.9951 |
| 26 | 4.998 | -14. | 2.166 | 2.424 | 0.8425 |
| 27 | 5.196 | -13.8 | 2.391 | 2.199 | 0.7643 |
| 28 | 5.4 | -13.6 | 2.4 | 2.19 | 0.7612 |
| 29 | 5.598 | -13.4 | 2.916 | 1.674 | 0.5819 |
| 30 | 5.796 | -13.2 | 2.429 | 2.161 | 0.7511 |
| 31 | 6. | -13. | 2.887 | 1.703 | 0.5919 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -12.8 | 2.648 | 1.942 | 0.675 |
| 33 | 6.396 | -12.6 | 1.894 | 2.696 | 0.9371 |
| 34 | 6.6 | -12.4 | 4.756 | -0.166 | -5.77e-002 |
| 35 | 6.798 | -12.2 | 2.992 | 1.598 | 0.5554 |
| 36 | 6.996 | -12. | 2.352 | 2.238 | 0.7779 |
| 37 | 7.2 | -11.8 | 2.605 | 1.985 | 0.69 |
| 38 | 7.398 | -11.6 | 2.772 | 1.818 | 0.6319 |
| 39 | 7.596 | -11.4 | 2.811 | 1.779 | 0.6184 |
| 40 | 7.8 | -11.2 | 2.648 | 1.942 | 0.675 |
| 41 | 7.998 | -11. | 2.462 | 2.128 | 0.7397 |
| 42 | 8.196 | -10.8 | 2.31 | 2.28 | 0.7925 |
| 43 | 8.4 | -10.6 | 2.257 | 2.333 | 0.8109 |
| 44 | 8.598 | -10.4 | 2.31 | 2.28 | 0.7925 |
| 45 | 8.796 | -10.2 | 2.429 | 2.161 | 0.7511 |
| 46 | 9. | -9.996 | 2.539 | 2.051 | 0.7129 |
| 47 | 9.198 | -9.798 | 2.601 | 1.989 | 0.6913 |
| 48 | 9.396 | -9.6 | 2.591 | 1.999 | 0.6948 |
| 49 | 9.6 | -9.396 | 2.534 | 2.056 | 0.7146 |
| 50 | 9.798 | -9.198 | 2.453 | 2.137 | 0.7428 |
| 51 | 9.996 | -9. | 2.4 | 2.19 | 0.7612 |
| 52 | 10.2 | -8.796 | 2.386 | 2.204 | 0.7661 |
| 53 | 10.4 | -8.598 | 2.415 | 2.175 | 0.756 |
| 54 | 10.6 | -8.4 | 2.467 | 2.123 | 0.7379 |
| 55 | 10.8 | -8.196 | 2.51 | 2.08 | 0.723 |
| 56 | 11. | -7.998 | 2.534 | 2.056 | 0.7146 |
| 57 | 11.2 | -7.8 | 2.524 | 2.066 | 0.7181 |
| 58 | 11.4 | -7.596 | 2.496 | 2.094 | 0.7278 |
| 59 | 11.6 | -7.398 | 2.462 | 2.128 | 0.7397 |
| 60 | 11.8 | -7.2 | 2.443 | 2.147 | 0.7463 |
| 61 | 12. | -6.996 | 2.443 | 2.147 | 0.7463 |
| 62 | 12.2 | -6.798 | 2.457 | 2.133 | 0.7414 |
| 63 | 12.4 | -6.6 | 2.481 | 2.109 | 0.7331 |
| 64 | 12.6 | -6.396 | 2.5 | 2.09 | 0.7265 |
| 65 | 12.8 | -6.198 | 2.505 | 2.085 | 0.7247 |
| 66 | 13. | -6. | 2.505 | 2.085 | 0.7247 |
| 67 | 13.2 | -5.796 | 2.481 | 2.109 | 0.7331 |
| 68 | 13.4 | -5.598 | 2.534 | 2.056 | 0.7146 |
| 69 | 13.6 | -5.4 | 2.472 | 2.118 | 0.7362 |
| 70 | 13.8 | -5.196 | 2.472 | 2.118 | 0.7362 |
| 71 | 14. | -4.998 | 2.481 | 2.109 | 0.7331 |
| 72 | 14.2 | -4.8 | 2.486 | 2.104 | 0.7313 |
| 73 | 14.4 | -4.596 | 2.491 | 2.099 | 0.7296 |
| 74 | 14.6 | -4.398 | 2.491 | 2.099 | 0.7296 |
| 75 | 14.8 | -4.2 | 2.777 | 1.813 | 0.6302 |
| 76 | 15. | -3.996 | 2.295 | 2.295 | 0.7977 |
| 77 | 15.2 | -3.798 | 2.462 | 2.128 | 0.7397 |
| 78 | 15.4 | -3.6 | 2.51 | 2.08 | 0.723 |
| 79 | 15.6 | -3.396 | 2.505 | 2.085 | 0.7247 |
| 80 | 15.8 | -3.198 | 2.51 | 2.08 | 0.723 |
| 81 | 16. | -3. | 2.5 | 2.09 | 0.7265 |
| 82 | 16.2 | -2.796 | 2.477 | 2.113 | 0.7344 |
| 83 | 16.4 | -2.598 | 2.462 | 2.128 | 0.7397 |
| 84 | 16.6 | -2.4 | 2.467 | 2.123 | 0.7379 |

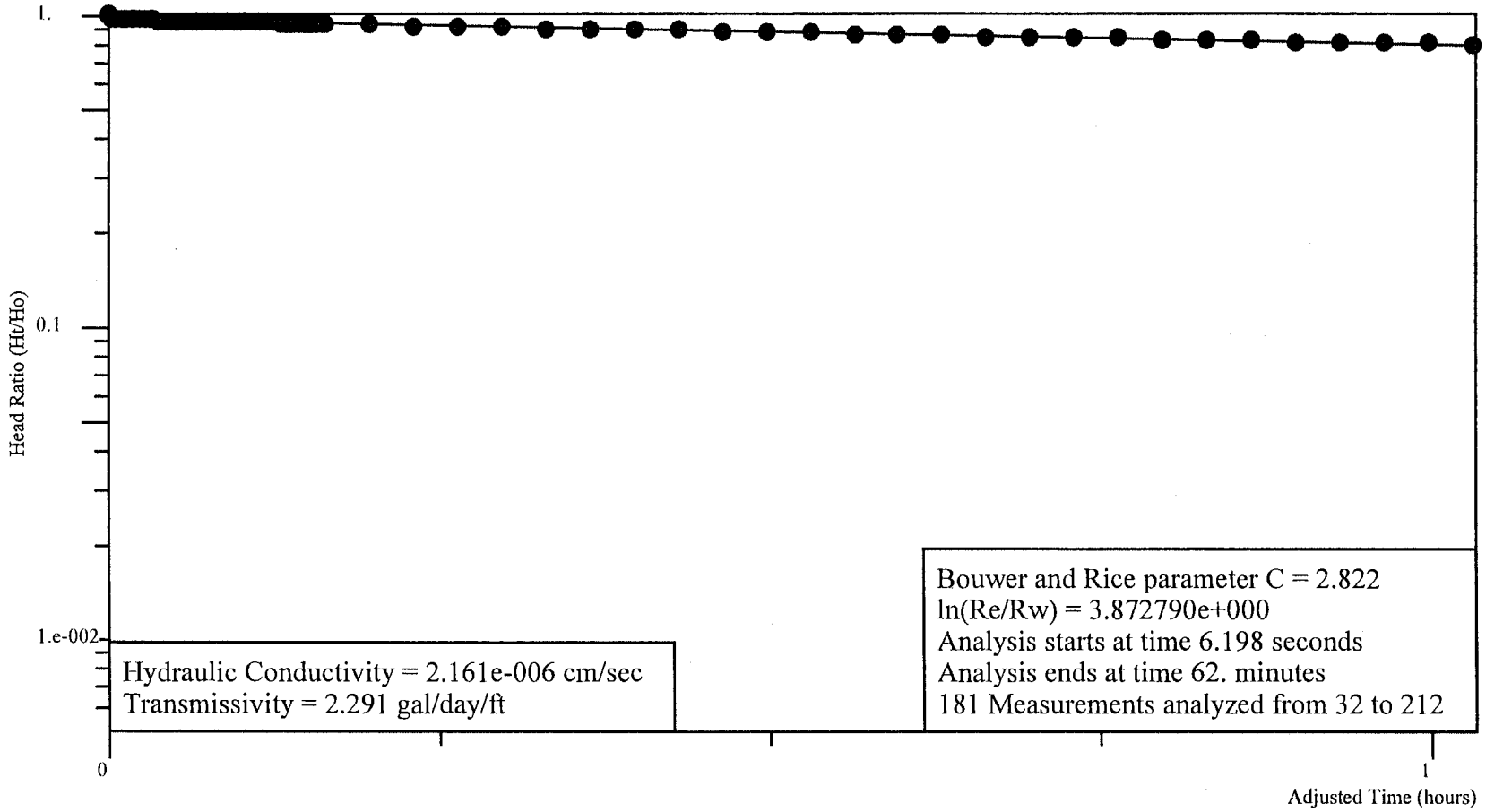
| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | -2.196 | 2.477 | 2.113 | 0.7344 |
| 86 | 17. | -1.998 | 2.486 | 2.104 | 0.7313 |
| 87 | 17.2 | -1.8 | 2.496 | 2.094 | 0.7278 |
| 88 | 17.4 | -1.596 | 2.496 | 2.094 | 0.7278 |
| 89 | 17.6 | -1.398 | 2.5 | 2.09 | 0.7265 |
| 90 | 17.8 | -1.2 | 2.486 | 2.104 | 0.7313 |
| 91 | 18. | -0.996 | 2.472 | 2.118 | 0.7362 |
| 92 | 18.2 | -0.798 | 2.486 | 2.104 | 0.7313 |
| 93 | 18.4 | -0.6 | 2.5 | 2.09 | 0.7265 |
| 94 | 18.6 | -0.396 | 2.343 | 2.247 | 0.781 |
| 95 | 18.8 | -0.198 | 2.481 | 2.109 | 0.7331 |
| 96 | 19. | 0. | 2.505 | 2.085 | 0.7247 |
| 97 | 19.2 | 0.204 | 2.486 | 2.104 | 0.7313 |
| 98 | 19.4 | 0.402 | 2.491 | 2.099 | 0.7296 |
| 99 | 19.6 | 0.6 | 2.543 | 2.047 | 0.7115 |
| 100 | 19.8 | 0.804 | 2.477 | 2.113 | 0.7344 |
| 101 | 20. | 1.002 | 2.486 | 2.104 | 0.7313 |
| 102 | 21. | 2.004 | 2.491 | 2.099 | 0.7296 |
| 103 | 22. | 3. | 2.486 | 2.104 | 0.7313 |
| 104 | 23. | 4.002 | 2.491 | 2.099 | 0.7296 |
| 105 | 24. | 5.004 | 2.491 | 2.099 | 0.7296 |
| 106 | 25. | 6. | 2.491 | 2.099 | 0.7296 |
| 107 | 26. | 7.002 | 2.491 | 2.099 | 0.7296 |
| 108 | 27. | 8.004 | 2.491 | 2.099 | 0.7296 |
| 109 | 28. | 9. | 2.491 | 2.099 | 0.7296 |
| 110 | 29. | 10. | 2.491 | 2.099 | 0.7296 |
| 111 | 30. | 11. | 2.491 | 2.099 | 0.7296 |
| 112 | 31. | 12. | 2.496 | 2.094 | 0.7278 |
| 113 | 32. | 13. | 2.496 | 2.094 | 0.7278 |
| 114 | 33. | 14. | 2.496 | 2.094 | 0.7278 |
| 115 | 34. | 15. | 2.496 | 2.094 | 0.7278 |
| 116 | 35. | 16. | 2.496 | 2.094 | 0.7278 |
| 117 | 36. | 17. | 2.496 | 2.094 | 0.7278 |
| 118 | 37. | 18. | 2.496 | 2.094 | 0.7278 |
| 119 | 38. | 19. | 2.496 | 2.094 | 0.7278 |
| 120 | 39. | 20. | 2.496 | 2.094 | 0.7278 |
| 121 | 40. | 21. | 2.5 | 2.09 | 0.7265 |
| 122 | 41. | 22. | 2.5 | 2.09 | 0.7265 |
| 123 | 42. | 23. | 2.5 | 2.09 | 0.7265 |
| 124 | 43. | 24. | 2.5 | 2.09 | 0.7265 |
| 125 | 44. | 25. | 2.5 | 2.09 | 0.7265 |
| 126 | 45. | 26. | 2.5 | 2.09 | 0.7265 |
| 127 | 46. | 27. | 2.5 | 2.09 | 0.7265 |
| 128 | 47. | 28. | 2.5 | 2.09 | 0.7265 |
| 129 | 48. | 29. | 2.5 | 2.09 | 0.7265 |
| 130 | 49. | 30. | 2.5 | 2.09 | 0.7265 |
| 131 | 50. | 31. | 2.5 | 2.09 | 0.7265 |
| 132 | 51. | 32. | 2.505 | 2.085 | 0.7247 |
| 133 | 52. | 33. | 2.505 | 2.085 | 0.7247 |
| 134 | 53. | 34. | 2.505 | 2.085 | 0.7247 |
| 135 | 54. | 35. | 2.505 | 2.085 | 0.7247 |
| 136 | 55. | 36. | 2.505 | 2.085 | 0.7247 |
| 137 | 56. | 37. | 2.505 | 2.085 | 0.7247 |

| | | | | | |
|---|---|---|---|---|---|
| 138 | 57. | 38. | 2.505 | 2.085 | 0.7247 |
| 139 | 58. | 39. | 2.505 | 2.085 | 0.7247 |
| 140 | 59. | 40. | 2.505 | 2.085 | 0.7247 |
| 141 | 60. | 41. | 2.505 | 2.085 | 0.7247 |
| 142 | 72. | 53. | 2.51 | 2.08 | 0.723 |
| 143 | 84. | 65. | 2.515 | 2.075 | 0.7212 |
| 144 | 96. | 77. | 2.52 | 2.07 | 0.7195 |
| 145 | 108. | 89. | 2.524 | 2.066 | 0.7181 |
| 146 | 120. | 101. | 2.529 | 2.061 | 0.7164 |
| 147 | 132. | 113. | 2.534 | 2.056 | 0.7146 |
| 148 | 144. | 125. | 2.534 | 2.056 | 0.7146 |
| 149 | 156. | 137. | 2.539 | 2.051 | 0.7129 |
| 150 | 168. | 149. | 2.543 | 2.047 | 0.7115 |
| 151 | 180. | 161. | 2.548 | 2.042 | 0.7098 |
| 152 | 192. | 173. | 2.553 | 2.037 | 0.708 |
| 153 | 204. | 185. | 2.553 | 2.037 | 0.708 |
| 154 | 216. | 197. | 2.558 | 2.032 | 0.7063 |
| 155 | 228. | 209. | 2.562 | 2.028 | 0.7049 |
| 156 | 240. | 221. | 2.567 | 2.023 | 0.7032 |
| 157 | 252. | 233. | 2.572 | 2.018 | 0.7014 |
| 158 | 264. | 245. | 2.577 | 2.013 | 0.6997 |
| 159 | 276. | 257. | 2.577 | 2.013 | 0.6997 |
| 160 | 288. | 269. | 2.582 | 2.008 | 0.6979 |
| 161 | 300. | 281. | 2.586 | 2.004 | 0.6966 |
| 162 | 312. | 293. | 2.591 | 1.999 | 0.6948 |
| 163 | 324. | 305. | 2.591 | 1.999 | 0.6948 |
| 164 | 336. | 317. | 2.596 | 1.994 | 0.6931 |
| 165 | 348. | 329. | 2.601 | 1.989 | 0.6913 |
| 166 | 360. | 341. | 2.605 | 1.985 | 0.69 |
| 167 | 372. | 353. | 2.61 | 1.98 | 0.6882 |
| 168 | 384. | 365. | 2.61 | 1.98 | 0.6882 |
| 169 | 396. | 377. | 2.615 | 1.975 | 0.6865 |
| 170 | 408. | 389. | 2.62 | 1.97 | 0.6847 |
| 171 | 420. | 401. | 2.625 | 1.965 | 0.683 |
| 172 | 432. | 413. | 2.625 | 1.965 | 0.683 |
| 173 | 444. | 425. | 2.629 | 1.961 | 0.6816 |
| 174 | 456. | 437. | 2.634 | 1.956 | 0.6799 |
| 175 | 468. | 449. | 2.634 | 1.956 | 0.6799 |
| 176 | 480. | 461. | 2.639 | 1.951 | 0.6781 |
| 177 | 492. | 473. | 2.643 | 1.947 | 0.6767 |
| 178 | 504. | 485. | 2.648 | 1.942 | 0.675 |
| 179 | 516. | 497. | 2.653 | 1.937 | 0.6733 |
| 180 | 528. | 509. | 2.653 | 1.937 | 0.6733 |
| 181 | 540. | 521. | 2.658 | 1.932 | 0.6715 |
| 182 | 552. | 533. | 2.663 | 1.927 | 0.6698 |
| 183 | 564. | 545. | 2.663 | 1.927 | 0.6698 |
| 184 | 576. | 557. | 2.667 | 1.923 | 0.6684 |
| 185 | 588. | 569. | 2.672 | 1.918 | 0.6667 |
| 186 | 600. | 581. | 2.677 | 1.913 | 0.6649 |
| 187 | 720. | 701. | 2.71 | 1.88 | 0.6535 |
| 188 | 840. | 821. | 2.744 | 1.846 | 0.6416 |
| 189 | 960. | 941. | 2.772 | 1.818 | 0.6319 |
| 190 | 1080 | 1061 | 2.806 | 1.784 | 0.6201 |

| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1181 | 2.839 | 1.751 | 0.6086 |
| 192 | 1320 | 1301 | 2.868 | 1.722 | 0.5985 |
| 193 | 1440 | 1421 | 2.901 | 1.689 | 0.5871 |
| 194 | 1560 | 1541 | 2.93 | 1.66 | 0.577 |
| 195 | 1680 | 1661 | 2.958 | 1.632 | 0.5673 |
| 196 | 1800 | 1781 | 2.987 | 1.603 | 0.5572 |
| 197 | 1920 | 1901 | 3.021 | 1.569 | 0.5454 |
| 198 | 2040 | 2021 | 3.044 | 1.546 | 0.5374 |
| 199 | 2160 | 2141 | 3.073 | 1.517 | 0.5273 |
| 200 | 2280 | 2261 | 3.102 | 1.488 | 0.5172 |
| 201 | 2400 | 2381 | 3.13 | 1.46 | 0.5075 |
| 202 | 2520 | 2501 | 3.159 | 1.431 | 0.4974 |
| 203 | 2640 | 2621 | 3.183 | 1.407 | 0.4891 |
| 204 | 2760 | 2741 | 3.207 | 1.383 | 0.4807 |
| 205 | 2880 | 2861 | 3.235 | 1.355 | 0.471 |
| 206 | 3000 | 2981 | 3.259 | 1.331 | 0.4626 |
| 207 | 3120 | 3101 | 3.288 | 1.302 | 0.4526 |
| 208 | 3240 | 3221 | 3.311 | 1.279 | 0.4446 |
| 209 | 3360 | 3341 | 3.335 | 1.255 | 0.4362 |
| 210 | 3480 | 3461 | 3.359 | 1.231 | 0.4279 |
| 211 | 3600 | 3581 | 3.383 | 1.207 | 0.4195 |
| 212 | 3720 | 3701 | 3.407 | 1.183 | 0.4112 |

**Aquifer Analysis February 13, 2002** **Bouwer and Rice Graph**

Coble's Sandrock P-19D (Rising)




Ho is 2.111 feet at 6.198 seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 13, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P19DRISI |

| | |
|---|---|
| Well Label: | P-19D (Rising) |
| Aquifer Thickness: | 50. feet |
| Screen Length: | 15. feet |
| Casing Radius: | 1.188 inches |
| Effective Radius: | 3.125 inches |
| Static Water Level: | 3.759 feet |
| Water Table to Screen Bottom: | 58.45 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 6.198 Seconds |

Test starts with trial 11
There are 212 time and drawdown measurements
Maximum head is 2.339 feet
Minimum head is 0. feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -6.198 | 3.759 | 0. | 0. |
| 2 | 0.198 | -6. | 4.531 | 0.772 | 0.3301 |
| 3 | 0.396 | -5.802 | 4.922 | 1.163 | 0.4972 |
| 4 | 0.6 | -5.598 | 5.136 | 1.377 | 0.5887 |
| 5 | 0.798 | -5.4 | 5.122 | 1.363 | 0.5827 |
| 6 | 0.996 | -5.202 | 5.627 | 1.868 | 0.7986 |
| 7 | 1.2 | -4.998 | 5.598 | 1.839 | 0.7862 |
| 8 | 1.398 | -4.8 | 5.922 | 2.163 | 0.9248 |
| 9 | 1.596 | -4.602 | 5.903 | 2.144 | 0.9166 |
| 10 | 1.8 | -4.398 | 5.979 | 2.22 | 0.9491 |
| 11 | 1.998 | -4.2 | 6.065 | 2.306 | 0.9859 |
| 12 | 2.196 | -4.002 | 6.098 | 2.339 | 1. |
| 13 | 2.4 | -3.798 | 6.06 | 2.301 | 0.9838 |
| 14 | 2.598 | -3.6 | 5.979 | 2.22 | 0.9491 |
| 15 | 2.796 | -3.402 | 5.884 | 2.125 | 0.9085 |
| 16 | 3. | -3.198 | 5.841 | 2.082 | 0.8901 |
| 17 | 3.198 | -3. | 5.832 | 2.073 | 0.8863 |
| 18 | 3.396 | -2.802 | 5.875 | 2.116 | 0.9047 |
| 19 | 3.6 | -2.598 | 5.936 | 2.177 | 0.9307 |
| 20 | 3.798 | -2.4 | 5.97 | 2.211 | 0.9453 |
| 21 | 3.996 | -2.202 | 5.984 | 2.225 | 0.9513 |
| 22 | 4.2 | -1.998 | 5.979 | 2.22 | 0.9491 |
| 23 | 4.398 | -1.8 | 5.898 | 2.139 | 0.9145 |
| 24 | 4.596 | -1.602 | 5.86 | 2.101 | 0.8982 |
| 25 | 4.8 | -1.398 | 5.836 | 2.077 | 0.888 |
| 26 | 4.998 | -1.2 | 5.846 | 2.087 | 0.8923 |
| 27 | 5.196 | -1.002 | 5.87 | 2.111 | 0.9025 |
| 28 | 5.4 | -0.798 | 5.898 | 2.139 | 0.9145 |
| 29 | 5.598 | -0.6 | 5.913 | 2.154 | 0.9209 |
| 30 | 5.796 | -0.402 | 5.913 | 2.154 | 0.9209 |
| 31 | 6. | -0.198 | 5.898 | 2.139 | 0.9145 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | 0. | 5.87 | 2.111 | 0.9025 |
| 33 | 6.396 | 0.198 | 5.855 | 2.096 | 0.8961 |
| 34 | 6.6 | 0.402 | 5.846 | 2.087 | 0.8923 |
| 35 | 6.798 | 0.6 | 5.851 | 2.092 | 0.8944 |
| 36 | 6.996 | 0.798 | 5.865 | 2.106 | 0.9004 |
| 37 | 7.2 | 1.002 | 5.879 | 2.12 | 0.9064 |
| 38 | 7.398 | 1.2 | 5.884 | 2.125 | 0.9085 |
| 39 | 7.596 | 1.398 | 5.879 | 2.12 | 0.9064 |
| 40 | 7.8 | 1.602 | 5.87 | 2.111 | 0.9025 |
| 41 | 7.998 | 1.8 | 5.86 | 2.101 | 0.8982 |
| 42 | 8.196 | 1.998 | 5.851 | 2.092 | 0.8944 |
| 43 | 8.4 | 2.202 | 5.851 | 2.092 | 0.8944 |
| 44 | 8.598 | 2.4 | 5.851 | 2.092 | 0.8944 |
| 45 | 8.796 | 2.598 | 5.86 | 2.101 | 0.8982 |
| 46 | 9. | 2.802 | 5.865 | 2.106 | 0.9004 |
| 47 | 9.198 | 3. | 5.865 | 2.106 | 0.9004 |
| 48 | 9.396 | 3.198 | 5.865 | 2.106 | 0.9004 |
| 49 | 9.6 | 3.402 | 5.86 | 2.101 | 0.8982 |
| 50 | 9.798 | 3.6 | 5.855 | 2.096 | 0.8961 |
| 51 | 9.996 | 3.798 | 5.851 | 2.092 | 0.8944 |
| 52 | 10.2 | 4.002 | 5.851 | 2.092 | 0.8944 |
| 53 | 10.4 | 4.2 | 5.851 | 2.092 | 0.8944 |
| 54 | 10.6 | 4.398 | 5.855 | 2.096 | 0.8961 |
| 55 | 10.8 | 4.602 | 5.855 | 2.096 | 0.8961 |
| 56 | 11. | 4.8 | 5.855 | 2.096 | 0.8961 |
| 57 | 11.2 | 4.998 | 5.855 | 2.096 | 0.8961 |
| 58 | 11.4 | 5.202 | 5.851 | 2.092 | 0.8944 |
| 59 | 11.6 | 5.4 | 5.851 | 2.092 | 0.8944 |
| 60 | 11.8 | 5.598 | 5.851 | 2.092 | 0.8944 |
| 61 | 12. | 5.802 | 5.846 | 2.087 | 0.8923 |
| 62 | 12.2 | 6. | 5.851 | 2.092 | 0.8944 |
| 63 | 12.4 | 6.198 | 5.851 | 2.092 | 0.8944 |
| 64 | 12.6 | 6.402 | 5.851 | 2.092 | 0.8944 |
| 65 | 12.8 | 6.6 | 5.851 | 2.092 | 0.8944 |
| 66 | 13. | 6.798 | 5.851 | 2.092 | 0.8944 |
| 67 | 13.2 | 7.002 | 5.846 | 2.087 | 0.8923 |
| 68 | 13.4 | 7.2 | 5.846 | 2.087 | 0.8923 |
| 69 | 13.6 | 7.398 | 5.846 | 2.087 | 0.8923 |
| 70 | 13.8 | 7.602 | 5.846 | 2.087 | 0.8923 |
| 71 | 14. | 7.8 | 5.846 | 2.087 | 0.8923 |
| 72 | 14.2 | 7.998 | 5.846 | 2.087 | 0.8923 |
| 73 | 14.4 | 8.202 | 5.846 | 2.087 | 0.8923 |
| 74 | 14.6 | 8.4 | 5.846 | 2.087 | 0.8923 |
| 75 | 14.8 | 8.598 | 5.846 | 2.087 | 0.8923 |
| 76 | 15. | 8.802 | 5.846 | 2.087 | 0.8923 |
| 77 | 15.2 | 9. | 5.846 | 2.087 | 0.8923 |
| 78 | 15.4 | 9.198 | 5.846 | 2.087 | 0.8923 |
| 79 | 15.6 | 9.402 | 5.846 | 2.087 | 0.8923 |
| 80 | 15.8 | 9.6 | 5.846 | 2.087 | 0.8923 |
| 81 | 16. | 9.798 | 5.846 | 2.087 | 0.8923 |
| 82 | 16.2 | 10. | 5.846 | 2.087 | 0.8923 |
| 83 | 16.4 | 10.2 | 5.846 | 2.087 | 0.8923 |
| 84 | 16.6 | 10.4 | 5.841 | 2.082 | 0.8901 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | 10.6 | 5.841 | 2.082 | 0.8901 |
| 86 | 17. | 10.8 | 5.841 | 2.082 | 0.8901 |
| 87 | 17.2 | 11. | 5.841 | 2.082 | 0.8901 |
| 88 | 17.4 | 11.2 | 5.841 | 2.082 | 0.8901 |
| 89 | 17.6 | 11.4 | 5.841 | 2.082 | 0.8901 |
| 90 | 17.8 | 11.6 | 5.841 | 2.082 | 0.8901 |
| 91 | 18. | 11.8 | 5.841 | 2.082 | 0.8901 |
| 92 | 18.2 | 12. | 5.841 | 2.082 | 0.8901 |
| 93 | 18.4 | 12.2 | 5.841 | 2.082 | 0.8901 |
| 94 | 18.6 | 12.4 | 5.841 | 2.082 | 0.8901 |
| 95 | 18.8 | 12.6 | 5.841 | 2.082 | 0.8901 |
| 96 | 19. | 12.8 | 5.841 | 2.082 | 0.8901 |
| 97 | 19.2 | 13. | 5.841 | 2.082 | 0.8901 |
| 98 | 19.4 | 13.2 | 5.841 | 2.082 | 0.8901 |
| 99 | 19.6 | 13.4 | 5.841 | 2.082 | 0.8901 |
| 100 | 19.8 | 13.6 | 5.841 | 2.082 | 0.8901 |
| 101 | 20. | 13.8 | 5.841 | 2.082 | 0.8901 |
| 102 | 21. | 14.8 | 5.836 | 2.077 | 0.888 |
| 103 | 22. | 15.8 | 5.836 | 2.077 | 0.888 |
| 104 | 23. | 16.8 | 5.836 | 2.077 | 0.888 |
| 105 | 24. | 17.8 | 5.836 | 2.077 | 0.888 |
| 106 | 25. | 18.8 | 5.836 | 2.077 | 0.888 |
| 107 | 26. | 19.8 | 5.832 | 2.073 | 0.8863 |
| 108 | 27. | 20.8 | 5.832 | 2.073 | 0.8863 |
| 109 | 28. | 21.8 | 5.832 | 2.073 | 0.8863 |
| 110 | 29. | 22.8 | 5.832 | 2.073 | 0.8863 |
| 111 | 30. | 23.8 | 5.832 | 2.073 | 0.8863 |
| 112 | 31. | 24.8 | 5.832 | 2.073 | 0.8863 |
| 113 | 32. | 25.8 | 5.832 | 2.073 | 0.8863 |
| 114 | 33. | 26.8 | 5.827 | 2.068 | 0.8841 |
| 115 | 34. | 27.8 | 5.827 | 2.068 | 0.8841 |
| 116 | 35. | 28.8 | 5.827 | 2.068 | 0.8841 |
| 117 | 36. | 29.8 | 5.827 | 2.068 | 0.8841 |
| 118 | 37. | 30.8 | 5.827 | 2.068 | 0.8841 |
| 119 | 38. | 31.8 | 5.827 | 2.068 | 0.8841 |
| 120 | 39. | 32.8 | 5.827 | 2.068 | 0.8841 |
| 121 | 40. | 33.8 | 5.827 | 2.068 | 0.8841 |
| 122 | 41. | 34.8 | 5.827 | 2.068 | 0.8841 |
| 123 | 42. | 35.8 | 5.827 | 2.068 | 0.8841 |
| 124 | 43. | 36.8 | 5.827 | 2.068 | 0.8841 |
| 125 | 44. | 37.8 | 5.827 | 2.068 | 0.8841 |
| 126 | 45. | 38.8 | 5.827 | 2.068 | 0.8841 |
| 127 | 46. | 39.8 | 5.827 | 2.068 | 0.8841 |
| 128 | 47. | 40.8 | 5.827 | 2.068 | 0.8841 |
| 129 | 48. | 41.8 | 5.822 | 2.063 | 0.882 |
| 130 | 49. | 42.8 | 5.822 | 2.063 | 0.882 |
| 131 | 50. | 43.8 | 5.822 | 2.063 | 0.882 |
| 132 | 51. | 44.8 | 5.822 | 2.063 | 0.882 |
| 133 | 52. | 45.8 | 5.822 | 2.063 | 0.882 |
| 134 | 53. | 46.8 | 5.822 | 2.063 | 0.882 |
| 135 | 54. | 47.8 | 5.822 | 2.063 | 0.882 |
| 136 | 55. | 48.8 | 5.822 | 2.063 | 0.882 |
| 137 | 56. | 49.8 | 5.822 | 2.063 | 0.882 |

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|---|---|---|---|---|---|
| 138 | 57. | 50.8 | 5.822 | 2.063 | 0.882 |
| 139 | 58. | 51.8 | 5.822 | 2.063 | 0.882 |
| 140 | 59. | 52.8 | 5.822 | 2.063 | 0.882 |
| 141 | 60. | 53.8 | 5.822 | 2.063 | 0.882 |
| 142 | 72. | 65.8 | 5.817 | 2.058 | 0.8799 |
| 143 | 84. | 77.8 | 5.817 | 2.058 | 0.8799 |
| 144 | 96. | 89.8 | 5.813 | 2.054 | 0.8782 |
| 145 | 108. | 101.8 | 5.813 | 2.054 | 0.8782 |
| 146 | 120. | 113.8 | 5.808 | 2.049 | 0.876 |
| 147 | 132. | 125.8 | 5.808 | 2.049 | 0.876 |
| 148 | 144. | 137.8 | 5.803 | 2.044 | 0.8739 |
| 149 | 156. | 149.8 | 5.803 | 2.044 | 0.8739 |
| 150 | 168. | 161.8 | 5.803 | 2.044 | 0.8739 |
| 151 | 180. | 173.8 | 5.798 | 2.039 | 0.8717 |
| 152 | 192. | 185.8 | 5.798 | 2.039 | 0.8717 |
| 153 | 204. | 197.8 | 5.798 | 2.039 | 0.8717 |
| 154 | 216. | 209.8 | 5.794 | 2.035 | 0.87 |
| 155 | 228. | 221.8 | 5.794 | 2.035 | 0.87 |
| 156 | 240. | 233.8 | 5.794 | 2.035 | 0.87 |
| 157 | 252. | 245.8 | 5.789 | 2.03 | 0.8679 |
| 158 | 264. | 257.8 | 5.789 | 2.03 | 0.8679 |
| 159 | 276. | 269.8 | 5.789 | 2.03 | 0.8679 |
| 160 | 288. | 281.8 | 5.784 | 2.025 | 0.8658 |
| 161 | 300. | 293.8 | 5.784 | 2.025 | 0.8658 |
| 162 | 312. | 305.8 | 5.779 | 2.02 | 0.8636 |
| 163 | 324. | 317.8 | 5.779 | 2.02 | 0.8636 |
| 164 | 336. | 329.8 | 5.779 | 2.02 | 0.8636 |
| 165 | 348. | 341.8 | 5.779 | 2.02 | 0.8636 |
| 166 | 360. | 353.8 | 5.775 | 2.016 | 0.8619 |
| 167 | 372. | 365.8 | 5.775 | 2.016 | 0.8619 |
| 168 | 384. | 377.8 | 5.775 | 2.016 | 0.8619 |
| 169 | 396. | 389.8 | 5.77 | 2.011 | 0.8598 |
| 170 | 408. | 401.8 | 5.77 | 2.011 | 0.8598 |
| 171 | 420. | 413.8 | 5.77 | 2.011 | 0.8598 |
| 172 | 432. | 425.8 | 5.765 | 2.006 | 0.8576 |
| 173 | 444. | 437.8 | 5.765 | 2.006 | 0.8576 |
| 174 | 456. | 449.8 | 5.765 | 2.006 | 0.8576 |
| 175 | 468. | 461.8 | 5.765 | 2.006 | 0.8576 |
| 176 | 480. | 473.8 | 5.76 | 2.001 | 0.8555 |
| 177 | 492. | 485.8 | 5.76 | 2.001 | 0.8555 |
| 178 | 504. | 497.8 | 5.76 | 2.001 | 0.8555 |
| 179 | 516. | 509.8 | 5.755 | 1.996 | 0.8534 |
| 180 | 528. | 521.8 | 5.755 | 1.996 | 0.8534 |
| 181 | 540. | 533.8 | 5.755 | 1.996 | 0.8534 |
| 182 | 552. | 545.8 | 5.751 | 1.992 | 0.8516 |
| 183 | 564. | 557.8 | 5.751 | 1.992 | 0.8516 |
| 184 | 576. | 569.8 | 5.751 | 1.992 | 0.8516 |
| 185 | 588. | 581.8 | 5.751 | 1.992 | 0.8516 |
| 186 | 600. | 593.8 | 5.746 | 1.987 | 0.8495 |
| 187 | 720. | 713.8 | 5.732 | 1.973 | 0.8435 |
| 188 | 840. | 833.8 | 5.722 | 1.963 | 0.8392 |
| 189 | 960. | 953.8 | 5.708 | 1.949 | 0.8333 |
| 190 | 1080 | 1074 | 5.694 | 1.935 | 0.8273 |

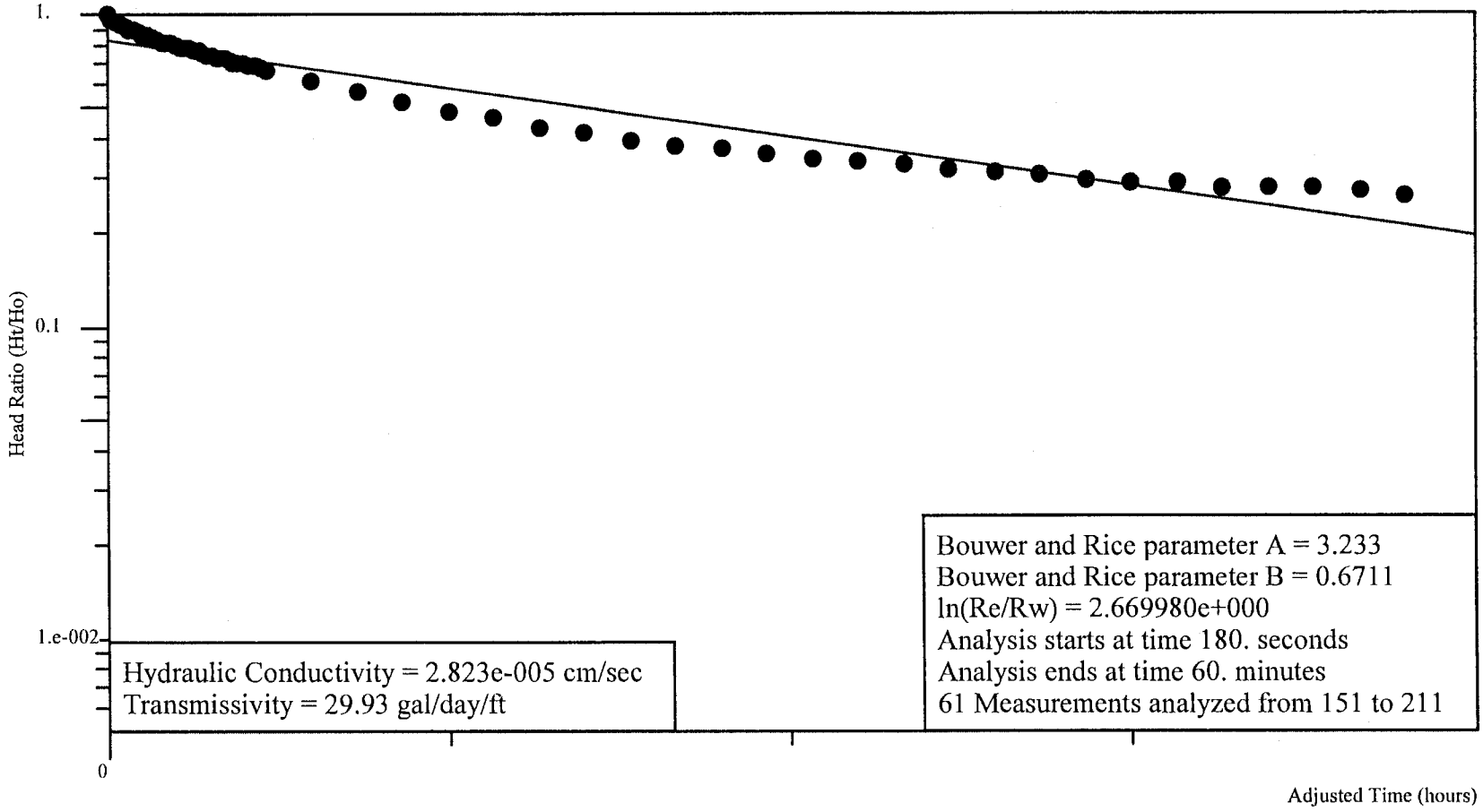
| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1194 | 5.684 | 1.925 | 0.823 |
| 192 | 1320 | 1314 | 5.675 | 1.916 | 0.8192 |
| 193 | 1440 | 1434 | 5.66 | 1.901 | 0.8127 |
| 194 | 1560 | 1554 | 5.651 | 1.892 | 0.8089 |
| 195 | 1680 | 1674 | 5.641 | 1.882 | 0.8046 |
| 196 | 1800 | 1794 | 5.627 | 1.868 | 0.7986 |
| 197 | 1920 | 1914 | 5.617 | 1.858 | 0.7944 |
| 198 | 2040 | 2034 | 5.608 | 1.849 | 0.7905 |
| 199 | 2160 | 2154 | 5.598 | 1.839 | 0.7862 |
| 200 | 2280 | 2274 | 5.584 | 1.825 | 0.7802 |
| 201 | 2400 | 2394 | 5.574 | 1.815 | 0.776 |
| 202 | 2520 | 2514 | 5.565 | 1.806 | 0.7721 |
| 203 | 2640 | 2634 | 5.555 | 1.796 | 0.7678 |
| 204 | 2760 | 2754 | 5.546 | 1.787 | 0.764 |
| 205 | 2880 | 2874 | 5.536 | 1.777 | 0.7597 |
| 206 | 3000 | 2994 | 5.527 | 1.768 | 0.7559 |
| 207 | 3120 | 3114 | 5.517 | 1.758 | 0.7516 |
| 208 | 3240 | 3234 | 5.508 | 1.749 | 0.7478 |
| 209 | 3360 | 3354 | 5.498 | 1.739 | 0.7435 |
| 210 | 3480 | 3474 | 5.489 | 1.73 | 0.7396 |
| 211 | 3600 | 3594 | 5.479 | 1.72 | 0.7354 |
| 212 | 3720 | 3714 | 5.474 | 1.715 | 0.7332 |

**Aquifer Analysis February 18, 2002**

Coble's Sandrock

**Bouwer and Rice Graph**

P-21 (Falling)




Ho is 0.567 feet at 180. seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 18, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P21FALL |

| | |
|---|---|
| Well Label: | P-21 (Falling) |
| Aquifer Thickness: | 50. feet |
| Screen Length: | 15. feet |
| Casing Radius: | 1.888 inches |
| Effective Radius: | 3.125 inches |
| Static Water Level: | 47.94 feet |
| Water Table to Screen Bottom: | 17.31 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 180. Seconds |

Test starts with trial 44
There are 211 time and drawdown measurements
Maximum head is 2.319 feet
Minimum head is -1.9e-002 feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -180. | 47.94 | 0. | 0. |
| 2 | 0.198 | -179.8 | 47.94 | 5.e-003 | 2.156e-003 |
| 3 | 0.396 | -179.6 | 47.94 | 5.e-003 | 2.156e-003 |
| 4 | 0.6 | -179.4 | 47.94 | 5.e-003 | 2.156e-003 |
| 5 | 0.798 | -179.2 | 47.94 | 5.e-003 | 2.156e-003 |
| 6 | 0.996 | -179. | 47.94 | 5.e-003 | 2.156e-003 |
| 7 | 1.2 | -178.8 | 47.94 | 5.e-003 | 2.156e-003 |
| 8 | 1.398 | -178.6 | 47.94 | 0. | 0. |
| 9 | 1.596 | -178.4 | 47.94 | 0. | 0. |
| 10 | 1.8 | -178.2 | 47.94 | 5.e-003 | 2.156e-003 |
| 11 | 1.998 | -178. | 47.93 | 1.e-002 | 4.312e-003 |
| 12 | 2.196 | -177.8 | 47.94 | 5.e-003 | 2.156e-003 |
| 13 | 2.4 | -177.6 | 47.94 | -4.e-003 | -1.725e-003 |
| 14 | 2.598 | -177.4 | 47.94 | 5.e-003 | 2.156e-003 |
| 15 | 2.796 | -177.2 | 47.94 | 0. | 0. |
| 16 | 3. | -177. | 47.94 | 0. | 0. |
| 17 | 3.198 | -176.8 | 47.93 | 1.e-002 | 4.312e-003 |
| 18 | 3.396 | -176.6 | 47.92 | 1.5e-002 | 6.468e-003 |
| 19 | 3.6 | -176.4 | 47.94 | -4.e-003 | -1.725e-003 |
| 20 | 3.798 | -176.2 | 47.94 | 5.e-003 | 2.156e-003 |
| 21 | 3.996 | -176. | 47.95 | -1.4e-002 | -6.037e-003 |
| 22 | 4.2 | -175.8 | 47.96 | -1.9e-002 | -8.193e-003 |
| 23 | 4.398 | -175.6 | 47.94 | 0. | 0. |
| 24 | 4.596 | -175.4 | 47.94 | 5.e-003 | 2.156e-003 |
| 25 | 4.8 | -175.2 | 47.91 | 3.4e-002 | 1.466e-002 |
| 26 | 4.998 | -175. | 47.94 | -4.e-003 | -1.725e-003 |
| 27 | 5.196 | -174.8 | 47.91 | 3.4e-002 | 1.466e-002 |
| 28 | 5.4 | -174.6 | 47.61 | 0.333 | 0.1436 |
| 29 | 5.598 | -174.4 | 47.4 | 0.543 | 0.2342 |
| 30 | 5.796 | -174.2 | 46.93 | 1.009 | 0.4351 |
| 31 | 6. | -174. | 46.8 | 1.138 | 0.4907 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -173.8 | 46.52 | 1.419 | 0.6119 |
| 33 | 6.396 | -173.6 | 46.42 | 1.519 | 0.655 |
| 34 | 6.6 | -173.4 | 46.27 | 1.666 | 0.7184 |
| 35 | 6.798 | -173.2 | 46.32 | 1.619 | 0.6981 |
| 36 | 6.996 | -173. | 46.16 | 1.785 | 0.7697 |
| 37 | 7.2 | -172.8 | 46.15 | 1.795 | 0.774 |
| 38 | 7.398 | -172.6 | 46.03 | 1.914 | 0.8254 |
| 39 | 7.596 | -172.4 | 45.8 | 2.138 | 0.9219 |
| 40 | 7.8 | -172.2 | 45.81 | 2.128 | 0.9176 |
| 41 | 7.998 | -172. | 46.24 | 1.704 | 0.7348 |
| 42 | 8.196 | -171.8 | 46.73 | 1.214 | 0.5235 |
| 43 | 8.4 | -171.6 | 46.59 | 1.347 | 0.5809 |
| 44 | 8.598 | -171.4 | 46.24 | 1.695 | 0.7309 |
| 45 | 8.796 | -171.2 | 45.62 | 2.319 | 1. |
| 46 | 9. | -171. | 45.9 | 2.042 | 0.8806 |
| 47 | 9.198 | -170.8 | 45.89 | 2.047 | 0.8827 |
| 48 | 9.396 | -170.6 | 45.81 | 2.128 | 0.9176 |
| 49 | 9.6 | -170.4 | 46.03 | 1.909 | 0.8232 |
| 50 | 9.798 | -170.2 | 46.17 | 1.766 | 0.7615 |
| 51 | 9.996 | -170. | 46.56 | 1.376 | 0.5934 |
| 52 | 10.2 | -169.8 | 46.13 | 1.809 | 0.7801 |
| 53 | 10.4 | -169.6 | 45.65 | 2.29 | 0.9875 |
| 54 | 10.6 | -169.4 | 46.16 | 1.776 | 0.7658 |
| 55 | 10.8 | -169.2 | 46.69 | 1.247 | 0.5377 |
| 56 | 11. | -169. | 46.53 | 1.409 | 0.6076 |
| 57 | 11.2 | -168.8 | 46.72 | 1.219 | 0.5257 |
| 58 | 11.4 | -168.6 | 46.41 | 1.528 | 0.6589 |
| 59 | 11.6 | -168.4 | 46.16 | 1.785 | 0.7697 |
| 60 | 11.8 | -168.2 | 45.97 | 1.966 | 0.8478 |
| 61 | 12. | -168. | 45.89 | 2.047 | 0.8827 |
| 62 | 12.2 | -167.8 | 45.95 | 1.99 | 0.8581 |
| 63 | 12.4 | -167.6 | 46.16 | 1.78 | 0.7676 |
| 64 | 12.6 | -167.4 | 46.4 | 1.538 | 0.6632 |
| 65 | 12.8 | -167.2 | 46.53 | 1.414 | 0.6097 |
| 66 | 13. | -167. | 46.53 | 1.409 | 0.6076 |
| 67 | 13.2 | -166.8 | 46.41 | 1.528 | 0.6589 |
| 68 | 13.4 | -166.6 | 46.26 | 1.676 | 0.7227 |
| 69 | 13.6 | -166.4 | 46.17 | 1.771 | 0.7637 |
| 70 | 13.8 | -166.2 | 46.07 | 1.866 | 0.8047 |
| 71 | 14. | -166. | 45.98 | 1.957 | 0.8439 |
| 72 | 14.2 | -165.8 | 46.14 | 1.804 | 0.7779 |
| 73 | 14.4 | -165.6 | 46.39 | 1.552 | 0.6693 |
| 74 | 14.6 | -165.4 | 46.53 | 1.414 | 0.6097 |
| 75 | 14.8 | -165.2 | 46.56 | 1.381 | 0.5955 |
| 76 | 15. | -165. | 46.46 | 1.481 | 0.6386 |
| 77 | 15.2 | -164.8 | 46.3 | 1.642 | 0.7081 |
| 78 | 15.4 | -164.6 | 46.15 | 1.79 | 0.7719 |
| 79 | 15.6 | -164.4 | 46.06 | 1.88 | 0.8107 |
| 80 | 15.8 | -164.2 | 46.16 | 1.776 | 0.7658 |
| 81 | 16. | -164. | 46.3 | 1.638 | 0.7063 |
| 82 | 16.2 | -163.8 | 46.44 | 1.504 | 0.6486 |
| 83 | 16.4 | -163.6 | 46.5 | 1.438 | 0.6201 |
| 84 | 16.6 | -163.4 | 46.48 | 1.461 | 0.63 |

| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | -163.2 | 46.4 | 1.542 | 0.6649 |
| 86 | 17. | -163. | 46.29 | 1.647 | 0.7102 |
| 87 | 17.2 | -162.8 | 46.23 | 1.714 | 0.7391 |
| 88 | 17.4 | -162.6 | 46.23 | 1.714 | 0.7391 |
| 89 | 17.6 | -162.4 | 46.28 | 1.661 | 0.7163 |
| 90 | 17.8 | -162.2 | 46.36 | 1.576 | 0.6796 |
| 91 | 18. | -162. | 46.43 | 1.509 | 0.6507 |
| 92 | 18.2 | -161.8 | 46.46 | 1.481 | 0.6386 |
| 93 | 18.4 | -161.6 | 46.44 | 1.5 | 0.6468 |
| 94 | 18.6 | -161.4 | 46.39 | 1.552 | 0.6693 |
| 95 | 18.8 | -161.2 | 46.34 | 1.604 | 0.6917 |
| 96 | 19. | -161. | 46.31 | 1.633 | 0.7042 |
| 97 | 19.2 | -160.8 | 46.32 | 1.623 | 0.6999 |
| 98 | 19.4 | -160.6 | 46.35 | 1.585 | 0.6835 |
| 99 | 19.6 | -160.4 | 46.4 | 1.538 | 0.6632 |
| 100 | 19.8 | -160.2 | 46.44 | 1.5 | 0.6468 |
| 101 | 20. | -160. | 46.45 | 1.49 | 0.6425 |
| 102 | 21. | -159. | 46.39 | 1.547 | 0.6671 |
| 103 | 22. | -158. | 46.43 | 1.514 | 0.6529 |
| 104 | 23. | -157. | 46.46 | 1.476 | 0.6365 |
| 105 | 24. | -156. | 46.45 | 1.485 | 0.6404 |
| 106 | 25. | -155. | 46.48 | 1.457 | 0.6283 |
| 107 | 26. | -154. | 46.5 | 1.438 | 0.6201 |
| 108 | 27. | -153. | 46.52 | 1.419 | 0.6119 |
| 109 | 28. | -152. | 46.53 | 1.414 | 0.6097 |
| 110 | 29. | -151. | 46.55 | 1.39 | 0.5994 |
| 111 | 30. | -150. | 46.56 | 1.376 | 0.5934 |
| 112 | 31. | -149. | 46.58 | 1.362 | 0.5873 |
| 113 | 32. | -148. | 46.59 | 1.347 | 0.5809 |
| 114 | 33. | -147. | 46.61 | 1.333 | 0.5748 |
| 115 | 34. | -146. | 46.63 | 1.314 | 0.5666 |
| 116 | 35. | -145. | 46.63 | 1.309 | 0.5645 |
| 117 | 36. | -144. | 46.65 | 1.29 | 0.5563 |
| 118 | 37. | -143. | 46.66 | 1.276 | 0.5502 |
| 119 | 38. | -142. | 46.67 | 1.266 | 0.5459 |
| 120 | 39. | -141. | 46.69 | 1.252 | 0.5399 |
| 121 | 40. | -140. | 46.7 | 1.238 | 0.5339 |
| 122 | 41. | -139. | 46.71 | 1.228 | 0.5295 |
| 123 | 42. | -138. | 46.73 | 1.214 | 0.5235 |
| 124 | 43. | -137. | 46.74 | 1.204 | 0.5192 |
| 125 | 44. | -136. | 46.75 | 1.19 | 0.5132 |
| 126 | 45. | -135. | 46.76 | 1.181 | 0.5093 |
| 127 | 46. | -134. | 46.77 | 1.171 | 0.505 |
| 128 | 47. | -133. | 46.78 | 1.157 | 0.4989 |
| 129 | 48. | -132. | 46.79 | 1.147 | 0.4946 |
| 130 | 49. | -131. | 46.8 | 1.138 | 0.4907 |
| 131 | 50. | -130. | 46.81 | 1.128 | 0.4864 |
| 132 | 51. | -129. | 46.83 | 1.114 | 0.4804 |
| 133 | 52. | -128. | 46.84 | 1.104 | 0.4761 |
| 134 | 53. | -127. | 46.84 | 1.095 | 0.4722 |
| 135 | 54. | -126. | 46.85 | 1.085 | 0.4679 |
| 136 | 55. | -125. | 46.86 | 1.076 | 0.464 |
| 137 | 56. | -124. | 46.87 | 1.066 | 0.4597 |

| | | | | | |
|---|---|---|---|---|---|
| 138 | 57. | -123. | 46.88 | 1.057 | 0.4558 |
| 139 | 58. | -122. | 46.89 | 1.047 | 0.4515 |
| 140 | 59. | -121. | 46.9 | 1.043 | 0.4498 |
| 141 | 60. | -120. | 46.91 | 1.033 | 0.4455 |
| 142 | 72. | -108. | 47.03 | 0.914 | 0.3941 |
| 143 | 84. | -96. | 47.1 | 0.838 | 0.3614 |
| 144 | 96. | -84. | 47.16 | 0.781 | 0.3368 |
| 145 | 108. | -72. | 47.21 | 0.728 | 0.3139 |
| 146 | 120. | -60. | 47.25 | 0.69 | 0.2975 |
| 147 | 132. | -48. | 47.28 | 0.657 | 0.2833 |
| 148 | 144. | -36. | 47.31 | 0.629 | 0.2712 |
| 149 | 156. | -24. | 47.34 | 0.605 | 0.2609 |
| 150 | 168. | -12. | 47.35 | 0.586 | 0.2527 |
| 151 | 180. | 0. | 47.37 | 0.567 | 0.2445 |
| 152 | 192. | 12. | 47.39 | 0.552 | 0.238 |
| 153 | 204. | 24. | 47.4 | 0.543 | 0.2342 |
| 154 | 216. | 36. | 47.41 | 0.529 | 0.2281 |
| 155 | 228. | 48. | 47.42 | 0.524 | 0.226 |
| 156 | 240. | 60. | 47.43 | 0.514 | 0.2216 |
| 157 | 252. | 72. | 47.44 | 0.505 | 0.2178 |
| 158 | 264. | 84. | 47.44 | 0.5 | 0.2156 |
| 159 | 276. | 96. | 47.45 | 0.49 | 0.2113 |
| 160 | 288. | 108. | 47.45 | 0.486 | 0.2096 |
| 161 | 300. | 120. | 47.46 | 0.481 | 0.2074 |
| 162 | 312. | 132. | 47.47 | 0.471 | 0.2031 |
| 163 | 324. | 144. | 47.47 | 0.467 | 0.2014 |
| 164 | 336. | 156. | 47.48 | 0.462 | 0.1992 |
| 165 | 348. | 168. | 47.48 | 0.462 | 0.1992 |
| 166 | 360. | 180. | 47.49 | 0.452 | 0.1949 |
| 167 | 372. | 192. | 47.49 | 0.448 | 0.1932 |
| 168 | 384. | 204. | 47.5 | 0.443 | 0.191 |
| 169 | 396. | 216. | 47.5 | 0.443 | 0.191 |
| 170 | 408. | 228. | 47.5 | 0.438 | 0.1889 |
| 171 | 420. | 240. | 47.51 | 0.433 | 0.1867 |
| 172 | 432. | 252. | 47.51 | 0.429 | 0.185 |
| 173 | 444. | 264. | 47.52 | 0.424 | 0.1828 |
| 174 | 456. | 276. | 47.52 | 0.419 | 0.1807 |
| 175 | 468. | 288. | 47.53 | 0.414 | 0.1785 |
| 176 | 480. | 300. | 47.53 | 0.41 | 0.1768 |
| 177 | 492. | 312. | 47.53 | 0.41 | 0.1768 |
| 178 | 504. | 324. | 47.53 | 0.405 | 0.1746 |
| 179 | 516. | 336. | 47.54 | 0.4 | 0.1725 |
| 180 | 528. | 348. | 47.55 | 0.395 | 0.1703 |
| 181 | 540. | 360. | 47.55 | 0.395 | 0.1703 |
| 182 | 552. | 372. | 47.55 | 0.391 | 0.1686 |
| 183 | 564. | 384. | 47.55 | 0.386 | 0.1665 |
| 184 | 576. | 396. | 47.55 | 0.386 | 0.1665 |
| 185 | 588. | 408. | 47.56 | 0.381 | 0.1643 |
| 186 | 600. | 420. | 47.56 | 0.376 | 0.1621 |
| 187 | 720. | 540. | 47.6 | 0.343 | 0.1479 |
| 188 | 840. | 660. | 47.62 | 0.319 | 0.1376 |
| 189 | 960. | 780. | 47.65 | 0.295 | 0.1272 |
| 190 | 1080 | 900. | 47.66 | 0.276 | 0.119 |

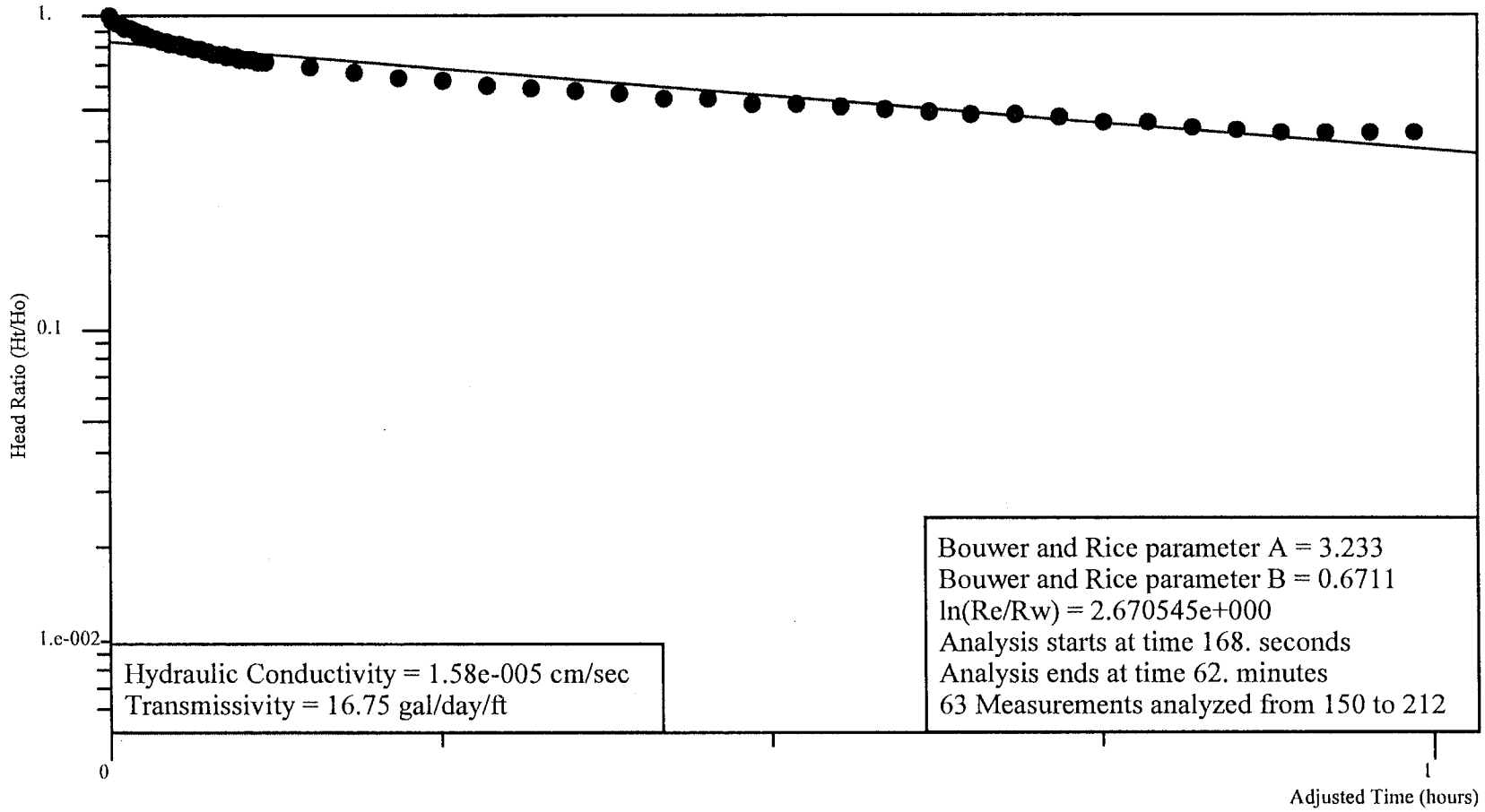
| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1020 | 47.68 | 0.262 | 0.113 |
| 192 | 1320 | 1140 | 47.7 | 0.243 | 0.1048 |
| 193 | 1440 | 1260 | 47.71 | 0.234 | 0.1009 |
| 194 | 1560 | 1380 | 47.72 | 0.224 | 9.659e-002 |
| 195 | 1680 | 1500 | 47.73 | 0.215 | 9.271e-002 |
| 196 | 1800 | 1620 | 47.73 | 0.21 | 9.056e-002 |
| 197 | 1920 | 1740 | 47.74 | 0.2 | 8.624e-002 |
| 198 | 2040 | 1860 | 47.74 | 0.195 | 8.409e-002 |
| 199 | 2160 | 1980 | 47.75 | 0.191 | 8.236e-002 |
| 200 | 2280 | 2100 | 47.75 | 0.186 | 8.021e-002 |
| 201 | 2400 | 2220 | 47.76 | 0.181 | 7.805e-002 |
| 202 | 2520 | 2340 | 47.76 | 0.176 | 7.589e-002 |
| 203 | 2640 | 2460 | 47.77 | 0.172 | 7.417e-002 |
| 204 | 2760 | 2580 | 47.77 | 0.167 | 7.201e-002 |
| 205 | 2880 | 2700 | 47.78 | 0.162 | 6.986e-002 |
| 206 | 3000 | 2820 | 47.78 | 0.162 | 6.986e-002 |
| 207 | 3120 | 2940 | 47.78 | 0.157 | 6.77e-002 |
| 208 | 3240 | 3060 | 47.78 | 0.157 | 6.77e-002 |
| 209 | 3360 | 3180 | 47.78 | 0.157 | 6.77e-002 |
| 210 | 3480 | 3300 | 47.79 | 0.153 | 6.598e-002 |
| 211 | 3600 | 3420 | 47.79 | 0.148 | 6.382e-002 |

**Aquifer Analysis February 18, 2002**

**Bouwer and Rice Graph**

Coble's Sandrock

P-21 (Rising)




Ho is 0.623 feet at 168. seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 18, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P21RISE |

| | |
|---|---|
| Well Label: | P-21 (Rising) |
| Aquifer Thickness: | 50. feet |
| Screen Length: | 15. feet |
| Casing Radius: | 1.888 inches |
| Effective Radius: | 3.125 inches |
| Static Water Level: | 47.92 feet |
| Water Table to Screen Bottom: | 17.33 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 168. Seconds |

Test starts with trial 11
There are 212 time and drawdown measurements
Maximum head is 3.352 feet
Minimum head is 0. feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -168. | 47.92 | 0. | 0. |
| 2 | 0.198 | -167.8 | 47.92 | 0. | 0. |
| 3 | 0.396 | -167.6 | 47.92 | 0. | 0. |
| 4 | 0.6 | -167.4 | 48.61 | 0.689 | 0.2055 |
| 5 | 0.798 | -167.2 | 50.01 | 2.087 | 0.6226 |
| 6 | 0.996 | -167. | 50.75 | 2.834 | 0.8455 |
| 7 | 1.2 | -166.8 | 50.22 | 2.297 | 0.6853 |
| 8 | 1.398 | -166.6 | 48.4 | 0.475 | 0.1417 |
| 9 | 1.596 | -166.4 | 48.06 | 0.138 | 4.117e-002 |
| 10 | 1.8 | -166.2 | 48.94 | 1.018 | 0.3037 |
| 11 | 1.998 | -166. | 51.12 | 3.2 | 0.9547 |
| 12 | 2.196 | -165.8 | 51.27 | 3.352 | 1. |
| 13 | 2.4 | -165.6 | 50.32 | 2.401 | 0.7163 |
| 14 | 2.598 | -165.4 | 48.9 | 0.984 | 0.2936 |
| 15 | 2.796 | -165.2 | 48.52 | 0.599 | 0.1787 |
| 16 | 3. | -165. | 49.48 | 1.564 | 0.4666 |
| 17 | 3.198 | -164.8 | 50.51 | 2.587 | 0.7718 |
| 18 | 3.396 | -164.6 | 50.69 | 2.767 | 0.8255 |
| 19 | 3.6 | -164.4 | 49.99 | 2.073 | 0.6184 |
| 20 | 3.798 | -164.2 | 49.14 | 1.222 | 0.3646 |
| 21 | 3.996 | -164. | 48.98 | 1.065 | 0.3177 |
| 22 | 4.2 | -163.8 | 49.58 | 1.664 | 0.4964 |
| 23 | 4.398 | -163.6 | 50.2 | 2.278 | 0.6796 |
| 24 | 4.596 | -163.4 | 50.3 | 2.382 | 0.7106 |
| 25 | 4.8 | -163.2 | 49.83 | 1.907 | 0.5689 |
| 26 | 4.998 | -163. | 49.31 | 1.393 | 0.4156 |
| 27 | 5.196 | -162.8 | 49.25 | 1.327 | 0.3959 |
| 28 | 5.4 | -162.6 | 49.63 | 1.707 | 0.5092 |
| 29 | 5.598 | -162.4 | 50.01 | 2.087 | 0.6226 |
| 30 | 5.796 | -162.2 | 50.04 | 2.121 | 0.6328 |
| 31 | 6. | -162. | 49.75 | 1.826 | 0.5447 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -161.8 | 49.42 | 1.503 | 0.4484 |
| 33 | 6.396 | -161.6 | 49.39 | 1.474 | 0.4397 |
| 34 | 6.6 | -161.4 | 49.63 | 1.707 | 0.5092 |
| 35 | 6.798 | -161.2 | 49.86 | 1.94 | 0.5788 |
| 36 | 6.996 | -161. | 49.88 | 1.964 | 0.5859 |
| 37 | 7.2 | -160.8 | 49.69 | 1.769 | 0.5277 |
| 38 | 7.398 | -160.6 | 49.49 | 1.569 | 0.4681 |
| 39 | 7.596 | -160.4 | 49.47 | 1.545 | 0.4609 |
| 40 | 7.8 | -160.2 | 49.62 | 1.698 | 0.5066 |
| 41 | 7.998 | -160. | 49.77 | 1.845 | 0.5504 |
| 42 | 8.196 | -159.8 | 49.77 | 1.855 | 0.5534 |
| 43 | 8.4 | -159.6 | 49.65 | 1.731 | 0.5164 |
| 44 | 8.598 | -159.4 | 49.52 | 1.603 | 0.4782 |
| 45 | 8.796 | -159.2 | 49.51 | 1.588 | 0.4737 |
| 46 | 9. | -159. | 49.59 | 1.674 | 0.4994 |
| 47 | 9.198 | -158.8 | 49.69 | 1.769 | 0.5277 |
| 48 | 9.396 | -158.6 | 49.69 | 1.774 | 0.5292 |
| 49 | 9.6 | -158.4 | 49.62 | 1.702 | 0.5078 |
| 50 | 9.798 | -158.2 | 49.53 | 1.612 | 0.4809 |
| 51 | 9.996 | -158. | 49.52 | 1.598 | 0.4767 |
| 52 | 10.2 | -157.8 | 49.58 | 1.655 | 0.4937 |
| 53 | 10.4 | -157.6 | 49.64 | 1.717 | 0.5122 |
| 54 | 10.6 | -157.4 | 49.64 | 1.721 | 0.5134 |
| 55 | 10.8 | -157.2 | 49.59 | 1.674 | 0.4994 |
| 56 | 11. | -157. | 49.54 | 1.617 | 0.4824 |
| 57 | 11.2 | -156.8 | 49.52 | 1.603 | 0.4782 |
| 58 | 11.4 | -156.6 | 49.55 | 1.631 | 0.4866 |
| 59 | 11.6 | -156.4 | 49.59 | 1.669 | 0.4979 |
| 60 | 11.8 | -156.2 | 49.59 | 1.674 | 0.4994 |
| 61 | 12. | -156. | 49.57 | 1.65 | 0.4922 |
| 62 | 12.2 | -155.8 | 49.54 | 1.617 | 0.4824 |
| 63 | 12.4 | -155.6 | 49.52 | 1.598 | 0.4767 |
| 64 | 12.6 | -155.4 | 49.53 | 1.607 | 0.4794 |
| 65 | 12.8 | -155.2 | 49.56 | 1.636 | 0.4881 |
| 66 | 13. | -155. | 49.56 | 1.645 | 0.4908 |
| 67 | 13.2 | -154.8 | 49.55 | 1.626 | 0.4851 |
| 68 | 13.4 | -154.6 | 49.52 | 1.598 | 0.4767 |
| 69 | 13.6 | -154.4 | 49.5 | 1.584 | 0.4726 |
| 70 | 13.8 | -154.2 | 49.51 | 1.588 | 0.4737 |
| 71 | 14. | -154. | 49.52 | 1.603 | 0.4782 |
| 72 | 14.2 | -153.8 | 49.53 | 1.612 | 0.4809 |
| 73 | 14.4 | -153.6 | 49.52 | 1.603 | 0.4782 |
| 74 | 14.6 | -153.4 | 49.51 | 1.588 | 0.4737 |
| 75 | 14.8 | -153.2 | 49.49 | 1.574 | 0.4696 |
| 76 | 15. | -153. | 49.49 | 1.569 | 0.4681 |
| 77 | 15.2 | -152.8 | 49.49 | 1.574 | 0.4696 |
| 78 | 15.4 | -152.6 | 49.5 | 1.579 | 0.4711 |
| 79 | 15.6 | -152.4 | 49.5 | 1.584 | 0.4726 |
| 80 | 15.8 | -152.2 | 49.49 | 1.574 | 0.4696 |
| 81 | 16. | -152. | 49.48 | 1.56 | 0.4654 |
| 82 | 16.2 | -151.8 | 49.46 | 1.541 | 0.4597 |
| 83 | 16.4 | -151.6 | 49.47 | 1.545 | 0.4609 |
| 84 | 16.6 | -151.4 | 49.47 | 1.55 | 0.4624 |

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|---|---|---|---|---|---|
| 85 | 16.8 | -151.2 | 49.48 | 1.564 | 0.4666 |
| 86 | 17. | -151. | 49.48 | 1.56 | 0.4654 |
| 87 | 17.2 | -150.8 | 49.46 | 1.541 | 0.4597 |
| 88 | 17.4 | -150.6 | 49.44 | 1.522 | 0.4541 |
| 89 | 17.6 | -150.4 | 49.45 | 1.526 | 0.4553 |
| 90 | 17.8 | -150.2 | 49.45 | 1.531 | 0.4567 |
| 91 | 18. | -150. | 49.47 | 1.545 | 0.4609 |
| 92 | 18.2 | -149.8 | 49.47 | 1.545 | 0.4609 |
| 93 | 18.4 | -149.6 | 49.45 | 1.526 | 0.4553 |
| 94 | 18.6 | -149.4 | 49.42 | 1.503 | 0.4484 |
| 95 | 18.8 | -149.2 | 49.42 | 1.498 | 0.4469 |
| 96 | 19. | -149. | 49.44 | 1.517 | 0.4526 |
| 97 | 19.2 | -148.8 | 49.45 | 1.526 | 0.4553 |
| 98 | 19.4 | -148.6 | 49.47 | 1.55 | 0.4624 |
| 99 | 19.6 | -148.4 | 49.31 | 1.393 | 0.4156 |
| 100 | 19.8 | -148.2 | 49.32 | 1.403 | 0.4186 |
| 101 | 20. | -148. | 49.37 | 1.45 | 0.4326 |
| 102 | 21. | -147. | 49.38 | 1.465 | 0.4371 |
| 103 | 22. | -146. | 49.38 | 1.455 | 0.4341 |
| 104 | 23. | -145. | 49.36 | 1.441 | 0.4299 |
| 105 | 24. | -144. | 49.35 | 1.431 | 0.4269 |
| 106 | 25. | -143. | 49.34 | 1.417 | 0.4227 |
| 107 | 26. | -142. | 49.32 | 1.403 | 0.4186 |
| 108 | 27. | -141. | 49.3 | 1.384 | 0.4129 |
| 109 | 28. | -140. | 49.29 | 1.37 | 0.4087 |
| 110 | 29. | -139. | 49.27 | 1.355 | 0.4042 |
| 111 | 30. | -138. | 49.26 | 1.341 | 0.4001 |
| 112 | 31. | -137. | 49.25 | 1.327 | 0.3959 |
| 113 | 32. | -136. | 49.23 | 1.312 | 0.3914 |
| 114 | 33. | -135. | 49.22 | 1.303 | 0.3887 |
| 115 | 34. | -134. | 49.21 | 1.289 | 0.3845 |
| 116 | 35. | -133. | 49.19 | 1.274 | 0.3801 |
| 117 | 36. | -132. | 49.19 | 1.265 | 0.3774 |
| 118 | 37. | -131. | 49.17 | 1.251 | 0.3732 |
| 119 | 38. | -130. | 49.16 | 1.241 | 0.3702 |
| 120 | 39. | -129. | 49.15 | 1.227 | 0.3661 |
| 121 | 40. | -128. | 49.14 | 1.217 | 0.3631 |
| 122 | 41. | -127. | 49.13 | 1.208 | 0.3604 |
| 123 | 42. | -126. | 49.11 | 1.194 | 0.3562 |
| 124 | 43. | -125. | 49.1 | 1.184 | 0.3532 |
| 125 | 44. | -124. | 49.09 | 1.175 | 0.3505 |
| 126 | 45. | -123. | 49.09 | 1.165 | 0.3476 |
| 127 | 46. | -122. | 49.07 | 1.151 | 0.3434 |
| 128 | 47. | -121. | 49.06 | 1.141 | 0.3404 |
| 129 | 48. | -120. | 49.05 | 1.132 | 0.3377 |
| 130 | 49. | -119. | 49.04 | 1.122 | 0.3347 |
| 131 | 50. | -118. | 49.03 | 1.113 | 0.332 |
| 132 | 51. | -117. | 49.02 | 1.103 | 0.3291 |
| 133 | 52. | -116. | 49.01 | 1.094 | 0.3264 |
| 134 | 53. | -115. | 49. | 1.084 | 0.3234 |
| 135 | 54. | -114. | 48.99 | 1.075 | 0.3207 |
| 136 | 55. | -113. | 48.99 | 1.07 | 0.3192 |
| 137 | 56. | -112. | 48.98 | 1.06 | 0.3162 |

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|---|---|---|---|---|---|
| 138 | 57. | -111. | 48.97 | 1.051 | 0.3135 |
| 139 | 58. | -110. | 48.96 | 1.041 | 0.3106 |
| 140 | 59. | -109. | 48.95 | 1.032 | 0.3079 |
| 141 | 60. | -108. | 48.95 | 1.027 | 0.3064 |
| 142 | 72. | -96. | 48.84 | 0.918 | 0.2739 |
| 143 | 84. | -84. | 48.77 | 0.851 | 0.2539 |
| 144 | 96. | -72. | 48.71 | 0.794 | 0.2369 |
| 145 | 108. | -60. | 48.67 | 0.751 | 0.224 |
| 146 | 120. | -48. | 48.63 | 0.713 | 0.2127 |
| 147 | 132. | -36. | 48.6 | 0.685 | 0.2044 |
| 148 | 144. | -24. | 48.58 | 0.656 | 0.1957 |
| 149 | 156. | -12. | 48.56 | 0.637 | 0.19 |
| 150 | 168. | 0. | 48.54 | 0.623 | 0.1859 |
| 151 | 180. | 12. | 48.53 | 0.609 | 0.1817 |
| 152 | 192. | 24. | 48.51 | 0.594 | 0.1772 |
| 153 | 204. | 36. | 48.51 | 0.585 | 0.1745 |
| 154 | 216. | 48. | 48.49 | 0.575 | 0.1715 |
| 155 | 228. | 60. | 48.49 | 0.566 | 0.1689 |
| 156 | 240. | 72. | 48.48 | 0.556 | 0.1659 |
| 157 | 252. | 84. | 48.47 | 0.551 | 0.1644 |
| 158 | 264. | 96. | 48.47 | 0.547 | 0.1632 |
| 159 | 276. | 108. | 48.46 | 0.537 | 0.1602 |
| 160 | 288. | 120. | 48.45 | 0.532 | 0.1587 |
| 161 | 300. | 132. | 48.45 | 0.528 | 0.1575 |
| 162 | 312. | 144. | 48.44 | 0.523 | 0.156 |
| 163 | 324. | 156. | 48.44 | 0.518 | 0.1545 |
| 164 | 336. | 168. | 48.43 | 0.513 | 0.153 |
| 165 | 348. | 180. | 48.43 | 0.509 | 0.1518 |
| 166 | 360. | 192. | 48.42 | 0.504 | 0.1504 |
| 167 | 372. | 204. | 48.42 | 0.499 | 0.1489 |
| 168 | 384. | 216. | 48.41 | 0.494 | 0.1474 |
| 169 | 396. | 228. | 48.41 | 0.49 | 0.1462 |
| 170 | 408. | 240. | 48.41 | 0.49 | 0.1462 |
| 171 | 420. | 252. | 48.41 | 0.485 | 0.1447 |
| 172 | 432. | 264. | 48.4 | 0.48 | 0.1432 |
| 173 | 444. | 276. | 48.4 | 0.48 | 0.1432 |
| 174 | 456. | 288. | 48.4 | 0.475 | 0.1417 |
| 175 | 468. | 300. | 48.39 | 0.471 | 0.1405 |
| 176 | 480. | 312. | 48.39 | 0.471 | 0.1405 |
| 177 | 492. | 324. | 48.39 | 0.466 | 0.139 |
| 178 | 504. | 336. | 48.38 | 0.461 | 0.1375 |
| 179 | 516. | 348. | 48.38 | 0.461 | 0.1375 |
| 180 | 528. | 360. | 48.38 | 0.456 | 0.136 |
| 181 | 540. | 372. | 48.38 | 0.456 | 0.136 |
| 182 | 552. | 384. | 48.37 | 0.452 | 0.1348 |
| 183 | 564. | 396. | 48.37 | 0.452 | 0.1348 |
| 184 | 576. | 408. | 48.37 | 0.447 | 0.1334 |
| 185 | 588. | 420. | 48.37 | 0.447 | 0.1334 |
| 186 | 600. | 432. | 48.36 | 0.442 | 0.1319 |
| 187 | 720. | 552. | 48.35 | 0.428 | 0.1277 |
| 188 | 840. | 672. | 48.33 | 0.409 | 0.122 |
| 189 | 960. | 792. | 48.31 | 0.394 | 0.1175 |
| 190 | 1080 | 912. | 48.31 | 0.385 | 0.1149 |

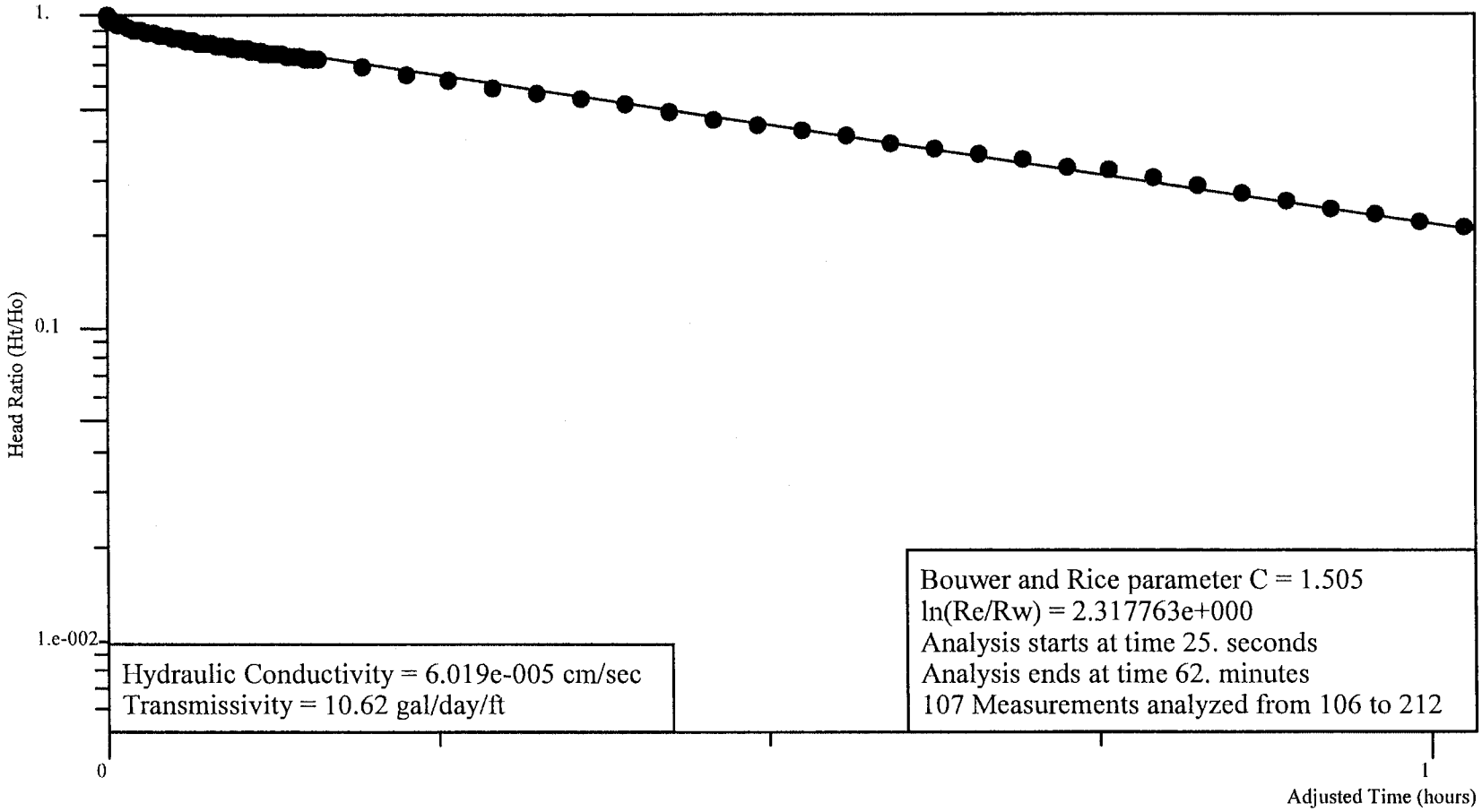
| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1032 | 48.3 | 0.375 | 0.1119 |
| 192 | 1320 | 1152 | 48.29 | 0.366 | 0.1092 |
| 193 | 1440 | 1272 | 48.28 | 0.356 | 0.1062 |
| 194 | 1560 | 1392 | 48.27 | 0.352 | 0.105 |
| 195 | 1680 | 1512 | 48.26 | 0.342 | 0.102 |
| 196 | 1800 | 1632 | 48.26 | 0.337 | 0.1005 |
| 197 | 1920 | 1752 | 48.25 | 0.328 | 9.785e-002 |
| 198 | 2040 | 1872 | 48.24 | 0.323 | 9.636e-002 |
| 199 | 2160 | 1992 | 48.24 | 0.318 | 9.487e-002 |
| 200 | 2280 | 2112 | 48.23 | 0.314 | 9.368e-002 |
| 201 | 2400 | 2232 | 48.23 | 0.309 | 9.218e-002 |
| 202 | 2520 | 2352 | 48.22 | 0.304 | 9.069e-002 |
| 203 | 2640 | 2472 | 48.22 | 0.299 | 8.92e-002 |
| 204 | 2760 | 2592 | 48.22 | 0.295 | 8.801e-002 |
| 205 | 2880 | 2712 | 48.2 | 0.285 | 8.502e-002 |
| 206 | 3000 | 2832 | 48.2 | 0.285 | 8.502e-002 |
| 207 | 3120 | 2952 | 48.2 | 0.276 | 8.234e-002 |
| 208 | 3240 | 3072 | 48.19 | 0.271 | 8.085e-002 |
| 209 | 3360 | 3192 | 48.19 | 0.266 | 7.936e-002 |
| 210 | 3480 | 3312 | 48.19 | 0.266 | 7.936e-002 |
| 211 | 3600 | 3432 | 48.18 | 0.261 | 7.786e-002 |
| 212 | 3720 | 3552 | 48.18 | 0.261 | 7.786e-002 |

**Aquifer Analysis February 18, 2002**

Coble's Sandrock

**Bouwer and Rice Graph**

P-22 (Falling)




Ho is 1.736 feet at 25. seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 18, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P22FALL |

| | |
|---|---|
| Well Label: | P-22 (Falling) |
| Aquifer Thickness: | 8.32 feet |
| Screen Length: | 6. feet |
| Casing Radius: | 1.888 inches |
| Effective Radius: | 4.125 inches |
| Static Water Level: | 3.68 feet |
| Water Table to Screen Bottom: | 8.32 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 25. Seconds |

Test starts with trial 45
There are 212 time and drawdown measurements
Maximum head is 1.921 feet
Minimum head is 0. feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -25. | 3.68 | 0. | 0. |
| 2 | 0.198 | -24.8 | 3.675 | 5.e-003 | 2.603e-003 |
| 3 | 0.396 | -24.6 | 3.675 | 5.e-003 | 2.603e-003 |
| 4 | 0.6 | -24.4 | 3.67 | 1.e-002 | 5.206e-003 |
| 5 | 0.798 | -24.2 | 3.675 | 5.e-003 | 2.603e-003 |
| 6 | 0.996 | -24. | 3.675 | 5.e-003 | 2.603e-003 |
| 7 | 1.2 | -23.8 | 3.675 | 5.e-003 | 2.603e-003 |
| 8 | 1.398 | -23.6 | 3.675 | 5.e-003 | 2.603e-003 |
| 9 | 1.596 | -23.4 | 3.637 | 4.3e-002 | 2.238e-002 |
| 10 | 1.8 | -23.2 | 3.533 | 0.147 | 7.652e-002 |
| 11 | 1.998 | -23. | 3.447 | 0.233 | 0.1213 |
| 12 | 2.196 | -22.8 | 3.381 | 0.299 | 0.1556 |
| 13 | 2.4 | -22.6 | 3.31 | 0.37 | 0.1926 |
| 14 | 2.598 | -22.4 | 3.13 | 0.55 | 0.2863 |
| 15 | 2.796 | -22.2 | 3.172 | 0.508 | 0.2644 |
| 16 | 3. | -22. | 3.077 | 0.603 | 0.3139 |
| 17 | 3.198 | -21.8 | 2.499 | 1.181 | 0.6148 |
| 18 | 3.396 | -21.6 | 2.447 | 1.233 | 0.6419 |
| 19 | 3.6 | -21.4 | 2.485 | 1.195 | 0.6221 |
| 20 | 3.798 | -21.2 | 2.366 | 1.314 | 0.684 |
| 21 | 3.996 | -21. | 2.058 | 1.622 | 0.8444 |
| 22 | 4.2 | -20.8 | 1.911 | 1.769 | 0.9209 |
| 23 | 4.398 | -20.6 | 1.977 | 1.703 | 0.8865 |
| 24 | 4.596 | -20.4 | 1.949 | 1.731 | 0.9011 |
| 25 | 4.8 | -20.2 | 1.873 | 1.807 | 0.9407 |
| 26 | 4.998 | -20. | 1.797 | 1.883 | 0.9802 |
| 27 | 5.196 | -19.8 | 2.186 | 1.494 | 0.7777 |
| 28 | 5.4 | -19.6 | 2.029 | 1.651 | 0.8594 |
| 29 | 5.598 | -19.4 | 1.93 | 1.75 | 0.911 |
| 30 | 5.796 | -19.2 | 1.882 | 1.798 | 0.936 |
| 31 | 6. | -19. | 1.868 | 1.812 | 0.9433 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | -18.8 | 1.816 | 1.864 | 0.9703 |
| 33 | 6.396 | -18.6 | 1.811 | 1.869 | 0.9729 |
| 34 | 6.6 | -18.4 | 1.816 | 1.864 | 0.9703 |
| 35 | 6.798 | -18.2 | 1.826 | 1.854 | 0.9651 |
| 36 | 6.996 | -18. | 1.802 | 1.878 | 0.9776 |
| 37 | 7.2 | -17.8 | 1.788 | 1.892 | 0.9849 |
| 38 | 7.398 | -17.6 | 1.783 | 1.897 | 0.9875 |
| 39 | 7.596 | -17.4 | 1.788 | 1.892 | 0.9849 |
| 40 | 7.8 | -17.2 | 1.783 | 1.897 | 0.9875 |
| 41 | 7.998 | -17. | 1.778 | 1.902 | 0.9901 |
| 42 | 8.196 | -16.8 | 1.773 | 1.907 | 0.9927 |
| 43 | 8.4 | -16.6 | 1.778 | 1.902 | 0.9901 |
| 44 | 8.598 | -16.4 | 1.778 | 1.902 | 0.9901 |
| 45 | 8.796 | -16.2 | 1.773 | 1.907 | 0.9927 |
| 46 | 9. | -16. | 1.759 | 1.921 | 1. |
| 47 | 9.198 | -15.8 | 1.783 | 1.897 | 0.9875 |
| 48 | 9.396 | -15.6 | 1.792 | 1.888 | 0.9828 |
| 49 | 9.6 | -15.4 | 1.783 | 1.897 | 0.9875 |
| 50 | 9.798 | -15.2 | 1.778 | 1.902 | 0.9901 |
| 51 | 9.996 | -15. | 1.783 | 1.897 | 0.9875 |
| 52 | 10.2 | -14.8 | 1.792 | 1.888 | 0.9828 |
| 53 | 10.4 | -14.6 | 1.792 | 1.888 | 0.9828 |
| 54 | 10.6 | -14.4 | 1.788 | 1.892 | 0.9849 |
| 55 | 10.8 | -14.2 | 1.792 | 1.888 | 0.9828 |
| 56 | 11. | -14. | 1.797 | 1.883 | 0.9802 |
| 57 | 11.2 | -13.8 | 1.802 | 1.878 | 0.9776 |
| 58 | 11.4 | -13.6 | 1.802 | 1.878 | 0.9776 |
| 59 | 11.6 | -13.4 | 1.802 | 1.878 | 0.9776 |
| 60 | 11.8 | -13.2 | 1.806 | 1.874 | 0.9755 |
| 61 | 12. | -13. | 1.811 | 1.869 | 0.9729 |
| 62 | 12.2 | -12.8 | 1.816 | 1.864 | 0.9703 |
| 63 | 12.4 | -12.6 | 1.816 | 1.864 | 0.9703 |
| 64 | 12.6 | -12.4 | 1.826 | 1.854 | 0.9651 |
| 65 | 12.8 | -12.2 | 1.821 | 1.859 | 0.9677 |
| 66 | 13. | -12. | 1.83 | 1.85 | 0.963 |
| 67 | 13.2 | -11.8 | 1.826 | 1.854 | 0.9651 |
| 68 | 13.4 | -11.6 | 1.83 | 1.85 | 0.963 |
| 69 | 13.6 | -11.4 | 1.835 | 1.845 | 0.9604 |
| 70 | 13.8 | -11.2 | 1.835 | 1.845 | 0.9604 |
| 71 | 14. | -11. | 1.84 | 1.84 | 0.9578 |
| 72 | 14.2 | -10.8 | 1.84 | 1.84 | 0.9578 |
| 73 | 14.4 | -10.6 | 1.84 | 1.84 | 0.9578 |
| 74 | 14.6 | -10.4 | 1.83 | 1.85 | 0.963 |
| 75 | 14.8 | -10.2 | 1.84 | 1.84 | 0.9578 |
| 76 | 15. | -9.996 | 1.849 | 1.831 | 0.9531 |
| 77 | 15.2 | -9.798 | 1.859 | 1.821 | 0.9479 |
| 78 | 15.4 | -9.6 | 1.863 | 1.817 | 0.9459 |
| 79 | 15.6 | -9.396 | 1.863 | 1.817 | 0.9459 |
| 80 | 15.8 | -9.198 | 1.863 | 1.817 | 0.9459 |
| 81 | 16. | -9. | 1.868 | 1.812 | 0.9433 |
| 82 | 16.2 | -8.796 | 1.873 | 1.807 | 0.9407 |
| 83 | 16.4 | -8.598 | 1.873 | 1.807 | 0.9407 |
| 84 | 16.6 | -8.4 | 1.878 | 1.802 | 0.9381 |

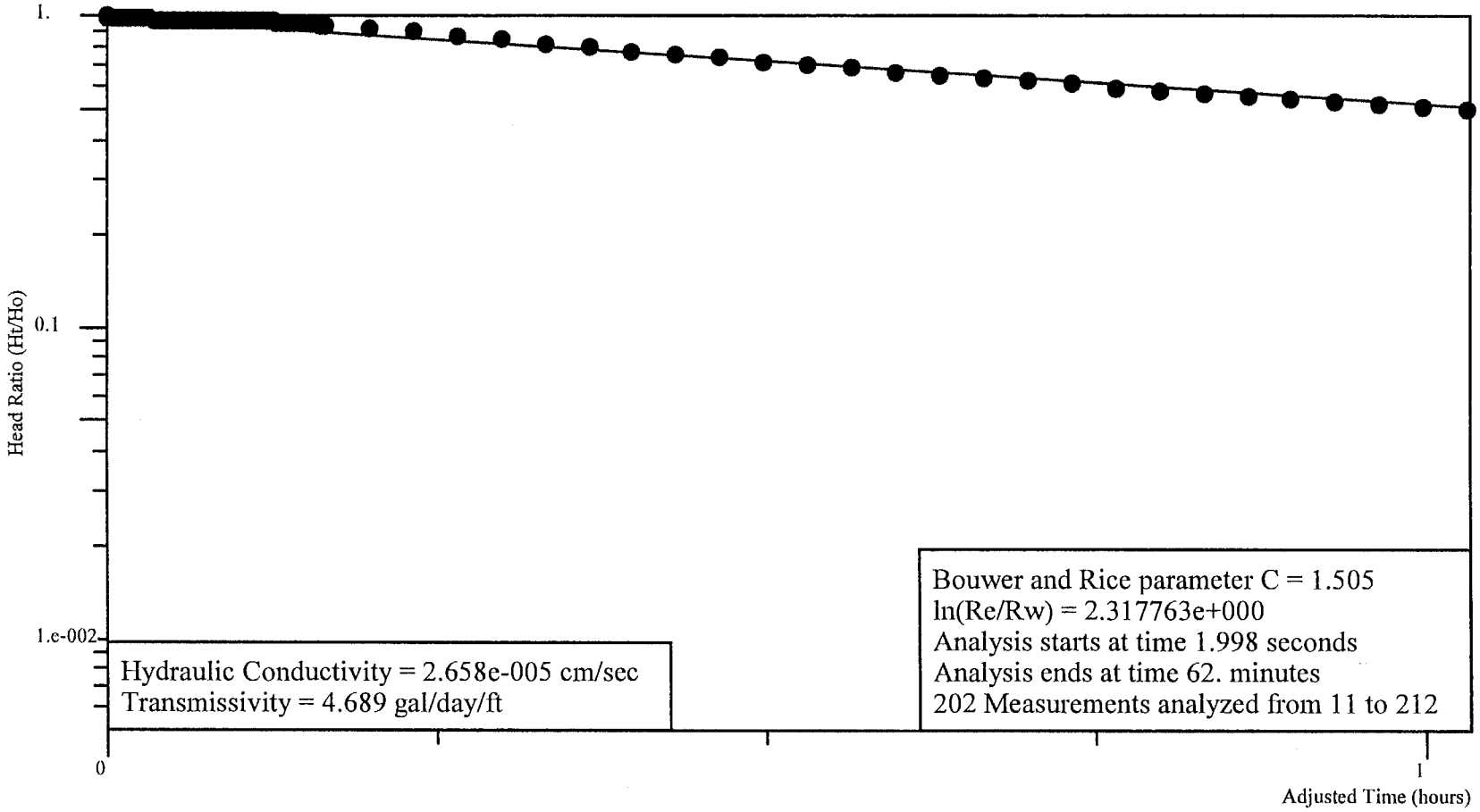
| | | | | | |
|---|---|---|---|---|---|
| 85 | 16.8 | -8.196 | 1.878 | 1.802 | 0.9381 |
| 86 | 17. | -7.998 | 1.868 | 1.812 | 0.9433 |
| 87 | 17.2 | -7.8 | 1.878 | 1.802 | 0.9381 |
| 88 | 17.4 | -7.596 | 1.882 | 1.798 | 0.936 |
| 89 | 17.6 | -7.398 | 1.887 | 1.793 | 0.9334 |
| 90 | 17.8 | -7.2 | 1.882 | 1.798 | 0.936 |
| 91 | 18. | -6.996 | 1.878 | 1.802 | 0.9381 |
| 92 | 18.2 | -6.798 | 1.887 | 1.793 | 0.9334 |
| 93 | 18.4 | -6.6 | 1.892 | 1.788 | 0.9308 |
| 94 | 18.6 | -6.396 | 1.901 | 1.779 | 0.9261 |
| 95 | 18.8 | -6.198 | 1.897 | 1.783 | 0.9282 |
| 96 | 19. | -6. | 1.892 | 1.788 | 0.9308 |
| 97 | 19.2 | -5.796 | 1.897 | 1.783 | 0.9282 |
| 98 | 19.4 | -5.598 | 1.897 | 1.783 | 0.9282 |
| 99 | 19.6 | -5.4 | 1.901 | 1.779 | 0.9261 |
| 100 | 19.8 | -5.196 | 1.906 | 1.774 | 0.9235 |
| 101 | 20. | -4.998 | 1.906 | 1.774 | 0.9235 |
| 102 | 21. | -3.996 | 1.916 | 1.764 | 0.9183 |
| 103 | 22. | -3. | 1.925 | 1.755 | 0.9136 |
| 104 | 23. | -1.998 | 1.93 | 1.75 | 0.911 |
| 105 | 24. | -0.996 | 1.939 | 1.741 | 0.9063 |
| 106 | 25. | 0. | 1.944 | 1.736 | 0.9037 |
| 107 | 26. | 1.002 | 1.954 | 1.726 | 0.8985 |
| 108 | 27. | 2.004 | 1.958 | 1.722 | 0.8964 |
| 109 | 28. | 3. | 1.963 | 1.717 | 0.8938 |
| 110 | 29. | 4.002 | 1.973 | 1.707 | 0.8886 |
| 111 | 30. | 5.004 | 1.973 | 1.707 | 0.8886 |
| 112 | 31. | 6. | 1.977 | 1.703 | 0.8865 |
| 113 | 32. | 7.002 | 1.982 | 1.698 | 0.8839 |
| 114 | 33. | 8.004 | 1.987 | 1.693 | 0.8813 |
| 115 | 34. | 9. | 1.987 | 1.693 | 0.8813 |
| 116 | 35. | 10. | 1.992 | 1.688 | 0.8787 |
| 117 | 36. | 11. | 1.996 | 1.684 | 0.8766 |
| 118 | 37. | 12. | 1.996 | 1.684 | 0.8766 |
| 119 | 38. | 13. | 1.996 | 1.684 | 0.8766 |
| 120 | 39. | 14. | 2.001 | 1.679 | 0.874 |
| 121 | 40. | 15. | 2.006 | 1.674 | 0.8714 |
| 122 | 41. | 16. | 2.006 | 1.674 | 0.8714 |
| 123 | 42. | 17. | 2.006 | 1.674 | 0.8714 |
| 124 | 43. | 18. | 2.01 | 1.67 | 0.8693 |
| 125 | 44. | 19. | 2.015 | 1.665 | 0.8667 |
| 126 | 45. | 20. | 2.015 | 1.665 | 0.8667 |
| 127 | 46. | 21. | 2.02 | 1.66 | 0.8641 |
| 128 | 47. | 22. | 2.02 | 1.66 | 0.8641 |
| 129 | 48. | 23. | 2.02 | 1.66 | 0.8641 |
| 130 | 49. | 24. | 2.025 | 1.655 | 0.8615 |
| 131 | 50. | 25. | 2.025 | 1.655 | 0.8615 |
| 132 | 51. | 26. | 2.025 | 1.655 | 0.8615 |
| 133 | 52. | 27. | 2.029 | 1.651 | 0.8594 |
| 134 | 53. | 28. | 2.034 | 1.646 | 0.8568 |
| 135 | 54. | 29. | 2.034 | 1.646 | 0.8568 |
| 136 | 55. | 30. | 2.039 | 1.641 | 0.8542 |
| 137 | 56. | 31. | 2.039 | 1.641 | 0.8542 |

| | | | | | |
|---|---|---|---|---|---|
| 138 | 57. | 32. | 2.044 | 1.636 | 0.8516 |
| 139 | 58. | 33. | 2.044 | 1.636 | 0.8516 |
| 140 | 59. | 34. | 2.044 | 1.636 | 0.8516 |
| 141 | 60. | 35. | 2.048 | 1.632 | 0.8496 |
| 142 | 72. | 47. | 2.072 | 1.608 | 0.8371 |
| 143 | 84. | 59. | 2.091 | 1.589 | 0.8272 |
| 144 | 96. | 71. | 2.105 | 1.575 | 0.8199 |
| 145 | 108. | 83. | 2.124 | 1.556 | 0.81 |
| 146 | 120. | 95. | 2.134 | 1.546 | 0.8048 |
| 147 | 132. | 107. | 2.148 | 1.532 | 0.7975 |
| 148 | 144. | 119. | 2.153 | 1.527 | 0.7949 |
| 149 | 156. | 131. | 2.162 | 1.518 | 0.7902 |
| 150 | 168. | 143. | 2.172 | 1.508 | 0.785 |
| 151 | 180. | 155. | 2.181 | 1.499 | 0.7803 |
| 152 | 192. | 167. | 2.191 | 1.489 | 0.7751 |
| 153 | 204. | 179. | 2.2 | 1.48 | 0.7704 |
| 154 | 216. | 191. | 2.21 | 1.47 | 0.7652 |
| 155 | 228. | 203. | 2.219 | 1.461 | 0.7605 |
| 156 | 240. | 215. | 2.224 | 1.456 | 0.7579 |
| 157 | 252. | 227. | 2.233 | 1.447 | 0.7533 |
| 158 | 264. | 239. | 2.243 | 1.437 | 0.748 |
| 159 | 276. | 251. | 2.252 | 1.428 | 0.7434 |
| 160 | 288. | 263. | 2.257 | 1.423 | 0.7408 |
| 161 | 300. | 275. | 2.267 | 1.413 | 0.7356 |
| 162 | 312. | 287. | 2.271 | 1.409 | 0.7335 |
| 163 | 324. | 299. | 2.281 | 1.399 | 0.7283 |
| 164 | 336. | 311. | 2.286 | 1.394 | 0.7257 |
| 165 | 348. | 323. | 2.295 | 1.385 | 0.721 |
| 166 | 360. | 335. | 2.3 | 1.38 | 0.7184 |
| 167 | 372. | 347. | 2.309 | 1.371 | 0.7137 |
| 168 | 384. | 359. | 2.314 | 1.366 | 0.7111 |
| 169 | 396. | 371. | 2.324 | 1.356 | 0.7059 |
| 170 | 408. | 383. | 2.328 | 1.352 | 0.7038 |
| 171 | 420. | 395. | 2.333 | 1.347 | 0.7012 |
| 172 | 432. | 407. | 2.342 | 1.338 | 0.6965 |
| 173 | 444. | 419. | 2.347 | 1.333 | 0.6939 |
| 174 | 456. | 431. | 2.357 | 1.323 | 0.6887 |
| 175 | 468. | 443. | 2.361 | 1.319 | 0.6866 |
| 176 | 480. | 455. | 2.371 | 1.309 | 0.6814 |
| 177 | 492. | 467. | 2.376 | 1.304 | 0.6788 |
| 178 | 504. | 479. | 2.38 | 1.3 | 0.6767 |
| 179 | 516. | 491. | 2.385 | 1.295 | 0.6741 |
| 180 | 528. | 503. | 2.395 | 1.285 | 0.6689 |
| 181 | 540. | 515. | 2.399 | 1.281 | 0.6668 |
| 182 | 552. | 527. | 2.404 | 1.276 | 0.6642 |
| 183 | 564. | 539. | 2.414 | 1.266 | 0.659 |
| 184 | 576. | 551. | 2.418 | 1.262 | 0.6569 |
| 185 | 588. | 563. | 2.423 | 1.257 | 0.6543 |
| 186 | 600. | 575. | 2.428 | 1.252 | 0.6517 |
| 187 | 720. | 695. | 2.49 | 1.19 | 0.6195 |
| 188 | 840. | 815. | 2.546 | 1.134 | 0.5903 |
| 189 | 960. | 935. | 2.599 | 1.081 | 0.5627 |
| 190 | 1080 | 1055 | 2.651 | 1.029 | 0.5357 |

| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1175 | 2.693 | 0.987 | 0.5138 |
| 192 | 1320 | 1295 | 2.736 | 0.944 | 0.4914 |
| 193 | 1440 | 1415 | 2.779 | 0.901 | 0.469 |
| 194 | 1560 | 1535 | 2.826 | 0.854 | 0.4446 |
| 195 | 1680 | 1655 | 2.869 | 0.811 | 0.4222 |
| 196 | 1800 | 1775 | 2.902 | 0.778 | 0.405 |
| 197 | 1920 | 1895 | 2.931 | 0.749 | 0.3899 |
| 198 | 2040 | 2015 | 2.964 | 0.716 | 0.3727 |
| 199 | 2160 | 2135 | 3.002 | 0.678 | 0.3529 |
| 200 | 2280 | 2255 | 3.03 | 0.65 | 0.3384 |
| 201 | 2400 | 2375 | 3.054 | 0.626 | 0.3259 |
| 202 | 2520 | 2495 | 3.077 | 0.603 | 0.3139 |
| 203 | 2640 | 2615 | 3.106 | 0.574 | 0.2988 |
| 204 | 2760 | 2735 | 3.125 | 0.555 | 0.2889 |
| 205 | 2880 | 2855 | 3.149 | 0.531 | 0.2764 |
| 206 | 3000 | 2975 | 3.177 | 0.503 | 0.2618 |
| 207 | 3120 | 3095 | 3.205 | 0.475 | 0.2473 |
| 208 | 3240 | 3215 | 3.234 | 0.446 | 0.2322 |
| 209 | 3360 | 3335 | 3.258 | 0.422 | 0.2197 |
| 210 | 3480 | 3455 | 3.277 | 0.403 | 0.2098 |
| 211 | 3600 | 3575 | 3.296 | 0.384 | 0.1999 |
| 212 | 3720 | 3695 | 3.315 | 0.365 | 0.19 |

**Aquifer Analysis February 18, 2002** **Bouwer and Rice Graph**

Coble's Sandrock P-22 (Rising)




Ho is 1.644 feet at 1.998 seconds

Project Number 419.06

Analysis by D. Reedy of Joyce Engineering, Inc.

## Aquifer Analysis

| | |
|---|---|
| Site Name: | Coble's Sandrock |
| Test Date: | February 18, 2002 |
| Project Number: | 419.06 |
| Import File: | P:\Coble's Sandrock\Hydrogeologic\Big Site Application\HG and GMP Report\Slug Tests\P22RISE |

| | |
|---|---|
| Well Label: | P-22 (Rising) |
| Aquifer Thickness: | 8.32 feet |
| Screen Length: | 6. feet |
| Casing Radius: | 1.888 inches |
| Effective Radius: | 4.125 inches |
| Static Water Level: | 3.68 feet |
| Water Table to Screen Bottom: | 8.32 feet |
| Anisotropy Ratio: | 1. |
| Time Adjustment: | 1.998 Seconds |

Test starts with trial 9
There are 212 time and drawdown measurements
Maximum head is 1.701 feet
Minimum head is 0. feet

| Trial | Time (seconds) | Adjusted Time (seconds) | Drawdown (feet) | Head (feet) | Head Ratio |
|---|---|---|---|---|---|
| 1 | 0. | -1.998 | 3.698 | 1.8e-002 | 1.058e-002 |
| 2 | 0.198 | -1.8 | 3.722 | 4.2e-002 | 2.469e-002 |
| 3 | 0.396 | -1.602 | 3.741 | 6.1e-002 | 3.586e-002 |
| 4 | 0.6 | -1.398 | 4.528 | 0.848 | 0.4985 |
| 5 | 0.798 | -1.2 | 4.571 | 0.891 | 0.5238 |
| 6 | 0.996 | -1.002 | 4.499 | 0.819 | 0.4815 |
| 7 | 1.2 | -0.798 | 4.552 | 0.872 | 0.5126 |
| 8 | 1.398 | -0.6 | 4.561 | 0.881 | 0.5179 |
| 9 | 1.596 | -0.402 | 4.561 | 0.881 | 0.5179 |
| 10 | 1.8 | -0.198 | 5.381 | 1.701 | 1. |
| 11 | 1.998 | 0. | 5.324 | 1.644 | 0.9665 |
| 12 | 2.196 | 0.198 | 5.314 | 1.634 | 0.9606 |
| 13 | 2.4 | 0.402 | 5.305 | 1.625 | 0.9553 |
| 14 | 2.598 | 0.6 | 5.305 | 1.625 | 0.9553 |
| 15 | 2.796 | 0.798 | 5.305 | 1.625 | 0.9553 |
| 16 | 3. | 1.002 | 5.3 | 1.62 | 0.9524 |
| 17 | 3.198 | 1.2 | 5.3 | 1.62 | 0.9524 |
| 18 | 3.396 | 1.398 | 5.3 | 1.62 | 0.9524 |
| 19 | 3.6 | 1.602 | 5.3 | 1.62 | 0.9524 |
| 20 | 3.798 | 1.8 | 5.3 | 1.62 | 0.9524 |
| 21 | 3.996 | 1.998 | 5.3 | 1.62 | 0.9524 |
| 22 | 4.2 | 2.202 | 5.3 | 1.62 | 0.9524 |
| 23 | 4.398 | 2.4 | 5.3 | 1.62 | 0.9524 |
| 24 | 4.596 | 2.598 | 5.3 | 1.62 | 0.9524 |
| 25 | 4.8 | 2.802 | 5.3 | 1.62 | 0.9524 |
| 26 | 4.998 | 3. | 5.3 | 1.62 | 0.9524 |
| 27 | 5.196 | 3.198 | 5.3 | 1.62 | 0.9524 |
| 28 | 5.4 | 3.402 | 5.3 | 1.62 | 0.9524 |
| 29 | 5.598 | 3.6 | 5.3 | 1.62 | 0.9524 |
| 30 | 5.796 | 3.798 | 5.3 | 1.62 | 0.9524 |
| 31 | 6. | 4.002 | 5.3 | 1.62 | 0.9524 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 6.198 | 4.2 | 5.3 | 1.62 | 0.9524 |
| 33 | 6.396 | 4.398 | 5.3 | 1.62 | 0.9524 |
| 34 | 6.6 | 4.602 | 5.3 | 1.62 | 0.9524 |
| 35 | 6.798 | 4.8 | 5.3 | 1.62 | 0.9524 |
| 36 | 6.996 | 4.998 | 5.3 | 1.62 | 0.9524 |
| 37 | 7.2 | 5.202 | 5.3 | 1.62 | 0.9524 |
| 38 | 7.398 | 5.4 | 5.3 | 1.62 | 0.9524 |
| 39 | 7.596 | 5.598 | 5.3 | 1.62 | 0.9524 |
| 40 | 7.8 | 5.802 | 5.3 | 1.62 | 0.9524 |
| 41 | 7.998 | 6. | 5.3 | 1.62 | 0.9524 |
| 42 | 8.196 | 6.198 | 5.3 | 1.62 | 0.9524 |
| 43 | 8.4 | 6.402 | 5.3 | 1.62 | 0.9524 |
| 44 | 8.598 | 6.6 | 5.3 | 1.62 | 0.9524 |
| 45 | 8.796 | 6.798 | 5.3 | 1.62 | 0.9524 |
| 46 | 9. | 7.002 | 5.3 | 1.62 | 0.9524 |
| 47 | 9.198 | 7.2 | 5.3 | 1.62 | 0.9524 |
| 48 | 9.396 | 7.398 | 5.3 | 1.62 | 0.9524 |
| 49 | 9.6 | 7.602 | 5.3 | 1.62 | 0.9524 |
| 50 | 9.798 | 7.8 | 5.3 | 1.62 | 0.9524 |
| 51 | 9.996 | 7.998 | 5.3 | 1.62 | 0.9524 |
| 52 | 10.2 | 8.202 | 5.3 | 1.62 | 0.9524 |
| 53 | 10.4 | 8.4 | 5.3 | 1.62 | 0.9524 |
| 54 | 10.6 | 8.598 | 5.3 | 1.62 | 0.9524 |
| 55 | 10.8 | 8.802 | 5.3 | 1.62 | 0.9524 |
| 56 | 11. | 9. | 5.3 | 1.62 | 0.9524 |
| 57 | 11.2 | 9.198 | 5.3 | 1.62 | 0.9524 |
| 58 | 11.4 | 9.402 | 5.3 | 1.62 | 0.9524 |
| 59 | 11.6 | 9.6 | 5.3 | 1.62 | 0.9524 |
| 60 | 11.8 | 9.798 | 5.3 | 1.62 | 0.9524 |
| 61 | 12. | 10. | 5.3 | 1.62 | 0.9524 |
| 62 | 12.2 | 10.2 | 5.3 | 1.62 | 0.9524 |
| 63 | 12.4 | 10.4 | 5.3 | 1.62 | 0.9524 |
| 64 | 12.6 | 10.6 | 5.3 | 1.62 | 0.9524 |
| 65 | 12.8 | 10.8 | 5.3 | 1.62 | 0.9524 |
| 66 | 13. | 11. | 5.3 | 1.62 | 0.9524 |
| 67 | 13.2 | 11.2 | 5.3 | 1.62 | 0.9524 |
| 68 | 13.4 | 11.4 | 5.3 | 1.62 | 0.9524 |
| 69 | 13.6 | 11.6 | 5.3 | 1.62 | 0.9524 |
| 70 | 13.8 | 11.8 | 5.3 | 1.62 | 0.9524 |
| 71 | 14. | 12. | 5.3 | 1.62 | 0.9524 |
| 72 | 14.2 | 12.2 | 5.3 | 1.62 | 0.9524 |
| 73 | 14.4 | 12.4 | 5.3 | 1.62 | 0.9524 |
| 74 | 14.6 | 12.6 | 5.3 | 1.62 | 0.9524 |
| 75 | 14.8 | 12.8 | 5.3 | 1.62 | 0.9524 |
| 76 | 15. | 13. | 5.3 | 1.62 | 0.9524 |
| 77 | 15.2 | 13.2 | 5.3 | 1.62 | 0.9524 |
| 78 | 15.4 | 13.4 | 5.3 | 1.62 | 0.9524 |
| 79 | 15.6 | 13.6 | 5.3 | 1.62 | 0.9524 |
| 80 | 15.8 | 13.8 | 5.3 | 1.62 | 0.9524 |
| 81 | 16. | 14. | 5.3 | 1.62 | 0.9524 |
| 82 | 16.2 | 14.2 | 5.3 | 1.62 | 0.9524 |
| 83 | 16.4 | 14.4 | 5.3 | 1.62 | 0.9524 |
| 84 | 16.6 | 14.6 | 5.3 | 1.62 | 0.9524 |

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|---|---|---|---|---|---|
| 85 | 16.8 | 14.8 | 5.3 | 1.62 | 0.9524 |
| 86 | 17. | 15. | 5.3 | 1.62 | 0.9524 |
| 87 | 17.2 | 15.2 | 5.3 | 1.62 | 0.9524 |
| 88 | 17.4 | 15.4 | 5.3 | 1.62 | 0.9524 |
| 89 | 17.6 | 15.6 | 5.3 | 1.62 | 0.9524 |
| 90 | 17.8 | 15.8 | 5.3 | 1.62 | 0.9524 |
| 91 | 18. | 16. | 5.3 | 1.62 | 0.9524 |
| 92 | 18.2 | 16.2 | 5.3 | 1.62 | 0.9524 |
| 93 | 18.4 | 16.4 | 5.3 | 1.62 | 0.9524 |
| 94 | 18.6 | 16.6 | 5.3 | 1.62 | 0.9524 |
| 95 | 18.8 | 16.8 | 5.3 | 1.62 | 0.9524 |
| 96 | 19. | 17. | 5.3 | 1.62 | 0.9524 |
| 97 | 19.2 | 17.2 | 5.3 | 1.62 | 0.9524 |
| 98 | 19.4 | 17.4 | 5.3 | 1.62 | 0.9524 |
| 99 | 19.6 | 17.6 | 5.3 | 1.62 | 0.9524 |
| 100 | 19.8 | 17.8 | 5.3 | 1.62 | 0.9524 |
| 101 | 20. | 18. | 5.3 | 1.62 | 0.9524 |
| 102 | 21. | 19. | 5.3 | 1.62 | 0.9524 |
| 103 | 22. | 20. | 5.3 | 1.62 | 0.9524 |
| 104 | 23. | 21. | 5.3 | 1.62 | 0.9524 |
| 105 | 24. | 22. | 5.3 | 1.62 | 0.9524 |
| 106 | 25. | 23. | 5.3 | 1.62 | 0.9524 |
| 107 | 26. | 24. | 5.3 | 1.62 | 0.9524 |
| 108 | 27. | 25. | 5.3 | 1.62 | 0.9524 |
| 109 | 28. | 26. | 5.3 | 1.62 | 0.9524 |
| 110 | 29. | 27. | 5.3 | 1.62 | 0.9524 |
| 111 | 30. | 28. | 5.3 | 1.62 | 0.9524 |
| 112 | 31. | 29. | 5.3 | 1.62 | 0.9524 |
| 113 | 32. | 30. | 5.3 | 1.62 | 0.9524 |
| 114 | 33. | 31. | 5.3 | 1.62 | 0.9524 |
| 115 | 34. | 32. | 5.3 | 1.62 | 0.9524 |
| 116 | 35. | 33. | 5.3 | 1.62 | 0.9524 |
| 117 | 36. | 34. | 5.3 | 1.62 | 0.9524 |
| 118 | 37. | 35. | 5.3 | 1.62 | 0.9524 |
| 119 | 38. | 36. | 5.3 | 1.62 | 0.9524 |
| 120 | 39. | 37. | 5.3 | 1.62 | 0.9524 |
| 121 | 40. | 38. | 5.3 | 1.62 | 0.9524 |
| 122 | 41. | 39. | 5.3 | 1.62 | 0.9524 |
| 123 | 42. | 40. | 5.3 | 1.62 | 0.9524 |
| 124 | 43. | 41. | 5.3 | 1.62 | 0.9524 |
| 125 | 44. | 42. | 5.3 | 1.62 | 0.9524 |
| 126 | 45. | 43. | 5.295 | 1.615 | 0.9494 |
| 127 | 46. | 44. | 5.3 | 1.62 | 0.9524 |
| 128 | 47. | 45. | 5.295 | 1.615 | 0.9494 |
| 129 | 48. | 46. | 5.295 | 1.615 | 0.9494 |
| 130 | 49. | 47. | 5.3 | 1.62 | 0.9524 |
| 131 | 50. | 48. | 5.295 | 1.615 | 0.9494 |
| 132 | 51. | 49. | 5.3 | 1.62 | 0.9524 |
| 133 | 52. | 50. | 5.295 | 1.615 | 0.9494 |
| 134 | 53. | 51. | 5.295 | 1.615 | 0.9494 |
| 135 | 54. | 52. | 5.295 | 1.615 | 0.9494 |
| 136 | 55. | 53. | 5.3 | 1.62 | 0.9524 |
| 137 | 56. | 54. | 5.295 | 1.615 | 0.9494 |

| | | | | | |
|---|---|---|---|---|---|
| 138 | 57. | 55. | 5.295 | 1.615 | 0.9494 |
| 139 | 58. | 56. | 5.3 | 1.62 | 0.9524 |
| 140 | 59. | 57. | 5.295 | 1.615 | 0.9494 |
| 141 | 60. | 58. | 5.295 | 1.615 | 0.9494 |
| 142 | 72. | 70. | 5.3 | 1.62 | 0.9524 |
| 143 | 84. | 82. | 5.295 | 1.615 | 0.9494 |
| 144 | 96. | 94. | 5.295 | 1.615 | 0.9494 |
| 145 | 108. | 106. | 5.295 | 1.615 | 0.9494 |
| 146 | 120. | 118. | 5.295 | 1.615 | 0.9494 |
| 147 | 132. | 130. | 5.291 | 1.611 | 0.9471 |
| 148 | 144. | 142. | 5.291 | 1.611 | 0.9471 |
| 149 | 156. | 154. | 5.291 | 1.611 | 0.9471 |
| 150 | 168. | 166. | 5.291 | 1.611 | 0.9471 |
| 151 | 180. | 178. | 5.291 | 1.611 | 0.9471 |
| 152 | 192. | 190. | 5.291 | 1.611 | 0.9471 |
| 153 | 204. | 202. | 5.286 | 1.606 | 0.9442 |
| 154 | 216. | 214. | 5.286 | 1.606 | 0.9442 |
| 155 | 228. | 226. | 5.286 | 1.606 | 0.9442 |
| 156 | 240. | 238. | 5.286 | 1.606 | 0.9442 |
| 157 | 252. | 250. | 5.286 | 1.606 | 0.9442 |
| 158 | 264. | 262. | 5.286 | 1.606 | 0.9442 |
| 159 | 276. | 274. | 5.281 | 1.601 | 0.9412 |
| 160 | 288. | 286. | 5.281 | 1.601 | 0.9412 |
| 161 | 300. | 298. | 5.281 | 1.601 | 0.9412 |
| 162 | 312. | 310. | 5.281 | 1.601 | 0.9412 |
| 163 | 324. | 322. | 5.277 | 1.597 | 0.9389 |
| 164 | 336. | 334. | 5.277 | 1.597 | 0.9389 |
| 165 | 348. | 346. | 5.272 | 1.592 | 0.9359 |
| 166 | 360. | 358. | 5.272 | 1.592 | 0.9359 |
| 167 | 372. | 370. | 5.272 | 1.592 | 0.9359 |
| 168 | 384. | 382. | 5.272 | 1.592 | 0.9359 |
| 169 | 396. | 394. | 5.267 | 1.587 | 0.933 |
| 170 | 408. | 406. | 5.267 | 1.587 | 0.933 |
| 171 | 420. | 418. | 5.267 | 1.587 | 0.933 |
| 172 | 432. | 430. | 5.262 | 1.582 | 0.93 |
| 173 | 444. | 442. | 5.262 | 1.582 | 0.93 |
| 174 | 456. | 454. | 5.262 | 1.582 | 0.93 |
| 175 | 468. | 466. | 5.258 | 1.578 | 0.9277 |
| 176 | 480. | 478. | 5.253 | 1.573 | 0.9248 |
| 177 | 492. | 490. | 5.253 | 1.573 | 0.9248 |
| 178 | 504. | 502. | 5.248 | 1.568 | 0.9218 |
| 179 | 516. | 514. | 5.248 | 1.568 | 0.9218 |
| 180 | 528. | 526. | 5.243 | 1.563 | 0.9189 |
| 181 | 540. | 538. | 5.239 | 1.559 | 0.9165 |
| 182 | 552. | 550. | 5.239 | 1.559 | 0.9165 |
| 183 | 564. | 562. | 5.239 | 1.559 | 0.9165 |
| 184 | 576. | 574. | 5.234 | 1.554 | 0.9136 |
| 185 | 588. | 586. | 5.229 | 1.549 | 0.9106 |
| 186 | 600. | 598. | 5.229 | 1.549 | 0.9106 |
| 187 | 720. | 718. | 5.191 | 1.511 | 0.8883 |
| 188 | 840. | 838. | 5.149 | 1.469 | 0.8636 |
| 189 | 960. | 958. | 5.106 | 1.426 | 0.8383 |
| 190 | 1080 | 1078 | 5.063 | 1.383 | 0.8131 |

| | | | | | |
|---|---|---|---|---|---|
| 191 | 1200 | 1198 | 5.025 | 1.345 | 0.7907 |
| 192 | 1320 | 1318 | 4.992 | 1.312 | 0.7713 |
| 193 | 1440 | 1438 | 4.954 | 1.274 | 0.749 |
| 194 | 1560 | 1558 | 4.921 | 1.241 | 0.7296 |
| 195 | 1680 | 1678 | 4.888 | 1.208 | 0.7102 |
| 196 | 1800 | 1798 | 4.86 | 1.18 | 0.6937 |
| 197 | 1920 | 1918 | 4.831 | 1.151 | 0.6767 |
| 198 | 2040 | 2038 | 4.803 | 1.123 | 0.6602 |
| 199 | 2160 | 2158 | 4.774 | 1.094 | 0.6432 |
| 200 | 2280 | 2278 | 4.751 | 1.071 | 0.6296 |
| 201 | 2400 | 2398 | 4.722 | 1.042 | 0.6126 |
| 202 | 2520 | 2518 | 4.699 | 1.019 | 0.5991 |
| 203 | 2640 | 2638 | 4.675 | 0.995 | 0.585 |
| 204 | 2760 | 2758 | 4.651 | 0.971 | 0.5708 |
| 205 | 2880 | 2878 | 4.632 | 0.952 | 0.5597 |
| 206 | 3000 | 2998 | 4.613 | 0.933 | 0.5485 |
| 207 | 3120 | 3118 | 4.59 | 0.91 | 0.535 |
| 208 | 3240 | 3238 | 4.571 | 0.891 | 0.5238 |
| 209 | 3360 | 3358 | 4.556 | 0.876 | 0.515 |
| 210 | 3480 | 3478 | 4.537 | 0.857 | 0.5038 |
| 211 | 3600 | 3598 | 4.518 | 0.838 | 0.4927 |
| 212 | 3720 | 3718 | 4.504 | 0.824 | 0.4844 |

## *Coble's Sandrock Phase 3 Expansion*

| | |
|---|---|
| Well/Piezometer: | **P-20** |
| Initial Measured Depth to Water: | 7.09 |
| Final Measured Depth to Water: | - |
| Screen Interval: | 15.30' - 32.30' |
| Total Well Depth: | 32.30' |
| Date(s) for Slug Testing: | 2/14/2007 |

*A 1.6"x36" bailer was used to complete the slug test.

| | |
|---|---|
| $A$ = Function of $L_e/R$: | 3.892 |
| $B$ = Function of $L_e/R$: | 0.641 |
| $h$ = The saturated thickness of the aquifer (ft): | 27.91 |
| $L_w$ = Difference from water table to bottom of borehole or well screen (ft): | 23.21 |
| $r_c$ = Radius of Well Casing (ft): | 0.083 |
| $R$ = Radius of Gravel Envelope (ft): | 0.260 |
| $R_e$ = Effective Radial Distance over which head is dissipated (ft): | 4.737 |
| $L_e$ = Length of screen of the well through which water can enter (ft): | 15 |
| $H_o$ = Drawdown at time 0 (ft): | 1.35 |
| $H_t$ = Drawdown at time t (ft): | 0.24 |
| $t$ = time (sec): | 364 |

The Bouwer and Rice Equation is used for all hydraulic conductivity calculations in this study.

$$K = \frac{r_c^2 LN(R_e/R)}{2L_e}\left(\frac{1}{t}\right)LN\left(\frac{H_o}{H_t}\right)$$

Bouwer and Rice present the equation below as a method to estimate $LN(R_e/R)$. This method is ultimately used to solve for $R_e$ This equation is used if the distance from the water table to the bottom of the borehole or well screen is less than the saturated thickness of the aquifer.

$$LN\left(\frac{R_e}{R}\right) = \left[\frac{1.1}{LN(L_w/R)} + \frac{A + B * LN[(h - L_w)/R]}{L_e/R}\right]^{-1}$$

A & B are determined from a graph determined by Bouwer and Rice.

$R_e$ = 4.737

| | | |
|---|---|---|
| ***Hydraulic Conductivity (Rising):*** | ***3.16E-06*** | ***ft/sec*** |
| | ***9.64E-05*** | ***cm/sec*** |
| ***Hydraulic Conductivity (Falling):*** | ***2.82E-06*** | ***ft/sec*** |
| | ***8.60E-05*** | ***cm/sec*** |

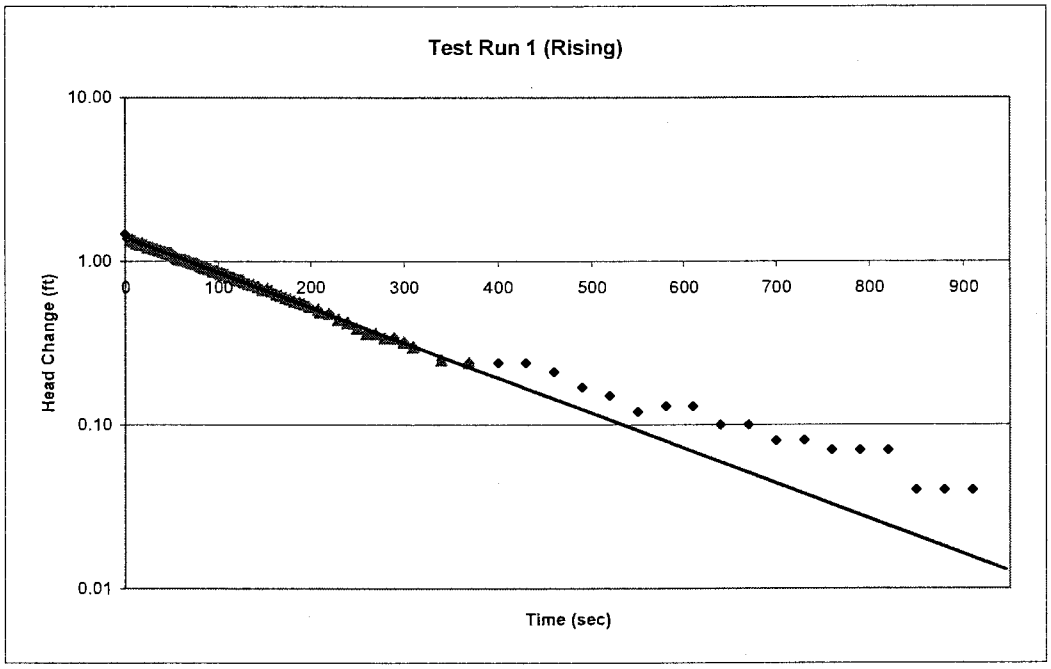
***Test Run 1 (Rising)***

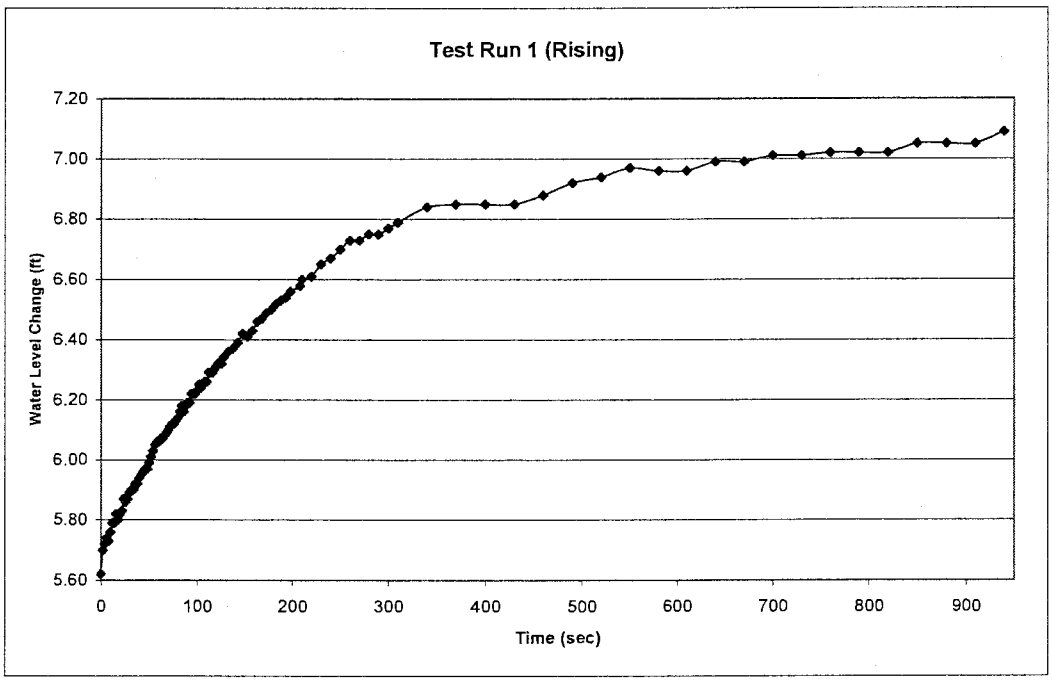
| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 2564 | 2/14/2007 | 0:39:42 | 0 | 22.85 | 1.47 | 5.62 |
| 2566 | 2/14/2007 | 0:39:44 | 2 | 22.93 | 1.39 | 5.70 |
| 2568 | 2/14/2007 | 0:39:46 | 4 | 22.95 | 1.37 | 5.72 |
| 2570 | 2/14/2007 | 0:39:48 | 6 | 22.97 | 1.35 | 5.74 |
| 2572 | 2/14/2007 | 0:39:50 | 8 | 22.96 | 1.36 | 5.73 |
| 2574 | 2/14/2007 | 0:39:52 | 10 | 22.99 | 1.33 | 5.76 |
| 2576 | 2/14/2007 | 0:39:54 | 12 | 23.02 | 1.30 | 5.79 |
| 2578 | 2/14/2007 | 0:39:56 | 14 | 23.02 | 1.30 | 5.79 |
| 2580 | 2/14/2007 | 0:39:58 | 16 | 23.05 | 1.27 | 5.82 |
| 2582 | 2/14/2007 | 0:40:00 | 18 | 23.03 | 1.29 | 5.80 |
| 2584 | 2/14/2007 | 0:40:02 | 20 | 23.05 | 1.27 | 5.82 |
| 2586 | 2/14/2007 | 0:40:04 | 22 | 23.06 | 1.26 | 5.83 |
| 2588 | 2/14/2007 | 0:40:06 | 24 | 23.10 | 1.22 | 5.87 |
| 2590 | 2/14/2007 | 0:40:08 | 26 | 23.09 | 1.23 | 5.86 |
| 2592 | 2/14/2007 | 0:40:10 | 28 | 23.10 | 1.22 | 5.87 |
| 2594 | 2/14/2007 | 0:40:12 | 30 | 23.12 | 1.20 | 5.89 |
| 2596 | 2/14/2007 | 0:40:14 | 32 | 23.13 | 1.19 | 5.90 |
| 2598 | 2/14/2007 | 0:40:16 | 34 | 23.13 | 1.19 | 5.90 |
| 2600 | 2/14/2007 | 0:40:18 | 36 | 23.15 | 1.17 | 5.92 |
| 2602 | 2/14/2007 | 0:40:20 | 38 | 23.15 | 1.17 | 5.92 |
| 2604 | 2/14/2007 | 0:40:22 | 40 | 23.17 | 1.15 | 5.94 |
| 2606 | 2/14/2007 | 0:40:24 | 42 | 23.18 | 1.14 | 5.95 |
| 2608 | 2/14/2007 | 0:40:26 | 44 | 23.19 | 1.13 | 5.96 |
| 2610 | 2/14/2007 | 0:40:28 | 46 | 23.20 | 1.12 | 5.97 |
| 2612 | 2/14/2007 | 0:40:30 | 48 | 23.20 | 1.12 | 5.97 |
| 2614 | 2/14/2007 | 0:40:32 | 50 | 23.22 | 1.10 | 5.99 |
| 2616 | 2/14/2007 | 0:40:34 | 52 | 23.24 | 1.08 | 6.01 |
| 2618 | 2/14/2007 | 0:40:36 | 54 | 23.26 | 1.06 | 6.03 |
| 2620 | 2/14/2007 | 0:40:38 | 56 | 23.28 | 1.04 | 6.05 |
| 2622 | 2/14/2007 | 0:40:40 | 58 | 23.29 | 1.03 | 6.06 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2624 | 2/14/2007 | 0:40:42 | 60 | 23.29 | 1.03 | 6.06 |
| 2626 | 2/14/2007 | 0:40:44 | 62 | 23.30 | 1.02 | 6.07 |
| 2628 | 2/14/2007 | 0:40:46 | 64 | 23.30 | 1.02 | 6.07 |
| 2630 | 2/14/2007 | 0:40:48 | 66 | 23.31 | 1.01 | 6.08 |
| 2632 | 2/14/2007 | 0:40:50 | 68 | 23.32 | 1.00 | 6.09 |
| 2634 | 2/14/2007 | 0:40:52 | 70 | 23.33 | 0.99 | 6.10 |
| 2636 | 2/14/2007 | 0:40:54 | 72 | 23.34 | 0.98 | 6.11 |
| 2638 | 2/14/2007 | 0:40:56 | 74 | 23.35 | 0.97 | 6.12 |
| 2640 | 2/14/2007 | 0:40:58 | 76 | 23.35 | 0.97 | 6.12 |
| 2642 | 2/14/2007 | 0:41:00 | 78 | 23.36 | 0.96 | 6.13 |
| 2644 | 2/14/2007 | 0:41:02 | 80 | 23.37 | 0.95 | 6.14 |
| 2646 | 2/14/2007 | 0:41:04 | 82 | 23.39 | 0.93 | 6.16 |
| 2648 | 2/14/2007 | 0:41:06 | 84 | 23.41 | 0.91 | 6.18 |
| 2650 | 2/14/2007 | 0:41:08 | 86 | 23.39 | 0.93 | 6.16 |
| 2652 | 2/14/2007 | 0:41:10 | 88 | 23.41 | 0.91 | 6.18 |
| 2654 | 2/14/2007 | 0:41:12 | 90 | 23.42 | 0.90 | 6.19 |
| 2656 | 2/14/2007 | 0:41:14 | 92 | 23.42 | 0.90 | 6.19 |
| 2658 | 2/14/2007 | 0:41:16 | 94 | 23.45 | 0.87 | 6.22 |
| 2660 | 2/14/2007 | 0:41:18 | 96 | 23.45 | 0.87 | 6.22 |
| 2662 | 2/14/2007 | 0:41:20 | 98 | 23.45 | 0.87 | 6.22 |
| 2664 | 2/14/2007 | 0:41:22 | 100 | 23.46 | 0.86 | 6.23 |
| 2666 | 2/14/2007 | 0:41:24 | 102 | 23.48 | 0.84 | 6.25 |
| 2668 | 2/14/2007 | 0:41:26 | 104 | 23.47 | 0.85 | 6.24 |
| 2670 | 2/14/2007 | 0:41:28 | 106 | 23.48 | 0.84 | 6.25 |
| 2672 | 2/14/2007 | 0:41:30 | 108 | 23.49 | 0.83 | 6.26 |
| 2674 | 2/14/2007 | 0:41:32 | 110 | 23.49 | 0.83 | 6.26 |
| 2676 | 2/14/2007 | 0:41:34 | 112 | 23.52 | 0.80 | 6.29 |
| 2678 | 2/14/2007 | 0:41:36 | 114 | 23.52 | 0.80 | 6.29 |
| 2680 | 2/14/2007 | 0:41:38 | 116 | 23.52 | 0.80 | 6.29 |
| 2682 | 2/14/2007 | 0:41:40 | 118 | 23.53 | 0.79 | 6.30 |
| 2684 | 2/14/2007 | 0:41:42 | 120 | 23.54 | 0.78 | 6.31 |
| 2686 | 2/14/2007 | 0:41:44 | 122 | 23.55 | 0.77 | 6.32 |
| 2688 | 2/14/2007 | 0:41:46 | 124 | 23.55 | 0.77 | 6.32 |
| 2690 | 2/14/2007 | 0:41:48 | 126 | 23.55 | 0.77 | 6.32 |
| 2692 | 2/14/2007 | 0:41:50 | 128 | 23.57 | 0.75 | 6.34 |
| 2697 | 2/14/2007 | 0:41:55 | 133 | 23.59 | 0.73 | 6.36 |
| 2702 | 2/14/2007 | 0:42:00 | 138 | 23.60 | 0.72 | 6.37 |
| 2707 | 2/14/2007 | 0:42:05 | 143 | 23.62 | 0.70 | 6.39 |
| 2712 | 2/14/2007 | 0:42:10 | 148 | 23.65 | 0.67 | 6.42 |
| 2717 | 2/14/2007 | 0:42:15 | 153 | 23.64 | 0.68 | 6.41 |
| 2722 | 2/14/2007 | 0:42:20 | 158 | 23.66 | 0.66 | 6.43 |
| 2727 | 2/14/2007 | 0:42:25 | 163 | 23.69 | 0.63 | 6.46 |
| 2732 | 2/14/2007 | 0:42:30 | 168 | 23.70 | 0.62 | 6.47 |
| 2737 | 2/14/2007 | 0:42:35 | 173 | 23.72 | 0.60 | 6.49 |
| 2742 | 2/14/2007 | 0:42:40 | 178 | 23.73 | 0.59 | 6.50 |
| 2747 | 2/14/2007 | 0:42:45 | 183 | 23.75 | 0.57 | 6.52 |
| 2752 | 2/14/2007 | 0:42:50 | 188 | 23.76 | 0.56 | 6.53 |
| 2757 | 2/14/2007 | 0:42:55 | 193 | 23.77 | 0.55 | 6.54 |
| 2762 | 2/14/2007 | 0:43:00 | 198 | 23.79 | 0.53 | 6.56 |
| 2772 | 2/14/2007 | 0:43:10 | 208 | 23.81 | 0.51 | 6.58 |
| 2782 | 2/14/2007 | 0:43:20 | 210 | 23.83 | 0.49 | 6.60 |
| 2792 | 2/14/2007 | 0:43:30 | 220 | 23.84 | 0.48 | 6.61 |
| 2802 | 2/14/2007 | 0:43:40 | 230 | 23.88 | 0.44 | 6.65 |
| 2812 | 2/14/2007 | 0:43:50 | 240 | 23.90 | 0.42 | 6.67 |
| 2822 | 2/14/2007 | 0:44:00 | 250 | 23.93 | 0.39 | 6.70 |
| 2832 | 2/14/2007 | 0:44:10 | 260 | 23.96 | 0.36 | 6.73 |
| 2842 | 2/14/2007 | 0:44:20 | 270 | 23.96 | 0.36 | 6.73 |
| 2852 | 2/14/2007 | 0:44:30 | 280 | 23.98 | 0.34 | 6.75 |
| 2862 | 2/14/2007 | 0:44:40 | 290 | 23.98 | 0.34 | 6.75 |
| 2872 | 2/14/2007 | 0:44:50 | 300 | 24.00 | 0.32 | 6.77 |
| 2882 | 2/14/2007 | 0:45:00 | 310 | 24.02 | 0.30 | 6.79 |
| 2912 | 2/14/2007 | 0:45:30 | 340 | 24.07 | 0.25 | 6.84 |
| 2942 | 2/14/2007 | 0:46:00 | 370 | 24.08 | 0.24 | 6.85 |
| 2972 | 2/14/2007 | 0:46:30 | 400 | 24.08 | 0.24 | 6.85 |
| 3002 | 2/14/2007 | 0:47:00 | 430 | 24.08 | 0.24 | 6.85 |
| 3032 | 2/14/2007 | 0:47:30 | 460 | 24.11 | 0.21 | 6.88 |
| 3062 | 2/14/2007 | 0:48:00 | 490 | 24.15 | 0.17 | 6.92 |
| 3092 | 2/14/2007 | 0:48:30 | 520 | 24.17 | 0.15 | 6.94 |
| 3122 | 2/14/2007 | 0:49:00 | 550 | 24.20 | 0.12 | 6.97 |
| 3152 | 2/14/2007 | 0:49:30 | 580 | 24.19 | 0.13 | 6.96 |
| 3182 | 2/14/2007 | 0:50:00 | 610 | 24.19 | 0.13 | 6.96 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3212 | 2/14/2007 | 0:50:30 | 640 | 24.22 | 0.10 | 6.99 |
| 3242 | 2/14/2007 | 0:51:00 | 670 | 24.22 | 0.10 | 6.99 |
| 3272 | 2/14/2007 | 0:51:30 | 700 | 24.24 | 0.08 | 7.01 |
| 3302 | 2/14/2007 | 0:52:00 | 730 | 24.24 | 0.08 | 7.01 |
| 3332 | 2/14/2007 | 0:52:30 | 760 | 24.25 | 0.07 | 7.02 |
| 3362 | 2/14/2007 | 0:53:00 | 790 | 24.25 | 0.07 | 7.02 |
| 3392 | 2/14/2007 | 0:53:30 | 820 | 24.25 | 0.07 | 7.02 |
| 3422 | 2/14/2007 | 0:54:00 | 850 | 24.28 | 0.04 | 7.05 |
| 3452 | 2/14/2007 | 0:54:30 | 880 | 24.28 | 0.04 | 7.05 |
| 3482 | 2/14/2007 | 0:55:00 | 910 | 24.28 | 0.04 | 7.05 |
| 3512 | 2/14/2007 | 0:55:30 | 940 | 24.32 | 0.00 | 7.09 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.00000316*** | ***ft/sec*** | ***or*** | ***3.16E-06*** | ***ft/sec*** |
| | = | ***0.0000964*** | ***cm/sec*** | ***or*** | ***9.64E-05*** | ***cm/sec*** |



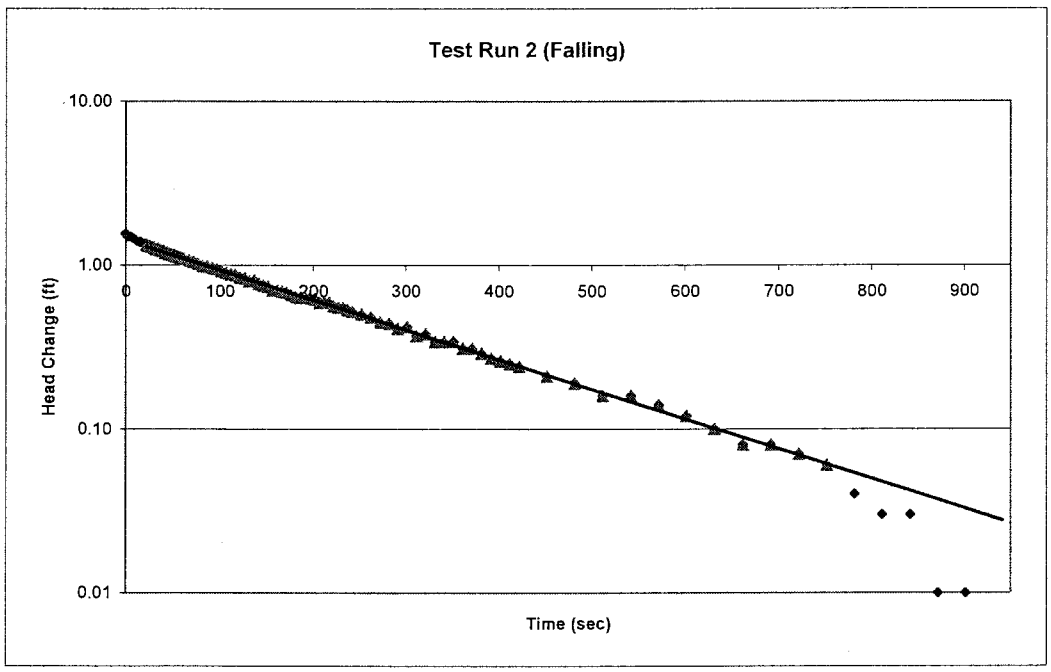
| | |
|---|---|
| $r_c$ = Radius of Well Casing (ft): | 0.083 |
| $R$ = Radius of Gravel Envelope (ft): | 0.260 |
| $R_e$ = Effective Radial Distance over which head is dissipated (ft): | 4.737 |
| $L_e$ = Length of screen of the well through which water can enter (ft): | 15 |
| $H_o$ = Drawdown at time 0 (ft): | 1.33 |
| $H_t$ = Drawdown at time t (ft): | 0.06 |
| $t$ = time (sec): | 732 |

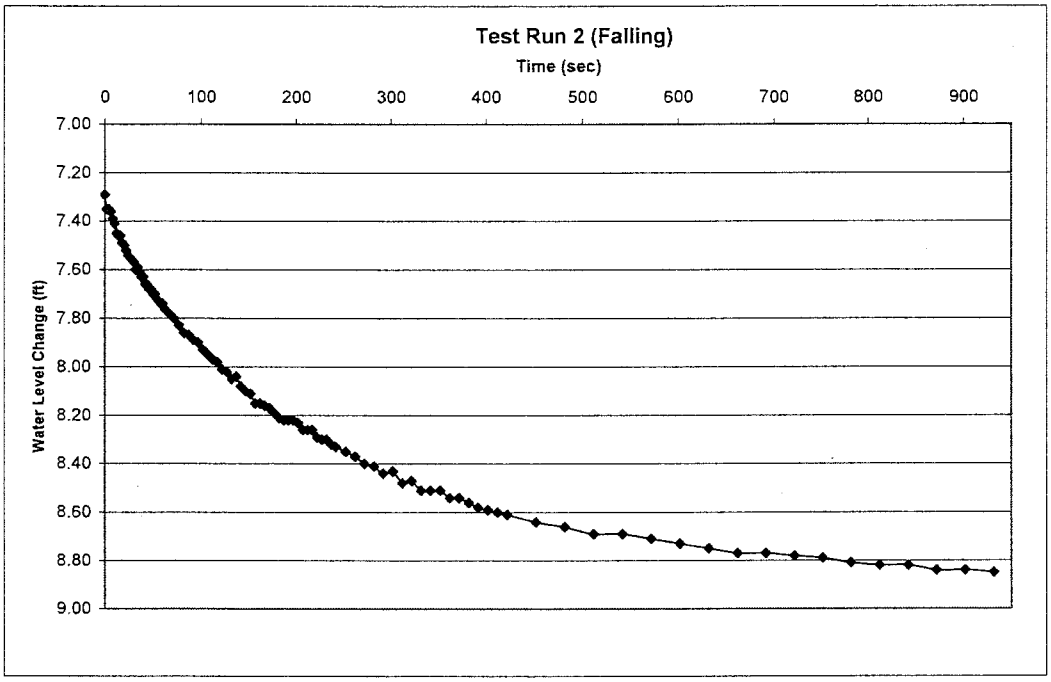
***Test Run 2 (Falling)***

| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 3660 | 2/14/2007 | 0:57:58 | 0 | 25.92 | 1.56 | 7.29 |
| 3662 | 2/14/2007 | 0:58:00 | 2 | 25.86 | 1.50 | 7.35 |
| 3664 | 2/14/2007 | 0:58:02 | 4 | 25.86 | 1.50 | 7.35 |
| 3666 | 2/14/2007 | 0:58:04 | 6 | 25.85 | 1.49 | 7.36 |
| 3668 | 2/14/2007 | 0:58:06 | 8 | 25.82 | 1.46 | 7.39 |
| 3670 | 2/14/2007 | 0:58:08 | 10 | 25.80 | 1.44 | 7.41 |
| 3672 | 2/14/2007 | 0:58:10 | 12 | 25.76 | 1.40 | 7.45 |
| 3674 | 2/14/2007 | 0:58:12 | 14 | 25.75 | 1.39 | 7.46 |
| 3676 | 2/14/2007 | 0:58:14 | 16 | 25.75 | 1.39 | 7.46 |
| 3678 | 2/14/2007 | 0:58:16 | 18 | 25.72 | 1.36 | 7.49 |
| 3680 | 2/14/2007 | 0:58:18 | 20 | 25.71 | 1.35 | 7.50 |
| 3682 | 2/14/2007 | 0:58:20 | 22 | 25.69 | 1.33 | 7.52 |
| 3684 | 2/14/2007 | 0:58:22 | 24 | 25.67 | 1.31 | 7.54 |
| 3686 | 2/14/2007 | 0:58:24 | 26 | 25.66 | 1.30 | 7.55 |
| 3688 | 2/14/2007 | 0:58:26 | 28 | 25.65 | 1.29 | 7.56 |
| 3690 | 2/14/2007 | 0:58:28 | 30 | 25.64 | 1.28 | 7.57 |
| 3692 | 2/14/2007 | 0:58:30 | 32 | 25.61 | 1.25 | 7.60 |
| 3694 | 2/14/2007 | 0:58:32 | 34 | 25.62 | 1.26 | 7.59 |
| 3696 | 2/14/2007 | 0:58:34 | 36 | 25.60 | 1.24 | 7.61 |
| 3698 | 2/14/2007 | 0:58:36 | 38 | 25.58 | 1.22 | 7.63 |
| 3700 | 2/14/2007 | 0:58:38 | 40 | 25.58 | 1.22 | 7.63 |
| 3702 | 2/14/2007 | 0:58:40 | 42 | 25.55 | 1.19 | 7.66 |
| 3704 | 2/14/2007 | 0:58:42 | 44 | 25.55 | 1.19 | 7.66 |
| 3706 | 2/14/2007 | 0:58:44 | 46 | 25.53 | 1.17 | 7.68 |
| 3708 | 2/14/2007 | 0:58:46 | 48 | 25.53 | 1.17 | 7.68 |
| 3710 | 2/14/2007 | 0:58:48 | 50 | 25.51 | 1.15 | 7.70 |
| 3712 | 2/14/2007 | 0:58:50 | 52 | 25.51 | 1.15 | 7.70 |
| 3714 | 2/14/2007 | 0:58:52 | 54 | 25.49 | 1.13 | 7.72 |
| 3716 | 2/14/2007 | 0:58:54 | 56 | 25.48 | 1.12 | 7.73 |
| 3718 | 2/14/2007 | 0:58:56 | 58 | 25.47 | 1.11 | 7.74 |
| 3720 | 2/14/2007 | 0:58:58 | 60 | 25.47 | 1.11 | 7.74 |
| 3722 | 2/14/2007 | 0:59:00 | 62 | 25.45 | 1.09 | 7.76 |
| 3727 | 2/14/2007 | 0:59:05 | 67 | 25.43 | 1.07 | 7.78 |
| 3732 | 2/14/2007 | 0:59:10 | 72 | 25.41 | 1.05 | 7.80 |
| 3737 | 2/14/2007 | 0:59:15 | 77 | 25.38 | 1.02 | 7.83 |
| 3742 | 2/14/2007 | 0:59:20 | 82 | 25.35 | 0.99 | 7.86 |
| 3747 | 2/14/2007 | 0:59:25 | 87 | 25.34 | 0.98 | 7.87 |
| 3752 | 2/14/2007 | 0:59:30 | 92 | 25.32 | 0.96 | 7.89 |
| 3757 | 2/14/2007 | 0:59:35 | 97 | 25.31 | 0.95 | 7.90 |
| 3762 | 2/14/2007 | 0:59:40 | 102 | 25.28 | 0.92 | 7.93 |
| 3767 | 2/14/2007 | 0:59:45 | 107 | 25.26 | 0.90 | 7.95 |
| 3772 | 2/14/2007 | 0:59:50 | 112 | 25.24 | 0.88 | 7.97 |
| 3777 | 2/14/2007 | 0:59:55 | 117 | 25.23 | 0.87 | 7.98 |
| 3782 | 2/14/2007 | 1:00:00 | 122 | 25.20 | 0.84 | 8.01 |
| 3787 | 2/14/2007 | 1:00:05 | 127 | 25.19 | 0.83 | 8.02 |
| 3792 | 2/14/2007 | 1:00:10 | 132 | 25.16 | 0.80 | 8.05 |
| 3797 | 2/14/2007 | 1:00:15 | 137 | 25.17 | 0.81 | 8.04 |
| 3802 | 2/14/2007 | 1:00:20 | 142 | 25.13 | 0.77 | 8.08 |
| 3807 | 2/14/2007 | 1:00:25 | 147 | 25.11 | 0.75 | 8.10 |
| 3812 | 2/14/2007 | 1:00:30 | 152 | 25.10 | 0.74 | 8.11 |
| 3817 | 2/14/2007 | 1:00:35 | 157 | 25.06 | 0.70 | 8.15 |
| 3822 | 2/14/2007 | 1:00:40 | 162 | 25.06 | 0.70 | 8.15 |
| 3827 | 2/14/2007 | 1:00:45 | 167 | 25.05 | 0.69 | 8.16 |
| 3832 | 2/14/2007 | 1:00:50 | 172 | 25.04 | 0.68 | 8.17 |
| 3837 | 2/14/2007 | 1:00:55 | 177 | 25.02 | 0.66 | 8.19 |
| 3842 | 2/14/2007 | 1:01:00 | 182 | 25.00 | 0.64 | 8.21 |
| 3847 | 2/14/2007 | 1:01:05 | 187 | 24.99 | 0.63 | 8.22 |
| 3852 | 2/14/2007 | 1:01:10 | 192 | 24.99 | 0.63 | 8.22 |
| 3857 | 2/14/2007 | 1:01:15 | 197 | 24.99 | 0.63 | 8.22 |
| 3862 | 2/14/2007 | 1:01:20 | 202 | 24.98 | 0.62 | 8.23 |
| 3867 | 2/14/2007 | 1:01:25 | 207 | 24.95 | 0.59 | 8.26 |
| 3872 | 2/14/2007 | 1:01:30 | 212 | 24.95 | 0.59 | 8.26 |
| 3877 | 2/14/2007 | 1:01:35 | 217 | 24.95 | 0.59 | 8.26 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3882 | 2/14/2007 | 1:01:40 | 222 | 24.92 | 0.56 | 8.29 |
| 3887 | 2/14/2007 | 1:01:45 | 227 | 24.91 | 0.55 | 8.30 |
| 3892 | 2/14/2007 | 1:01:50 | 232 | 24.91 | 0.55 | 8.30 |
| 3897 | 2/14/2007 | 1:01:55 | 237 | 24.89 | 0.53 | 8.32 |
| 3902 | 2/14/2007 | 1:02:00 | 242 | 24.88 | 0.52 | 8.33 |
| 3912 | 2/14/2007 | 1:02:10 | 252 | 24.86 | 0.50 | 8.35 |
| 3922 | 2/14/2007 | 1:02:20 | 262 | 24.84 | 0.48 | 8.37 |
| 3932 | 2/14/2007 | 1:02:30 | 272 | 24.81 | 0.45 | 8.40 |
| 3942 | 2/14/2007 | 1:02:40 | 282 | 24.80 | 0.44 | 8.41 |
| 3952 | 2/14/2007 | 1:02:50 | 292 | 24.77 | 0.41 | 8.44 |
| 3962 | 2/14/2007 | 1:03:00 | 302 | 24.78 | 0.42 | 8.43 |
| 3972 | 2/14/2007 | 1:03:10 | 312 | 24.73 | 0.37 | 8.48 |
| 3982 | 2/14/2007 | 1:03:20 | 322 | 24.74 | 0.38 | 8.47 |
| 3992 | 2/14/2007 | 1:03:30 | 332 | 24.70 | 0.34 | 8.51 |
| 4002 | 2/14/2007 | 1:03:40 | 342 | 24.70 | 0.34 | 8.51 |
| 4012 | 2/14/2007 | 1:03:50 | 352 | 24.70 | 0.34 | 8.51 |
| 4022 | 2/14/2007 | 1:04:00 | 362 | 24.67 | 0.31 | 8.54 |
| 4032 | 2/14/2007 | 1:04:10 | 372 | 24.67 | 0.31 | 8.54 |
| 4042 | 2/14/2007 | 1:04:20 | 382 | 24.65 | 0.29 | 8.56 |
| 4052 | 2/14/2007 | 1:04:30 | 392 | 24.63 | 0.27 | 8.58 |
| 4062 | 2/14/2007 | 1:04:40 | 402 | 24.62 | 0.26 | 8.59 |
| 4072 | 2/14/2007 | 1:04:50 | 412 | 24.61 | 0.25 | 8.60 |
| 4082 | 2/14/2007 | 1:05:00 | 422 | 24.60 | 0.24 | 8.61 |
| 4112 | 2/14/2007 | 1:05:30 | 452 | 24.57 | 0.21 | 8.64 |
| 4142 | 2/14/2007 | 1:06:00 | 482 | 24.55 | 0.19 | 8.66 |
| 4172 | 2/14/2007 | 1:06:30 | 512 | 24.52 | 0.16 | 8.69 |
| 4202 | 2/14/2007 | 1:07:00 | 542 | 24.52 | 0.16 | 8.69 |
| 4232 | 2/14/2007 | 1:07:30 | 572 | 24.50 | 0.14 | 8.71 |
| 4262 | 2/14/2007 | 1:08:00 | 602 | 24.48 | 0.12 | 8.73 |
| 4292 | 2/14/2007 | 1:08:30 | 632 | 24.46 | 0.10 | 8.75 |
| 4322 | 2/14/2007 | 1:09:00 | 662 | 24.44 | 0.08 | 8.77 |
| 4352 | 2/14/2007 | 1:09:30 | 692 | 24.44 | 0.08 | 8.77 |
| 4382 | 2/14/2007 | 1:10:00 | 722 | 24.43 | 0.07 | 8.78 |
| 4412 | 2/14/2007 | 1:10:30 | 752 | 24.42 | 0.06 | 8.79 |
| 4442 | 2/14/2007 | 1:11:00 | 782 | 24.40 | 0.04 | 8.81 |
| 4472 | 2/14/2007 | 1:11:30 | 812 | 24.39 | 0.03 | 8.82 |
| 4502 | 2/14/2007 | 1:12:00 | 842 | 24.39 | 0.03 | 8.82 |
| 4532 | 2/14/2007 | 1:12:30 | 872 | 24.37 | 0.01 | 8.84 |
| 4562 | 2/14/2007 | 1:13:00 | 902 | 24.37 | 0.01 | 8.84 |
| 4592 | 2/14/2007 | 1:13:30 | 932 | 24.36 | 0.00 | 8.85 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.00000282*** | ***ft/sec*** | ***or*** | ***2.82E-06*** | ***ft/sec*** |
| | = | ***0.0000860*** | ***cm/sec*** | ***or*** | ***8.60E-05*** | ***cm/sec*** |






***Analysis by JJK of Joyce Engineering, Inc.***

## *Coble's Sandrock Phase 3 Expansion*

| | |
|---|---|
| Well/Piezometer: | **P-32** |
| Initial Measured Depth to Water: | 24.99' |
| Final Measured Depth to Water: | 24.97' |
| Screen Interval: | 17.50' - 42.50' |
| Total Well Depth: | 42.50' |
| Date(s) for Slug Testing: | 2/12/2007 |

*A 1.6"x36" bailer was used to complete the slug test.

| | |
|---|---|
| *A* = Function of *Le/R*: | 3.605 |
| *B* = Function of *Le/R*: | 0.585 |
| *h* = The saturated thickness of the aquifer (ft): | 19.01 |
| *Lw* = Difference from water table to bottom of borehole or well screen (ft): | 17.51 |
| *rc* = Radius of Well Casing (ft): | 0.083 |
| *R* = Radius of Gravel Envelope (ft): | 0.260 |
| *Re* = Effective Radial Distance over which head is dissipated (ft): | 6.583 |
| *Le* = Length of screen of the well through which water can enter (ft): | 25 |
| *Ho* = Drawdown at time 0 (ft): | 0.13 |
| *Ht* = Drawdown at time t (ft): | 0.03 |
| *t* = time (sec): | 7800 |

The Bouwer and Rice Equation is used for all hydraulic conductivity calculations in this study.

$$K = \frac{r_c^2 LN(R_e/R)}{2L_e}\left(\frac{1}{t}\right)LN\left(\frac{H_o}{H_t}\right)$$

Bouwer and Rice present the equation below as a method to estimate *LN(Re/R)*. This method is ultimately used to solve for *Re* This equation is used if the distance from the water table to the bottom of the borehole or well screen is less than the saturated thickness of the aquifer.

$$LN\left(\frac{R_e}{R}\right) = \left[\frac{1.1}{LN(L_w/R)} + \frac{A + B * LN[(h - L_w)/R]}{L_e/R}\right]^{-1}$$

A & B are determined from a graph determined by Bouwer and Rice.

*Re* = 6.583

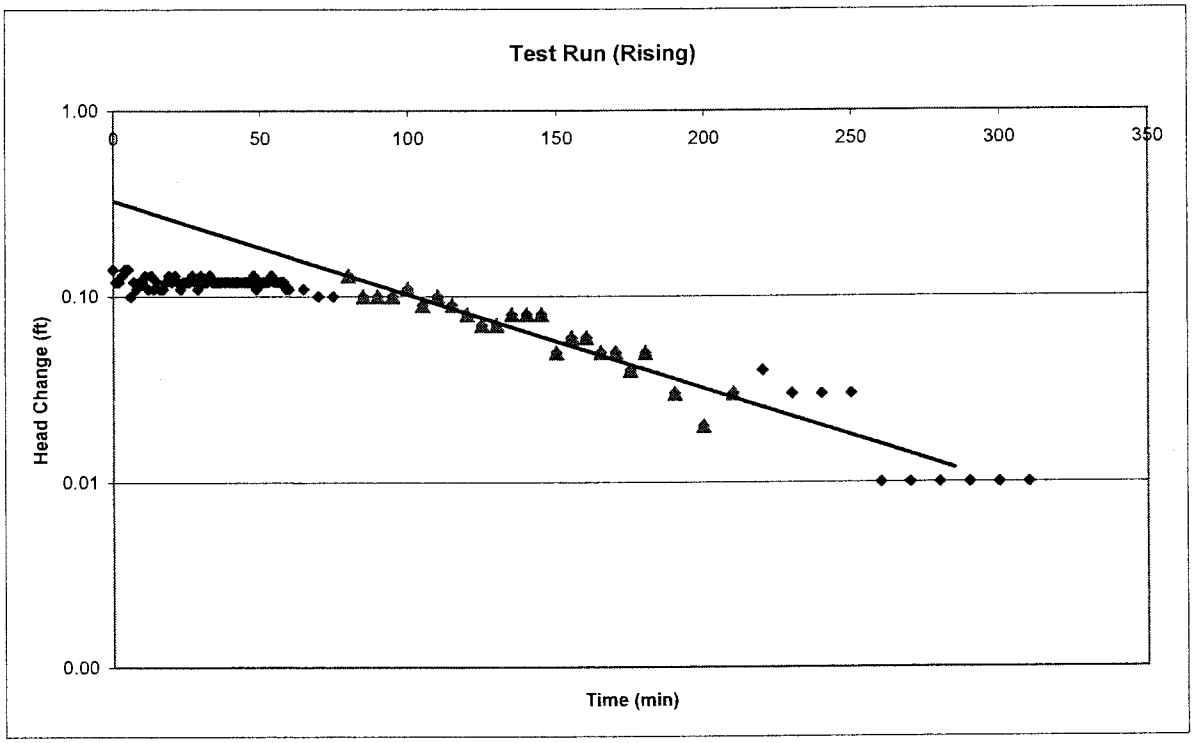
***Hydraulic Conductivity:*** ***8.37E-08*** ***ft/sec***
***2.55E-06*** ***cm/sec***

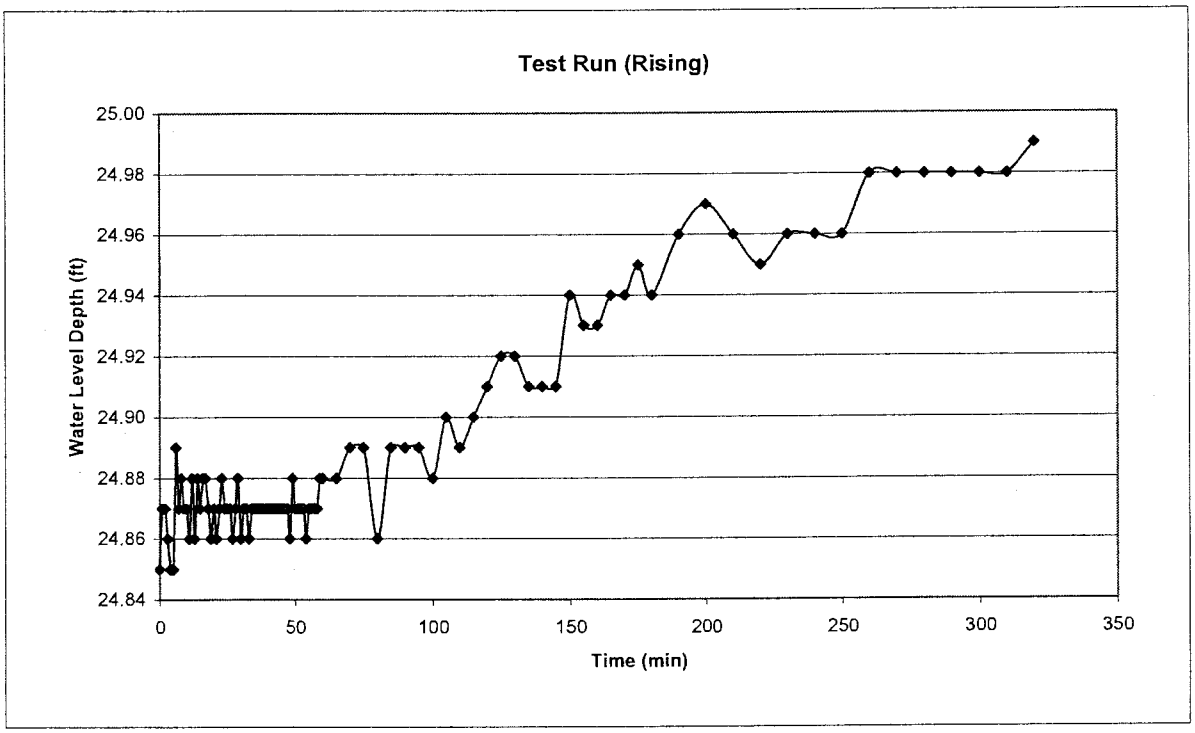
***Test Run (Rising)***

| No. | Date | Time | Time (Min) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 319 | 2/12/2007 | 5:00:52 | 0 | 14.23 | 0.14 | 24.85 |
| 323 | 2/12/2007 | 5:01:52 | 1 | 14.25 | 0.12 | 24.87 |
| 327 | 2/12/2007 | 5:02:52 | 2 | 14.25 | 0.12 | 24.87 |
| 331 | 2/12/2007 | 5:03:52 | 3 | 14.24 | 0.13 | 24.86 |
| 335 | 2/12/2007 | 5:04:52 | 4 | 14.23 | 0.14 | 24.85 |
| 339 | 2/12/2007 | 5:05:52 | 5 | 14.23 | 0.14 | 24.85 |
| 343 | 2/12/2007 | 5:06:52 | 6 | 14.27 | 0.10 | 24.89 |
| 347 | 2/12/2007 | 5:07:52 | 7 | 14.25 | 0.12 | 24.87 |
| 351 | 2/12/2007 | 5:08:52 | 8 | 14.26 | 0.11 | 24.88 |
| 355 | 2/12/2007 | 5:09:52 | 9 | 14.25 | 0.12 | 24.87 |
| 359 | 2/12/2007 | 5:10:52 | 10 | 14.25 | 0.12 | 24.87 |
| 363 | 2/12/2007 | 5:11:52 | 11 | 14.24 | 0.13 | 24.86 |
| 367 | 2/12/2007 | 5:12:52 | 12 | 14.26 | 0.11 | 24.88 |
| 371 | 2/12/2007 | 5:13:52 | 13 | 14.24 | 0.13 | 24.86 |
| 375 | 2/12/2007 | 5:14:52 | 14 | 14.26 | 0.11 | 24.88 |
| 379 | 2/12/2007 | 5:15:52 | 15 | 14.25 | 0.12 | 24.87 |
| 383 | 2/12/2007 | 5:16:52 | 16 | 14.26 | 0.11 | 24.88 |
| 387 | 2/12/2007 | 5:17:52 | 17 | 14.26 | 0.11 | 24.88 |
| 391 | 2/12/2007 | 5:18:52 | 18 | 14.25 | 0.12 | 24.87 |
| 395 | 2/12/2007 | 5:19:52 | 19 | 14.24 | 0.13 | 24.86 |
| 399 | 2/12/2007 | 5:20:52 | 20 | 14.25 | 0.12 | 24.87 |
| 403 | 2/12/2007 | 5:21:52 | 21 | 14.24 | 0.13 | 24.86 |
| 407 | 2/12/2007 | 5:22:52 | 22 | 14.25 | 0.12 | 24.87 |
| 411 | 2/12/2007 | 5:23:52 | 23 | 14.26 | 0.11 | 24.88 |
| 415 | 2/12/2007 | 5:24:52 | 24 | 14.25 | 0.12 | 24.87 |
| 419 | 2/12/2007 | 5:25:52 | 25 | 14.25 | 0.12 | 24.87 |
| 423 | 2/12/2007 | 5:26:52 | 26 | 14.25 | 0.12 | 24.87 |
| 427 | 2/12/2007 | 5:27:52 | 27 | 14.24 | 0.13 | 24.86 |
| 431 | 2/12/2007 | 5:28:52 | 28 | 14.25 | 0.12 | 24.87 |
| 435 | 2/12/2007 | 5:29:52 | 29 | 14.26 | 0.11 | 24.88 |
| 439 | 2/12/2007 | 5:30:52 | 30 | 14.24 | 0.13 | 24.86 |
| 443 | 2/12/2007 | 5:31:52 | 31 | 14.25 | 0.12 | 24.87 |
| 447 | 2/12/2007 | 5:32:52 | 32 | 14.25 | 0.12 | 24.87 |
| 451 | 2/12/2007 | 5:33:52 | 33 | 14.24 | 0.13 | 24.86 |
| 455 | 2/12/2007 | 5:34:52 | 34 | 14.25 | 0.12 | 24.87 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 459 | 2/12/2007 | 5:35:52 | 35 | 14.25 | 0.12 | 24.87 |
| 463 | 2/12/2007 | 5:36:52 | 36 | 14.25 | 0.12 | 24.87 |
| 467 | 2/12/2007 | 5:37:52 | 37 | 14.25 | 0.12 | 24.87 |
| 471 | 2/12/2007 | 5:38:52 | 38 | 14.25 | 0.12 | 24.87 |
| 475 | 2/12/2007 | 5:39:52 | 39 | 14.25 | 0.12 | 24.87 |
| 479 | 2/12/2007 | 5:40:52 | 40 | 14.25 | 0.12 | 24.87 |
| 483 | 2/12/2007 | 5:41:52 | 41 | 14.25 | 0.12 | 24.87 |
| 487 | 2/12/2007 | 5:42:52 | 42 | 14.25 | 0.12 | 24.87 |
| 491 | 2/12/2007 | 5:43:52 | 43 | 14.25 | 0.12 | 24.87 |
| 495 | 2/12/2007 | 5:44:52 | 44 | 14.25 | 0.12 | 24.87 |
| 499 | 2/12/2007 | 5:45:52 | 45 | 14.25 | 0.12 | 24.87 |
| 503 | 2/12/2007 | 5:46:52 | 46 | 14.25 | 0.12 | 24.87 |
| 507 | 2/12/2007 | 5:47:52 | 47 | 14.25 | 0.12 | 24.87 |
| 511 | 2/12/2007 | 5:48:52 | 48 | 14.24 | 0.13 | 24.86 |
| 515 | 2/12/2007 | 5:49:52 | 49 | 14.26 | 0.11 | 24.88 |
| 519 | 2/12/2007 | 5:50:52 | 50 | 14.25 | 0.12 | 24.87 |
| 523 | 2/12/2007 | 5:51:52 | 51 | 14.25 | 0.12 | 24.87 |
| 527 | 2/12/2007 | 5:52:52 | 52 | 14.25 | 0.12 | 24.87 |
| 531 | 2/12/2007 | 5:53:52 | 53 | 14.25 | 0.12 | 24.87 |
| 535 | 2/12/2007 | 5:54:52 | 54 | 14.24 | 0.13 | 24.86 |
| 539 | 2/12/2007 | 5:55:52 | 55 | 14.25 | 0.12 | 24.87 |
| 543 | 2/12/2007 | 5:56:52 | 56 | 14.25 | 0.12 | 24.87 |
| 547 | 2/12/2007 | 5:57:52 | 57 | 14.25 | 0.12 | 24.87 |
| 551 | 2/12/2007 | 5:58:52 | 58 | 14.25 | 0.12 | 24.87 |
| 555 | 2/12/2007 | 5:59:52 | 59 | 14.26 | 0.11 | 24.88 |
| 559 | 2/12/2007 | 6:00:52 | 60 | 14.26 | 0.11 | 24.88 |
| 579 | 2/12/2007 | 6:05:52 | 65 | 14.26 | 0.11 | 24.88 |
| 599 | 2/12/2007 | 6:10:52 | 70 | 14.27 | 0.10 | 24.89 |
| 619 | 2/12/2007 | 6:15:52 | 75 | 14.27 | 0.10 | 24.89 |
| 639 | 2/12/2007 | 6:20:52 | 80 | 14.24 | 0.13 | 24.86 |
| 659 | 2/12/2007 | 6:25:52 | 85 | 14.27 | 0.10 | 24.89 |
| 679 | 2/12/2007 | 6:30:52 | 90 | 14.27 | 0.10 | 24.89 |
| 699 | 2/12/2007 | 6:35:52 | 95 | 14.27 | 0.10 | 24.89 |
| 719 | 2/12/2007 | 6:40:52 | 100 | 14.26 | 0.11 | 24.88 |
| 739 | 2/12/2007 | 6:45:52 | 105 | 14.28 | 0.09 | 24.90 |
| 763 | 2/12/2007 | 6:50:52 | 110 | 14.27 | 0.10 | 24.89 |
| 779 | 2/12/2007 | 6:55:52 | 115 | 14.28 | 0.09 | 24.90 |
| 799 | 2/12/2007 | 7:00:52 | 120 | 14.29 | 0.08 | 24.91 |
| 819 | 2/12/2007 | 7:05:52 | 125 | 14.3 | 0.07 | 24.92 |
| 839 | 2/12/2007 | 7:10:52 | 130 | 14.3 | 0.07 | 24.92 |
| 859 | 2/12/2007 | 7:15:52 | 135 | 14.29 | 0.08 | 24.91 |
| 879 | 2/12/2007 | 7:20:52 | 140 | 14.29 | 0.08 | 24.91 |
| 899 | 2/12/2007 | 7:25:52 | 145 | 14.29 | 0.08 | 24.91 |
| 919 | 2/12/2007 | 7:30:52 | 150 | 14.32 | 0.05 | 24.94 |
| 939 | 2/12/2007 | 7:35:52 | 155 | 14.31 | 0.06 | 24.93 |
| 959 | 2/12/2007 | 7:40:52 | 160 | 14.31 | 0.06 | 24.93 |
| 979 | 2/12/2007 | 7:45:52 | 165 | 14.32 | 0.05 | 24.94 |
| 999 | 2/12/2007 | 7:50:52 | 170 | 14.32 | 0.05 | 24.94 |
| 1019 | 2/12/2007 | 7:55:52 | 175 | 14.33 | 0.04 | 24.95 |
| 1039 | 2/12/2007 | 8:00:52 | 180 | 14.32 | 0.05 | 24.94 |
| 1079 | 2/12/2007 | 8:10:52 | 190 | 14.34 | 0.03 | 24.96 |
| 1119 | 2/12/2007 | 8:20:52 | 200 | 14.35 | 0.02 | 24.97 |
| 1159 | 2/12/2007 | 8:30:52 | 210 | 14.34 | 0.03 | 24.96 |
| 1199 | 2/12/2007 | 8:40:52 | 220 | 14.33 | 0.04 | 24.95 |
| 1239 | 2/12/2007 | 8:50:52 | 230 | 14.34 | 0.03 | 24.96 |
| 1279 | 2/12/2007 | 9:00:52 | 240 | 14.34 | 0.03 | 24.96 |
| 1319 | 2/12/2007 | 9:10:52 | 250 | 14.34 | 0.03 | 24.96 |
| 1359 | 2/12/2007 | 9:20:52 | 260 | 14.36 | 0.01 | 24.98 |
| 1399 | 2/12/2007 | 9:30:52 | 270 | 14.36 | 0.01 | 24.98 |
| 1439 | 2/12/2007 | 9:40:52 | 280 | 14.36 | 0.01 | 24.98 |
| 1479 | 2/12/2007 | 9:50:52 | 290 | 14.36 | 0.01 | 24.98 |
| 1519 | 2/12/2007 | 10:00:52 | 300 | 14.36 | 0.01 | 24.98 |
| 1559 | 2/12/2007 | 10:10:52 | 310 | 14.36 | 0.01 | 24.98 |
| 1599 | 2/12/2007 | 10:20:52 | 320 | 14.37 | 0.00 | 24.99 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | ***=*** | ***0.0000000837*** | ***ft/sec*** | ***or*** | ***8.37E-08*** | ***ft/sec*** |
| | ***=*** | ***0.000002551*** | ***cm/sec*** | ***or*** | ***2.55E-06*** | ***cm/sec*** |




*Analysis by JJK of Joyce Engineering, Inc.*

## *Coble's Sandrock Phase 3 Expansion*

| | |
|---|---|
| Well/Piezometer: | **P-33** |
| Initial Measured Depth to Water: | 25.24' |
| Final Measured Depth to Water: | 25.30' |
| Screen Interval: | 17.50' - 37.50' |
| Total Well Depth: | 37.50' |
| Date(s) for Slug Testing: | 2/12/2007 |

*A 1.6"x36" bailer was used to complete the slug test.

| | |
|---|---|
| *A* = Function of *Le/R*: | 3.024 |
| *B* = Function of *Le/R*: | 0.485 |
| *h* = The saturated thickness of the aquifer (ft): | 14.76 |
| *Lw* = Difference from water table to bottom of borehole or well screen (ft): | 12.26 |
| *rc* = Radius of Well Casing (ft): | 0.083 |
| *R* = Radius of Gravel Envelope (ft): | 0.260 |
| *Re* = Effective Radial Distance over which head is dissipated (ft): | 4.965 |
| *Le* = Length of screen of the well through which water can enter (ft): | 20 |
| *Ho* = Drawdown at time 0 (ft): | 0.18 |
| *Ht* = Drawdown at time t (ft): | 0.04 |
| *t* = time (sec): | 1110 |

The Bouwer and Rice Equation is used for all hydraulic conductivity calculations in this study.

$$K = \frac{r_c^2 LN(R_e/R)}{2L_e}\left(\frac{1}{t}\right)LN\left(\frac{H_o}{H_t}\right)$$

Bouwer and Rice present the equation below as a method to estimate *LN(Re/R)*. This method is ultimately used to solve for *Re* This equation is used if the distance from the water table to the bottom of the borehole or well screen is less than the saturated thickness of the aquifer.

$$LN\left(\frac{R_e}{R}\right) = \left[\frac{1.1}{LN(L_w/R)} + \frac{A + B * LN[(h - L_w)/R]}{L_e/R}\right]^{-1}$$

A & B are determined from a graph determined by Bouwer and Rice.

*Re* = 4.965

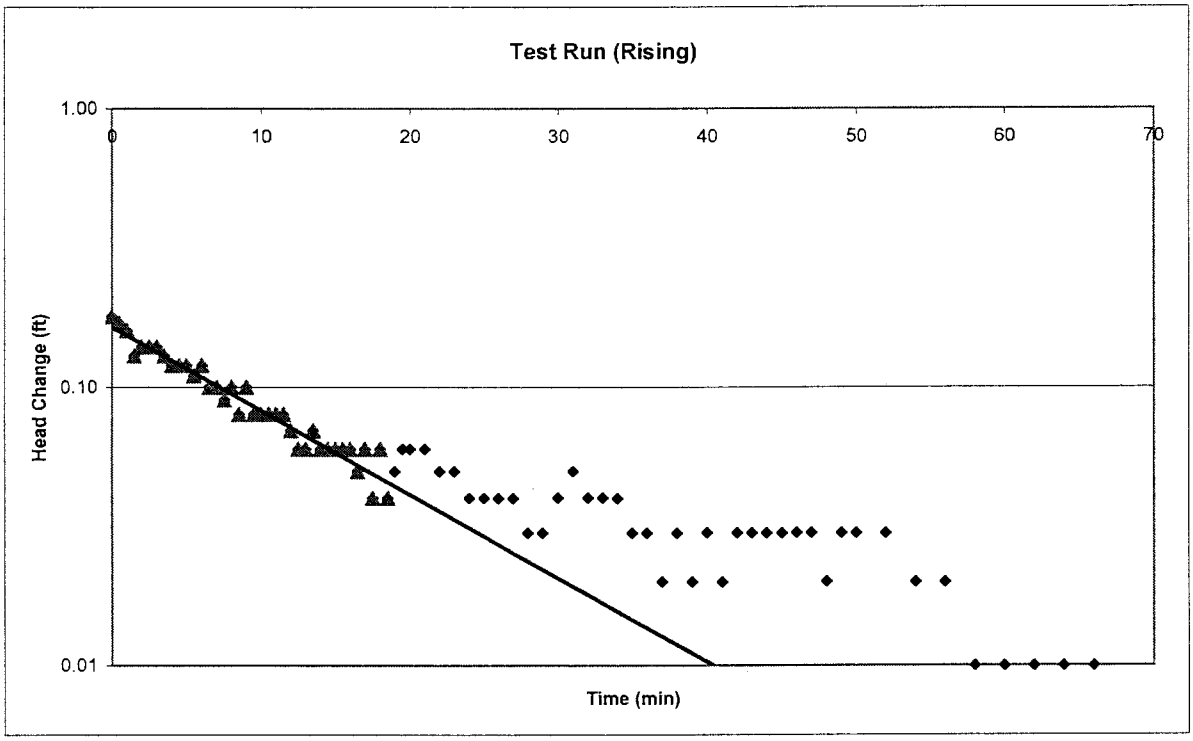
***Hydraulic Conductivity:*** ***6.88E-07*** ***ft/sec***
***2.10E-05*** ***cm/sec***

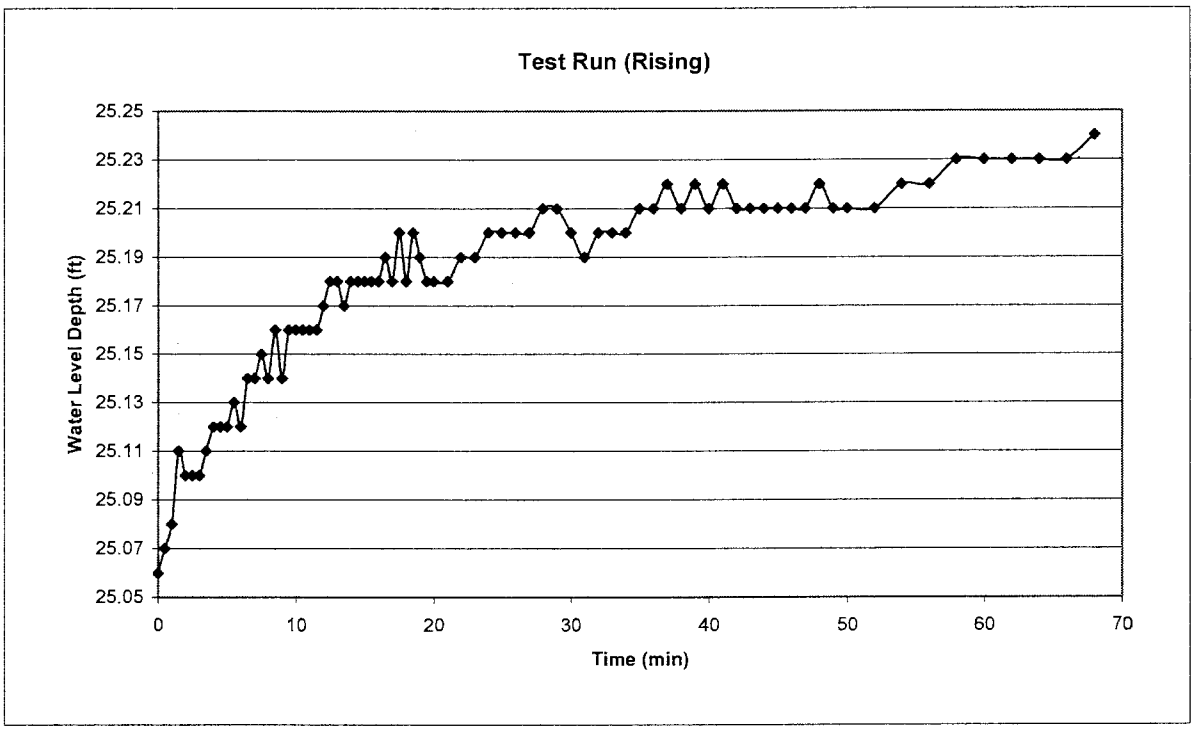
***Test Run (Rising)***

| No. | Date | Time | Time (Min) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 56 | 2/12/2007 | 4:17:13 | 0 | 12.27 | 0.18 | 25.06 |
| 58 | 2/12/2007 | 4:17:43 | 0.5 | 12.28 | 0.17 | 25.07 |
| 60 | 2/12/2007 | 4:18:13 | 1 | 12.29 | 0.16 | 25.08 |
| 62 | 2/12/2007 | 4:18:43 | 1.5 | 12.32 | 0.13 | 25.11 |
| 64 | 2/12/2007 | 4:19:13 | 2 | 12.31 | 0.14 | 25.10 |
| 66 | 2/12/2007 | 4:19:43 | 2.5 | 12.31 | 0.14 | 25.10 |
| 68 | 2/12/2007 | 4:20:13 | 3 | 12.31 | 0.14 | 25.10 |
| 70 | 2/12/2007 | 4:20:43 | 3.5 | 12.32 | 0.13 | 25.11 |
| 72 | 2/12/2007 | 4:21:13 | 4 | 12.33 | 0.12 | 25.12 |
| 74 | 2/12/2007 | 4:21:43 | 4.5 | 12.33 | 0.12 | 25.12 |
| 76 | 2/12/2007 | 4:22:13 | 5 | 12.33 | 0.12 | 25.12 |
| 78 | 2/12/2007 | 4:22:43 | 5.5 | 12.34 | 0.11 | 25.13 |
| 80 | 2/12/2007 | 4:23:13 | 6 | 12.33 | 0.12 | 25.12 |
| 82 | 2/12/2007 | 4:23:43 | 6.5 | 12.35 | 0.10 | 25.14 |
| 84 | 2/12/2007 | 4:24:13 | 7 | 12.35 | 0.10 | 25.14 |
| 86 | 2/12/2007 | 4:24:43 | 7.5 | 12.36 | 0.09 | 25.15 |
| 88 | 2/12/2007 | 4:25:13 | 8 | 12.35 | 0.10 | 25.14 |
| 90 | 2/12/2007 | 4:25:43 | 8.5 | 12.37 | 0.08 | 25.16 |
| 92 | 2/12/2007 | 4:26:13 | 9 | 12.35 | 0.10 | 25.14 |
| 94 | 2/12/2007 | 4:26:43 | 9.5 | 12.37 | 0.08 | 25.16 |
| 96 | 2/12/2007 | 4:27:13 | 10 | 12.37 | 0.08 | 25.16 |
| 98 | 2/12/2007 | 4:27:43 | 10.5 | 12.37 | 0.08 | 25.16 |
| 100 | 2/12/2007 | 4:28:13 | 11 | 12.37 | 0.08 | 25.16 |
| 102 | 2/12/2007 | 4:28:43 | 11.5 | 12.37 | 0.08 | 25.16 |
| 104 | 2/12/2007 | 4:29:13 | 12 | 12.38 | 0.07 | 25.17 |
| 106 | 2/12/2007 | 4:29:43 | 12.5 | 12.39 | 0.06 | 25.18 |
| 108 | 2/12/2007 | 4:30:13 | 13 | 12.39 | 0.06 | 25.18 |
| 110 | 2/12/2007 | 4:30:43 | 13.5 | 12.38 | 0.07 | 25.17 |
| 112 | 2/12/2007 | 4:31:13 | 14 | 12.39 | 0.06 | 25.18 |
| 114 | 2/12/2007 | 4:31:43 | 14.5 | 12.39 | 0.06 | 25.18 |
| 116 | 2/12/2007 | 4:32:13 | 15 | 12.39 | 0.06 | 25.18 |
| 118 | 2/12/2007 | 4:32:43 | 15.5 | 12.39 | 0.06 | 25.18 |
| 120 | 2/12/2007 | 4:33:13 | 16 | 12.39 | 0.06 | 25.18 |
| 122 | 2/12/2007 | 4:33:43 | 16.5 | 12.4 | 0.05 | 25.19 |
| 124 | 2/12/2007 | 4:34:13 | 17 | 12.39 | 0.06 | 25.18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 126 | 2/12/2007 | 4:34:43 | 17.5 | 12.41 | 0.04 | 25.20 |
| 128 | 2/12/2007 | 4:35:13 | 18 | 12.39 | 0.06 | 25.18 |
| 130 | 2/12/2007 | 4:35:43 | 18.5 | 12.41 | 0.04 | 25.20 |
| 132 | 2/12/2007 | 4:36:13 | 19 | 12.4 | 0.05 | 25.19 |
| 134 | 2/12/2007 | 4:36:43 | 19.5 | 12.39 | 0.06 | 25.18 |
| 136 | 2/12/2007 | 4:37:13 | 20 | 12.39 | 0.06 | 25.18 |
| 140 | 2/12/2007 | 4:38:13 | 21 | 12.39 | 0.06 | 25.18 |
| 144 | 2/12/2007 | 4:39:13 | 22 | 12.4 | 0.05 | 25.19 |
| 148 | 2/12/2007 | 4:40:13 | 23 | 12.4 | 0.05 | 25.19 |
| 152 | 2/12/2007 | 4:41:13 | 24 | 12.41 | 0.04 | 25.20 |
| 156 | 2/12/2007 | 4:42:13 | 25 | 12.41 | 0.04 | 25.20 |
| 160 | 2/12/2007 | 4:43:13 | 26 | 12.41 | 0.04 | 25.20 |
| 164 | 2/12/2007 | 4:44:13 | 27 | 12.41 | 0.04 | 25.20 |
| 168 | 2/12/2007 | 4:45:13 | 28 | 12.42 | 0.03 | 25.21 |
| 172 | 2/12/2007 | 4:46:13 | 29 | 12.42 | 0.03 | 25.21 |
| 176 | 2/12/2007 | 4:47:13 | 30 | 12.41 | 0.04 | 25.20 |
| 180 | 2/12/2007 | 4:48:13 | 31 | 12.4 | 0.05 | 25.19 |
| 184 | 2/12/2007 | 4:49:13 | 32 | 12.41 | 0.04 | 25.20 |
| 188 | 2/12/2007 | 4:50:13 | 33 | 12.41 | 0.04 | 25.20 |
| 192 | 2/12/2007 | 4:51:13 | 34 | 12.41 | 0.04 | 25.20 |
| 196 | 2/12/2007 | 4:52:13 | 35 | 12.42 | 0.03 | 25.21 |
| 200 | 2/12/2007 | 4:53:13 | 36 | 12.42 | 0.03 | 25.21 |
| 204 | 2/12/2007 | 4:54:13 | 37 | 12.43 | 0.02 | 25.22 |
| 208 | 2/12/2007 | 4:55:13 | 38 | 12.42 | 0.03 | 25.21 |
| 212 | 2/12/2007 | 4:56:13 | 39 | 12.43 | 0.02 | 25.22 |
| 216 | 2/12/2007 | 4:57:13 | 40 | 12.42 | 0.03 | 25.21 |
| 220 | 2/12/2007 | 4:58:13 | 41 | 12.43 | 0.02 | 25.22 |
| 224 | 2/12/2007 | 4:59:13 | 42 | 12.42 | 0.03 | 25.21 |
| 228 | 2/12/2007 | 5:00:13 | 43 | 12.42 | 0.03 | 25.21 |
| 232 | 2/12/2007 | 5:01:13 | 44 | 12.42 | 0.03 | 25.21 |
| 236 | 2/12/2007 | 5:02:13 | 45 | 12.42 | 0.03 | 25.21 |
| 240 | 2/12/2007 | 5:03:13 | 46 | 12.42 | 0.03 | 25.21 |
| 244 | 2/12/2007 | 5:04:13 | 47 | 12.42 | 0.03 | 25.21 |
| 248 | 2/12/2007 | 5:05:13 | 48 | 12.43 | 0.02 | 25.22 |
| 252 | 2/12/2007 | 5:06:13 | 49 | 12.42 | 0.03 | 25.21 |
| 256 | 2/12/2007 | 5:07:13 | 50 | 12.42 | 0.03 | 25.21 |
| 264 | 2/12/2007 | 5:09:13 | 52 | 12.42 | 0.03 | 25.21 |
| 272 | 2/12/2007 | 5:11:13 | 54 | 12.43 | 0.02 | 25.22 |
| 280 | 2/12/2007 | 5:13:13 | 56 | 12.43 | 0.02 | 25.22 |
| 288 | 2/12/2007 | 5:15:13 | 58 | 12.44 | 0.01 | 25.23 |
| 296 | 2/12/2007 | 5:17:13 | 60 | 12.44 | 0.01 | 25.23 |
| 304 | 2/12/2007 | 5:19:13 | 62 | 12.44 | 0.01 | 25.23 |
| 312 | 2/12/2007 | 5:21:13 | 64 | 12.44 | 0.01 | 25.23 |
| 320 | 2/12/2007 | 5:23:13 | 66 | 12.44 | 0.01 | 25.23 |
| 328 | 2/12/2007 | 5:25:13 | 68 | 12.45 | 0.00 | 25.24 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.000000688*** | ***ft/sec*** | ***or*** | ***6.88E-07*** | ***ft/sec*** |
| | = | ***0.0000210*** | ***cm/sec*** | ***or*** | ***2.10E-05*** | ***cm/sec*** |




*Analysis by JJK of Joyce Engineering, Inc.*

## *Coble's Sandrock Phase 3 Expansion*

| | |
|---|---|
| Well/Piezometer: | P-34 |
| Initial Measured Depth to Water: | 7.13 |
| Final Measured Depth to Water: | 7.17 |
| Screen Interval: | 10.50' - 25.50' |
| Total Well Depth: | 25.50' |
| Date(s) for Slug Testing: | 2/13/2007 |

*A 1.6"x48" bailer was used to complete the slug test.

| | |
|---|---|
| *A* = Function of *Le/R*: | 2.613 |
| *B* = Function of *Le/R*: | 0.428 |
| *h* = The saturated thickness of the aquifer (ft): | 22.87 |
| *Lw* = Difference from water table to bottom of borehole or well screen (ft): | 18.37 |
| *rc* = Radius of Well Casing (ft): | 0.083 |
| *R* = Radius of Gravel Envelope (ft): | 0.458 |
| *Re* = Effective Radial Distance over which head is dissipated (ft): | 5.325 |
| *Le* = Length of screen of the well through which water can enter (ft): | 15 |
| *Ho* = Drawdown at time 0 (ft): | 0.76 |
| *Ht* = Drawdown at time t (ft): | 0.1 |
| *t* = time (sec): | 215 |

The Bouwer and Rice Equation is used for all hydraulic conductivity calculations in this study.

$$K = \frac{r_c^2 LN(R_e/R)}{2L_e}\left(\frac{1}{t}\right)LN\left(\frac{H_o}{H_t}\right)$$

Bouwer and Rice present the equation below as a method to estimate *LN(Re/R)*. This method is ultimately used to solve for *Re* This equation is used if the distance from the water table to the bottom of the borehole or well screen is less than the saturated thickness of the aquifer.

$$LN\left(\frac{R_e}{R}\right) = \left[\frac{1.1}{LN(L_w/R)} + \frac{A + B * LN[(h - L_w)/R]}{L_e/R}\right]^{-1}$$

A & B are determined from a graph determined by Bouwer and Rice.

*Re* = 5.325

| | | |
|---|---|---|
| ***Hydraulic Conductivity (Rising):*** | ***5.31E-06*** | ***ft/sec*** |
| | ***1.62E-04*** | ***cm/sec*** |
| ***Hydraulic Conductivity (Falling):*** | ***6.49E-06*** | ***ft/sec*** |
| | ***1.98E-04*** | ***cm/sec*** |

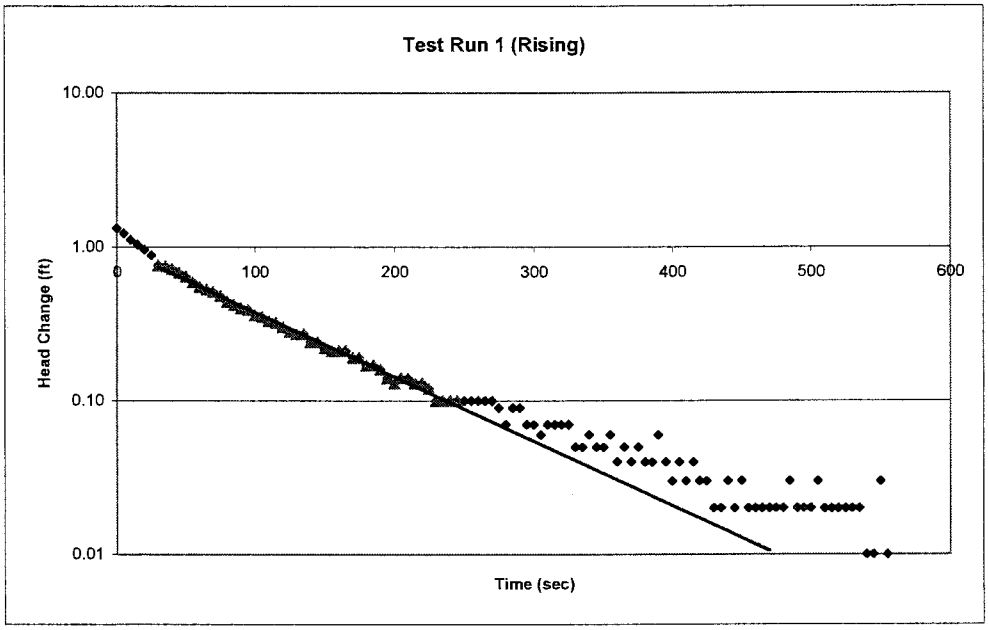
***Test Run 1 (Rising)***

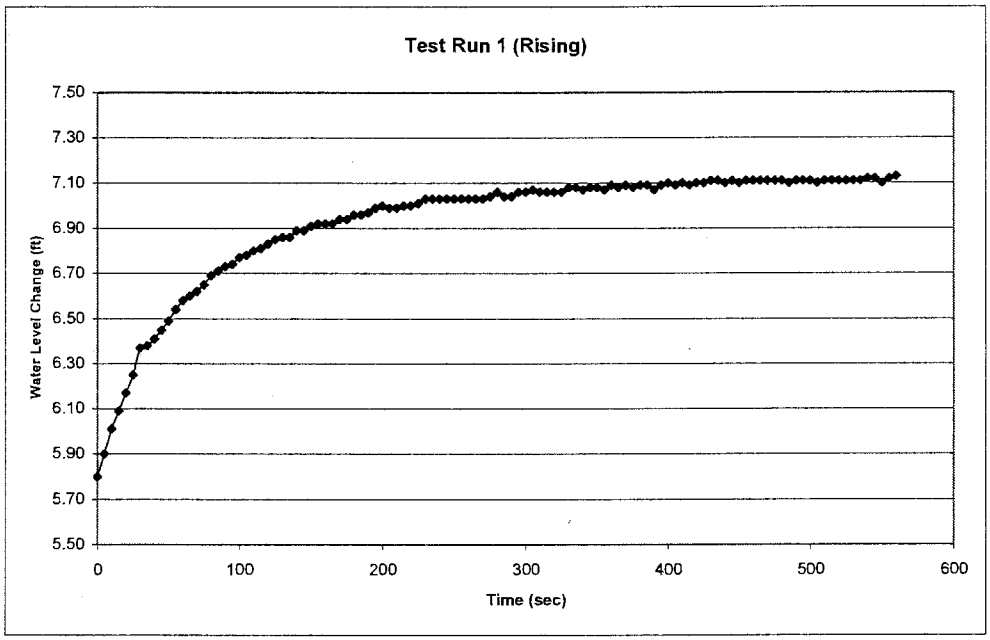
| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 252 | 2/13/2007 | 22:14:43 | 0 | 16.5 | 1.33 | 5.80 |
| 253 | 2/13/2007 | 22:14:48 | 5 | 16.6 | 1.23 | 5.90 |
| 254 | 2/13/2007 | 22:14:53 | 10 | 16.71 | 1.12 | 6.01 |
| 255 | 2/13/2007 | 22:14:58 | 15 | 16.79 | 1.04 | 6.09 |
| 256 | 2/13/2007 | 22:15:03 | 20 | 16.87 | 0.96 | 6.17 |
| 257 | 2/13/2007 | 22:15:08 | 25 | 16.95 | 0.88 | 6.25 |
| 258 | 2/13/2007 | 22:15:13 | 30 | 17.07 | 0.76 | 6.37 |
| 259 | 2/13/2007 | 22:15:18 | 35 | 17.08 | 0.75 | 6.38 |
| 260 | 2/13/2007 | 22:15:23 | 40 | 17.11 | 0.72 | 6.41 |
| 261 | 2/13/2007 | 22:15:28 | 45 | 17.15 | 0.68 | 6.45 |
| 262 | 2/13/2007 | 22:15:33 | 50 | 17.19 | 0.64 | 6.49 |
| 263 | 2/13/2007 | 22:15:38 | 55 | 17.24 | 0.59 | 6.54 |
| 264 | 2/13/2007 | 22:15:43 | 60 | 17.28 | 0.55 | 6.58 |
| 265 | 2/13/2007 | 22:15:48 | 65 | 17.3 | 0.53 | 6.60 |
| 266 | 2/13/2007 | 22:15:53 | 70 | 17.32 | 0.51 | 6.62 |
| 267 | 2/13/2007 | 22:15:58 | 75 | 17.35 | 0.48 | 6.65 |
| 268 | 2/13/2007 | 22:16:03 | 80 | 17.39 | 0.44 | 6.69 |
| 269 | 2/13/2007 | 22:16:08 | 85 | 17.41 | 0.42 | 6.71 |
| 270 | 2/13/2007 | 22:16:13 | 90 | 17.43 | 0.40 | 6.73 |
| 271 | 2/13/2007 | 22:16:18 | 95 | 17.44 | 0.39 | 6.74 |
| 272 | 2/13/2007 | 22:16:23 | 100 | 17.47 | 0.36 | 6.77 |
| 273 | 2/13/2007 | 22:16:28 | 105 | 17.48 | 0.35 | 6.78 |
| 274 | 2/13/2007 | 22:16:33 | 110 | 17.5 | 0.33 | 6.80 |
| 275 | 2/13/2007 | 22:16:38 | 115 | 17.51 | 0.32 | 6.81 |
| 276 | 2/13/2007 | 22:16:43 | 120 | 17.53 | 0.30 | 6.83 |
| 277 | 2/13/2007 | 22:16:48 | 125 | 17.55 | 0.28 | 6.85 |
| 278 | 2/13/2007 | 22:16:53 | 130 | 17.56 | 0.27 | 6.86 |
| 279 | 2/13/2007 | 22:16:58 | 135 | 17.56 | 0.27 | 6.86 |
| 280 | 2/13/2007 | 22:17:03 | 140 | 17.59 | 0.24 | 6.89 |
| 281 | 2/13/2007 | 22:17:08 | 145 | 17.59 | 0.24 | 6.89 |
| 282 | 2/13/2007 | 22:17:13 | 150 | 17.61 | 0.22 | 6.91 |
| 283 | 2/13/2007 | 22:17:18 | 155 | 17.62 | 0.21 | 6.92 |
| 284 | 2/13/2007 | 22:17:23 | 160 | 17.62 | 0.21 | 6.92 |
| 285 | 2/13/2007 | 22:17:28 | 165 | 17.62 | 0.21 | 6.92 |
| 286 | 2/13/2007 | 22:17:33 | 170 | 17.64 | 0.19 | 6.94 |
| 287 | 2/13/2007 | 22:17:38 | 175 | 17.64 | 0.19 | 6.94 |
| 288 | 2/13/2007 | 22:17:43 | 180 | 17.66 | 0.17 | 6.96 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 289 | 2/13/2007 | 22:17:48 | 185 | 17.66 | 0.17 | 6.96 |
| 290 | 2/13/2007 | 22:17:53 | 190 | 17.67 | 0.16 | 6.97 |
| 291 | 2/13/2007 | 22:17:58 | 195 | 17.69 | 0.14 | 6.99 |
| 292 | 2/13/2007 | 22:18:03 | 200 | 17.7 | 0.13 | 7.00 |
| 293 | 2/13/2007 | 22:18:08 | 205 | 17.69 | 0.14 | 6.99 |
| 294 | 2/13/2007 | 22:18:13 | 210 | 17.69 | 0.14 | 6.99 |
| 295 | 2/13/2007 | 22:18:18 | 215 | 17.7 | 0.13 | 7.00 |
| 296 | 2/13/2007 | 22:18:23 | 220 | 17.7 | 0.13 | 7.00 |
| 297 | 2/13/2007 | 22:18:28 | 225 | 17.71 | 0.12 | 7.01 |
| 298 | 2/13/2007 | 22:18:33 | 230 | 17.73 | 0.10 | 7.03 |
| 299 | 2/13/2007 | 22:18:38 | 235 | 17.73 | 0.10 | 7.03 |
| 300 | 2/13/2007 | 22:18:43 | 240 | 17.73 | 0.10 | 7.03 |
| 301 | 2/13/2007 | 22:18:48 | 245 | 17.73 | 0.10 | 7.03 |
| 302 | 2/13/2007 | 22:18:53 | 250 | 17.73 | 0.10 | 7.03 |
| 303 | 2/13/2007 | 22:18:58 | 255 | 17.73 | 0.10 | 7.03 |
| 304 | 2/13/2007 | 22:19:03 | 260 | 17.73 | 0.10 | 7.03 |
| 305 | 2/13/2007 | 22:19:08 | 265 | 17.73 | 0.10 | 7.03 |
| 306 | 2/13/2007 | 22:19:13 | 270 | 17.73 | 0.10 | 7.03 |
| 307 | 2/13/2007 | 22:19:18 | 275 | 17.74 | 0.09 | 7.04 |
| 308 | 2/13/2007 | 22:19:23 | 280 | 17.76 | 0.07 | 7.06 |
| 309 | 2/13/2007 | 22:19:28 | 285 | 17.74 | 0.09 | 7.04 |
| 310 | 2/13/2007 | 22:19:33 | 290 | 17.74 | 0.09 | 7.04 |
| 311 | 2/13/2007 | 22:19:38 | 295 | 17.76 | 0.07 | 7.06 |
| 312 | 2/13/2007 | 22:19:43 | 300 | 17.76 | 0.07 | 7.06 |
| 313 | 2/13/2007 | 22:19:48 | 305 | 17.77 | 0.06 | 7.07 |
| 314 | 2/13/2007 | 22:19:53 | 310 | 17.76 | 0.07 | 7.06 |
| 315 | 2/13/2007 | 22:19:58 | 315 | 17.76 | 0.07 | 7.06 |
| 316 | 2/13/2007 | 22:20:03 | 320 | 17.76 | 0.07 | 7.06 |
| 317 | 2/13/2007 | 22:20:08 | 325 | 17.76 | 0.07 | 7.06 |
| 318 | 2/13/2007 | 22:20:13 | 330 | 17.78 | 0.05 | 7.08 |
| 319 | 2/13/2007 | 22:20:18 | 335 | 17.78 | 0.05 | 7.08 |
| 320 | 2/13/2007 | 22:20:23 | 340 | 17.77 | 0.06 | 7.07 |
| 321 | 2/13/2007 | 22:20:28 | 345 | 17.78 | 0.05 | 7.08 |
| 322 | 2/13/2007 | 22:20:33 | 350 | 17.78 | 0.05 | 7.08 |
| 323 | 2/13/2007 | 22:20:38 | 355 | 17.77 | 0.06 | 7.07 |
| 324 | 2/13/2007 | 22:20:43 | 360 | 17.79 | 0.04 | 7.09 |
| 325 | 2/13/2007 | 22:20:48 | 365 | 17.78 | 0.05 | 7.08 |
| 326 | 2/13/2007 | 22:20:53 | 370 | 17.79 | 0.04 | 7.09 |
| 327 | 2/13/2007 | 22:20:58 | 375 | 17.78 | 0.05 | 7.08 |
| 328 | 2/13/2007 | 22:21:03 | 380 | 17.79 | 0.04 | 7.09 |
| 329 | 2/13/2007 | 22:21:08 | 385 | 17.79 | 0.04 | 7.09 |
| 330 | 2/13/2007 | 22:21:13 | 390 | 17.77 | 0.06 | 7.07 |
| 331 | 2/13/2007 | 22:21:18 | 395 | 17.79 | 0.04 | 7.09 |
| 332 | 2/13/2007 | 22:21:23 | 400 | 17.8 | 0.03 | 7.10 |
| 333 | 2/13/2007 | 22:21:28 | 405 | 17.79 | 0.04 | 7.09 |
| 334 | 2/13/2007 | 22:21:33 | 410 | 17.8 | 0.03 | 7.10 |
| 335 | 2/13/2007 | 22:21:38 | 415 | 17.79 | 0.04 | 7.09 |
| 336 | 2/13/2007 | 22:21:43 | 420 | 17.8 | 0.03 | 7.10 |
| 337 | 2/13/2007 | 22:21:48 | 425 | 17.8 | 0.03 | 7.10 |
| 338 | 2/13/2007 | 22:21:53 | 430 | 17.81 | 0.02 | 7.11 |
| 339 | 2/13/2007 | 22:21:58 | 435 | 17.81 | 0.02 | 7.11 |
| 340 | 2/13/2007 | 22:22:03 | 440 | 17.8 | 0.03 | 7.10 |
| 341 | 2/13/2007 | 22:22:08 | 445 | 17.81 | 0.02 | 7.11 |
| 342 | 2/13/2007 | 22:22:13 | 450 | 17.8 | 0.03 | 7.10 |
| 343 | 2/13/2007 | 22:22:18 | 455 | 17.81 | 0.02 | 7.11 |
| 344 | 2/13/2007 | 22:22:23 | 460 | 17.81 | 0.02 | 7.11 |
| 345 | 2/13/2007 | 22:22:28 | 465 | 17.81 | 0.02 | 7.11 |
| 346 | 2/13/2007 | 22:22:33 | 470 | 17.81 | 0.02 | 7.11 |
| 347 | 2/13/2007 | 22:22:38 | 475 | 17.81 | 0.02 | 7.11 |
| 348 | 2/13/2007 | 22:22:43 | 480 | 17.81 | 0.02 | 7.11 |
| 349 | 2/13/2007 | 22:22:48 | 485 | 17.8 | 0.03 | 7.10 |
| 350 | 2/13/2007 | 22:22:53 | 490 | 17.81 | 0.02 | 7.11 |
| 351 | 2/13/2007 | 22:22:58 | 495 | 17.81 | 0.02 | 7.11 |
| 352 | 2/13/2007 | 22:23:03 | 500 | 17.81 | 0.02 | 7.11 |
| 353 | 2/13/2007 | 22:23:08 | 505 | 17.8 | 0.03 | 7.10 |
| 354 | 2/13/2007 | 22:23:13 | 510 | 17.81 | 0.02 | 7.11 |
| 355 | 2/13/2007 | 22:23:18 | 515 | 17.81 | 0.02 | 7.11 |
| 356 | 2/13/2007 | 22:23:23 | 520 | 17.81 | 0.02 | 7.11 |
| 357 | 2/13/2007 | 22:23:28 | 525 | 17.81 | 0.02 | 7.11 |
| 358 | 2/13/2007 | 22:23:33 | 530 | 17.81 | 0.02 | 7.11 |
| 359 | 2/13/2007 | 22:23:38 | 535 | 17.81 | 0.02 | 7.11 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 360 | 2/13/2007 | 22:23:43 | 540 | 17.82 | 0.01 | 7.12 |
| 361 | 2/13/2007 | 22:23:48 | 545 | 17.82 | 0.01 | 7.12 |
| 362 | 2/13/2007 | 22:23:53 | 550 | 17.8 | 0.03 | 7.10 |
| 363 | 2/13/2007 | 22:23:58 | 555 | 17.82 | 0.01 | 7.12 |
| 364 | 2/13/2007 | 22:24:03 | 560 | 17.83 | 0.00 | 7.13 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.00000531*** | ***ft/sec*** | ***or*** | ***5.31E-06*** | ***ft/sec*** |
| | = | ***0.000162*** | ***cm/sec*** | ***or*** | ***1.62E-04*** | ***cm/sec*** |



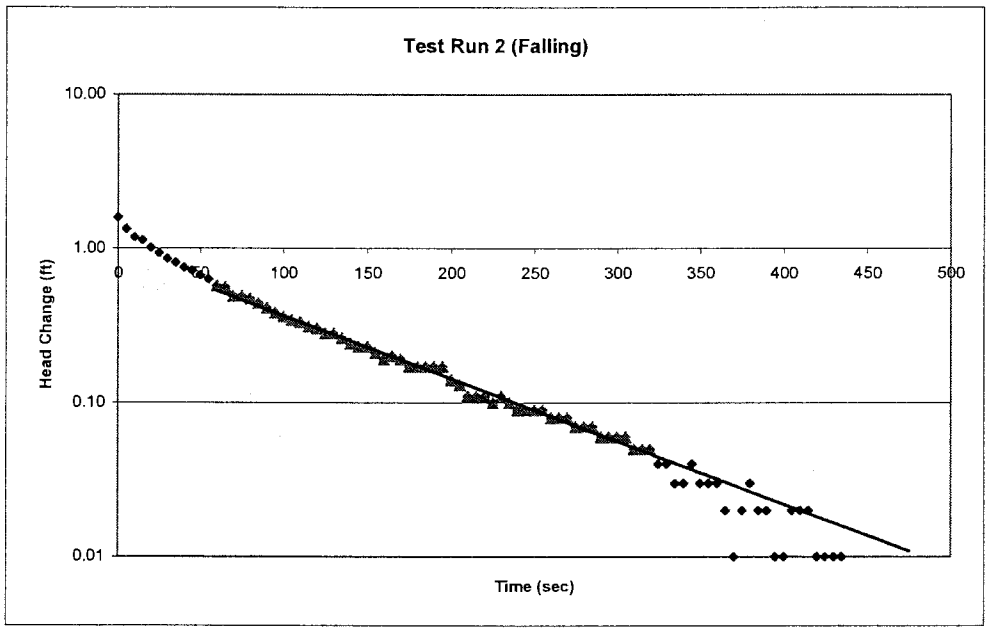
| | |
|---|---|
| $r_c$ = Radius of Well Casing (ft): | 0.083 |
| $R$ = Radius of Gravel Envelope (ft): | 0.260 |
| $R_e$ = Effective Radial Distance over which head is dissipated (ft): | 5.325 |
| $L_e$ = Length of screen of the well through which water can enter (ft): | 15 |
| $H_o$ = Drawdown at time 0 (ft): | 0.57 |
| $H_t$ = Drawdown at time t (ft): | 0.05 |
| $t$ = time (sec): | 260 |

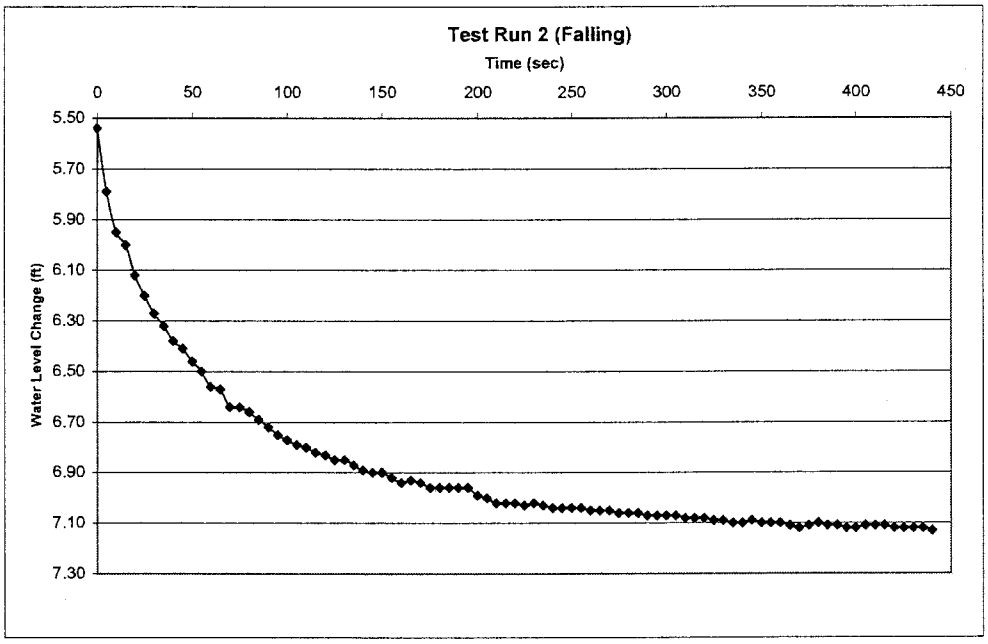
***Test Run 2 (Falling)***

| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 846 | 2/13/2007 | 23:04:13 | 0 | 19.54 | 1.59 | 5.54 |
| 847 | 2/13/2007 | 23:04:18 | 5 | 19.29 | 1.34 | 5.79 |
| 848 | 2/13/2007 | 23:04:23 | 10 | 19.13 | 1.18 | 5.95 |
| 849 | 2/13/2007 | 23:04:28 | 15 | 19.08 | 1.13 | 6.00 |
| 850 | 2/13/2007 | 23:04:33 | 20 | 18.96 | 1.01 | 6.12 |
| 851 | 2/13/2007 | 23:04:38 | 25 | 18.88 | 0.93 | 6.20 |
| 852 | 2/13/2007 | 23:04:43 | 30 | 18.81 | 0.86 | 6.27 |
| 853 | 2/13/2007 | 23:04:48 | 35 | 18.76 | 0.81 | 6.32 |
| 854 | 2/13/2007 | 23:04:53 | 40 | 18.7 | 0.75 | 6.38 |
| 855 | 2/13/2007 | 23:04:58 | 45 | 18.67 | 0.72 | 6.41 |
| 856 | 2/13/2007 | 23:05:03 | 50 | 18.62 | 0.67 | 6.46 |
| 857 | 2/13/2007 | 23:05:08 | 55 | 18.58 | 0.63 | 6.50 |
| 858 | 2/13/2007 | 23:05:13 | 60 | 18.52 | 0.57 | 6.56 |
| 859 | 2/13/2007 | 23:05:18 | 65 | 18.51 | 0.56 | 6.57 |
| 860 | 2/13/2007 | 23:05:23 | 70 | 18.44 | 0.49 | 6.64 |
| 861 | 2/13/2007 | 23:05:28 | 75 | 18.44 | 0.49 | 6.64 |
| 862 | 2/13/2007 | 23:05:33 | 80 | 18.42 | 0.47 | 6.66 |
| 863 | 2/13/2007 | 23:05:38 | 85 | 18.39 | 0.44 | 6.69 |
| 864 | 2/13/2007 | 23:05:43 | 90 | 18.36 | 0.41 | 6.72 |
| 865 | 2/13/2007 | 23:05:48 | 95 | 18.33 | 0.38 | 6.75 |
| 866 | 2/13/2007 | 23:05:53 | 100 | 18.31 | 0.36 | 6.77 |
| 867 | 2/13/2007 | 23:05:58 | 105 | 18.29 | 0.34 | 6.79 |
| 868 | 2/13/2007 | 23:06:03 | 110 | 18.28 | 0.33 | 6.80 |
| 869 | 2/13/2007 | 23:06:08 | 115 | 18.26 | 0.31 | 6.82 |
| 870 | 2/13/2007 | 23:06:13 | 120 | 18.25 | 0.30 | 6.83 |
| 871 | 2/13/2007 | 23:06:18 | 125 | 18.23 | 0.28 | 6.85 |
| 872 | 2/13/2007 | 23:06:23 | 130 | 18.23 | 0.28 | 6.85 |
| 873 | 2/13/2007 | 23:06:28 | 135 | 18.21 | 0.26 | 6.87 |
| 874 | 2/13/2007 | 23:06:33 | 140 | 18.19 | 0.24 | 6.89 |
| 875 | 2/13/2007 | 23:06:38 | 145 | 18.18 | 0.23 | 6.90 |
| 876 | 2/13/2007 | 23:06:43 | 150 | 18.18 | 0.23 | 6.90 |
| 877 | 2/13/2007 | 23:06:48 | 155 | 18.16 | 0.21 | 6.92 |
| 878 | 2/13/2007 | 23:06:53 | 160 | 18.14 | 0.19 | 6.94 |
| 879 | 2/13/2007 | 23:06:58 | 165 | 18.15 | 0.20 | 6.93 |
| 880 | 2/13/2007 | 23:07:03 | 170 | 18.14 | 0.19 | 6.94 |
| 881 | 2/13/2007 | 23:07:08 | 175 | 18.12 | 0.17 | 6.96 |
| 882 | 2/13/2007 | 23:07:13 | 180 | 18.12 | 0.17 | 6.96 |
| 883 | 2/13/2007 | 23:07:18 | 185 | 18.12 | 0.17 | 6.96 |
| 884 | 2/13/2007 | 23:07:23 | 190 | 18.12 | 0.17 | 6.96 |
| 885 | 2/13/2007 | 23:07:28 | 195 | 18.12 | 0.17 | 6.96 |
| 886 | 2/13/2007 | 23:07:33 | 200 | 18.09 | 0.14 | 6.99 |
| 887 | 2/13/2007 | 23:07:38 | 205 | 18.08 | 0.13 | 7.00 |
| 888 | 2/13/2007 | 23:07:43 | 210 | 18.06 | 0.11 | 7.02 |
| 889 | 2/13/2007 | 23:07:48 | 215 | 18.06 | 0.11 | 7.02 |
| 890 | 2/13/2007 | 23:07:53 | 220 | 18.06 | 0.11 | 7.02 |
| 891 | 2/13/2007 | 23:07:58 | 225 | 18.05 | 0.10 | 7.03 |
| 892 | 2/13/2007 | 23:08:03 | 230 | 18.06 | 0.11 | 7.02 |
| 893 | 2/13/2007 | 23:08:08 | 235 | 18.05 | 0.10 | 7.03 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 894 | 2/13/2007 | 23:08:13 | 240 | 18.04 | 0.09 | 7.04 |
| 895 | 2/13/2007 | 23:08:18 | 245 | 18.04 | 0.09 | 7.04 |
| 896 | 2/13/2007 | 23:08:23 | 250 | 18.04 | 0.09 | 7.04 |
| 897 | 2/13/2007 | 23:08:28 | 255 | 18.04 | 0.09 | 7.04 |
| 898 | 2/13/2007 | 23:08:33 | 260 | 18.03 | 0.08 | 7.05 |
| 899 | 2/13/2007 | 23:08:38 | 265 | 18.03 | 0.08 | 7.05 |
| 900 | 2/13/2007 | 23:08:43 | 270 | 18.03 | 0.08 | 7.05 |
| 901 | 2/13/2007 | 23:08:48 | 275 | 18.02 | 0.07 | 7.06 |
| 902 | 2/13/2007 | 23:08:53 | 280 | 18.02 | 0.07 | 7.06 |
| 903 | 2/13/2007 | 23:08:58 | 285 | 18.02 | 0.07 | 7.06 |
| 904 | 2/13/2007 | 23:09:03 | 290 | 18.01 | 0.06 | 7.07 |
| 905 | 2/13/2007 | 23:09:08 | 295 | 18.01 | 0.06 | 7.07 |
| 906 | 2/13/2007 | 23:09:13 | 300 | 18.01 | 0.06 | 7.07 |
| 907 | 2/13/2007 | 23:09:18 | 305 | 18.01 | 0.06 | 7.07 |
| 908 | 2/13/2007 | 23:09:23 | 310 | 18 | 0.05 | 7.08 |
| 909 | 2/13/2007 | 23:09:28 | 315 | 18 | 0.05 | 7.08 |
| 910 | 2/13/2007 | 23:09:33 | 320 | 18 | 0.05 | 7.08 |
| 911 | 2/13/2007 | 23:09:38 | 325 | 17.99 | 0.04 | 7.09 |
| 912 | 2/13/2007 | 23:09:43 | 330 | 17.99 | 0.04 | 7.09 |
| 913 | 2/13/2007 | 23:09:48 | 335 | 17.98 | 0.03 | 7.10 |
| 914 | 2/13/2007 | 23:09:53 | 340 | 17.98 | 0.03 | 7.10 |
| 915 | 2/13/2007 | 23:09:58 | 345 | 17.99 | 0.04 | 7.09 |
| 916 | 2/13/2007 | 23:10:03 | 350 | 17.98 | 0.03 | 7.10 |
| 917 | 2/13/2007 | 23:10:08 | 355 | 17.98 | 0.03 | 7.10 |
| 918 | 2/13/2007 | 23:10:13 | 360 | 17.98 | 0.03 | 7.10 |
| 919 | 2/13/2007 | 23:10:18 | 365 | 17.97 | 0.02 | 7.11 |
| 920 | 2/13/2007 | 23:10:23 | 370 | 17.96 | 0.01 | 7.12 |
| 921 | 2/13/2007 | 23:10:28 | 375 | 17.97 | 0.02 | 7.11 |
| 922 | 2/13/2007 | 23:10:33 | 380 | 17.98 | 0.03 | 7.10 |
| 923 | 2/13/2007 | 23:10:38 | 385 | 17.97 | 0.02 | 7.11 |
| 924 | 2/13/2007 | 23:10:43 | 390 | 17.97 | 0.02 | 7.11 |
| 925 | 2/13/2007 | 23:10:48 | 395 | 17.96 | 0.01 | 7.12 |
| 926 | 2/13/2007 | 23:10:53 | 400 | 17.96 | 0.01 | 7.12 |
| 927 | 2/13/2007 | 23:10:58 | 405 | 17.97 | 0.02 | 7.11 |
| 928 | 2/13/2007 | 23:11:03 | 410 | 17.97 | 0.02 | 7.11 |
| 929 | 2/13/2007 | 23:11:08 | 415 | 17.97 | 0.02 | 7.11 |
| 930 | 2/13/2007 | 23:11:13 | 420 | 17.96 | 0.01 | 7.12 |
| 931 | 2/13/2007 | 23:11:18 | 425 | 17.96 | 0.01 | 7.12 |
| 932 | 2/13/2007 | 23:11:23 | 430 | 17.96 | 0.01 | 7.12 |
| 933 | 2/13/2007 | 23:11:28 | 435 | 17.96 | 0.01 | 7.12 |
| 934 | 2/13/2007 | 23:11:33 | 440 | 17.95 | 0.00 | 7.13 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Hydraulic Conductivity* | = | *0.00000649* | *ft/sec* | *or* | *6.49E-06* | *ft/sec* |
| | = | *0.000198* | *cm/sec* | *or* | *1.98E-04* | *cm/sec* |






*Analysis by JJK of Joyce Engineering, Inc.*

## *Coble's Sandrock Phase 3 Expansion*

| | |
|---|---|
| Well/Piezometer: | **P-35** |
| Initial Measured Depth to Water: | 11.42' |
| Final Measured Depth to Water: | - |
| Screen Interval: | 12.50' - 32.50' |
| Total Well Depth: | 32.50' |
| Date(s) for Slug Testing: | 2/13/2007 |

*A 1.6"x48" bailer was used to complete the slug test.

| | |
|---|---|
| $A$ = Function of $L_e/R$: | 3.892 |
| $B$ = Function of $L_e/R$: | 0.641 |
| $h$ = The saturated thickness of the aquifer (ft): | 23.58 |
| $L_w$ = Difference from water table to bottom of borehole or well screen (ft): | 21.08 |
| $r_c$ = Radius of Well Casing (ft): | 0.083 |
| $R$ = Radius of Gravel Envelope (ft): | 0.260 |
| $R_e$ = Effective Radial Distance over which head is dissipated (ft): | 5.934 |
| $L_e$ = Length of screen of the well through which water can enter (ft): | 20 |
| $H_o$ = Drawdown at time 0 (ft): | 1.07 |
| $H_t$ = Drawdown at time t (ft): | 0.06 |
| $t$ = time (sec): | 790 |

The Bouwer and Rice Equation is used for all hydraulic conductivity calculations in this study.

$$K = \frac{r_c^2 LN(R_e/R)}{2L_e}\left(\frac{1}{t}\right)LN\left(\frac{H_o}{H_t}\right)$$

Bouwer and Rice present the equation below as a method to estimate $LN(R_e/R)$. This method is ultimately used to solve for $R_e$ This equation is used if the distance from the water table to the bottom of the borehole or well screen is less than the saturated thickness of the aquifer.

$$LN\left(\frac{R_e}{R}\right) = \left[\frac{1.1}{LN(L_w/R)} + \frac{A + B * LN[(h - L_w)/R]}{L_e/R}\right]^{-1}$$

A & B are determined from a graph determined by Bouwer and Rice.

$R_e$ = 5.934

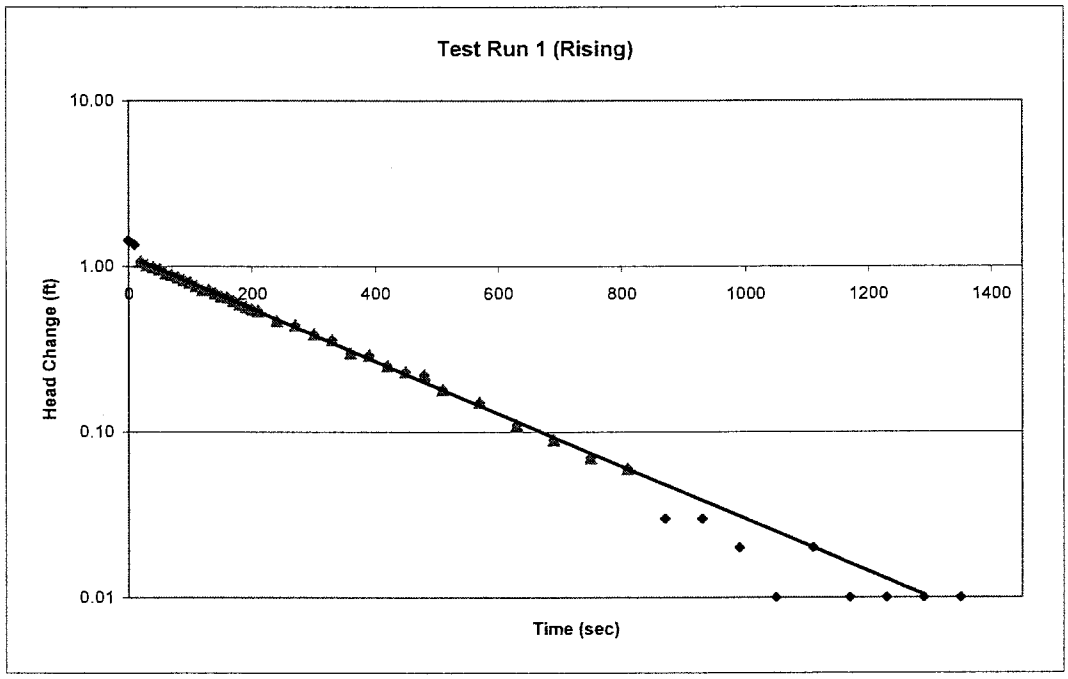
| | | |
|---|---|---|
| ***Hydraulic Conductivity (Rising):*** | ***1.96E-06*** | ***ft/sec*** |
| | ***5.99E-05*** | ***cm/sec*** |
| ***Hydraulic Conductivity (Falling):*** | ***1.95E-06*** | ***ft/sec*** |
| | ***5.95E-05*** | ***cm/sec*** |

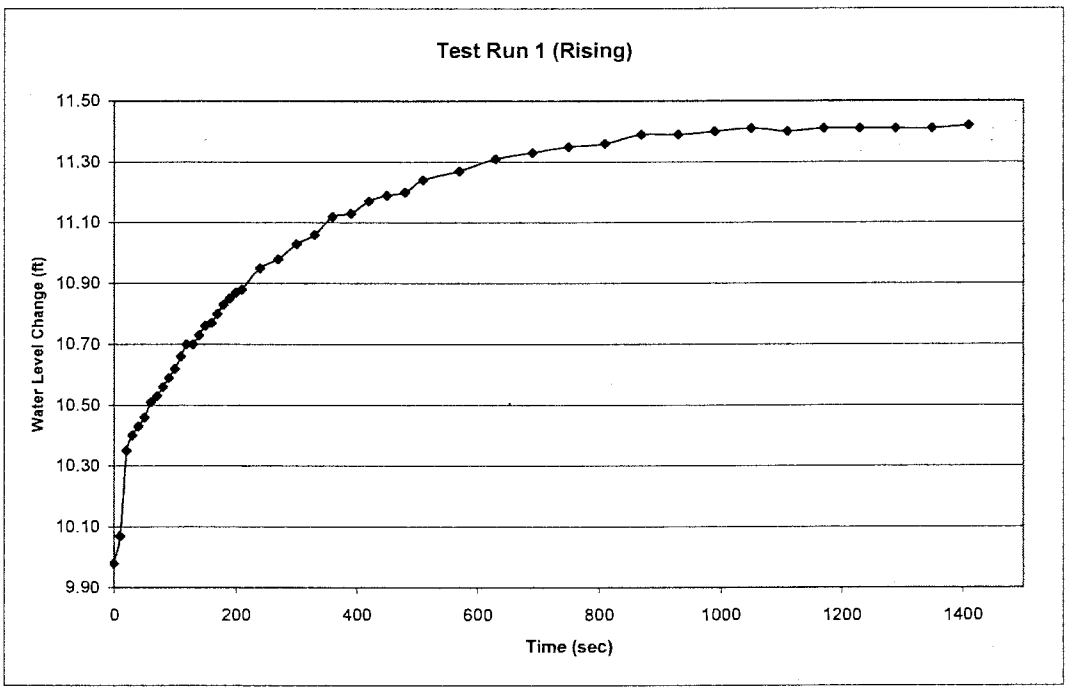
***Test Run 1 (Rising)***

| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 1055 | 2/13/2007 | 3:56:34 | 0 | 18.47 | 1.44 | 9.98 |
| 1065 | 2/13/2007 | 3:56:44 | 10 | 18.56 | 1.35 | 10.07 |
| 1075 | 2/13/2007 | 3:56:54 | 20 | 18.84 | 1.07 | 10.35 |
| 1085 | 2/13/2007 | 3:57:04 | 30 | 18.89 | 1.02 | 10.40 |
| 1095 | 2/13/2007 | 3:57:14 | 40 | 18.92 | 0.99 | 10.43 |
| 1105 | 2/13/2007 | 3:57:24 | 50 | 18.95 | 0.96 | 10.46 |
| 1115 | 2/13/2007 | 3:57:34 | 60 | 19.00 | 0.91 | 10.51 |
| 1125 | 2/13/2007 | 3:57:44 | 70 | 19.02 | 0.89 | 10.53 |
| 1135 | 2/13/2007 | 3:57:54 | 80 | 19.05 | 0.86 | 10.56 |
| 1145 | 2/13/2007 | 3:58:04 | 90 | 19.08 | 0.83 | 10.59 |
| 1155 | 2/13/2007 | 3:58:14 | 100 | 19.11 | 0.80 | 10.62 |
| 1165 | 2/13/2007 | 3:58:24 | 110 | 19.15 | 0.76 | 10.66 |
| 1175 | 2/13/2007 | 3:58:34 | 120 | 19.19 | 0.72 | 10.70 |
| 1185 | 2/13/2007 | 3:58:44 | 130 | 19.19 | 0.72 | 10.70 |
| 1195 | 2/13/2007 | 3:58:54 | 140 | 19.22 | 0.69 | 10.73 |
| 1205 | 2/13/2007 | 3:59:04 | 150 | 19.25 | 0.66 | 10.76 |
| 1215 | 2/13/2007 | 3:59:14 | 160 | 19.26 | 0.65 | 10.77 |
| 1225 | 2/13/2007 | 3:59:24 | 170 | 19.29 | 0.62 | 10.80 |
| 1235 | 2/13/2007 | 3:59:34 | 180 | 19.32 | 0.59 | 10.83 |
| 1245 | 2/13/2007 | 3:59:44 | 190 | 19.34 | 0.57 | 10.85 |
| 1255 | 2/13/2007 | 3:59:54 | 200 | 19.36 | 0.55 | 10.87 |
| 1265 | 2/13/2007 | 4:00:04 | 210 | 19.37 | 0.54 | 10.88 |
| 1295 | 2/13/2007 | 4:00:34 | 240 | 19.44 | 0.47 | 10.95 |
| 1325 | 2/13/2007 | 4:01:04 | 270 | 19.47 | 0.44 | 10.98 |
| 1355 | 2/13/2007 | 4:01:34 | 300 | 19.52 | 0.39 | 11.03 |
| 1385 | 2/13/2007 | 4:02:04 | 330 | 19.55 | 0.36 | 11.06 |
| 1415 | 2/13/2007 | 4:02:34 | 360 | 19.61 | 0.30 | 11.12 |
| 1445 | 2/13/2007 | 4:03:04 | 390 | 19.62 | 0.29 | 11.13 |
| 1475 | 2/13/2007 | 4:03:34 | 420 | 19.66 | 0.25 | 11.17 |
| 1505 | 2/13/2007 | 4:04:04 | 450 | 19.68 | 0.23 | 11.19 |
| 1535 | 2/13/2007 | 4:04:34 | 480 | 19.69 | 0.22 | 11.20 |
| 1565 | 2/13/2007 | 4:05:04 | 510 | 19.73 | 0.18 | 11.24 |
| 1625 | 2/13/2007 | 4:06:04 | 570 | 19.76 | 0.15 | 11.27 |
| 1685 | 2/13/2007 | 4:07:04 | 630 | 19.80 | 0.11 | 11.31 |
| 1745 | 2/13/2007 | 4:08:04 | 690 | 19.82 | 0.09 | 11.33 |
| 1805 | 2/13/2007 | 4:09:04 | 750 | 19.84 | 0.07 | 11.35 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1865 | 2/13/2007 | 4:10:04 | 810 | 19.85 | 0.06 | 11.36 |
| 1925 | 2/13/2007 | 4:11:04 | 870 | 19.88 | 0.03 | 11.39 |
| 1985 | 2/13/2007 | 4:12:04 | 930 | 19.88 | 0.03 | 11.39 |
| 2045 | 2/13/2007 | 4:13:04 | 990 | 19.89 | 0.02 | 11.40 |
| 2105 | 2/13/2007 | 4:14:04 | 1050 | 19.90 | 0.01 | 11.41 |
| 2165 | 2/13/2007 | 4:15:04 | 1110 | 19.89 | 0.02 | 11.40 |
| 2225 | 2/13/2007 | 4:16:04 | 1170 | 19.90 | 0.01 | 11.41 |
| 2285 | 2/13/2007 | 4:17:04 | 1230 | 19.90 | 0.01 | 11.41 |
| 2345 | 2/13/2007 | 4:18:04 | 1290 | 19.90 | 0.01 | 11.41 |
| 2405 | 2/13/2007 | 4:19:04 | 1350 | 19.90 | 0.01 | 11.41 |
| 2465 | 2/13/2007 | 4:20:04 | 1410 | 19.91 | 0.00 | 11.42 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.00000196*** | ***ft/sec*** | ***or*** | ***1.96E-06*** | ***ft/sec*** |
| | = | ***0.0000599*** | ***cm/sec*** | ***or*** | ***5.99E-05*** | ***cm/sec*** |



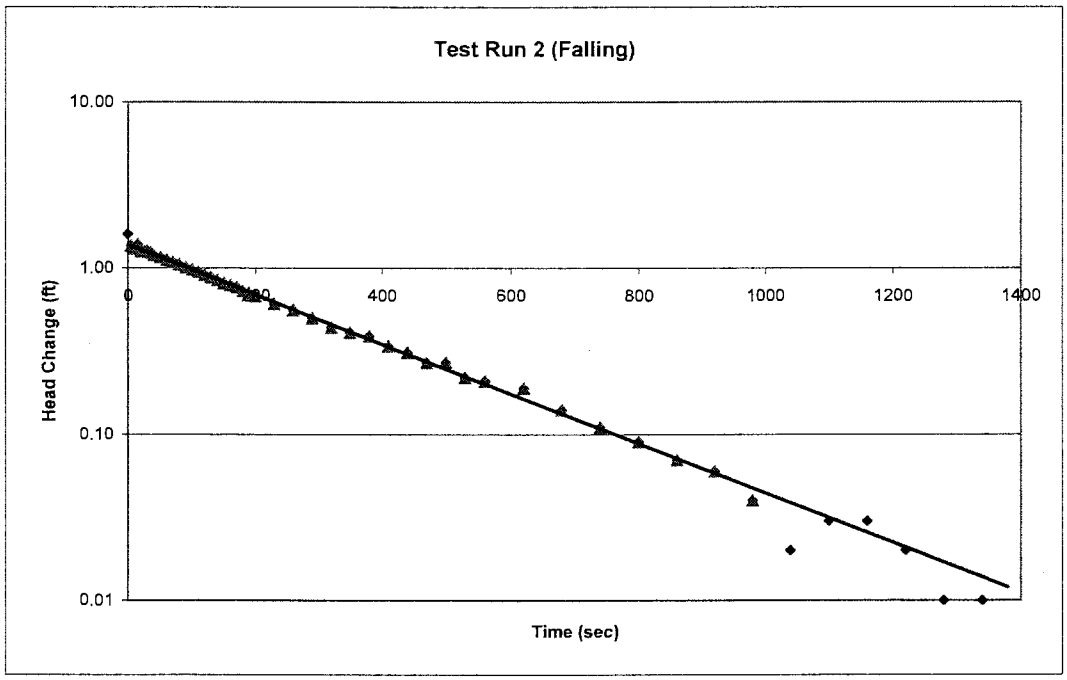
| | |
|---|---|
| $r_c$ = Radius of Well Casing (ft): | 0.083 |
| $R$ = Radius of Gravel Envelope (ft): | 0.260 |
| $R_e$ = Effective Radial Distance over which head is dissipated (ft): | 5.934 |
| $L_e$ = Length of screen of the well through which water can enter (ft): | 20 |
| $H_o$ = Drawdown at time 0 (ft): | 1.37 |
| $H_t$ = Drawdown at time t (ft): | 0.04 |
| $t$ = time (sec): | 975 |

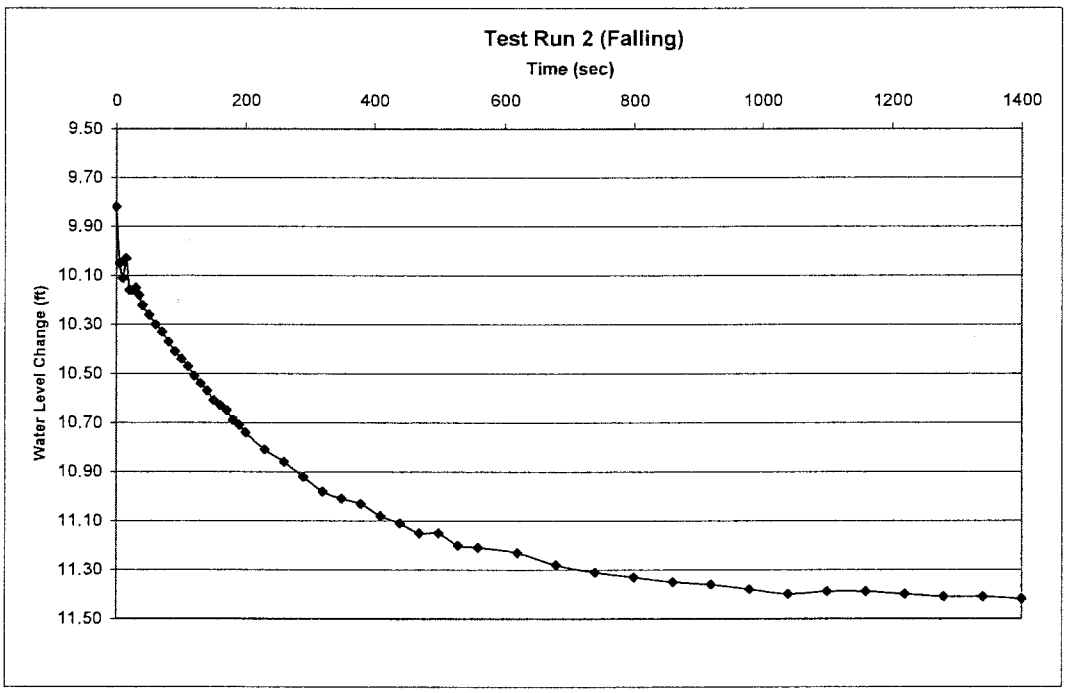
***Test Run 2 (Falling)***

| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 2560 | 2/13/2007 | 4:21:39 | 0 | 21.52 | 1.60 | 9.82 |
| 2565 | 2/13/2007 | 4:21:44 | 5 | 21.29 | 1.37 | 10.05 |
| 2570 | 2/13/2007 | 4:21:49 | 10 | 21.23 | 1.31 | 10.11 |
| 2575 | 2/13/2007 | 4:21:54 | 15 | 21.31 | 1.39 | 10.03 |
| 2580 | 2/13/2007 | 4:21:59 | 20 | 21.18 | 1.26 | 10.16 |
| 2585 | 2/13/2007 | 4:22:04 | 25 | 21.18 | 1.26 | 10.16 |
| 2590 | 2/13/2007 | 4:22:09 | 30 | 21.19 | 1.27 | 10.15 |
| 2595 | 2/13/2007 | 4:22:14 | 35 | 21.16 | 1.24 | 10.18 |
| 2600 | 2/13/2007 | 4:22:19 | 40 | 21.12 | 1.20 | 10.22 |
| 2610 | 2/13/2007 | 4:22:29 | 50 | 21.08 | 1.16 | 10.26 |
| 2620 | 2/13/2007 | 4:22:39 | 60 | 21.04 | 1.12 | 10.30 |
| 2630 | 2/13/2007 | 4:22:49 | 70 | 21.01 | 1.09 | 10.33 |
| 2640 | 2/13/2007 | 4:22:59 | 80 | 20.97 | 1.05 | 10.37 |
| 2650 | 2/13/2007 | 4:23:09 | 90 | 20.93 | 1.01 | 10.41 |
| 2660 | 2/13/2007 | 4:23:19 | 100 | 20.90 | 0.98 | 10.44 |
| 2670 | 2/13/2007 | 4:23:29 | 110 | 20.87 | 0.95 | 10.47 |
| 2680 | 2/13/2007 | 4:23:39 | 120 | 20.83 | 0.91 | 10.51 |
| 2690 | 2/13/2007 | 4:23:49 | 130 | 20.80 | 0.88 | 10.54 |
| 2700 | 2/13/2007 | 4:23:59 | 140 | 20.77 | 0.85 | 10.57 |
| 2710 | 2/13/2007 | 4:24:09 | 150 | 20.73 | 0.81 | 10.61 |
| 2720 | 2/13/2007 | 4:24:19 | 160 | 20.71 | 0.79 | 10.63 |
| 2730 | 2/13/2007 | 4:24:29 | 170 | 20.69 | 0.77 | 10.65 |
| 2740 | 2/13/2007 | 4:24:39 | 180 | 20.65 | 0.73 | 10.69 |
| 2750 | 2/13/2007 | 4:24:49 | 190 | 20.63 | 0.71 | 10.71 |
| 2760 | 2/13/2007 | 4:24:59 | 200 | 20.60 | 0.68 | 10.74 |
| 2790 | 2/13/2007 | 4:25:29 | 230 | 20.53 | 0.61 | 10.81 |
| 2820 | 2/13/2007 | 4:25:59 | 260 | 20.48 | 0.56 | 10.86 |
| 2850 | 2/13/2007 | 4:26:29 | 290 | 20.42 | 0.50 | 10.92 |
| 2880 | 2/13/2007 | 4:26:59 | 320 | 20.36 | 0.44 | 10.98 |
| 2910 | 2/13/2007 | 4:27:29 | 350 | 20.33 | 0.41 | 11.01 |
| 2940 | 2/13/2007 | 4:27:59 | 380 | 20.31 | 0.39 | 11.03 |
| 2970 | 2/13/2007 | 4:28:29 | 410 | 20.26 | 0.34 | 11.08 |
| 3000 | 2/13/2007 | 4:28:59 | 440 | 20.23 | 0.31 | 11.11 |
| 3030 | 2/13/2007 | 4:29:29 | 470 | 20.19 | 0.27 | 11.15 |
| 3060 | 2/13/2007 | 4:29:59 | 500 | 20.19 | 0.27 | 11.15 |
| 3090 | 2/13/2007 | 4:30:29 | 530 | 20.14 | 0.22 | 11.20 |
| 3120 | 2/13/2007 | 4:30:59 | 560 | 20.13 | 0.21 | 11.21 |
| 3180 | 2/13/2007 | 4:31:59 | 620 | 20.11 | 0.19 | 11.23 |
| 3240 | 2/13/2007 | 4:32:59 | 680 | 20.06 | 0.14 | 11.28 |
| 3300 | 2/13/2007 | 4:33:59 | 740 | 20.03 | 0.11 | 11.31 |
| 3360 | 2/13/2007 | 4:34:59 | 800 | 20.01 | 0.09 | 11.33 |
| 3420 | 2/13/2007 | 4:35:59 | 860 | 19.99 | 0.07 | 11.35 |
| 3480 | 2/13/2007 | 4:36:59 | 920 | 19.98 | 0.06 | 11.36 |
| 3540 | 2/13/2007 | 4:37:59 | 980 | 19.96 | 0.04 | 11.38 |
| 3600 | 2/13/2007 | 4:38:59 | 1040 | 19.94 | 0.02 | 11.40 |
| 3660 | 2/13/2007 | 4:39:59 | 1100 | 19.95 | 0.03 | 11.39 |
| 3720 | 2/13/2007 | 4:40:59 | 1160 | 19.95 | 0.03 | 11.39 |
| 3780 | 2/13/2007 | 4:41:59 | 1220 | 19.94 | 0.02 | 11.40 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3840 | 2/13/2007 | 4:42:59 | 1280 | 19.93 | 0.01 | 11.41 |
| 3900 | 2/13/2007 | 4:43:59 | 1340 | 19.93 | 0.01 | 11.41 |
| 3960 | 2/13/2007 | 4:44:59 | 1400 | 19.92 | 0.00 | 11.42 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.00000195*** | ***ft/sec*** | ***or*** | ***1.95E-06*** | ***ft/sec*** |
| | = | ***0.0000595*** | ***cm/sec*** | ***or*** | ***5.95E-05*** | ***cm/sec*** |




***Analysis by JJK of Joyce Engineering, Inc.***

## *Coble's Sandrock Phase 3 Expansion*

| | |
|---|---|
| Well/Piezometer: | **P-36** |
| Initial Measured Depth to Water: | 4.98 |
| Final Measured Depth to Water: | - |
| Screen Interval: | 12.50' - 32.50' |
| Total Well Depth: | 32.50' |
| Date(s) for Slug Testing: | 2/12/2007 |

*A 1.6"x48" bailer was used to complete the slug test.

| | |
|---|---|
| *A* = Function of *Le/R:* | 3.892 |
| *B* = Function of *Le/R:* | 0.641 |
| *h* = The saturated thickness of the aquifer (ft): | 30.02 |
| *Lw* = Difference from water table to bottom of borehole or well screen (ft): | 27.52 |
| *rc* = Radius of Well Casing (ft): | 0.083 |
| *R* = Radius of Gravel Envelope (ft): | 0.260 |
| *Re* = Effective Radial Distance over which head is dissipated (ft): | 6.871 |
| *Le* = Length of screen of the well through which water can enter (ft): | 20 |
| *Ho* = Drawdown at time 0 (ft): | 0.79 |
| *Ht* = Drawdown at time t (ft): | 0.07 |
| *t* = time (sec): | 47 |

The Bouwer and Rice Equation is used for all hydraulic conductivity calculations in this study.

$$K = \frac{r_c^2 LN(R_e/R)}{2L_e}\left(\frac{1}{t}\right)LN\left(\frac{H_o}{H_t}\right)$$

Bouwer and Rice present the equation below as a method to estimate *LN(Re/R)*. This method is ultimately used to solve for *Re* This equation is used if the distance from the water table to the bottom of the borehole or well screen is less than the saturated thickness of the aquifer.

$$LN\left(\frac{R_e}{R}\right) = \left[\frac{1.1}{LN(L_w/R)} + \frac{A + B * LN[(h - L_w)/R]}{L_e/R}\right]^{-1}$$

A & B are determined from a graph determined by Bouwer and Rice.

*Re* = 6.871

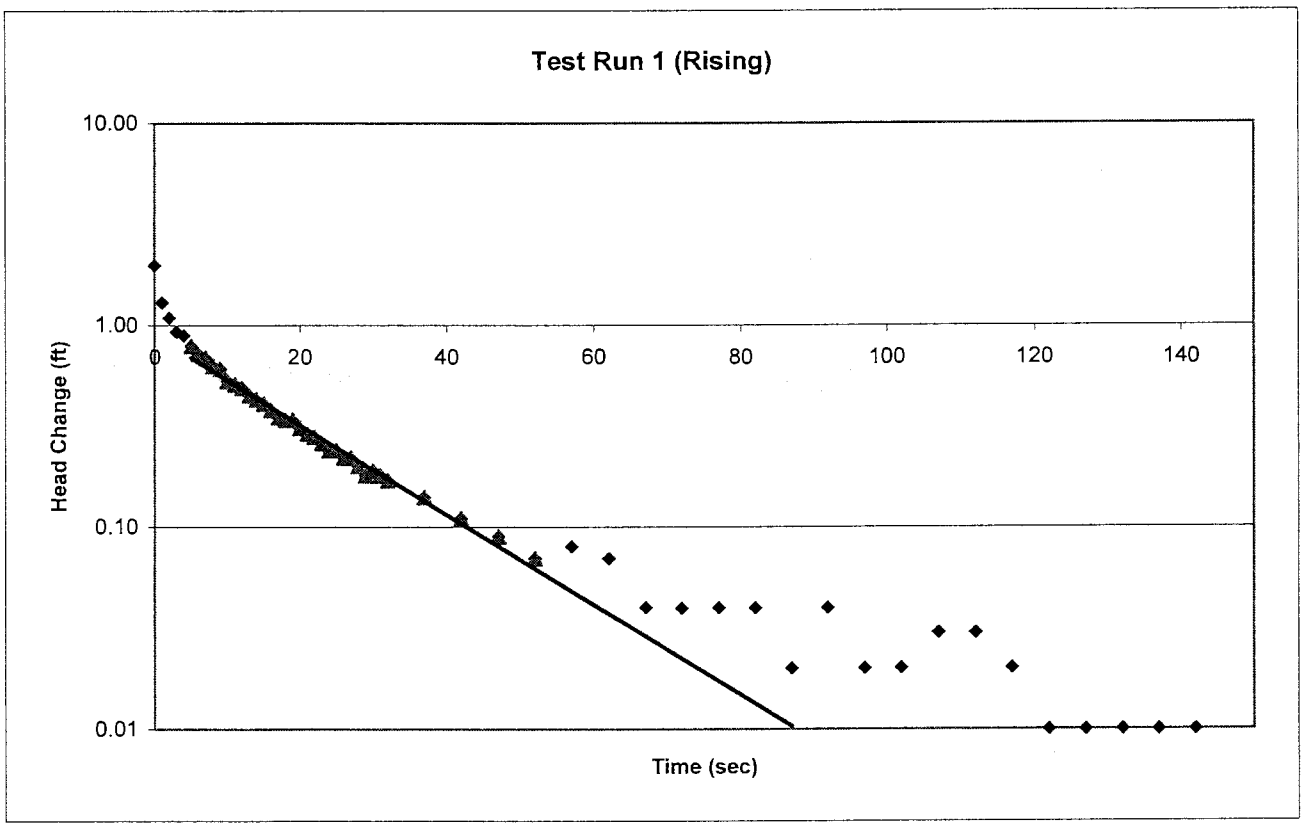
| | | |
|---|---|---|
| ***Hydraulic Conductivity (Rising):*** | ***2.91E-05*** | ***ft/sec*** |
| | ***8.86E-04*** | ***cm/sec*** |
| ***Hydraulic Conductivity (Falling):*** | ***2.41E-05*** | ***ft/sec*** |
| | ***7.35E-04*** | ***cm/sec*** |

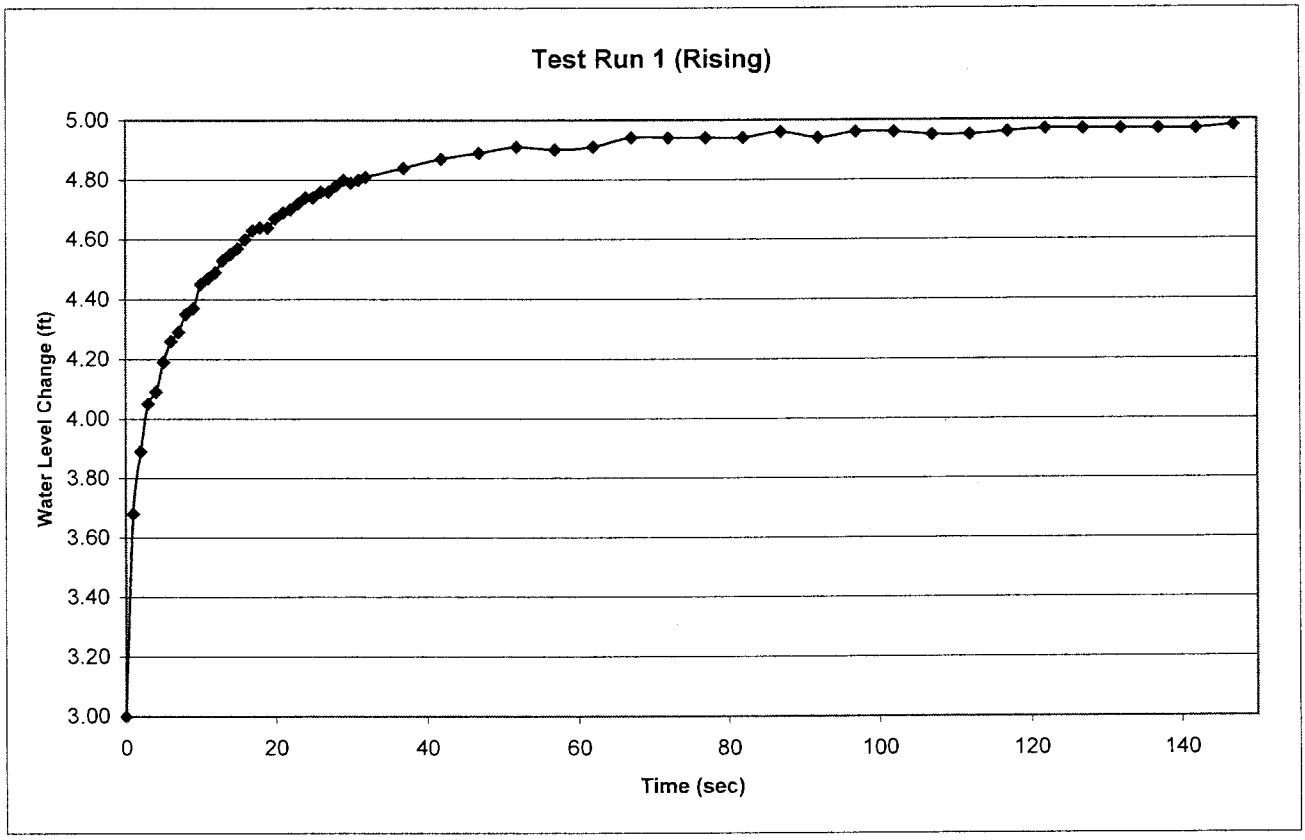
***Test Run 1 (Rising)***

| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 572 | 2/12/2007 | 4:42:58 | 0 | 24.88 | 1.98 | 3.00 |
| 573 | 2/12/2007 | 4:42:59 | 1 | 25.56 | 1.30 | 3.68 |
| 574 | 2/12/2007 | 4:43:00 | 2 | 25.77 | 1.09 | 3.89 |
| 575 | 2/12/2007 | 4:43:01 | 3 | 25.93 | 0.93 | 4.05 |
| 576 | 2/12/2007 | 4:43:02 | 4 | 25.97 | 0.89 | 4.09 |
| 577 | 2/12/2007 | 4:43:03 | 5 | 26.07 | 0.79 | 4.19 |
| 578 | 2/12/2007 | 4:43:04 | 6 | 26.14 | 0.72 | 4.26 |
| 579 | 2/12/2007 | 4:43:05 | 7 | 26.17 | 0.69 | 4.29 |
| 580 | 2/12/2007 | 4:43:06 | 8 | 26.23 | 0.63 | 4.35 |
| 581 | 2/12/2007 | 4:43:07 | 9 | 26.25 | 0.61 | 4.37 |
| 582 | 2/12/2007 | 4:43:08 | 10 | 26.33 | 0.53 | 4.45 |
| 583 | 2/12/2007 | 4:43:09 | 11 | 26.35 | 0.51 | 4.47 |
| 584 | 2/12/2007 | 4:43:10 | 12 | 26.37 | 0.49 | 4.49 |
| 585 | 2/12/2007 | 4:43:11 | 13 | 26.41 | 0.45 | 4.53 |
| 586 | 2/12/2007 | 4:43:12 | 14 | 26.43 | 0.43 | 4.55 |
| 587 | 2/12/2007 | 4:43:13 | 15 | 26.45 | 0.41 | 4.57 |
| 588 | 2/12/2007 | 4:43:14 | 16 | 26.48 | 0.38 | 4.60 |
| 589 | 2/12/2007 | 4:43:15 | 17 | 26.51 | 0.35 | 4.63 |
| 590 | 2/12/2007 | 4:43:16 | 18 | 26.52 | 0.34 | 4.64 |
| 591 | 2/12/2007 | 4:43:17 | 19 | 26.52 | 0.34 | 4.64 |
| 592 | 2/12/2007 | 4:43:18 | 20 | 26.55 | 0.31 | 4.67 |
| 593 | 2/12/2007 | 4:43:19 | 21 | 26.57 | 0.29 | 4.69 |
| 594 | 2/12/2007 | 4:43:20 | 22 | 26.58 | 0.28 | 4.70 |
| 595 | 2/12/2007 | 4:43:21 | 23 | 26.60 | 0.26 | 4.72 |
| 596 | 2/12/2007 | 4:43:22 | 24 | 26.62 | 0.24 | 4.74 |
| 597 | 2/12/2007 | 4:43:23 | 25 | 26.62 | 0.24 | 4.74 |
| 598 | 2/12/2007 | 4:43:24 | 26 | 26.64 | 0.22 | 4.76 |
| 599 | 2/12/2007 | 4:43:25 | 27 | 26.64 | 0.22 | 4.76 |
| 600 | 2/12/2007 | 4:43:26 | 28 | 26.66 | 0.20 | 4.78 |
| 601 | 2/12/2007 | 4:43:27 | 29 | 26.68 | 0.18 | 4.80 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 602 | 2/12/2007 | 4:43:28 | 30 | 26.67 | 0.19 | 4.79 |
| 603 | 2/12/2007 | 4:43:29 | 31 | 26.68 | 0.18 | 4.80 |
| 604 | 2/12/2007 | 4:43:30 | 32 | 26.69 | 0.17 | 4.81 |
| 609 | 2/12/2007 | 4:43:35 | 37 | 26.72 | 0.14 | 4.84 |
| 614 | 2/12/2007 | 4:43:40 | 42 | 26.75 | 0.11 | 4.87 |
| 619 | 2/12/2007 | 4:43:45 | 47 | 26.77 | 0.09 | 4.89 |
| 624 | 2/12/2007 | 4:43:50 | 52 | 26.79 | 0.07 | 4.91 |
| 629 | 2/12/2007 | 4:43:55 | 57 | 26.78 | 0.08 | 4.90 |
| 634 | 2/12/2007 | 4:44:00 | 62 | 26.79 | 0.07 | 4.91 |
| 639 | 2/12/2007 | 4:44:05 | 67 | 26.82 | 0.04 | 4.94 |
| 644 | 2/12/2007 | 4:44:10 | 72 | 26.82 | 0.04 | 4.94 |
| 649 | 2/12/2007 | 4:44:15 | 77 | 26.82 | 0.04 | 4.94 |
| 654 | 2/12/2007 | 4:44:20 | 82 | 26.82 | 0.04 | 4.94 |
| 659 | 2/12/2007 | 4:44:25 | 87 | 26.84 | 0.02 | 4.96 |
| 664 | 2/12/2007 | 4:44:30 | 92 | 26.82 | 0.04 | 4.94 |
| 669 | 2/12/2007 | 4:44:35 | 97 | 26.84 | 0.02 | 4.96 |
| 674 | 2/12/2007 | 4:44:40 | 102 | 26.84 | 0.02 | 4.96 |
| 679 | 2/12/2007 | 4:44:45 | 107 | 26.83 | 0.03 | 4.95 |
| 684 | 2/12/2007 | 4:44:50 | 112 | 26.83 | 0.03 | 4.95 |
| 689 | 2/12/2007 | 4:44:55 | 117 | 26.84 | 0.02 | 4.96 |
| 694 | 2/12/2007 | 4:45:00 | 122 | 26.85 | 0.01 | 4.97 |
| 699 | 2/12/2007 | 4:45:05 | 127 | 26.85 | 0.01 | 4.97 |
| 704 | 2/12/2007 | 4:45:10 | 132 | 26.85 | 0.01 | 4.97 |
| 709 | 2/12/2007 | 4:45:15 | 137 | 26.85 | 0.01 | 4.97 |
| 714 | 2/12/2007 | 4:45:20 | 142 | 26.85 | 0.01 | 4.97 |
| 719 | 2/12/2007 | 4:45:25 | 147 | 26.86 | 0.00 | 4.98 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.0000291*** | ***ft/sec*** | ***or*** | ***2.91E-05*** | ***ft/sec*** |
| | = | ***0.000886*** | ***cm/sec*** | ***or*** | ***8.86E-04*** | ***cm/sec*** |





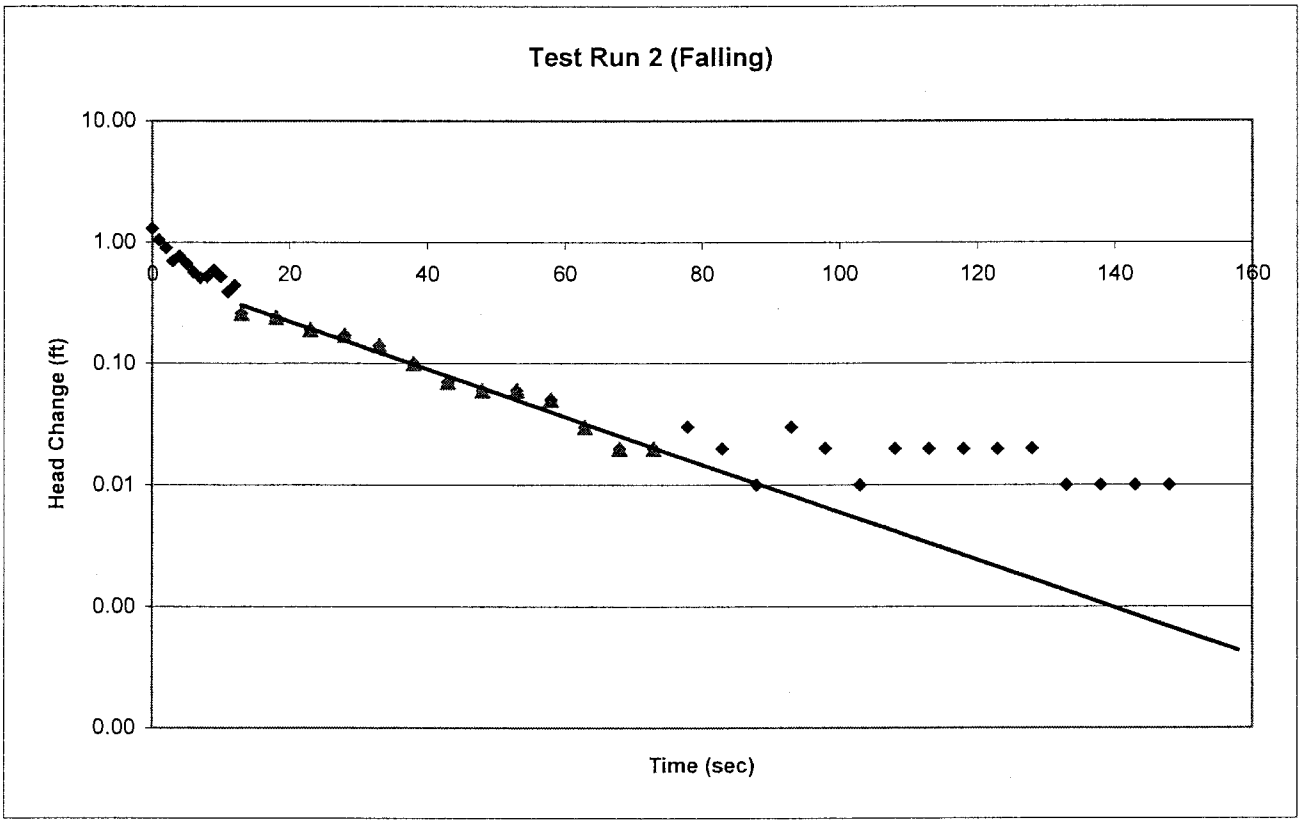

| | |
|---|---|
| $r_c$ = Radius of Well Casing (ft): | 0.083 |
| $R$ = Radius of Gravel Envelope (ft): | 0.260 |
| $R_e$ = Effective Radial Distance over which head is dissipated (ft): | 6.871 |
| $L_e$ = Length of screen of the well through which water can enter (ft): | 20 |
| $H_o$ = Drawdown at time 0 (ft): | 0.26 |
| $H_t$ = Drawdown at time t (ft): | 0.02 |
| $t$ = time (sec): | 60 |

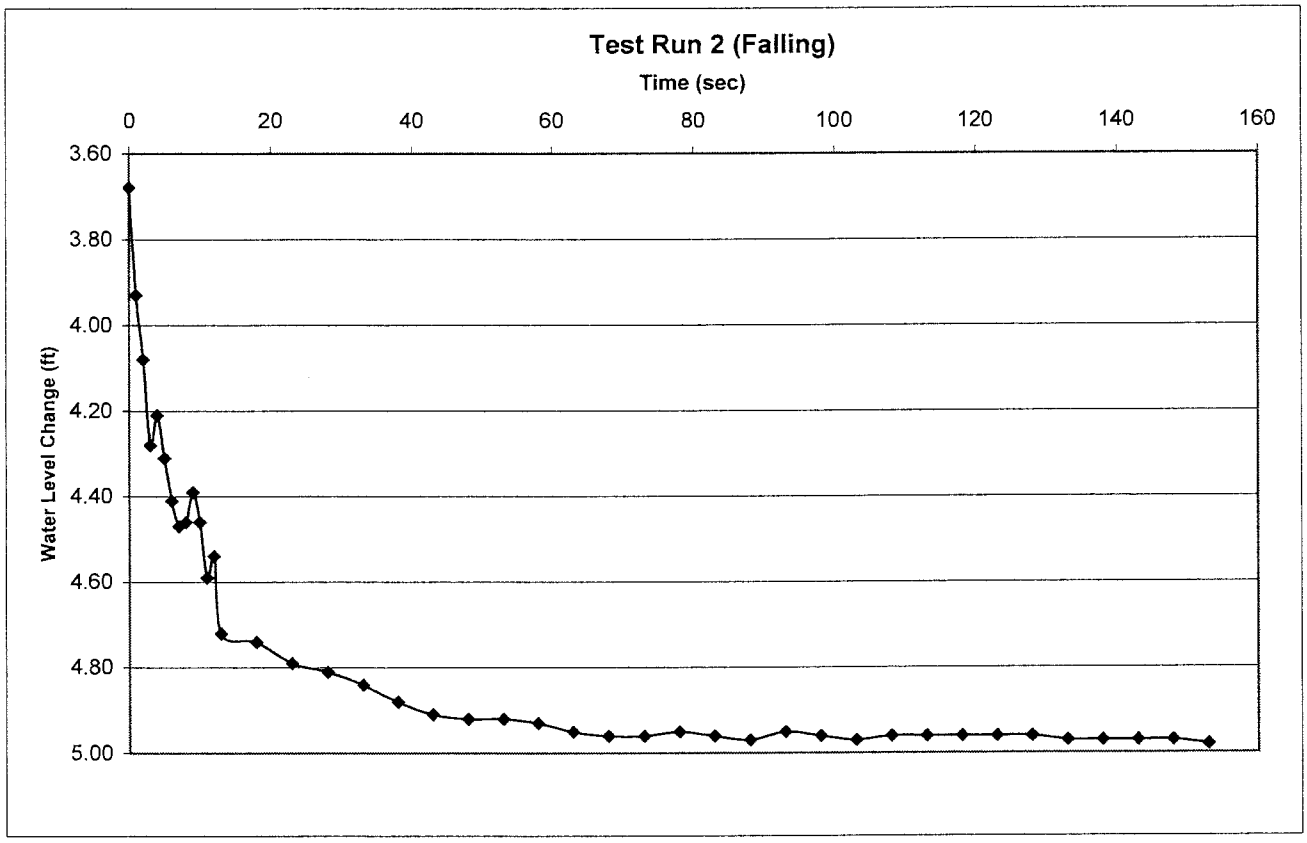
***Test Run 2 (Falling)***

| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 832 | 2/12/2007 | 4:47:18 | 0 | 28.17 | 1.30 | 3.68 |
| 833 | 2/12/2007 | 4:47:19 | 1 | 27.92 | 1.05 | 3.93 |
| 834 | 2/12/2007 | 4:47:20 | 2 | 27.77 | 0.90 | 4.08 |
| 835 | 2/12/2007 | 4:47:21 | 3 | 27.57 | 0.70 | 4.28 |
| 836 | 2/12/2007 | 4:47:22 | 4 | 27.64 | 0.77 | 4.21 |
| 837 | 2/12/2007 | 4:47:23 | 5 | 27.54 | 0.67 | 4.31 |
| 838 | 2/12/2007 | 4:47:24 | 6 | 27.44 | 0.57 | 4.41 |
| 839 | 2/12/2007 | 4:47:25 | 7 | 27.38 | 0.51 | 4.47 |
| 840 | 2/12/2007 | 4:47:26 | 8 | 27.39 | 0.52 | 4.46 |
| 841 | 2/12/2007 | 4:47:27 | 9 | 27.46 | 0.59 | 4.39 |
| 842 | 2/12/2007 | 4:47:28 | 10 | 27.39 | 0.52 | 4.46 |
| 843 | 2/12/2007 | 4:47:29 | 11 | 27.26 | 0.39 | 4.59 |
| 844 | 2/12/2007 | 4:47:30 | 12 | 27.31 | 0.44 | 4.54 |
| 849 | 2/12/2007 | 4:47:35 | 13 | 27.13 | 0.26 | 4.72 |
| 854 | 2/12/2007 | 4:47:40 | 18 | 27.11 | 0.24 | 4.74 |
| 859 | 2/12/2007 | 4:47:45 | 23 | 27.06 | 0.19 | 4.79 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 864 | 2/12/2007 | 4:47:50 | 28 | 27.04 | 0.17 | 4.81 |
| 869 | 2/12/2007 | 4:47:55 | 33 | 27.01 | 0.14 | 4.84 |
| 874 | 2/12/2007 | 4:48:00 | 38 | 26.97 | 0.10 | 4.88 |
| 879 | 2/12/2007 | 4:48:05 | 43 | 26.94 | 0.07 | 4.91 |
| 884 | 2/12/2007 | 4:48:10 | 48 | 26.93 | 0.06 | 4.92 |
| 889 | 2/12/2007 | 4:48:15 | 53 | 26.93 | 0.06 | 4.92 |
| 894 | 2/12/2007 | 4:48:20 | 58 | 26.92 | 0.05 | 4.93 |
| 899 | 2/12/2007 | 4:48:25 | 63 | 26.90 | 0.03 | 4.95 |
| 904 | 2/12/2007 | 4:48:30 | 68 | 26.89 | 0.02 | 4.96 |
| 909 | 2/12/2007 | 4:48:35 | 73 | 26.89 | 0.02 | 4.96 |
| 914 | 2/12/2007 | 4:48:40 | 78 | 26.90 | 0.03 | 4.95 |
| 919 | 2/12/2007 | 4:48:45 | 83 | 26.89 | 0.02 | 4.96 |
| 924 | 2/12/2007 | 4:48:50 | 88 | 26.88 | 0.01 | 4.97 |
| 929 | 2/12/2007 | 4:48:55 | 93 | 26.90 | 0.03 | 4.95 |
| 934 | 2/12/2007 | 4:49:00 | 98 | 26.89 | 0.02 | 4.96 |
| 939 | 2/12/2007 | 4:49:05 | 103 | 26.88 | 0.01 | 4.97 |
| 944 | 2/12/2007 | 4:49:10 | 108 | 26.89 | 0.02 | 4.96 |
| 949 | 2/12/2007 | 4:49:15 | 113 | 26.89 | 0.02 | 4.96 |
| 954 | 2/12/2007 | 4:49:20 | 118 | 26.89 | 0.02 | 4.96 |
| 959 | 2/12/2007 | 4:49:25 | 123 | 26.89 | 0.02 | 4.96 |
| 964 | 2/12/2007 | 4:49:30 | 128 | 26.89 | 0.02 | 4.96 |
| 969 | 2/12/2007 | 4:49:35 | 133 | 26.88 | 0.01 | 4.97 |
| 974 | 2/12/2007 | 4:49:40 | 138 | 26.88 | 0.01 | 4.97 |
| 979 | 2/12/2007 | 4:49:45 | 143 | 26.88 | 0.01 | 4.97 |
| 984 | 2/12/2007 | 4:49:50 | 148 | 26.88 | 0.01 | 4.97 |
| 989 | 2/12/2007 | 4:49:55 | 153 | 26.87 | 0.00 | 4.98 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.0000241*** | ***ft/sec*** | ***or*** | ***2.41E-05*** | ***ft/sec*** |
| | = | ***0.000735*** | ***cm/sec*** | ***or*** | ***7.35E-04*** | ***cm/sec*** |






*Analysis by JJK of Joyce Engineering, Inc.*

## *Coble's Sandrock Phase 3 Expansion*

| | |
|---|---|
| Well/Piezometer: | P-37 |
| Initial Measured Depth to Water: | 8.85' |
| Final Measured Depth to Water: | - |
| Screen Interval: | 12.50' - 32.50' |
| Total Well Depth: | 32.50' |
| Date(s) for Slug Testing: | 2/13/2007 |

*A 1.6"x48" bailer was used to complete the slug test.

| | |
|---|---|
| $A$ = Function of $L_e/R$: | 3.892 |
| $B$ = Function of $L_e/R$: | 0.641 |
| $h$ = The saturated thickness of the aquifer (ft): | 26.15 |
| $L_w$ = Difference from water table to bottom of borehole or well screen (ft): | 23.65 |
| $r_c$ = Radius of Well Casing (ft): | 0.083 |
| $R$ = Radius of Gravel Envelope (ft): | 0.260 |
| $R_e$ = Effective Radial Distance over which head is dissipated (ft): | 6.324 |
| $L_e$ = Length of screen of the well through which water can enter (ft): | 20 |
| $H_o$ = Drawdown at time 0 (ft): | 1.15 |
| $H_t$ = Drawdown at time t (ft): | 0.06 |
| $t$ = time (sec): | 447 |

The Bouwer and Rice Equation is used for all hydraulic conductivity calculations in this study.

$$K = \frac{r_c^2 LN(R_e/R)}{2L_e}\left(\frac{1}{t}\right)LN\left(\frac{H_o}{H_t}\right)$$

Bouwer and Rice present the equation below as a method to estimate $LN(R_e/R)$. This method is ultimately used to solve for $R_e$ This equation is used if the distance from the water table to the bottom of the borehole or well screen is less than the saturated thickness of the aquifer.

$$LN\left(\frac{R_e}{R}\right) = \left[\frac{1.1}{LN(L_w/R)} + \frac{A + B * LN[(h - L_w)/R]}{L_e/R}\right]^{-1}$$

A & B are determined from a graph determined by Bouwer and Rice.

$R_e$ = 6.324

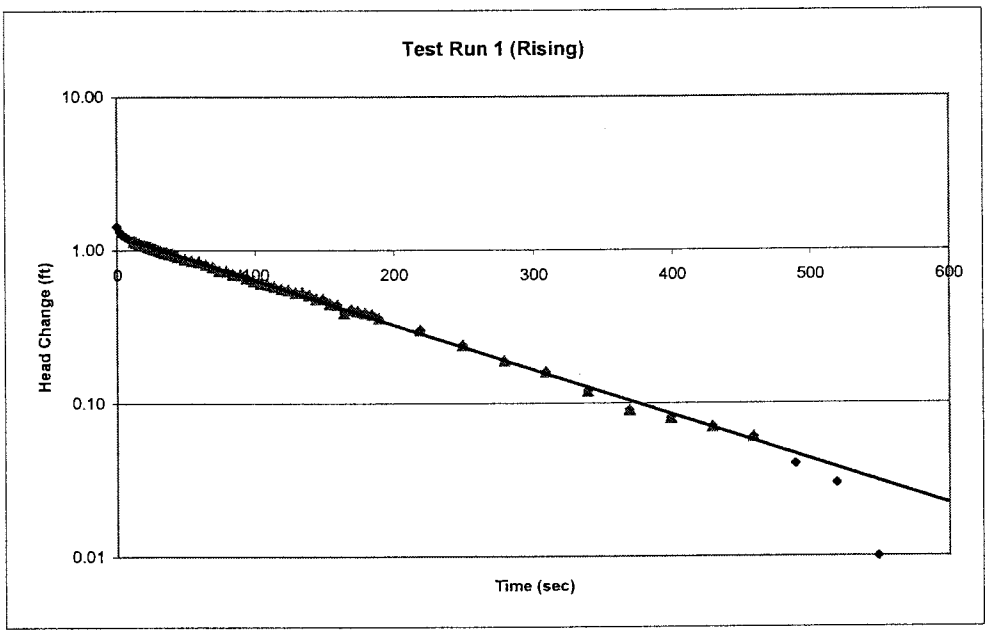
| | | |
|---|---|---|
| ***Hydraulic Conductivity (Rising):*** | ***3.63E-06*** | ***ft/sec*** |
| | ***1.11E-04*** | ***cm/sec*** |
| ***Hydraulic Conductivity (Falling):*** | ***3.60E-06*** | ***ft/sec*** |
| | ***1.10E-04*** | ***cm/sec*** |

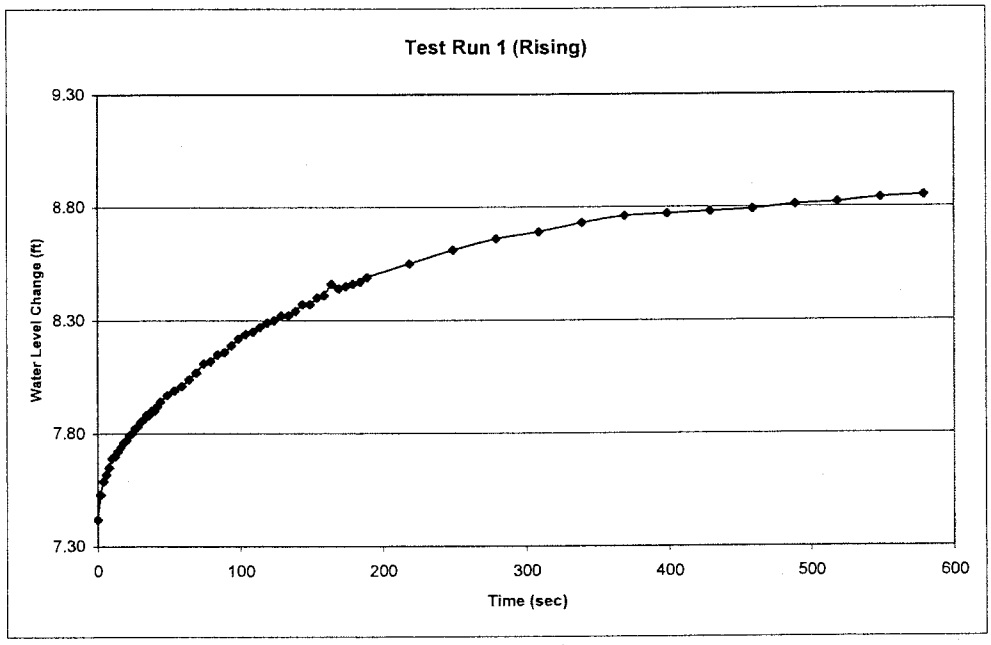
***Test Run 1 (Rising)***

| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 2788 | 2/13/2007 | 2:19:51 | 0 | 15.08 | 1.43 | 7.42 |
| 2790 | 2/13/2007 | 2:19:53 | 2 | 15.19 | 1.32 | 7.53 |
| 2792 | 2/13/2007 | 2:19:55 | 4 | 15.25 | 1.26 | 7.59 |
| 2794 | 2/13/2007 | 2:19:57 | 6 | 15.28 | 1.23 | 7.62 |
| 2796 | 2/13/2007 | 2:19:59 | 8 | 15.31 | 1.20 | 7.65 |
| 2798 | 2/13/2007 | 2:20:01 | 10 | 15.35 | 1.16 | 7.69 |
| 2800 | 2/13/2007 | 2:20:03 | 12 | 15.36 | 1.15 | 7.70 |
| 2802 | 2/13/2007 | 2:20:05 | 14 | 15.38 | 1.13 | 7.72 |
| 2804 | 2/13/2007 | 2:20:07 | 16 | 15.40 | 1.11 | 7.74 |
| 2806 | 2/13/2007 | 2:20:09 | 18 | 15.42 | 1.09 | 7.76 |
| 2808 | 2/13/2007 | 2:20:11 | 20 | 15.43 | 1.08 | 7.77 |
| 2810 | 2/13/2007 | 2:20:13 | 22 | 15.45 | 1.06 | 7.79 |
| 2812 | 2/13/2007 | 2:20:15 | 24 | 15.46 | 1.05 | 7.80 |
| 2814 | 2/13/2007 | 2:20:17 | 26 | 15.48 | 1.03 | 7.82 |
| 2816 | 2/13/2007 | 2:20:19 | 28 | 15.49 | 1.02 | 7.83 |
| 2818 | 2/13/2007 | 2:20:21 | 30 | 15.51 | 1.00 | 7.85 |
| 2820 | 2/13/2007 | 2:20:23 | 32 | 15.52 | 0.99 | 7.86 |
| 2822 | 2/13/2007 | 2:20:25 | 34 | 15.54 | 0.97 | 7.88 |
| 2824 | 2/13/2007 | 2:20:27 | 36 | 15.54 | 0.97 | 7.88 |
| 2826 | 2/13/2007 | 2:20:29 | 38 | 15.56 | 0.95 | 7.90 |
| 2828 | 2/13/2007 | 2:20:31 | 40 | 15.56 | 0.95 | 7.90 |
| 2830 | 2/13/2007 | 2:20:33 | 42 | 15.58 | 0.93 | 7.92 |
| 2832 | 2/13/2007 | 2:20:35 | 44 | 15.60 | 0.91 | 7.94 |
| 2837 | 2/13/2007 | 2:20:40 | 49 | 15.63 | 0.88 | 7.97 |
| 2842 | 2/13/2007 | 2:20:45 | 54 | 15.65 | 0.86 | 7.99 |
| 2847 | 2/13/2007 | 2:20:50 | 59 | 15.67 | 0.84 | 8.01 |
| 2852 | 2/13/2007 | 2:20:55 | 64 | 15.70 | 0.81 | 8.04 |
| 2857 | 2/13/2007 | 2:21:00 | 69 | 15.73 | 0.78 | 8.07 |
| 2862 | 2/13/2007 | 2:21:05 | 74 | 15.77 | 0.74 | 8.11 |
| 2867 | 2/13/2007 | 2:21:10 | 79 | 15.78 | 0.73 | 8.12 |
| 2872 | 2/13/2007 | 2:21:15 | 84 | 15.81 | 0.70 | 8.15 |
| 2877 | 2/13/2007 | 2:21:20 | 89 | 15.82 | 0.69 | 8.16 |
| 2882 | 2/13/2007 | 2:21:25 | 94 | 15.85 | 0.66 | 8.19 |
| 2887 | 2/13/2007 | 2:21:30 | 99 | 15.88 | 0.63 | 8.22 |
| 2892 | 2/13/2007 | 2:21:35 | 104 | 15.90 | 0.61 | 8.24 |
| 2897 | 2/13/2007 | 2:21:40 | 109 | 15.91 | 0.60 | 8.25 |
| 2902 | 2/13/2007 | 2:21:45 | 114 | 15.93 | 0.58 | 8.27 |
| 2907 | 2/13/2007 | 2:21:50 | 119 | 15.95 | 0.56 | 8.29 |
| 2912 | 2/13/2007 | 2:21:55 | 124 | 15.96 | 0.55 | 8.30 |
| 2917 | 2/13/2007 | 2:22:00 | 129 | 15.98 | 0.53 | 8.32 |
| 2922 | 2/13/2007 | 2:22:05 | 134 | 15.98 | 0.53 | 8.32 |
| 2927 | 2/13/2007 | 2:22:10 | 139 | 16.00 | 0.51 | 8.34 |
| 2932 | 2/13/2007 | 2:22:15 | 144 | 16.03 | 0.48 | 8.37 |
| 2937 | 2/13/2007 | 2:22:20 | 149 | 16.03 | 0.48 | 8.37 |
| 2942 | 2/13/2007 | 2:22:25 | 154 | 16.06 | 0.45 | 8.40 |
| 2947 | 2/13/2007 | 2:22:30 | 159 | 16.07 | 0.44 | 8.41 |
| 2952 | 2/13/2007 | 2:22:35 | 164 | 16.12 | 0.39 | 8.46 |
| 2957 | 2/13/2007 | 2:22:40 | 169 | 16.10 | 0.41 | 8.44 |
| 2962 | 2/13/2007 | 2:22:45 | 174 | 16.11 | 0.40 | 8.45 |
| 2967 | 2/13/2007 | 2:22:50 | 179 | 16.12 | 0.39 | 8.46 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2972 | 2/13/2007 | 2:22:55 | 184 | 16.13 | 0.38 | 8.47 |
| 2977 | 2/13/2007 | 2:23:00 | 189 | 16.15 | 0.36 | 8.49 |
| 3007 | 2/13/2007 | 2:23:30 | 219 | 16.21 | 0.30 | 8.55 |
| 3037 | 2/13/2007 | 2:24:00 | 249 | 16.27 | 0.24 | 8.61 |
| 3067 | 2/13/2007 | 2:24:30 | 279 | 16.32 | 0.19 | 8.66 |
| 3097 | 2/13/2007 | 2:25:00 | 309 | 16.35 | 0.16 | 8.69 |
| 3127 | 2/13/2007 | 2:25:30 | 339 | 16.39 | 0.12 | 8.73 |
| 3157 | 2/13/2007 | 2:26:00 | 369 | 16.42 | 0.09 | 8.76 |
| 3187 | 2/13/2007 | 2:26:30 | 399 | 16.43 | 0.08 | 8.77 |
| 3217 | 2/13/2007 | 2:27:00 | 429 | 16.44 | 0.07 | 8.78 |
| 3247 | 2/13/2007 | 2:27:30 | 459 | 16.45 | 0.06 | 8.79 |
| 3277 | 2/13/2007 | 2:28:00 | 489 | 16.47 | 0.04 | 8.81 |
| 3307 | 2/13/2007 | 2:28:30 | 519 | 16.48 | 0.03 | 8.82 |
| 3337 | 2/13/2007 | 2:29:00 | 549 | 16.50 | 0.01 | 8.84 |
| 3367 | 2/13/2007 | 2:29:30 | 579 | 16.51 | 0.00 | 8.85 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.00000363*** | ***ft/sec*** | ***or*** | ***3.63E-06*** | ***ft/sec*** |
| | = | ***0.000111*** | ***cm/sec*** | ***or*** | ***1.11E-04*** | ***cm/sec*** |



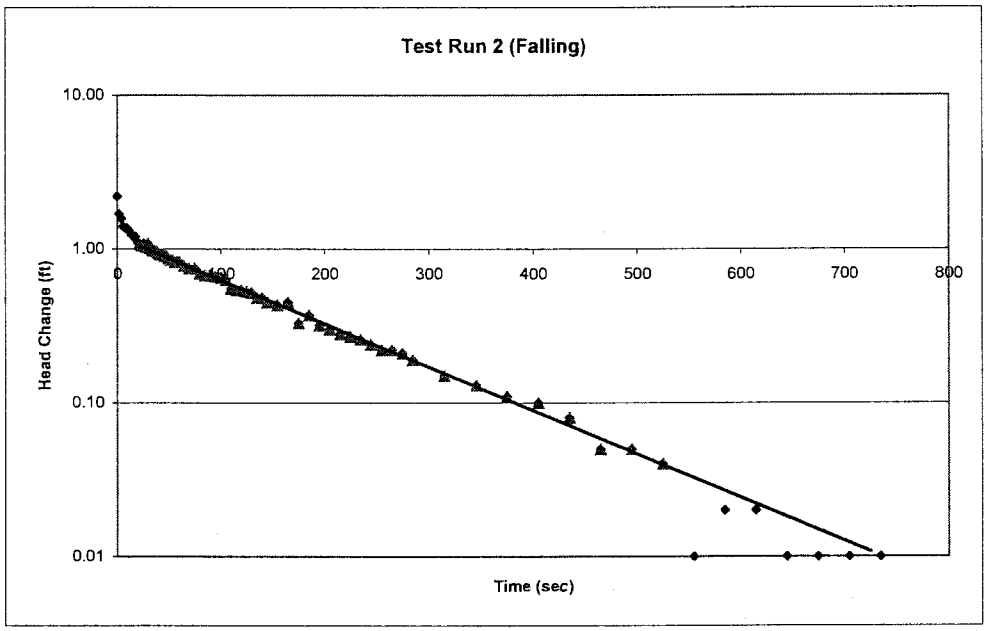
| | |
|---|---|
| $r_c$ = Radius of Well Casing (ft): | 0.083 |
| $R$ = Radius of Gravel Envelope (ft): | 0.260 |
| $R_e$ = Effective Radial Distance over which head is dissipated (ft): | 6.324 |
| $L_e$ = Length of screen of the well through which water can enter (ft): | 20 |
| $H_o$ = Drawdown at time 0 (ft): | 1.08 |
| $H_t$ = Drawdown at time t (ft): | 0.04 |
| $t$ = time (sec): | 503 |

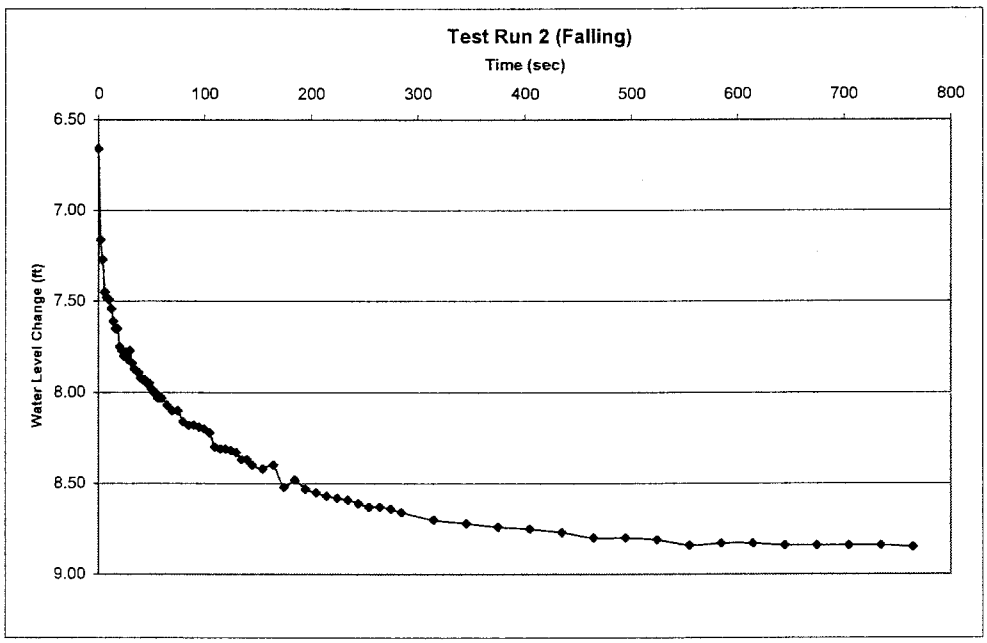
***Test Run 2 (Falling)***

| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 3594 | 2/13/2007 | 2:33:17 | 0 | 18.75 | 2.19 | 6.66 |
| 3596 | 2/13/2007 | 2:33:19 | 2 | 18.25 | 1.69 | 7.16 |
| 3598 | 2/13/2007 | 2:33:21 | 4 | 18.14 | 1.58 | 7.27 |
| 3600 | 2/13/2007 | 2:33:23 | 6 | 17.96 | 1.40 | 7.45 |
| 3602 | 2/13/2007 | 2:33:25 | 8 | 17.93 | 1.37 | 7.48 |
| 3604 | 2/13/2007 | 2:33:27 | 10 | 17.92 | 1.36 | 7.49 |
| 3606 | 2/13/2007 | 2:33:29 | 12 | 17.87 | 1.31 | 7.54 |
| 3608 | 2/13/2007 | 2:33:31 | 14 | 17.8 | 1.24 | 7.61 |
| 3610 | 2/13/2007 | 2:33:33 | 16 | 17.76 | 1.20 | 7.65 |
| 3612 | 2/13/2007 | 2:33:35 | 18 | 17.76 | 1.20 | 7.65 |
| 3614 | 2/13/2007 | 2:33:37 | 20 | 17.66 | 1.10 | 7.75 |
| 3616 | 2/13/2007 | 2:33:39 | 22 | 17.64 | 1.08 | 7.77 |
| 3618 | 2/13/2007 | 2:33:41 | 24 | 17.61 | 1.05 | 7.80 |
| 3620 | 2/13/2007 | 2:33:43 | 26 | 17.63 | 1.07 | 7.78 |
| 3622 | 2/13/2007 | 2:33:45 | 28 | 17.59 | 1.03 | 7.82 |
| 3624 | 2/13/2007 | 2:33:47 | 30 | 17.64 | 1.08 | 7.77 |
| 3626 | 2/13/2007 | 2:33:49 | 32 | 17.57 | 1.01 | 7.84 |
| 3628 | 2/13/2007 | 2:33:51 | 34 | 17.54 | 0.98 | 7.87 |
| 3630 | 2/13/2007 | 2:33:53 | 36 | 17.53 | 0.97 | 7.88 |
| 3632 | 2/13/2007 | 2:33:55 | 38 | 17.52 | 0.96 | 7.89 |
| 3634 | 2/13/2007 | 2:33:57 | 40 | 17.49 | 0.93 | 7.92 |
| 3636 | 2/13/2007 | 2:33:59 | 42 | 17.48 | 0.92 | 7.93 |
| 3638 | 2/13/2007 | 2:34:01 | 44 | 17.48 | 0.92 | 7.93 |
| 3640 | 2/13/2007 | 2:34:03 | 46 | 17.46 | 0.90 | 7.95 |
| 3642 | 2/13/2007 | 2:34:05 | 48 | 17.46 | 0.90 | 7.95 |
| 3644 | 2/13/2007 | 2:34:07 | 50 | 17.43 | 0.87 | 7.98 |
| 3646 | 2/13/2007 | 2:34:09 | 52 | 17.41 | 0.85 | 8.00 |
| 3648 | 2/13/2007 | 2:34:11 | 54 | 17.41 | 0.85 | 8.00 |
| 3650 | 2/13/2007 | 2:34:13 | 56 | 17.38 | 0.82 | 8.03 |
| 3652 | 2/13/2007 | 2:34:15 | 58 | 17.38 | 0.82 | 8.03 |
| 3654 | 2/13/2007 | 2:34:17 | 60 | 17.38 | 0.82 | 8.03 |
| 3659 | 2/13/2007 | 2:34:22 | 65 | 17.34 | 0.78 | 8.07 |
| 3664 | 2/13/2007 | 2:34:27 | 70 | 17.31 | 0.75 | 8.10 |
| 3669 | 2/13/2007 | 2:34:32 | 75 | 17.31 | 0.75 | 8.10 |
| 3674 | 2/13/2007 | 2:34:37 | 80 | 17.25 | 0.69 | 8.16 |
| 3679 | 2/13/2007 | 2:34:42 | 85 | 17.23 | 0.67 | 8.18 |
| 3684 | 2/13/2007 | 2:34:47 | 90 | 17.23 | 0.67 | 8.18 |
| 3689 | 2/13/2007 | 2:34:52 | 95 | 17.22 | 0.66 | 8.19 |
| 3694 | 2/13/2007 | 2:34:57 | 100 | 17.21 | 0.65 | 8.20 |
| 3699 | 2/13/2007 | 2:35:02 | 105 | 17.19 | 0.63 | 8.22 |
| 3704 | 2/13/2007 | 2:35:07 | 110 | 17.11 | 0.55 | 8.30 |
| 3709 | 2/13/2007 | 2:35:12 | 115 | 17.1 | 0.54 | 8.31 |
| 3714 | 2/13/2007 | 2:35:17 | 120 | 17.1 | 0.54 | 8.31 |
| 3719 | 2/13/2007 | 2:35:22 | 125 | 17.09 | 0.53 | 8.32 |
| 3724 | 2/13/2007 | 2:35:27 | 130 | 17.08 | 0.52 | 8.33 |
| 3729 | 2/13/2007 | 2:35:32 | 135 | 17.04 | 0.48 | 8.37 |
| 3734 | 2/13/2007 | 2:35:37 | 140 | 17.04 | 0.48 | 8.37 |
| 3739 | 2/13/2007 | 2:35:42 | 145 | 17.01 | 0.45 | 8.40 |
| 3749 | 2/13/2007 | 2:35:52 | 155 | 16.99 | 0.43 | 8.42 |
| 3759 | 2/13/2007 | 2:36:02 | 165 | 17.01 | 0.45 | 8.40 |
| 3769 | 2/13/2007 | 2:36:12 | 175 | 16.89 | 0.33 | 8.52 |
| 3779 | 2/13/2007 | 2:36:22 | 185 | 16.93 | 0.37 | 8.48 |
| 3789 | 2/13/2007 | 2:36:32 | 195 | 16.88 | 0.32 | 8.53 |
| 3799 | 2/13/2007 | 2:36:42 | 205 | 16.86 | 0.30 | 8.55 |
| 3809 | 2/13/2007 | 2:36:52 | 215 | 16.84 | 0.28 | 8.57 |
| 3819 | 2/13/2007 | 2:37:02 | 225 | 16.83 | 0.27 | 8.58 |
| 3829 | 2/13/2007 | 2:37:12 | 235 | 16.82 | 0.26 | 8.59 |
| 3839 | 2/13/2007 | 2:37:22 | 245 | 16.8 | 0.24 | 8.61 |
| 3849 | 2/13/2007 | 2:37:32 | 255 | 16.78 | 0.22 | 8.63 |
| 3859 | 2/13/2007 | 2:37:42 | 265 | 16.78 | 0.22 | 8.63 |
| 3869 | 2/13/2007 | 2:37:52 | 275 | 16.77 | 0.21 | 8.64 |
| 3879 | 2/13/2007 | 2:38:02 | 285 | 16.75 | 0.19 | 8.66 |
| 3909 | 2/13/2007 | 2:38:32 | 315 | 16.71 | 0.15 | 8.70 |
| 3939 | 2/13/2007 | 2:39:02 | 345 | 16.69 | 0.13 | 8.72 |
| 3969 | 2/13/2007 | 2:39:32 | 375 | 16.67 | 0.11 | 8.74 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3999 | 2/13/2007 | 2:40:02 | 405 | 16.66 | 0.10 | 8.75 |
| 4029 | 2/13/2007 | 2:40:32 | 435 | 16.64 | 0.08 | 8.77 |
| 4059 | 2/13/2007 | 2:41:02 | 465 | 16.61 | 0.05 | 8.80 |
| 4089 | 2/13/2007 | 2:41:32 | 495 | 16.61 | 0.05 | 8.80 |
| 4119 | 2/13/2007 | 2:42:02 | 525 | 16.6 | 0.04 | 8.81 |
| 4149 | 2/13/2007 | 2:42:32 | 555 | 16.57 | 0.01 | 8.84 |
| 4179 | 2/13/2007 | 2:43:02 | 585 | 16.58 | 0.02 | 8.83 |
| 4209 | 2/13/2007 | 2:43:32 | 615 | 16.58 | 0.02 | 8.83 |
| 4239 | 2/13/2007 | 2:44:02 | 645 | 16.57 | 0.01 | 8.84 |
| 4269 | 2/13/2007 | 2:44:32 | 675 | 16.57 | 0.01 | 8.84 |
| 4299 | 2/13/2007 | 2:45:02 | 705 | 16.57 | 0.01 | 8.84 |
| 4329 | 2/13/2007 | 2:45:32 | 735 | 16.57 | 0.01 | 8.84 |
| 4359 | 2/13/2007 | 2:46:02 | 765 | 16.56 | 0.00 | 8.85 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.00000360*** | ***ft/sec*** | ***or*** | ***3.60E-06*** | ***ft/sec*** |
| | = | ***0.000110*** | ***cm/sec*** | ***or*** | ***1.10E-04*** | ***cm/sec*** |




***Analysis by JJK of Joyce Engineering, Inc.***

## *Coble's Sandrock Phase 3 Expansion*

| | |
|---|---|
| Well/Piezometer: | P-38 |
| Initial Measured Depth to Water: | 21.13 |
| Final Measured Depth to Water: | - |
| Screen Interval: | 22.50' - 42.50' |
| Total Well Depth: | 42.50' |
| Date(s) for Slug Testing: | 2/14/2007 |

*A 1.6"x36" bailer was used to complete the slug test.

| | |
|---|---|
| $A$ = Function of $L_e/R$: | 2.938 |
| $B$ = Function of $L_e/R$: | 0.473 |
| $h$ = The saturated thickness of the aquifer (ft): | 23.87 |
| $L_w$ = Difference from water table to bottom of borehole or well screen (ft): | 21.37 |
| $r_c$ = Radius of Well Casing (ft): | 0.083 |
| $R$ = Radius of Gravel Envelope (ft): | 0.458 |
| $R_e$ = Effective Radial Distance over which head is dissipated (ft): | 6.739 |
| $L_e$ = Length of screen of the well through which water can enter (ft): | 20 |
| $H_o$ = Drawdown at time 0 (ft): | 0.81 |
| $H_t$ = Drawdown at time t (ft): | 0.15 |
| $t$ = time (sec): | 1345 |

The Bouwer and Rice Equation is used for all hydraulic conductivity calculations in this study.

$$K = \frac{r_c^2 LN(R_e/R)}{2L_e}\left(\frac{1}{t}\right)LN\left(\frac{H_o}{H_t}\right)$$

Bouwer and Rice present the equation below as a method to estimate $LN(R_e/R)$. This method is ultimately used to solve for $R_e$ This equation is used if the distance from the water table to the bottom of the borehole or well screen is less than the saturated thickness of the aquifer.

$$LN\left(\frac{R_e}{R}\right) = \left[\frac{1.1}{LN(L_w/R)} + \frac{A + B * LN[(h - L_w)/R]}{L_e/R}\right]^{-1}$$

A & B are determined from a graph determined by Bouwer and Rice.

$R_e$ = 6.739

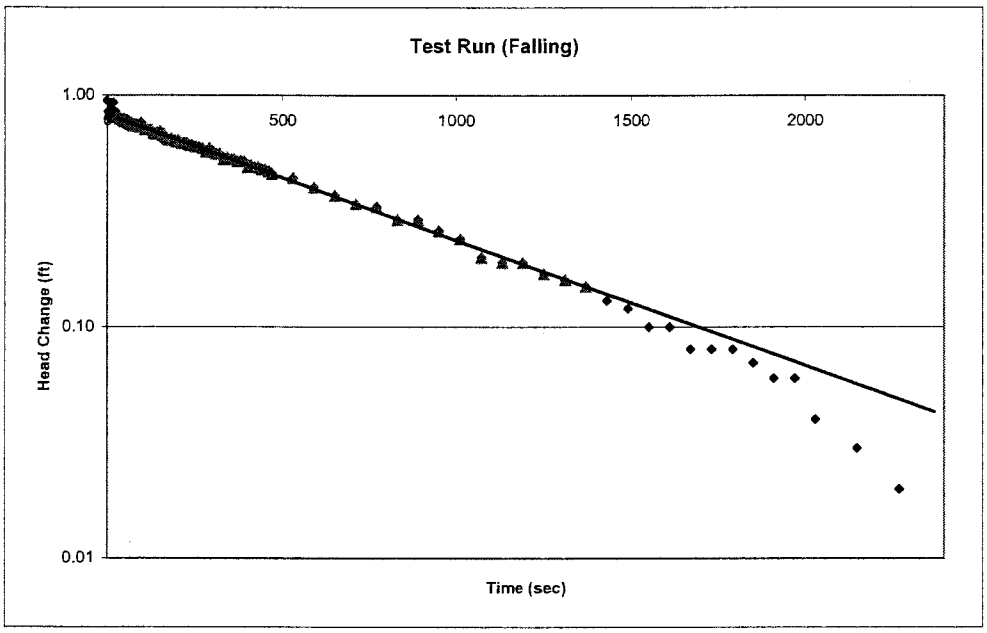
***Hydraulic Conductivity (Falling):*** ***5.81E-07 ft/sec***
***1.77E-05 cm/sec***

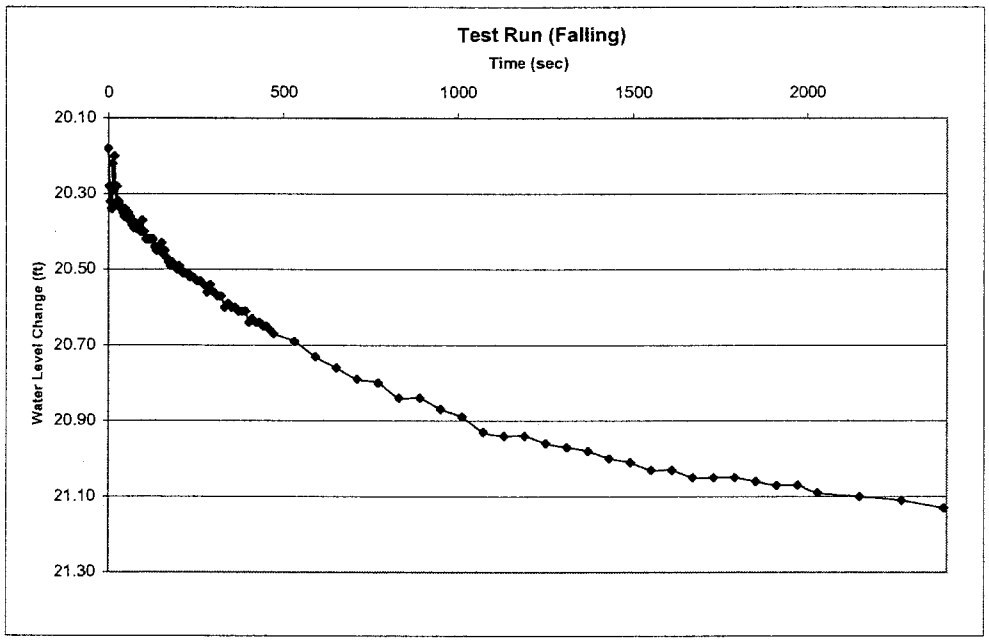
***Test Run (Falling)***

| No. | Date | Time | Time (sec) | Transducer Depth (ft) | Head Change (ft) | Water Level Change (ft) |
|---|---|---|---|---|---|---|
| 5885 | 2/14/2007 | 23:49:14 | 0 | 21.84 | 0.95 | 20.18 |
| 5888 | 2/14/2007 | 23:49:17 | 3 | 21.74 | 0.85 | 20.28 |
| 5891 | 2/14/2007 | 23:49:20 | 6 | 21.70 | 0.81 | 20.32 |
| 5894 | 2/14/2007 | 23:49:23 | 9 | 21.68 | 0.79 | 20.34 |
| 5897 | 2/14/2007 | 23:49:26 | 12 | 21.80 | 0.91 | 20.22 |
| 5900 | 2/14/2007 | 23:49:29 | 15 | 21.73 | 0.84 | 20.29 |
| 5903 | 2/14/2007 | 23:49:32 | 18 | 21.82 | 0.93 | 20.20 |
| 5906 | 2/14/2007 | 23:49:35 | 21 | 21.69 | 0.80 | 20.33 |
| 5909 | 2/14/2007 | 23:49:38 | 24 | 21.74 | 0.85 | 20.28 |
| 5912 | 2/14/2007 | 23:49:41 | 27 | 21.70 | 0.81 | 20.32 |
| 5915 | 2/14/2007 | 23:49:44 | 30 | 21.70 | 0.81 | 20.32 |
| 5918 | 2/14/2007 | 23:49:47 | 33 | 21.69 | 0.80 | 20.33 |
| 5921 | 2/14/2007 | 23:49:50 | 36 | 21.68 | 0.79 | 20.34 |
| 5924 | 2/14/2007 | 23:49:53 | 39 | 21.68 | 0.79 | 20.34 |
| 5927 | 2/14/2007 | 23:49:56 | 42 | 21.67 | 0.78 | 20.35 |
| 5930 | 2/14/2007 | 23:49:59 | 45 | 21.66 | 0.77 | 20.36 |
| 5933 | 2/14/2007 | 23:50:02 | 48 | 21.68 | 0.79 | 20.34 |
| 5936 | 2/14/2007 | 23:50:05 | 51 | 21.67 | 0.78 | 20.35 |
| 5939 | 2/14/2007 | 23:50:08 | 54 | 21.67 | 0.78 | 20.35 |
| 5942 | 2/14/2007 | 23:50:11 | 57 | 21.67 | 0.78 | 20.35 |
| 5945 | 2/14/2007 | 23:50:14 | 60 | 21.65 | 0.76 | 20.37 |
| 5948 | 2/14/2007 | 23:50:17 | 63 | 21.66 | 0.77 | 20.36 |
| 5951 | 2/14/2007 | 23:50:20 | 66 | 21.64 | 0.75 | 20.38 |
| 5954 | 2/14/2007 | 23:50:23 | 69 | 21.65 | 0.76 | 20.37 |
| 5957 | 2/14/2007 | 23:50:26 | 72 | 21.63 | 0.74 | 20.39 |
| 5960 | 2/14/2007 | 23:50:29 | 75 | 21.64 | 0.75 | 20.38 |
| 5963 | 2/14/2007 | 23:50:32 | 78 | 21.63 | 0.74 | 20.39 |
| 5966 | 2/14/2007 | 23:50:35 | 81 | 21.64 | 0.75 | 20.38 |
| 5969 | 2/14/2007 | 23:50:38 | 84 | 21.63 | 0.74 | 20.39 |
| 5972 | 2/14/2007 | 23:50:41 | 87 | 21.63 | 0.74 | 20.39 |
| 5977 | 2/14/2007 | 23:50:46 | 92 | 21.62 | 0.73 | 20.40 |
| 5982 | 2/14/2007 | 23:50:51 | 97 | 21.65 | 0.76 | 20.37 |
| 5987 | 2/14/2007 | 23:50:56 | 102 | 21.62 | 0.73 | 20.40 |
| 5992 | 2/14/2007 | 23:51:01 | 107 | 21.60 | 0.71 | 20.42 |
| 5997 | 2/14/2007 | 23:51:06 | 112 | 21.60 | 0.71 | 20.42 |
| 6002 | 2/14/2007 | 23:51:11 | 117 | 21.60 | 0.71 | 20.42 |
| 6007 | 2/14/2007 | 23:51:16 | 122 | 21.60 | 0.71 | 20.42 |
| 6012 | 2/14/2007 | 23:51:21 | 127 | 21.60 | 0.71 | 20.42 |
| 6017 | 2/14/2007 | 23:51:26 | 132 | 21.58 | 0.69 | 20.44 |
| 6022 | 2/14/2007 | 23:51:31 | 137 | 21.57 | 0.68 | 20.45 |
| 6027 | 2/14/2007 | 23:51:36 | 142 | 21.58 | 0.69 | 20.44 |
| 6032 | 2/14/2007 | 23:51:41 | 147 | 21.57 | 0.68 | 20.45 |
| 6037 | 2/14/2007 | 23:51:46 | 152 | 21.59 | 0.70 | 20.43 |
| 6042 | 2/14/2007 | 23:51:51 | 157 | 21.56 | 0.67 | 20.46 |
| 6047 | 2/14/2007 | 23:51:56 | 162 | 21.57 | 0.68 | 20.45 |
| 6052 | 2/14/2007 | 23:52:01 | 167 | 21.55 | 0.66 | 20.47 |
| 6057 | 2/14/2007 | 23:52:06 | 172 | 21.54 | 0.65 | 20.48 |
| 6062 | 2/14/2007 | 23:52:11 | 177 | 21.53 | 0.64 | 20.49 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6067 | 2/14/2007 | 23:52:16 | 182 | 21.54 | 0.65 | 20.48 |
| 6072 | 2/14/2007 | 23:52:21 | 187 | 21.53 | 0.64 | 20.49 |
| 6077 | 2/14/2007 | 23:52:26 | 192 | 21.53 | 0.64 | 20.49 |
| 6082 | 2/14/2007 | 23:52:31 | 197 | 21.52 | 0.63 | 20.50 |
| 6087 | 2/14/2007 | 23:52:36 | 202 | 21.53 | 0.64 | 20.49 |
| 6092 | 2/14/2007 | 23:52:41 | 207 | 21.52 | 0.63 | 20.50 |
| 6097 | 2/14/2007 | 23:52:46 | 212 | 21.51 | 0.62 | 20.51 |
| 6102 | 2/14/2007 | 23:52:51 | 217 | 21.51 | 0.62 | 20.51 |
| 6107 | 2/14/2007 | 23:52:56 | 222 | 21.51 | 0.62 | 20.51 |
| 6112 | 2/14/2007 | 23:53:01 | 227 | 21.51 | 0.62 | 20.51 |
| 6117 | 2/14/2007 | 23:53:06 | 232 | 21.50 | 0.61 | 20.52 |
| 6127 | 2/14/2007 | 23:53:16 | 242 | 21.50 | 0.61 | 20.52 |
| 6137 | 2/14/2007 | 23:53:26 | 252 | 21.49 | 0.60 | 20.53 |
| 6147 | 2/14/2007 | 23:53:36 | 262 | 21.49 | 0.60 | 20.53 |
| 6157 | 2/14/2007 | 23:53:46 | 272 | 21.48 | 0.59 | 20.54 |
| 6167 | 2/14/2007 | 23:53:56 | 282 | 21.46 | 0.57 | 20.56 |
| 6177 | 2/14/2007 | 23:54:06 | 292 | 21.48 | 0.59 | 20.54 |
| 6187 | 2/14/2007 | 23:54:16 | 302 | 21.46 | 0.57 | 20.56 |
| 6197 | 2/14/2007 | 23:54:26 | 312 | 21.45 | 0.56 | 20.57 |
| 6207 | 2/14/2007 | 23:54:36 | 322 | 21.45 | 0.56 | 20.57 |
| 6217 | 2/14/2007 | 23:54:46 | 332 | 21.42 | 0.53 | 20.60 |
| 6227 | 2/14/2007 | 23:54:56 | 342 | 21.43 | 0.54 | 20.59 |
| 6237 | 2/14/2007 | 23:55:06 | 352 | 21.42 | 0.53 | 20.60 |
| 6247 | 2/14/2007 | 23:55:16 | 362 | 21.42 | 0.53 | 20.60 |
| 6257 | 2/14/2007 | 23:55:26 | 372 | 21.41 | 0.52 | 20.61 |
| 6267 | 2/14/2007 | 23:55:36 | 382 | 21.41 | 0.52 | 20.61 |
| 6277 | 2/14/2007 | 23:55:46 | 392 | 21.41 | 0.52 | 20.61 |
| 6287 | 2/14/2007 | 23:55:56 | 402 | 21.38 | 0.49 | 20.64 |
| 6297 | 2/14/2007 | 23:56:06 | 412 | 21.39 | 0.50 | 20.63 |
| 6307 | 2/14/2007 | 23:56:16 | 422 | 21.38 | 0.49 | 20.64 |
| 6317 | 2/14/2007 | 23:56:26 | 432 | 21.38 | 0.49 | 20.64 |
| 6327 | 2/14/2007 | 23:56:36 | 442 | 21.37 | 0.48 | 20.65 |
| 6337 | 2/14/2007 | 23:56:46 | 452 | 21.37 | 0.48 | 20.65 |
| 6347 | 2/14/2007 | 23:56:56 | 462 | 21.36 | 0.47 | 20.66 |
| 6357 | 2/14/2007 | 23:57:06 | 472 | 21.35 | 0.46 | 20.67 |
| 6417 | 2/14/2007 | 23:58:06 | 532 | 21.33 | 0.44 | 20.69 |
| 6477 | 2/14/2007 | 23:59:06 | 592 | 21.29 | 0.40 | 20.73 |
| 6537 | 2/14/2007 | 0:00:06 | 652 | 21.26 | 0.37 | 20.76 |
| 6597 | 2/14/2007 | 0:01:06 | 712 | 21.23 | 0.34 | 20.79 |
| 6657 | 2/14/2007 | 0:02:06 | 772 | 21.22 | 0.33 | 20.80 |
| 6717 | 2/14/2007 | 0:03:06 | 832 | 21.18 | 0.29 | 20.84 |
| 6777 | 2/14/2007 | 0:04:06 | 892 | 21.18 | 0.29 | 20.84 |
| 6837 | 2/14/2007 | 0:05:06 | 952 | 21.15 | 0.26 | 20.87 |
| 6897 | 2/14/2007 | 0:06:06 | 1012 | 21.13 | 0.24 | 20.89 |
| 6957 | 2/14/2007 | 0:07:06 | 1072 | 21.09 | 0.20 | 20.93 |
| 7017 | 2/14/2007 | 0:08:06 | 1132 | 21.08 | 0.19 | 20.94 |
| 7077 | 2/14/2007 | 0:09:06 | 1192 | 21.08 | 0.19 | 20.94 |
| 7137 | 2/14/2007 | 0:10:06 | 1252 | 21.06 | 0.17 | 20.96 |
| 7197 | 2/14/2007 | 0:11:06 | 1312 | 21.05 | 0.16 | 20.97 |
| 7257 | 2/14/2007 | 0:12:06 | 1372 | 21.04 | 0.15 | 20.98 |
| 7317 | 2/14/2007 | 0:13:06 | 1432 | 21.02 | 0.13 | 21.00 |
| 7377 | 2/14/2007 | 0:14:06 | 1492 | 21.01 | 0.12 | 21.01 |
| 7437 | 2/14/2007 | 0:15:06 | 1552 | 20.99 | 0.10 | 21.03 |
| 7497 | 2/14/2007 | 0:16:06 | 1612 | 20.99 | 0.10 | 21.03 |
| 7557 | 2/14/2007 | 0:17:06 | 1672 | 20.97 | 0.08 | 21.05 |
| 7617 | 2/14/2007 | 0:18:06 | 1732 | 20.97 | 0.08 | 21.05 |
| 7677 | 2/14/2007 | 0:19:06 | 1792 | 20.97 | 0.08 | 21.05 |
| 7737 | 2/14/2007 | 0:20:06 | 1852 | 20.96 | 0.07 | 21.06 |
| 7797 | 2/14/2007 | 0:21:06 | 1912 | 20.95 | 0.06 | 21.07 |
| 7857 | 2/14/2007 | 0:22:06 | 1972 | 20.95 | 0.06 | 21.07 |
| 7917 | 2/14/2007 | 0:23:06 | 2032 | 20.93 | 0.04 | 21.09 |
| 8037 | 2/14/2007 | 0:25:06 | 2152 | 20.92 | 0.03 | 21.10 |
| 8157 | 2/14/2007 | 0:27:06 | 2272 | 20.91 | 0.02 | 21.11 |
| 8277 | 2/14/2007 | 0:29:06 | 2392 | 20.89 | 0.00 | 21.13 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Hydraulic Conductivity*** | = | ***0.000000581*** | ***ft/sec*** | ***or*** | ***5.81E-07*** | ***ft/sec*** |
| | = | ***0.0000177*** | ***cm/sec*** | ***or*** | ***1.77E-05*** | ***cm/sec*** |




*Analysis by JJK of Joyce Engineering, Inc.*

# APPENDIX DH-5

## Geologic Map of Region G, North Carolina

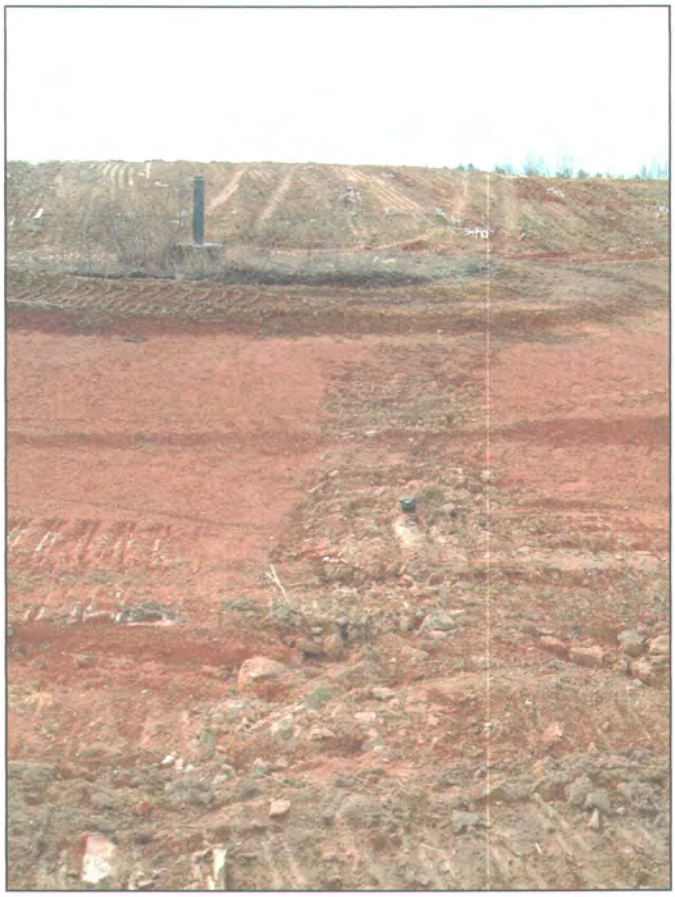
# APPENDIX DH-6

## Photographs from the Current Investigation

Photograph 1. Outcrop in drainage southeast of MW-3.

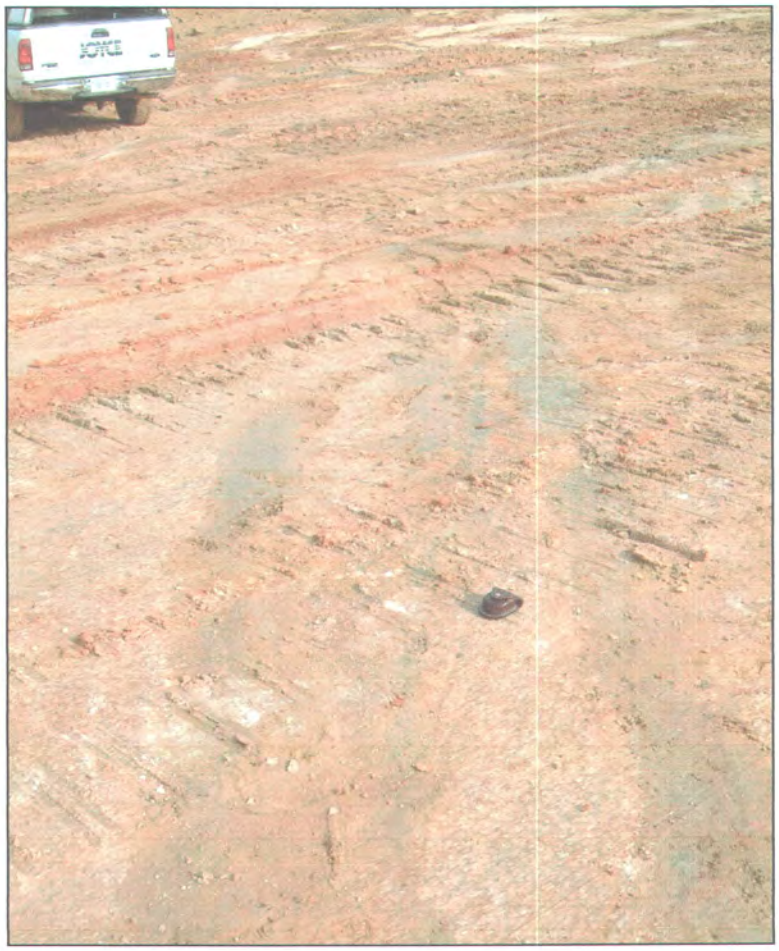
Photograph 2. Outcrop in drainage near MW-3. Fractures present, but rock not in place.

Photograph 3. Outcrop near P-5, picture oriented due south.



Photograph 4. Dike near MW-1. Picture oriented due south.

Photograph 5. Dike near MW-3. Picture oriented due east.



Photograph 6. Small dikes between MW-1 and MW-3. Picture oriented to northeast.

# APPENDIX DH-7

## Magnetometer Survey

Prepared for:

Coble's Sandrock
5833 Foster Store Road
Liberty, North Carolina 27298

JEI PROJECT NO. 419.00, TASK 19

# MAGNETOMETER SURVEY REPORT

## COBLE'S SANDROCK
## CONSTRUCTION AND DEMOLITION LANDFILL
## ALAMANCE COUNTY, NORTH CAROLINA

DECEMBER 2005

Prepared by:

JOYCE
ENGINEERING, INC

2301 West Meadowview Road, Suite 203
Greensboro, North Carolina 27407
(336) 323-0092

# MAGNETOMETER SURVEY REPORT
# TABLE OF CONTENTS


1.0 INTRODUCTION ..... 1
2.0 DATA COLLECTION & PROCESSING ..... 1
2.1 Instrumentation ..... 1
2.2 Survey Layout ..... 1
2.3 Data Acquisition ..... 2
2.4 Data Processing ..... 2
3.0 RESULTS AND CONCLUSIONS ..... 3


**Drawing:**


Drawing 1: Magnetometer Survey Plan

# MAGNETOMETER SURVEY REPORT

## COBLE'S SANDROCK
## CONSTRUCTION AND DEMOLITION LANDFILL
## ALAMANCE COUNTY, NORTH CAROLINA

## 1.0 INTRODUCTION

Joyce Engineering, Inc. performed a magnetometer survey at the Cobles Sandrock Construction and Demolition Landfill site on April 19-20, 2005. The purpose of this geophysical investigation was to determine whether there are large diabase dikes present at the site which could have potential impact upon the groundwater flow regime. Small-scale dikes were identified in surface exposures and drill cuttings at the site prior to the survey. These dikes are composed of light-green volcanic or meta-volcanic rock. No diabase has been observed on this site; however, diabase dikes are common in this region. This survey was requested by NCDENR to determine the extent of observed volcanic dikes and to identify any diabase dikes on the site.

Local anomalies in the Earth's magnetic field can be produced by the distribution of different rock types in the subsurface. Ferrous metal objects or deposits of magnetic minerals such as magnetite can sustain significant remnant (permanent) magnetization and produce strong magnetic anomalies. Magnetic anomalies can also be produced near contacts between different rock types with very different magnetic susceptibilities. The magnetic susceptibility of any rock is dependant on its mineralogy. Rocks with abundant mafic minerals have greater magnetic susceptibility than rocks with predominantly felsic minerals.

Diabase has a very high magnetic susceptibility compared to the typical granitic country rock in this area, so a diabase dike normally produces a strong magnetic anomaly. The magnetic susceptibility of the meta-volcanic dikes observed on this site is probably not as high as diabase, but may still provide enough contrast to produce an observable anomaly.

## 2.0 DATA COLLECTION & PROCESSING

### 2.1 Instrumentation

A Geometrics G-858 Cesium Magnetometer/Gradiometer was used to locate magnetic anomalies by measuring total magnetic field strength and the vertical magnetic gradient. The G-858 was calibrated and both the instrument and operator were degaussed in the field in accordance with the manufacturer's recommendations. A backpack-mounted Trimble AG-132 differential GPS receiver was used to collect GPS locations which were recorded by the G-858 along with the magnetometer data.

### 2.2 Survey Layout

Since the dominant orientation of both diabase dikes in the region and the meta-volcanic dikes observed on the site is northeast-southwest, lines for the magnetometer survey were laid out in a roughly northwest-southeast orientation across the site. There were many areas on the site which

had to be avoided due to physical obstructions or magnetic interference from buildings, equipment, debris, fences, and the C&D landfill. Some areas of the site property are heavily wooded and/or overgrown and paths for data acquisition had to be cleared prior to the survey. The primary survey lines were marked with wooden stakes at 200-foot intervals to aid in data acquisition and in taking field notes.

### 2.3 Data Acquisition

A base station was set up in a central location which reconnaissance with the magnetometer showed to have a very low magnetic gradient. In order to adjust the survey data for diurnal variations of the Earth's magnetic field, base station readings we obtained at the beginning and end of the survey and at approximately 20-40 minute intervals during the survey.

Data was collected in "Simple Survey" mode by walking the primary survey lines with the G-858 magnetometer/gradiometer and integrated GPS unit. The G-858 recorded data from both the top and bottom magnetometer sensors along with differential GPS locations. Data was collected continuously with a cycle time of one reading every 2.0 seconds. In many cases, when the operator was finished walking one of the primary survey lines and had to return to the base station, the G-858 was allowed to continue collecting data as the operator returned along a secondary line, generally parallel with the primary lines. After all the primary data was collected, additional secondary lines were collected in areas where there was easy access to augment the primary data. A total of over 14,000 linear feet of magnetometer data was collected on the site.

### 2.4 Data Processing

The magnetometer data was downloaded from the G-858 to a laptop computer in the field and later transferred to a desktop PC for processing using Geometric's MAGPIC software (ver. 2.77). First, the base station data was used to adjust the magnetometer data for normal diurnal variations in the Earth's magnetic field. Second, a despiking filter was applied to remove anomalous single points or zero-readings that may have been due to the sensor being out of alignment at the moment the data were recorded.

There were many areas on this site where there was metal debris, equipment, or other near-surface magnetic interference. Some of the lines crossed portions of the C&D landfill and thus had considerable near surface interference. Near surface metal debris creates a very high magnetic gradient. To remove data affected by near surface interference, the magnetometer data was filtered to remove any data with a vertical magnetic gradient of greater than 500 gammas/meter. This created some apparent gaps in a few of the lines where they passed over areas with considerable metal debris either at the surface or in the shallow subsurface.

The magnetometer data were then output for gridding and contouring using SURFER. The data were gridded using linear point kriging with a latitude/longitude grid spacing of 2.0E-05 degrees using a search radius of 7.0E-05 degrees. The data were contoured using non-linear contour intervals chosen to best represent important features in the data.

The GPS receiver recorded the locations of the magnetometer data in latitude/longitude coordinates; however, the site maps are drafted in North Carolina State Plane coordinates. A data conversion routine was applied to the SURFER output to convert the location data into the proper coordinates for plotting on the site map. Drawing 1 shows the results of the magnetometer survey plotted on the site map.

## 3.0 RESULTS & CONCLUSIONS

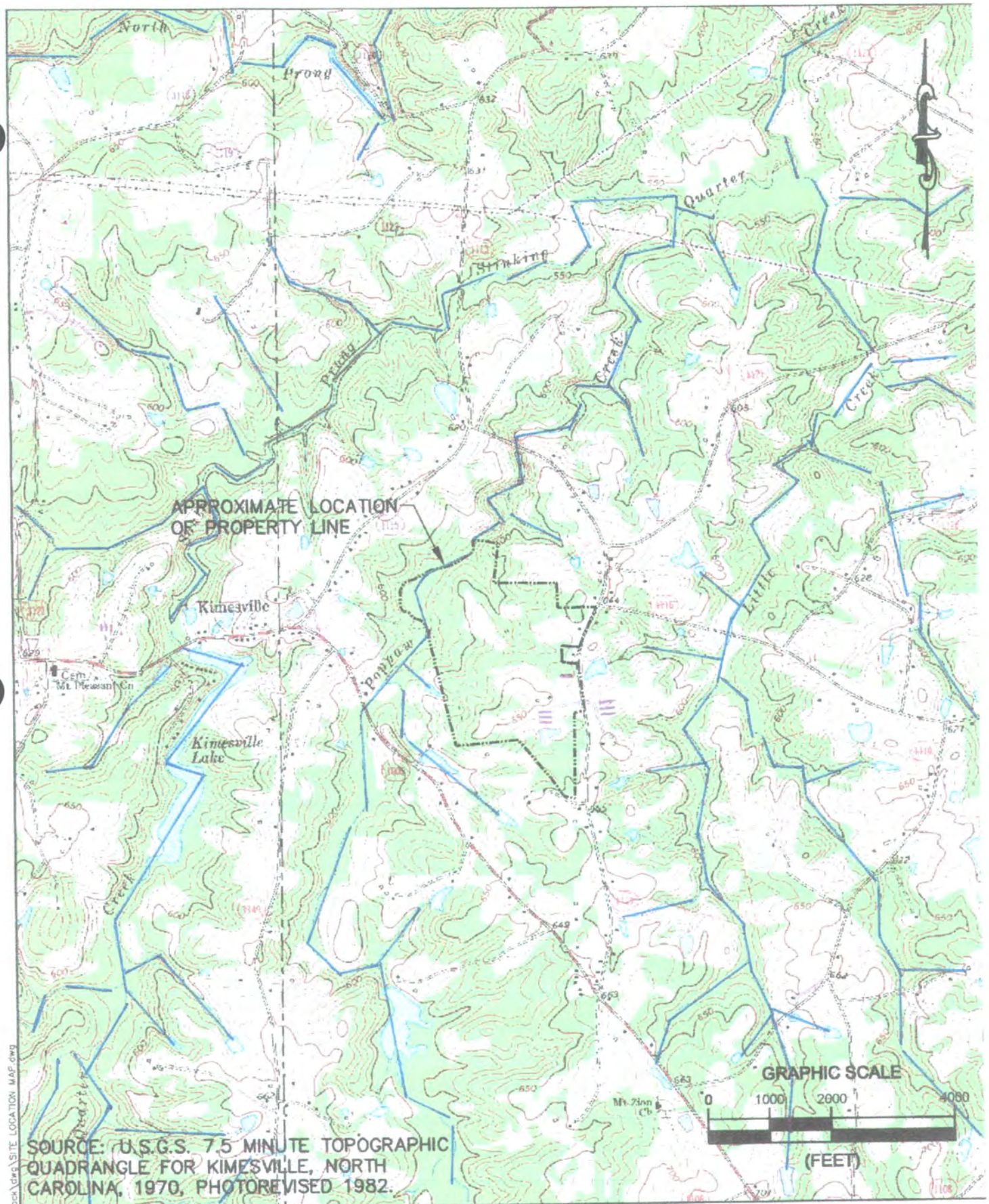
Parts of the magnetometer survey that crossed over or near the C&D landfill showed highly irregular, but generally low (50,500-51,300 gammas) magnetic field strength. This is almost certainly due to the waste and is not indicative of geologic features. The areas away from the landfill areas showed a normal range of magnetic field strength for this geographic area (51,300-51,500 gammas).

Within these "normal" areas there were a few small areas of slightly elevated magnetic field strength (51,500-51,700). The most pronounced of these anomalies is located in the west-central part of the site between piezometers P-16 and P-5, and may correlate with an area of similar values to the north-northeast. These anomalies may represent meta-volcanic dikes; however, they are far too weak to represent diabase dikes. Even small diabase dikes (< 20 feet across) would be expected to produce anomalies of at least 400-500 gammas above the ambient field.

JEI concludes that the magnetometer survey found no evidence of significant diabase dikes on the subject property. Small, low-amplitude anomalies with weak correlation in the central part of the site may be due to small meta-volcanic dikes previously observed on the site in outcrops.

# APPENDIX DH-8

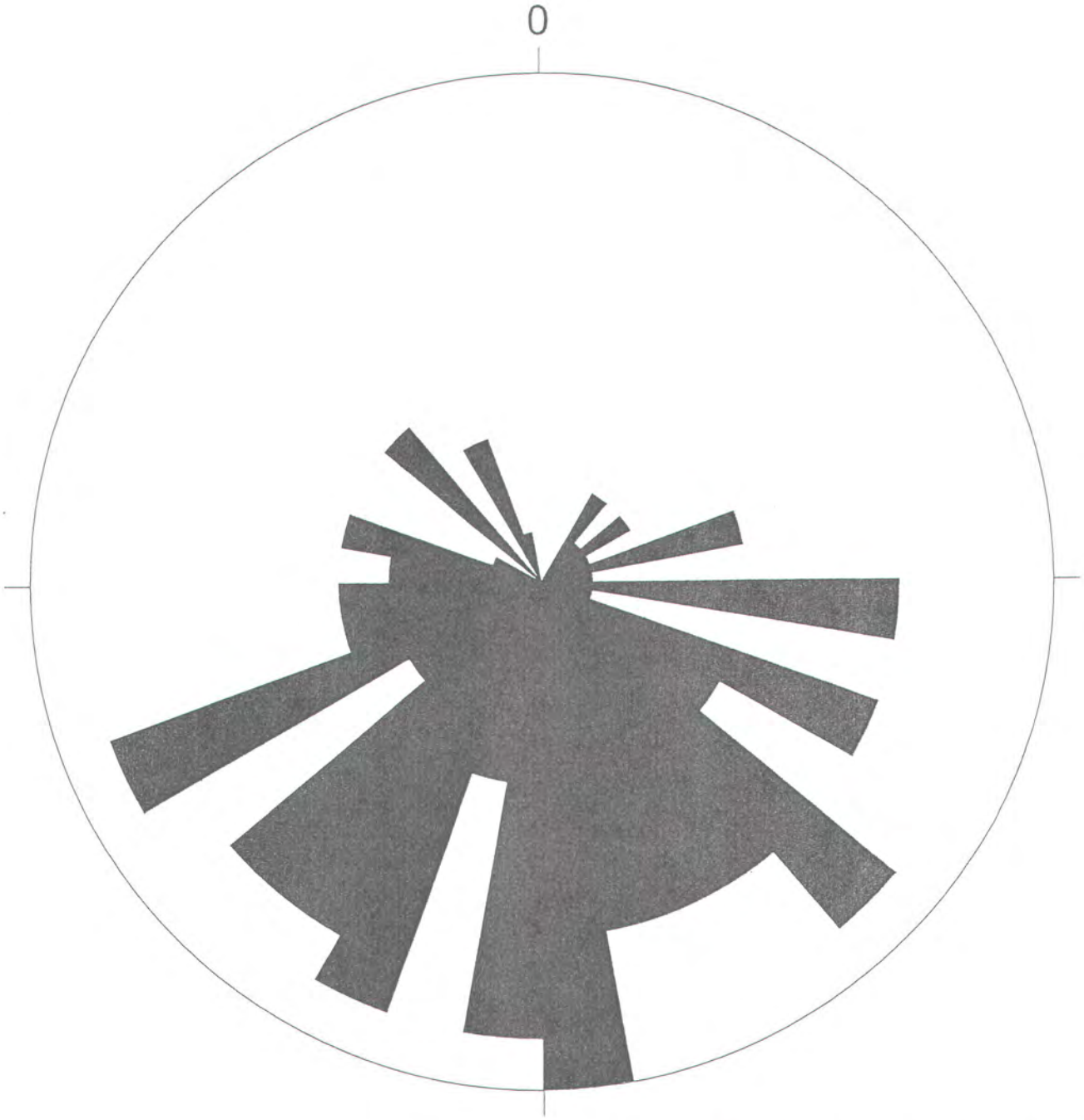
## Fracture Trace and Rose Diagram




SOURCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE FOR KIMESVILLE, NORTH CAROLINA, 1970, PHOTOREVISED 1982.

L:\Coble Sandrock\dwg\SITE LOCATION MAP.dwg

| FIGURE NO. 1 | JOYCE ENGINEERING, INC. 2301 WEST MEADOWVIEW ROAD GREENSBORO, N.C. 27407 PHONE (336) 323-0092 © 2005 Joyce Engineering, Inc. All rights reserved | SCALE 1"=2000' | PROJECT NO. 419.19 | COBLE'S SANDROCK KIMESVILLE, NORTH CAROLINA SITE LOCATION MAP |
|---|---|---|---|---|




n=14
large
large

Dip Direction: 10 ° classes

# APPENDIX DH-9

## Laboratory Test Results for Soil Samples

TRIGON
ENGINEERING CONSULTANTS, INC.

P.O. Box 18846 • Zip 27419-8846 • 313 Gallimore Dairy Road • Greensboro, NC 27409 • (336) 668-0093 • FAX (336) 668-3868

# LETTER OF TRANSMITTAL

TO: Mr. David Reedy II
Joyce Engineering, Inc.
Henderson Building, Suite 203
2301 West Meadowview Road
Greensboro, North Carolina 27407

Date: 04/11/02
Regular Mail:XXX
Express Mail:
Federal Express:
Hand Carried:
Other:

| COPIES | PAGES | DESCRIPTION | COMMENTS |
|---|---|---|---|
| 1 | 8 | Laboratory Test Data Summary | |
| | | | |
| | | | |
| | | | |

Job Number: 013-02-046

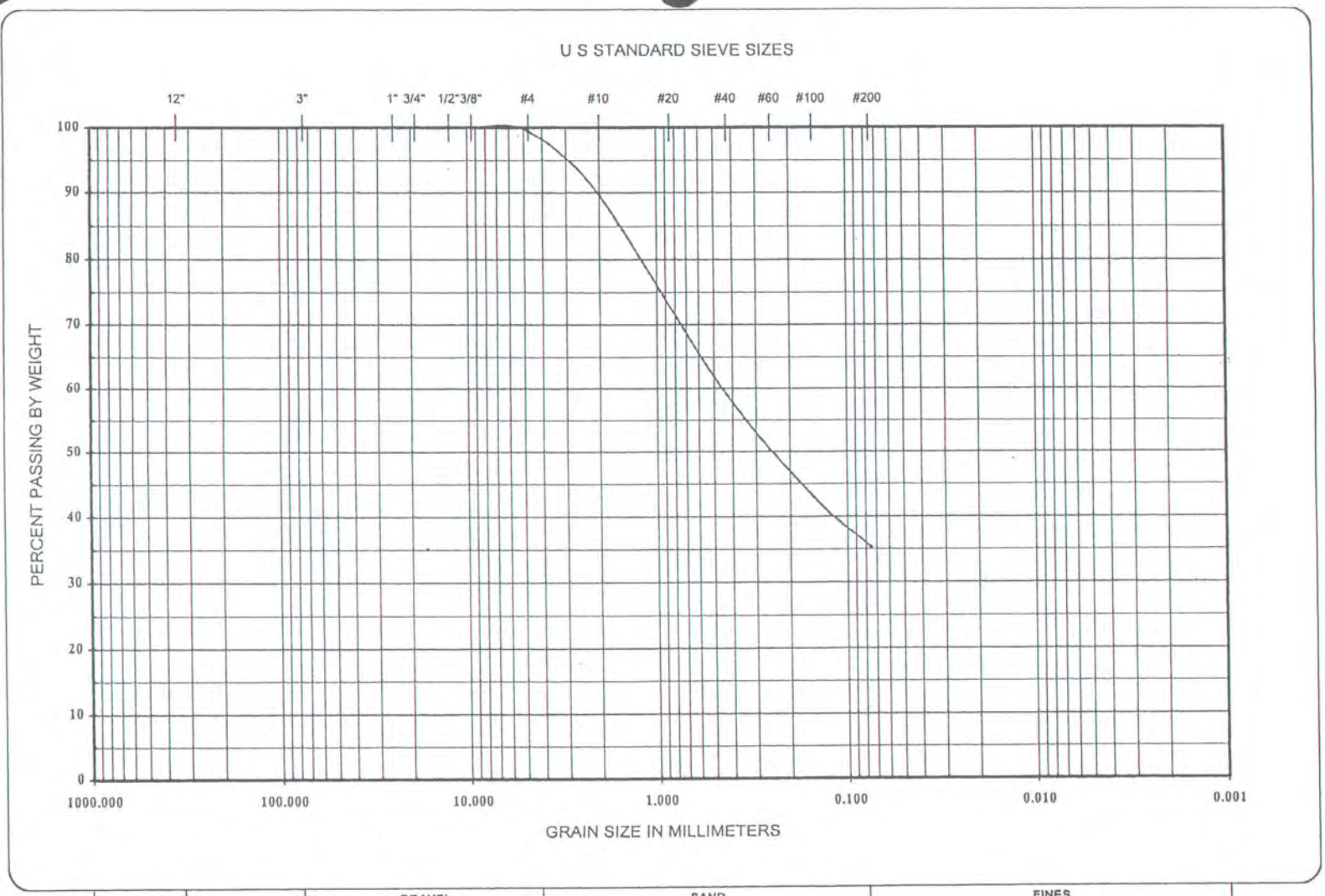
SIGNATURE: _____
Steve Pistole
Construction Services Manager

# Laboratory Test Data Summary

## Coble's Sandrock

Trigon Project Number 013-02-046

| Sample No. | Sample Type | Depth | USCS Class. | Unit Weight | | Atterberg Limits | | | Gradation Results | | | | | | | | | Natural Moisture Content (%) | Total Porosity (%) | Permeability | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Percent Passing | | | | | | | | | | | | | | |
| | | | | Max. Dry Density (pcf) | Optimum Moisture (%) | L.L. | P.L. | P.I. | 1" | 3/4" | 1/2" | 3/8" | #4 | #10 | #40 | #100 | #200 | | | % Moisture | Unit Weight (pcf) Wet | Unit Weight (pcf) Dry | cm/sec |
| P-15 | SS | 5-7' | SC-SM | -- | -- | 26 | 19 | 7 | 100.0 | 100.0 | 100.0 | 100.0 | 99.0 | 89.5 | 58.8 | 42.9 | 35.2 | -- | -- | -- | -- | -- | -- |
| P-17 | SS | 5-7' | MH | -- | -- | 62 | 36 | 26 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 99.2 | 94.3 | 92.0 | 90.2 | -- | -- | -- | -- | -- | -- |
| P-19S | UD | 4-6' | SM | -- | -- | 31 | 23 | 8 | 100.0 | 100.0 | 100.0 | 98.4 | 95.5 | 90.7 | 56.7 | 39.0 | 32.5 | 27.2 | 39.4 | 27.2 | 125.9 | 99.0 | $7.74\ E^{-6}$ |
| P-20 | SS | 20-22' | SM | -- | -- | 27 | 27 | 0 | 100.0 | 100.0 | 100.0 | 100.0 | 99.1 | 84.8 | 40.3 | 25.2 | 18.3 | -- | -- | -- | -- | -- | -- |
| P-21 | BULK | 2-10' | CL | 112.5 | 15.7 | 42 | 24 | 18 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 97.0 | 89.0 | 83.7 | 78.4 | -- | 35.4 | 15.2 | 124.9 | 108.4 | $8.76\ E^{-8}$ |
| P-23 | SS | 0-2' | MH | -- | -- | 60 | 32 | 28 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 95.7 | 77.6 | 71.2 | 67.2 | -- | -- | -- | -- | -- | -- |




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT | CLAY |

| BORING NO. | SAMPLE NO. | ELEVATION OR DEPTH | NMC % | LL | PL | PI | CLASSIFICATION |
|---|---|---|---|---|---|---|---|
| | P-15 | 5-7' | | 26 | 19 | 7 | Light Tan-Orange Silty Clayey SAND<br>SC-SM |

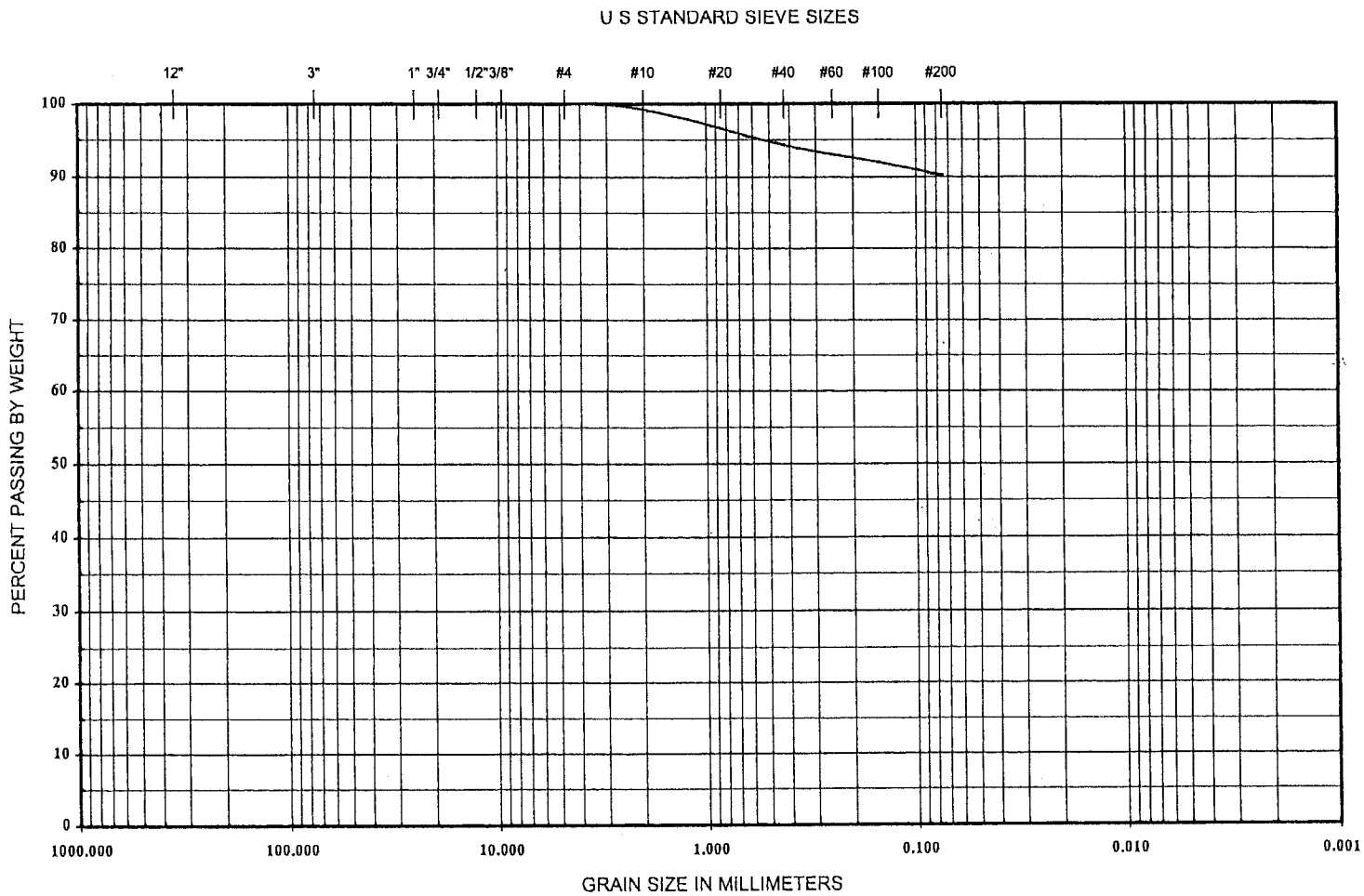
# GRAIN SIZE DISTRIBUTION

Coble' Sandrock

Trigon Project Number 013-02-046

Date 3/29/02

TRIGON




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT | CLAY |

| BORING NO. | SAMPLE NO. | ELEVATION OR DEPTH | NMC % | LL | PL | PI | CLASSIFICATION |
|---|---|---|---|---|---|---|---|
| | P-17 | 5-7' | | 62 | 36 | 26 | Grey-Tan Elastic SILT<br>MH |

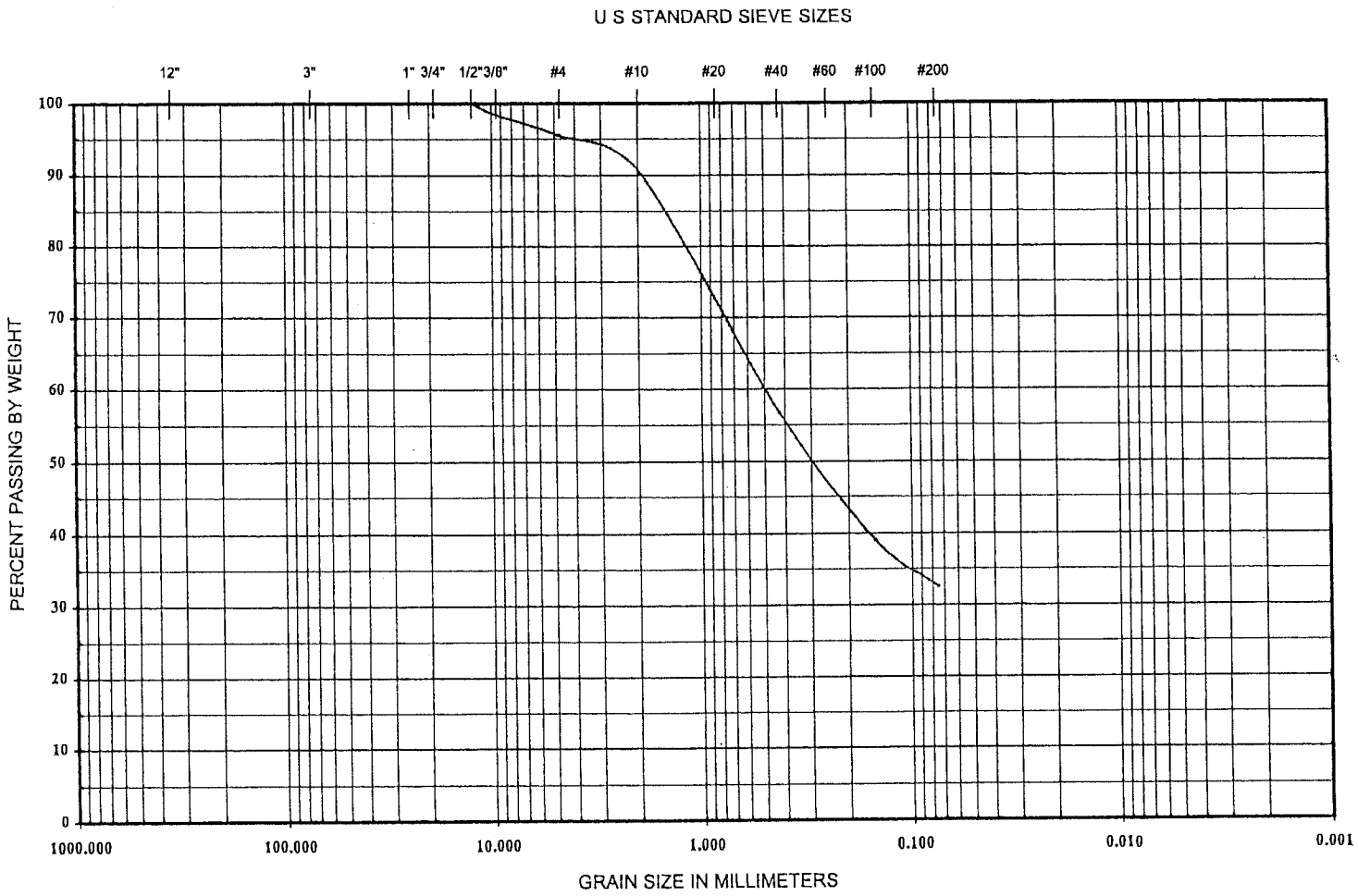
# GRAIN SIZE DISTRIBUTION

Coble' Sandrock

Trigon Project Number 013-02-046

Date 3/29/02

TRIGON




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT | CLAY |

| BORING NO. | SAMPLE NO. | ELEVATION OR DEPTH | NMC % | LL | PL | PI | CLASSIFICATION |
|---|---|---|---|---|---|---|---|
| | P-19S UD | 4-6' | | 31 | 23 | 8 | Dark Grey Silty SAND<br>SM |

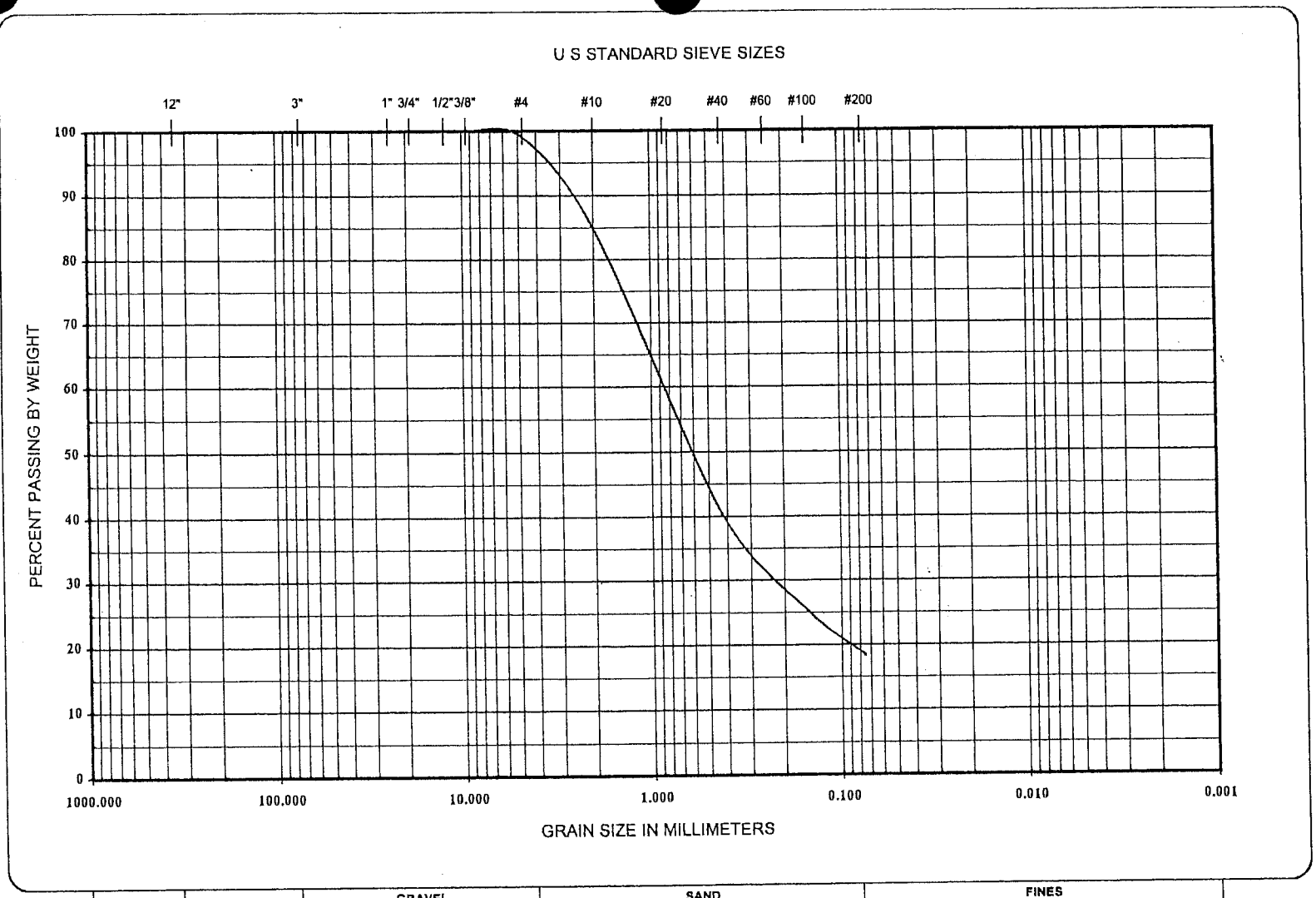
# GRAIN SIZE DISTRIBUTION

Coble' Sandrock

Trigon Project Number 013-02-046

Date 3/29/02

TRIGON




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT | CLAY |

| BORING NO. | SAMPLE NO. | ELEVATION OR DEPTH | NMC % | LL | PL | PI | CLASSIFICATION |
|---|---|---|---|---|---|---|---|
| | P-20 | 20-22' | | 27 | 27 | 0 | Tan & White Silty SAND<br>SM |

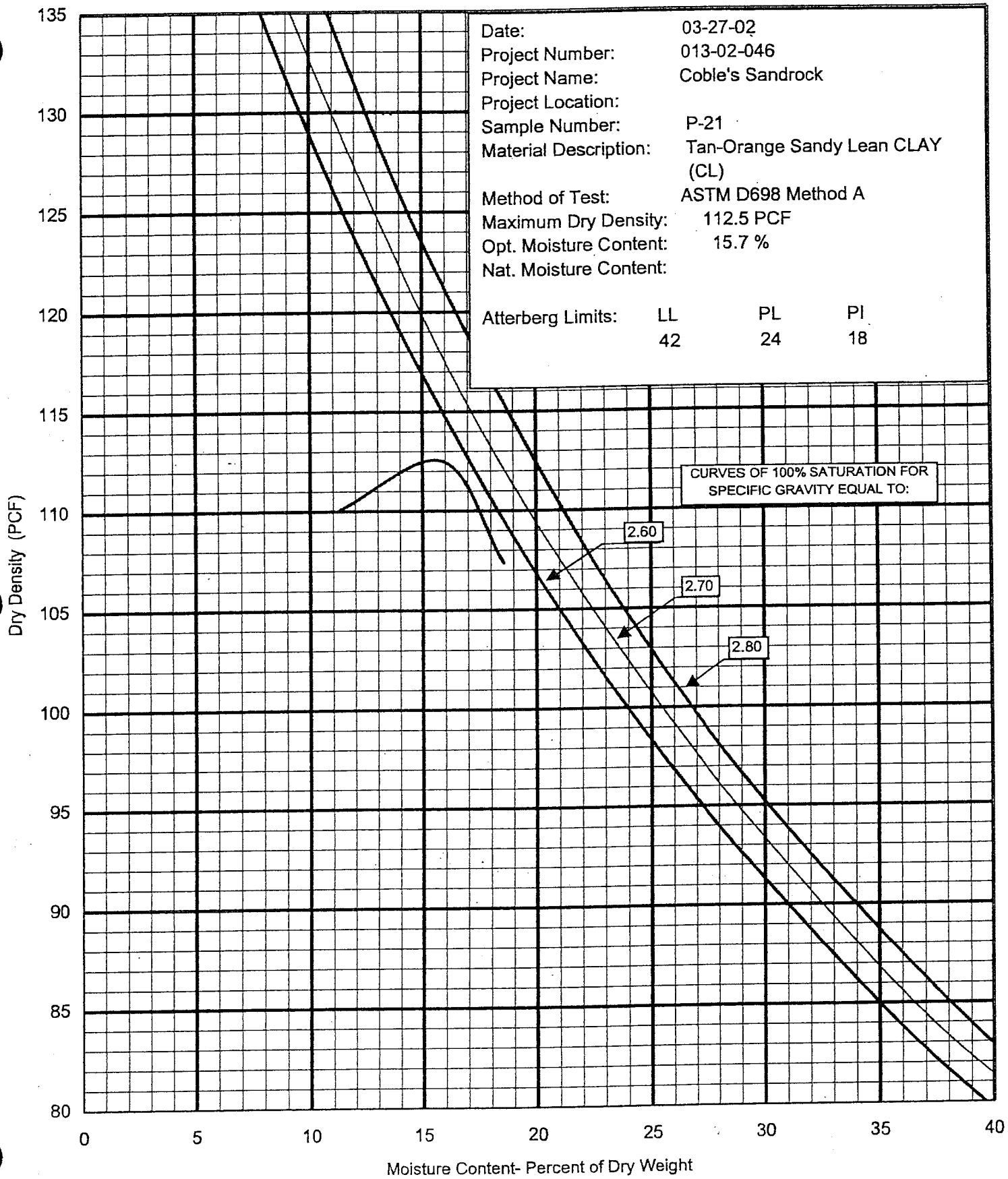
# GRAIN SIZE DISTRIBUTION

Coble' Sandrock

Trigon Project Number 013-02-046

Date 3/29/02

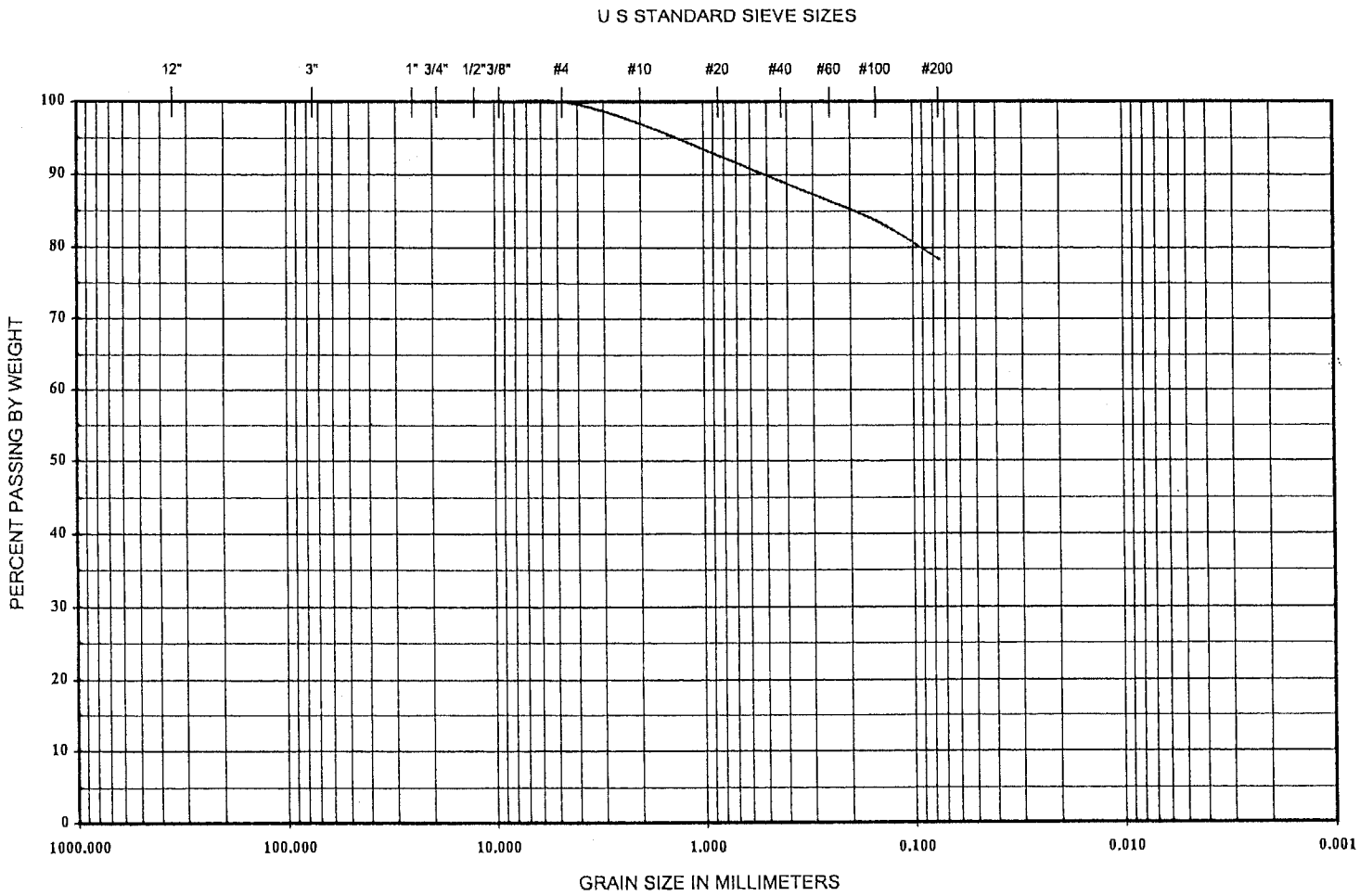
TRIGON




## MOISTURE-DENSITY RELATIONSHIP

TRIGON ENGINEERING CONSULTANTS, INC.

Greensboro, NC




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT | CLAY |

| BORING NO. | SAMPLE NO. | ELEVATION OR DEPTH | NMC % | LL | PL | PI | CLASSIFICATION |
|---|---|---|---|---|---|---|---|
| | P-21 | 2-10' | | 42 | 24 | 18 | Tan-Orange Sandy Lean CLAY<br>CL |

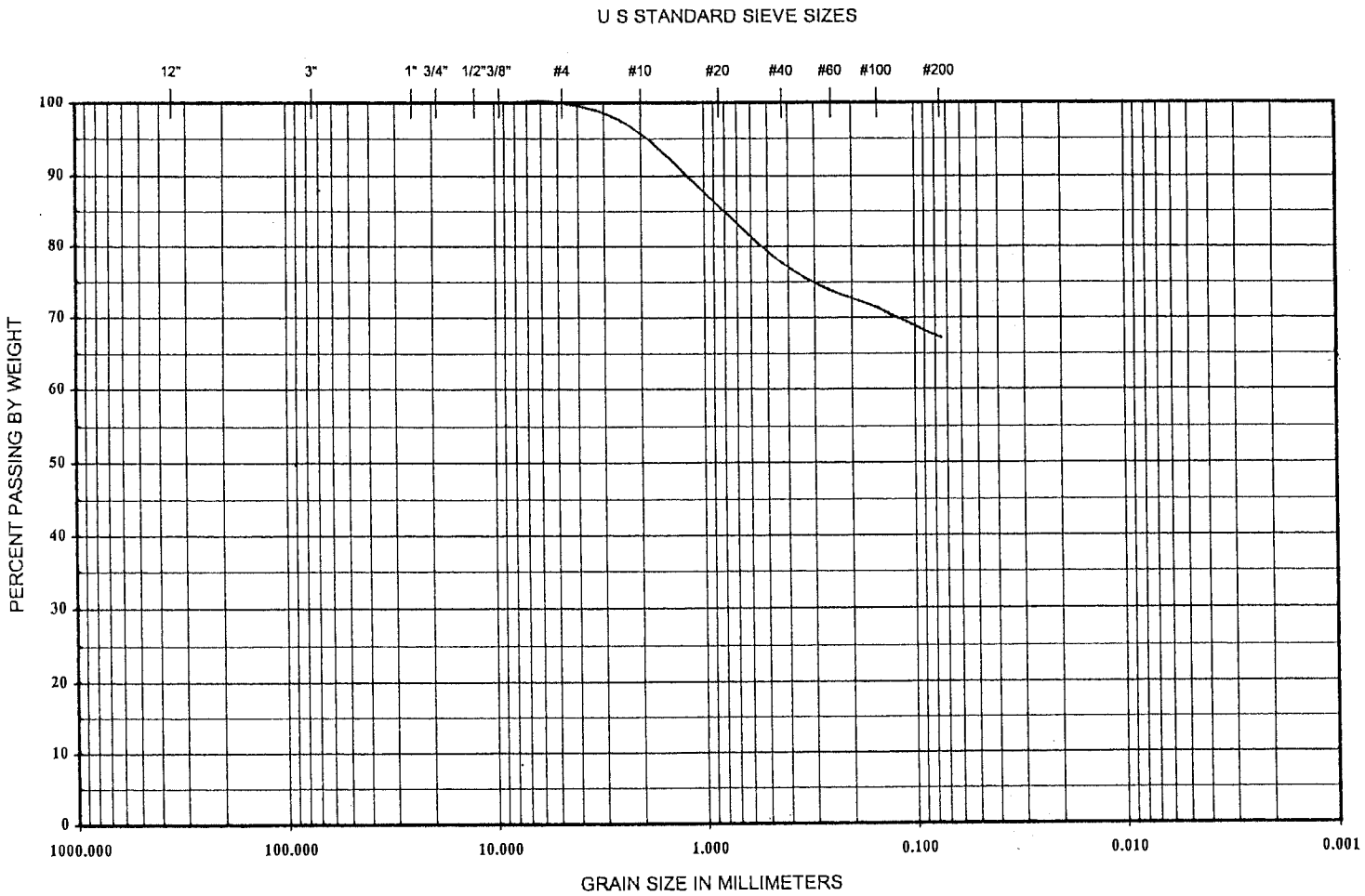
# GRAIN SIZE DISTRIBUTION

Coble' Sandrock

Trigon Project Number 013-02-046

Date 3/29/02

TRIGON




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT | CLAY |

| BORING NO. | SAMPLE NO. | ELEVATION OR DEPTH | NMC % | LL | PL | PI | CLASSIFICATION |
|---|---|---|---|---|---|---|---|
| | P-23 | 0-2' | | 60 | 32 | 28 | Grey-Tan & Orange Sandy Elastic Silt<br>MH |

# GRAIN SIZE DISTRIBUTION

Coble' Sandrock

Trigon Project Number 013-02-046

Date 3/29/02

TRIGON

**Geotechnics**

.....GEOTECHNICAL, GEOENVIRONMENTAL, AND GEOSYNTHETIC LABORATORIES

September 15, 2005

Project No. 2005-584-01

Mr. Dusty Reedy
Joyce Engineering, Inc.
2301 W. Meadowview Rd. Suite 203
Greensboro, NC 27407

**Transmittal**
**Laboratory Test Results**
**Coble's Sandrock C & D Landfill**

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was faxed to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens which were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectively submitted,
***Geotechnics, Inc.***

Michael P. Smith
Regional Manager

***We understand that you have a choice in your laboratory services and we thank you for choosing Geotechnics.***

*DCN: Data Transmittal Letter Date: 1/28/05 Rev.: 1*

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# ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLE'S SANDROCK C&D LF | Depth (ft) | 2'-6' |
| Project No. | 2005-584-01 | Sample No. | MW-8 |
| Lab ID | 2005-584-01-01 | Soil Description | **BROWN LEAN CLAY** |

***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)

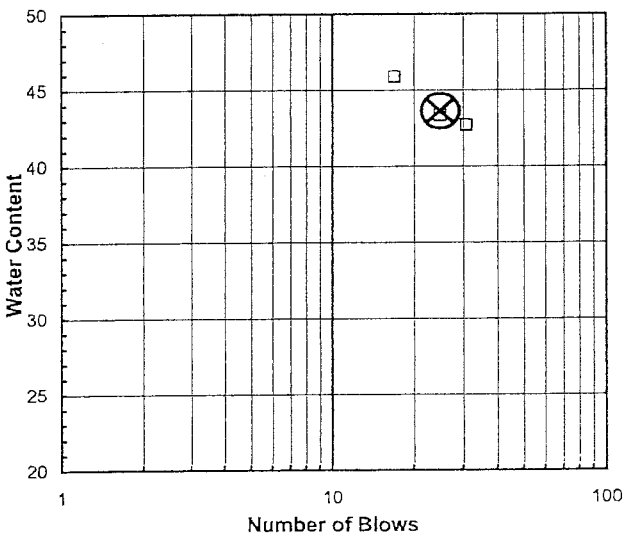
| **Liquid Limit Test** | **1** | **2** | **3** | |
|---|---|---|---|---|
| Tare Number | I | H | A-I | MULTIPOINT |
| Wt. of Tare & WS (gm) | 29.10 | 28.70 | 31.41 | |
| Wt. of Tare & DS (gm) | 24.75 | 24.62 | 26.67 | |
| Wt. of Tare (gm) | 15.26 | 15.20 | 15.56 | |
| Wt. of Water (gm) | 4.4 | 4.1 | 4.7 | |
| Wt. of DS (gm) | 9.5 | 9.4 | 11.1 | |
| **Moisture Content (%)** | **45.8** | **43.3** | **42.7** | |
| **Number of Blows** | **17** | **25** | **31** | |

| **Plastic Limit Test** | **1** | **2** | **Range** |
|---|---|---|---|
| Tare Number | A-P | G | |
| Wt. of Tare & WS (gm) | 22.06 | 20.92 | |
| Wt. of Tare & DS (gm) | 21.08 | 20.03 | |
| Wt. of Tare (gm) | 15.64 | 15.08 | |
| Wt. of Water (gm) | 1.0 | 0.9 | |
| Wt. of DS (gm) | 5.4 | 5.0 | |
| **Moisture Content (%)** | **18.0** | **18.0** | **0.0** |

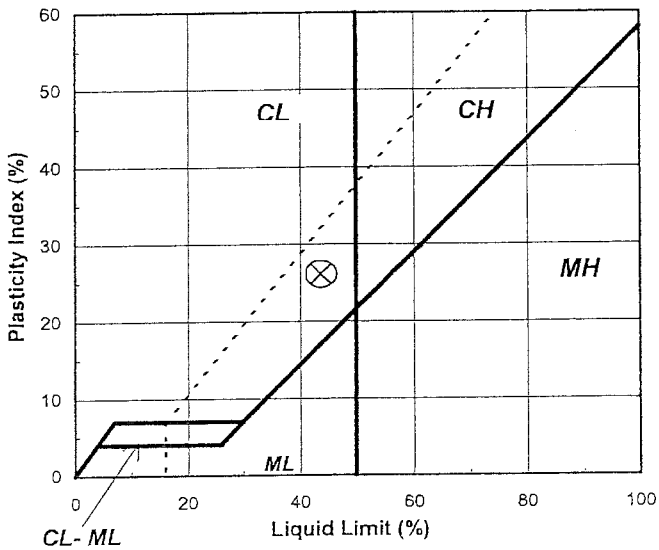
*Note: The acceptable range of the two Moisture contents is ± 2.6*

| **Test Results** | |
|---|---|
| **Liquid Limit (%)** | **44** |
| **Plastic Limit (%)** | **18** |
| **Plasticity Index (%)** | **26** |
| **USCS Symbol** | **CL** |

**Flow Curve**




**Plasticity Chart**




*Tested By* MCW *Date* 9/14/2005 *Checked By* GEM *Date* 9-15-05

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# ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLE'S SANDROCK C&D LF | Depth (ft) | 5'-12' |
| Project No. | 2005-584-01 | Sample No. | P-24 |
| Lab ID | 2005-584-01-03 | Soil Description | **BROWN LEAN CLAY** |

***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)

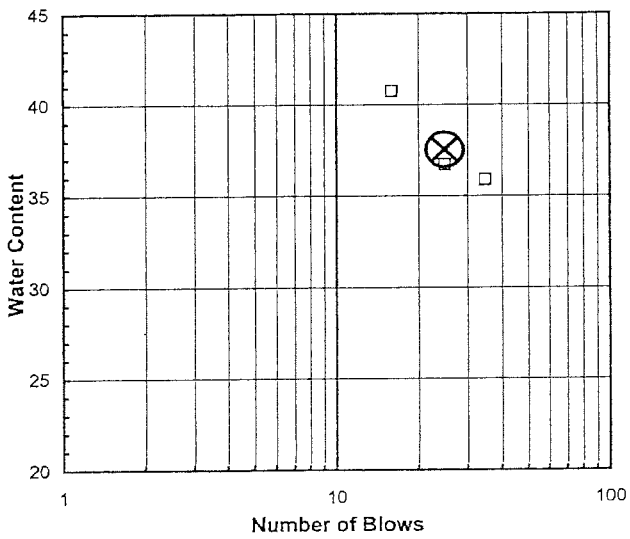
| **Liquid Limit Test** | **1** | **2** | **3** | |
|---|---|---|---|---|
| Tare Number | A-F | A-T | F | MULTIPOINT |
| Wt. of Tare & WS (gm) | 28.29 | 28.10 | 28.32 | |
| Wt. of Tare & DS (gm) | 24.60 | 24.76 | 24.86 | |
| Wt. of Tare (gm) | 15.54 | 15.65 | 15.21 | |
| Wt. of Water (gm) | 3.7 | 3.3 | 3.5 | |
| Wt. of DS (gm) | 9.1 | 9.1 | 9.7 | |
| **Moisture Content (%)** | **40.7** | **36.7** | **35.9** | |
| **Number of Blows** | **16** | **25** | **35** | |

| **Plastic Limit Test** | **1** | **2** | **Range** |
|---|---|---|---|
| Tare Number | J | A-D | |
| Wt. of Tare & WS (gm) | 22.95 | 23.77 | |
| Wt. of Tare & DS (gm) | 21.74 | 22.45 | |
| Wt. of Tare (gm) | 15.24 | 15.45 | |
| Wt. of Water (gm) | 1.2 | 1.3 | |
| Wt. of DS (gm) | 6.5 | 7.0 | |
| **Moisture Content (%)** | **18.6** | **18.9** | **-0.2** |

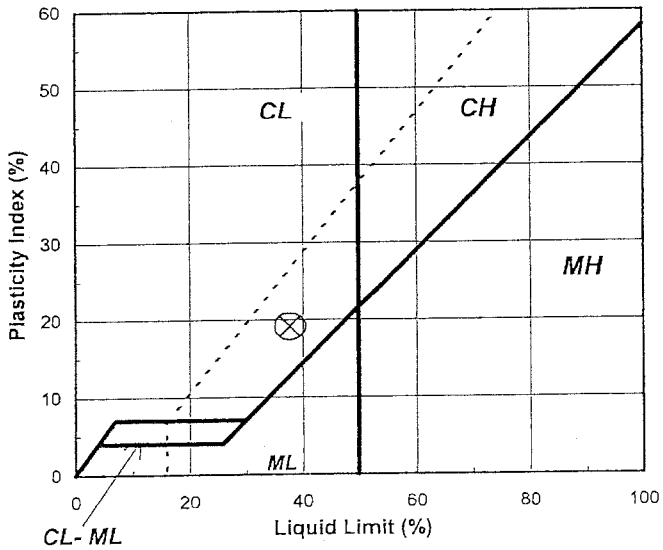
*Note: The acceptable range of the two Moisture contents is ± 2.6*

| **Test Results** | |
|---|---|
| **Liquid Limit (%)** | **38** |
| **Plastic Limit (%)** | **19** |
| **Plasticity Index (%)** | **19** |
| **USCS Symbol** | **CL** |

**Flow Curve**




**Plasticity Chart**




*Tested By* *MCW* *Date* *9/13/2005* *Checked By* GEM *Date* 9-15-05

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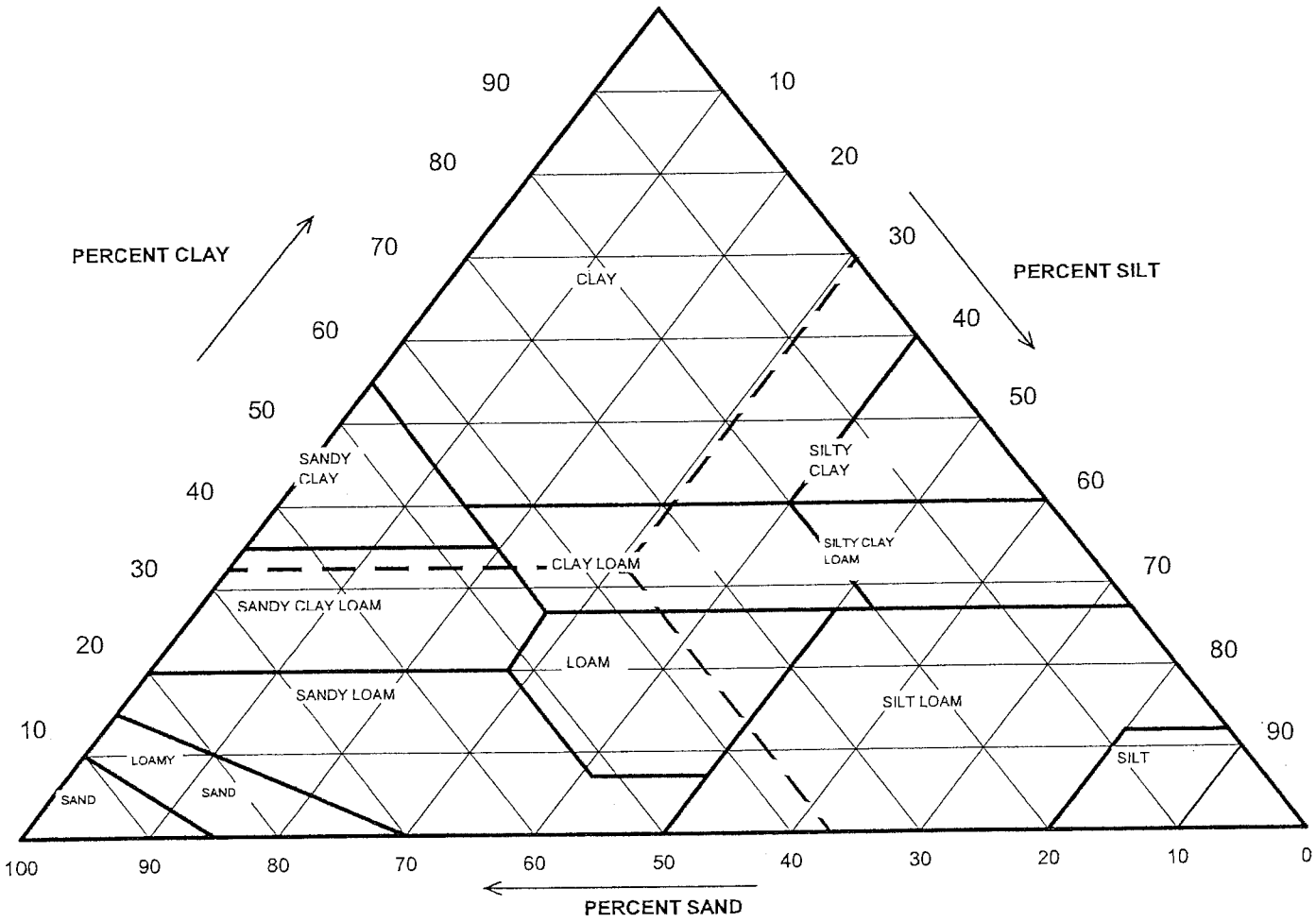
# USDA CLASSIFICATION CHART

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLE'S SANDROCK C&D LF | Depth (ft) | 2'-6' |
| Project No. | 2005-584-01 | Sample No. | MW-8 |
| Lab ID | 2005-584-01-01 | Soil Color | BROWN |




| Particle Size (mm) | Percent Finer | USDA SUMMARY | Actual Percentage | Corrected % of Minus 2.0 mm material for USDA Classificat. |
|---|---|---|---|---|
| | | *Gravel* | 1.67 | 0.00 |
| 2 | 98.33 | *Sand* | 36.21 | 36.82 |
| 0.05 | 62.12 | *Silt* | 30.21 | 30.72 |
| 0.002 | 31.92 | *Clay* | 31.92 | 32.46 |

USDA Classification: *CLAY LOAM*



DCN: CT-S3S DATE: 1/14/04 REVISION: Original

*C:\2005 Projects\2005-584 JOYCE\[2005-584-01-01 Wentworth Sieve.xls]Sheet1*

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# HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLE'S SANDROCK C&D LF | Depth (ft) | 2'-6' |
| Project No. | 2005-584-01 | Sample No. | MW-8 |
| Lab ID | 2005-584-01-01 | Soil Color | **BROWN** |

Bulb Ser.#
**435834**

| Elapsed Time (min) | | R Measured | Temp. (°C) | Composite Correction | R Corrected | N (%) | K Factor | Diameter (mm) | N' (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | 37.0 | 37.0 | 22.8 | 4.14 | 32.9 | 59.2 | 0.01300 | 0.0294 | **58.2** |
| 5 | | 34.0 | 22.8 | 4.14 | 29.9 | 53.8 | 0.01300 | 0.0190 | **52.9** |
| 15 | | 30.0 | 22.7 | 4.17 | 25.8 | 46.5 | 0.01302 | 0.0113 | **45.7** |
| 30 | | 28.0 | 22.7 | 4.17 | 23.8 | 42.9 | 0.01302 | 0.0081 | **42.2** |
| 60 | | 27.0 | 22.7 | 4.17 | 22.8 | 41.1 | 0.01302 | 0.0058 | **40.4** |
| 250 | | 23.0 | 22.4 | 4.26 | 18.7 | 33.7 | 0.01307 | 0.0029 | **33.2** |
| 1440 | | 21.0 | 23.6 | 3.91 | 17.1 | 30.8 | 0.01288 | 0.0012 | **30.3** |

| Soil Specimen Data | | Other Corrections | |
|---|---|---|---|
| Dry Sample Wt - #10 (gm) | 54.98 | Hygroscopic Moisture Factor | 0.980 |
| Weight of Deflocculant (gm) | 5.0 | a - Factor | 0.99 |
| | | Percent Finer than # 10 | 98.33 |
| | | Specific Gravity | 2.7 Assumed |

***Notes:***

Tested By MCW Date 09/13/05 Checked By MPS Date 9-15-05



DCN: CT-S3S DATE: 1/14/04 REVISION: Original

*C:\2005 Projects\2005-584 JOYCE\[2005-584-01-01 Wentwerth Sieve.xls]Sheet1*

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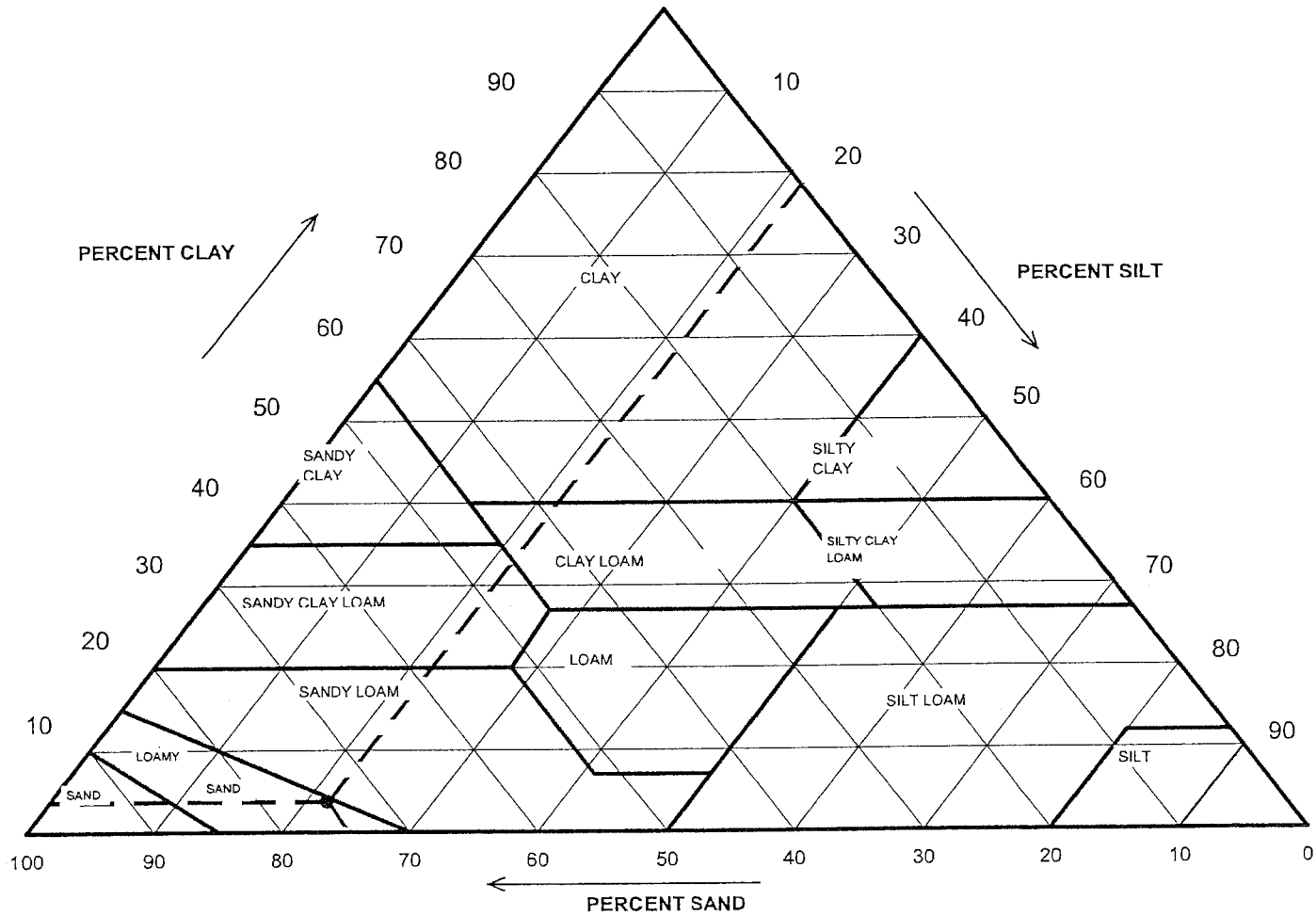
# USDA CLASSIFICATION CHART

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLE'S SANDROCK C&D LF | Depth (ft) | 15'-22' |
| Project No. | 2005-584-01 | Sample No. | MW-8 |
| Lab ID | 2005-584-01-02 | Soil Color | LIGHT BROWN |




| Particle Size (mm) | Percent Finer | USDA SUMMARY | Actual Percentage | Corrected % of Minus 2.0 mm material for USDA Classificat. |
|---|---|---|---|---|
| | | *Gravel* | 6.86 | **0.00** |
| 2 | 93.14 | *Sand* | 69.51 | **74.62** |
| 0.05 | 23.64 | *Silt* | 20.17 | **21.65** |
| 0.002 | 3.47 | *Clay* | 3.47 | **3.73** |

**USDA Classification:** ***LOAMY SAND***



DCN: CT-S3S DATE: 1/14/04 REVISION: Original

*C:\2005 Projects\2005-584 JOYCE\[2005-584-01-02 Wentwerth Sieve.xls]Sheet1*

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# HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLE'S SANDROCK C&D LF | Depth (ft) | 15'-22' |
| Project No. | 2005-584-01 | Sample No. | MW-8 |
| Lab ID | 2005-584-01-02 | Soil Color | **LIGHT BROWN** |

Bulb Ser.#
**435834**

| Elapsed Time (min) | | R Measured | Temp. (°C) | Composite Correction | R Corrected | N (%) | K Factor | Diameter (mm) | N' (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | 26.0 | 26.0 | 22.8 | 4.14 | 21.9 | 21.1 | 0.01300 | 0.0319 | **19.6** |
| 5 | | 21.0 | 22.8 | 4.14 | 16.9 | 16.2 | 0.01300 | 0.0208 | **15.1** |
| 15 | | 16.0 | 22.8 | 4.14 | 11.9 | 11.4 | 0.01300 | 0.0124 | **10.6** |
| 30 | | 14.0 | 22.7 | 4.17 | 9.8 | 9.5 | 0.01302 | 0.0089 | **8.8** |
| 60 | | 12.0 | 22.7 | 4.17 | 7.8 | 7.5 | 0.01302 | 0.0064 | **7.0** |
| 250 | | 9.0 | 22.5 | 4.23 | 4.8 | 4.6 | 0.01305 | 0.0032 | **4.3** |
| 1440 | | 7.0 | 23.5 | 3.94 | 3.1 | 3.0 | 0.01290 | 0.0013 | **2.7** |

| **Soil Specimen Data** | | **Other Corrections** | |
|---|---|---|---|
| Dry Sample Wt - #10 (gm) | 102.74 | Hygroscopic Moisture Factor | 0.994 |
| Weight of Deflocculant (gm) | 5.0 | a - Factor | 0.99 |
| | | Percent Finer than # 10 | 93.14 |
| | | Specific Gravity | 2.7 Assumed |

***Notes:***

Tested By MCW Date 09/13/05 Checked By MDS Date 9-15-05



DCN: CT-S3S DATE: 1/14/04 REVISION: Original

*C:\2005 Projects\2005-584 JOYCE\[2005-584-01-02 Wentwerth Sieve.xls]Sheet1*

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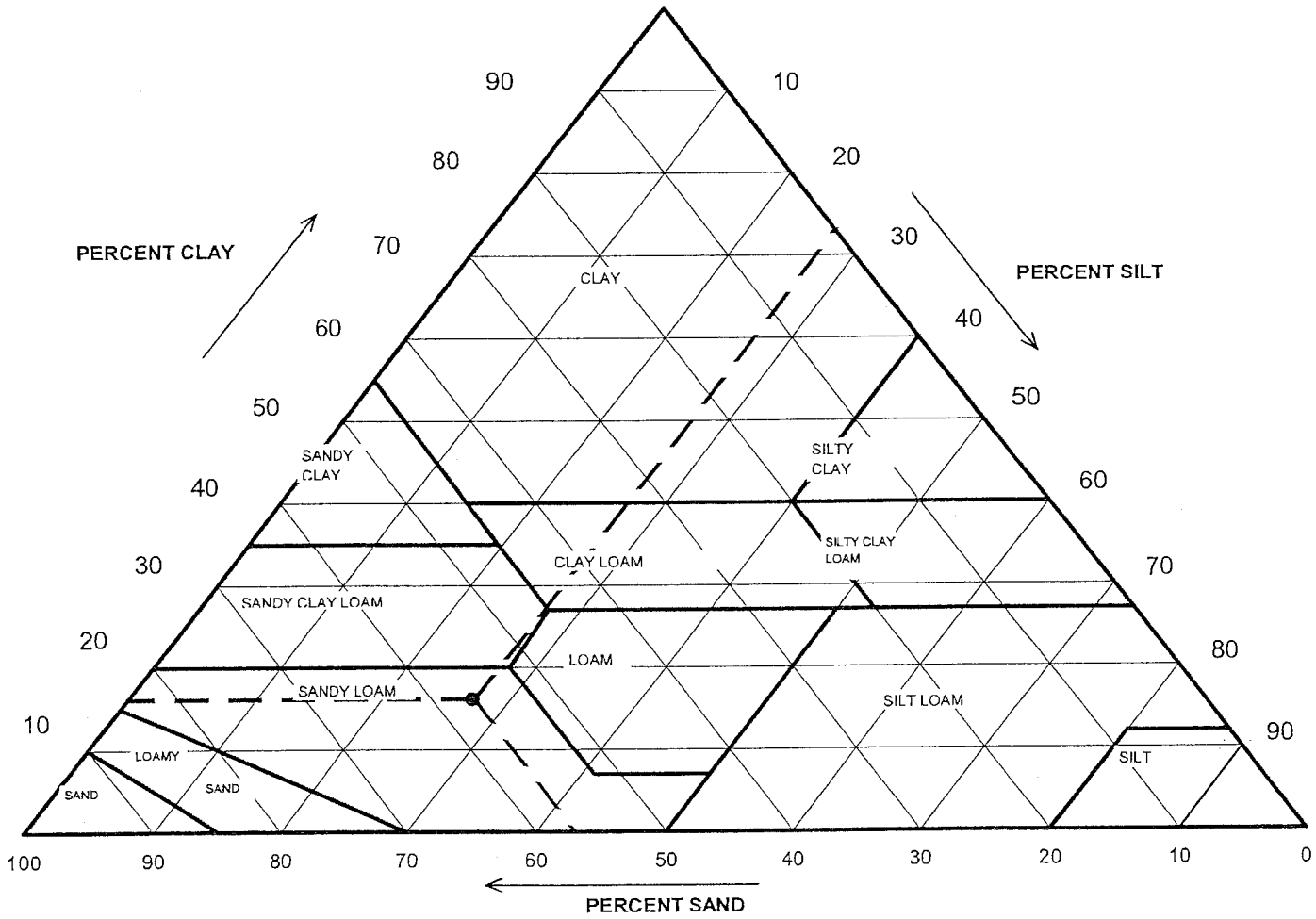
# USDA CLASSIFICATION CHART

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLE'S SANDROCK C&D LF | Depth (ft) | 5'-12' |
| Project No. | 2005-584-01 | Sample No. | P-24 |
| Lab ID | 2005-584-01-03 | Soil Color | LIGHT BROWN |




| Particle Size (mm) | Percent Finer | USDA SUMMARY | Actual Percentage | Corrected % of Minus 2.0 mm material for USDA Classificat. |
|---|---|---|---|---|
| | | *Gravel* | 10.04 | 0.00 |
| 2 | 89.96 | *Sand* | 51.10 | 56.80 |
| 0.05 | 38.86 | *Silt* | 24.36 | 27.08 |
| 0.002 | 14.50 | *Clay* | 14.50 | 16.12 |

**USDA Classification:** ***SANDY LOAM***



DCN: CT-S3S DATE: 1/14/04 REVISION: Original

*C:\2005 Projects\2005-584 JOYCE\[2005-584-01-03 Wentwerth Sieve.xls]Sheet1*

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# HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLE'S SANDROCK C&D LF | Depth (ft) | 5'-12' |
| Project No. | 2005-584-01 | Sample No. | P-24 |
| Lab ID | 2005-584-01-03 | Soil Color | **LIGHT BROWN** |

Bulb Ser.#
**435834**

| Elapsed Time (min) | | R Measured | Temp. (°C) | Composite Correction | R Corrected | N (%) | K Factor | Diameter (mm) | N' (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | 51.0 | 51.0 | 22.8 | 4.14 | 46.9 | 37.3 | 0.01300 | 0.0259 | **33.5** |
| 5 | | 46.0 | 22.8 | 4.14 | 41.9 | 33.3 | 0.01300 | 0.0172 | **30.0** |
| 15 | | 39.0 | 22.8 | 4.14 | 34.9 | 27.7 | 0.01300 | 0.0106 | **25.0** |
| 30 | | 35.0 | 22.8 | 4.14 | 30.9 | 24.6 | 0.01300 | 0.0077 | **22.1** |
| 60 | | 32.0 | 22.8 | 4.14 | 27.9 | 22.2 | 0.01300 | 0.0056 | **19.9** |
| 250 | | 26.0 | 22.7 | 4.17 | 21.8 | 17.4 | 0.01302 | 0.0029 | **15.6** |
| 1440 | | 22.0 | 23.4 | 3.97 | 18.0 | 14.4 | 0.01291 | 0.0012 | **12.9** |

| Soil Specimen Data | | Other Corrections | |
|---|---|---|---|
| Dry Sample Wt - #10 (gm) | 124.39 | Hygroscopic Moisture Factor | 0.985 |
| Weight of Deflocculant (gm) | 5.0 | a - Factor | 0.99 |
| | | Percent Finer than # 10 | 89.96 |
| | | Specific Gravity | 2.7 Assumed |

***Notes:***

Tested By MCW Date 09/13/05 Checked By AMS Date 9-15-05



DCN: CT-S3S DATE: 1/14/04 REVISION: Original

*C:\2005 Projects\2005-584 JOYCE\[2005-584-01-03 Wentwerth Sieve.xls]Sheet1*

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.....GEOTECHNICAL, GEOENVIRONMENTAL, AND GEOSYNTHETIC LABORATORIES

March 12, 2007

Project No. 2007-538-01

Mr. Van Burbach
Joyce Engineering, Inc.
2211 W. Meadowview Rd., Suite 101
Greensboro, NC 27407

**Transmittal**
**Laboratory Test Results**
**Cobles Sandrock Land Fill**

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was faxed to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens which were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectively submitted,
***Geotechnics, Inc.***

for mps

Michael P. Smith
Regional Manager

***We understand that you have a choice in your laboratory services and we thank you for choosing Geotechnics.***



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# MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

| | |
|---|---|
| Client | JOYCE ENGINEERING, INC. |
| Client Reference | COBLES SANDROCK LF |
| Project No. | 2007-538-01 |

| | | | | | |
|---|---|---|---|---|---|
| Lab ID | .001 | .002 | .003 | .004 | .005 |
| Boring No. | NA | NA | NA | NA | NA |
| Depth (ft) | 6 | 10 | 6 | 10 | 2-4 |
| Sample No. | P-31 | P-32 | P-33 | P-34 | P-35 |
| Tare Number | 211 | 217 | 214 | 250 | 217 |
| Wt. of Tare & WS (gm) | 598.46 | 436.17 | 304.57 | 438.09 | 674.16 |
| Wt. of Tare & DS (gm) | 582.94 | 420.52 | 292.6 | 335.32 | 562.25 |
| Wt. of Tare (gm) | 171.22 | 171.01 | 171.41 | 169.34 | 171.07 |
| Wt. of Water (gm) | 15.52 | 15.65 | 11.97 | 102.77 | 111.91 |
| Wt. of DS (gm) | 411.72 | 249.51 | 121.19 | 165.98 | 391.18 |
| **Water Content (%)** | **3.8** | **6.3** | **9.9** | **61.9** | **28.6** |

| | | | | |
|---|---|---|---|---|
| Lab ID | .006 | .007 | .008 | .009 |
| Boring No. | NA | NA | NA | NA |
| Depth (ft) | 5 | 2-4 | 10 | 25 |
| Sample No. | P-36 | P-37 | P-38 | P-38 |
| Tare Number | P-12 | 319 | 215 | 216 |
| Wt. of Tare & WS (gm) | 601.78 | 990.05 | 609.42 | 261.2 |
| Wt. of Tare & DS (gm) | 572.9 | 864.25 | 556.36 | 253.03 |
| Wt. of Tare (gm) | 196.87 | 209.08 | 172.39 | 170.83 |
| Wt. of Water (gm) | 28.88 | 125.8 | 53.06 | 8.17 |
| Wt. of DS (gm) | 376.03 | 655.17 | 383.97 | 82.2 |
| **Water Content (%)** | **7.7** | **19.2** | **13.8** | **9.9** |

*Notes :* *NA*

*Tested By* *KMR* *Date* *3/1/2007* *Checked By* GSM *Date* 3-13-07



DCN: CT-S1 DATE 6-30-98 REVISION: 2

*Z:\2007 PROJECTS\2007-538 JOYCE\[2007-538-01 WATCONT.XLS]Sheet1*

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INTEGRITY IN TESTING

# SPECIFIC GRAVITY

ASTM D 854-00 (SOP - S5)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 10 |
| Project No. | 2007-538-01 | Sample No. | P-32 |
| Lab ID | 2007-538-01-02 | Visual Description | **TAN** |
| | | | ( Minus No.4 sieve material, airdried) |

| **Replicate Number** | 1 | 2 |
|---|---|---|
| Pycnometer ID | R 280 | R 292 |
| Weight of Pycnometer + Soil + Water (gm) | 717.32 | 704.66 |
| Temperature, T ( °Celsius ) | 20.6 | 20.5 |
| Weight of Pycnometer + Water (gm) | 685.76 | 673.45 |
| Tare Number | 201 | 216 |
| Weight of Tare + Dry Soil (gm) | 220.28 | 219.77 |
| Weight of Tare (gm) | 170.74 | 170.82 |
| Weight of Dry Soil (gm) | 49.54 | 48.95 |
| Specific Gravity of Soil @ T | 2.756 | 2.759 |
| Specific Gravity of Water @ T | 0.9981 | 0.9981 |
| Conversion Factor for Temperature T | 0.9999 | 0.9999 |
| Specific Gravity @ 20° Celsius | 2.756 | 2.759 |

| | |
|---|---|
| Average Specific Gravity @ 20° Celsius | 2.76 |

*Tested By* JBD *Date* 2/26/2007 *Checked By* GEM *Date* 2-27-07

DCN: CT-S5 Date: 03/24/05 Revision: 10R

Z:\Data Sheets\[Specific Gravity Soils 1Raleigh.xls]Sheet1

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# SPECIFIC GRAVITY

ASTM D 854-00 (SOP - S5)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 2-4 |
| Project No. | 2007-538-01 | Sample No. | P-37 |
| Lab ID | 2007-538-01-07 | Visual Description | **ORANGE BROWN** ( Minus No.4 sieve material, airdried) |

| **Replicate Number** | **1** | **2** |
|---|---|---|
| Pycnometer ID | R 280 | R 292 |
| Weight of Pycnometer + Soil + Water (gm) | 716.53 | 703.43 |
| Temperature, T ( °Celsius ) | 25.2 | 24.9 |
| Weight of Pycnometer + Water (gm) | 685.22 | 672.94 |
| Tare Number | 211 | 203 |
| Weight of Tare + Dry Soil (gm) | 220.65 | 219.6 |
| Weight of Tare (gm) | 171.23 | 171.09 |
| Weight of Dry Soil (gm) | 49.42 | 48.51 |
| Specific Gravity of Soil @ T | 2.729 | 2.692 |
| Specific Gravity of Water @ T | 0.9970 | 0.9971 |
| Conversion Factor for Temperature T | 0.9988 | 0.9989 |
| Specific Gravity @ 20° Celsius | 2.733 | 2.695 |

| | |
|---|---|
| Average Specific Gravity @ 20° Celsius | 2.71 |

*Tested By* KMR *Date* 3/9/2007 *Checked By* GEM *Date* 3-12-07

DCN: CT-S5 Date: 03/24/05 Revision: 10R

\\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-07 SPECIFIC GRAVITY.xls]Sheet1

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# ATTERBERG LIMIT

ASTM D 4318-00 (SOP - S4)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 10 |
| Project No. | 2007-538-01 | Sample No. | P-32 |
| Lab ID | 2007-538-01-02 | Visual Description | **TAN** |
| | | | ( Minus No. 40 sieve material, Wet Method) |

# NON - PLASTIC MATERIAL

*Tested By* *MPS* *Date* *2/20/2007* *Checked By* CAM *Date* 2-27-07

*page 1 of 1* DCN: CT-S4C DATE: 7-11-97 REVISION : 2 *Z:\Data Sheets\[Limit-(NP).xls]Sheet1*

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INTEGRITY IN TESTING

# ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 10 |
| Project No. | 2007-538-01 | Sample No. | P-34 |
| Lab ID | 2007-538-01-04 | Soil Description | **TAN ELASTIC SILT** |
| | | | ( Minus No. 40 sieve material, Airdried) |

***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 | A-G | H | A-U |
| Wt. of Tare & WS (gm) | 33.35 | 30.19 | 31.12 |
| Wt. of Tare & DS (gm) | 26.91 | 24.94 | 25.91 |
| Wt. of Tare (gm) | 15.57 | 15.16 | 15.59 |
| Wt. of Water (gm) | 6.4 | 5.3 | 5.2 |
| Wt. of DS (gm) | 11.3 | 9.8 | 10.3 |
| **Moisture Content (%)** | **56.8** | **53.7** | **50.5** |
| **Number of Blows** | **17** | **26** | **35** |

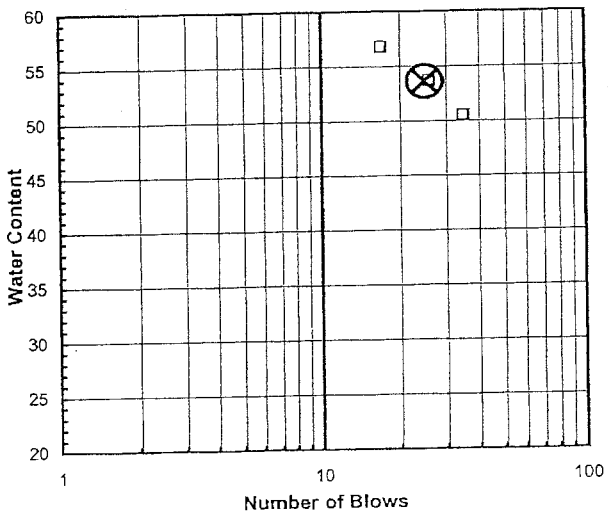
MULTIPOINT

| **Plastic Limit Test** | **1** | **2** | **Range** |
|---|---|---|---|
| Tare Number | K | A-C | |
| Wt. of Tare & WS (gm) | 32.99 | 31.61 | |
| Wt. of Tare & DS (gm) | 28.23 | 27.44 | |
| Wt. of Tare (gm) | 15.23 | 15.55 | |
| Wt. of Water (gm) | 4.8 | 4.2 | |
| Wt. of DS (gm) | 13.0 | 11.9 | |
| **Moisture Content (%)** | **36.6** | **35.1** | **1.5** |

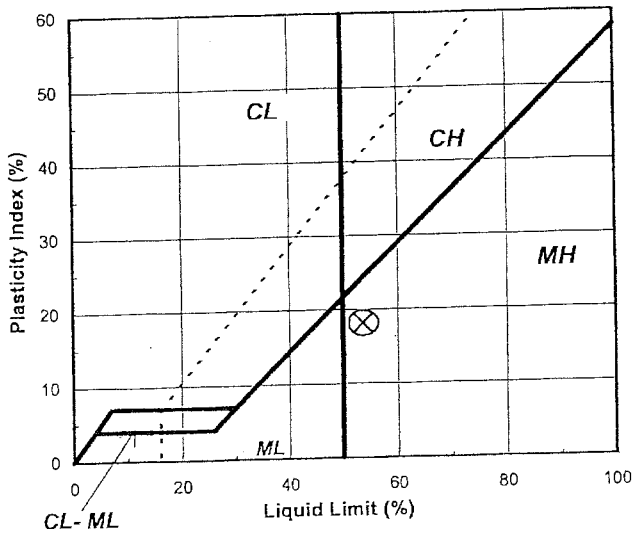
*Note: The acceptable range of the two Moisture contents is ± 2.6*

| **Test Results** | |
|---|---|
| **Liquid Limit (%)** | **54** |
| **Plastic Limit (%)** | **36** |
| **Plasticity Index (%)** | **18** |
| **USCS Symbol** | **MH** |

**Flow Curve**




**Plasticity Chart**




*Tested By* JSC *Date* 2/22/2007 *Checked By* GZM *Date* 3-2-07

*page 1 of 1* DCN: CT-S4B DATE: 10/8/2001 REVISION: 2

*\\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-04 LIMIT.xls]Sheet1*

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# ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 5 |
| Project No. | 2007-538-01 | Sample No. | P-36 |
| Lab ID | 2007-538-01-06 | Soil Description | **TAN SILT** |

( Minus No. 40 sieve material, Airdried)

***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 | H | U | K |
| Wt. of Tare & WS (gm) | 28.80 | 28.28 | 28.08 |
| Wt. of Tare & DS (gm) | 25.45 | 25.23 | 25.33 |
| Wt. of Tare (gm) | 15.16 | 15.18 | 15.24 |
| Wt. of Water (gm) | 3.4 | 3.1 | 2.8 |
| Wt. of DS (gm) | 10.3 | 10.1 | 10.1 |
| **Moisture Content (%)** | **32.6** | **30.3** | **27.3** |
| **Number of Blows** | **15** | **25** | **35** |

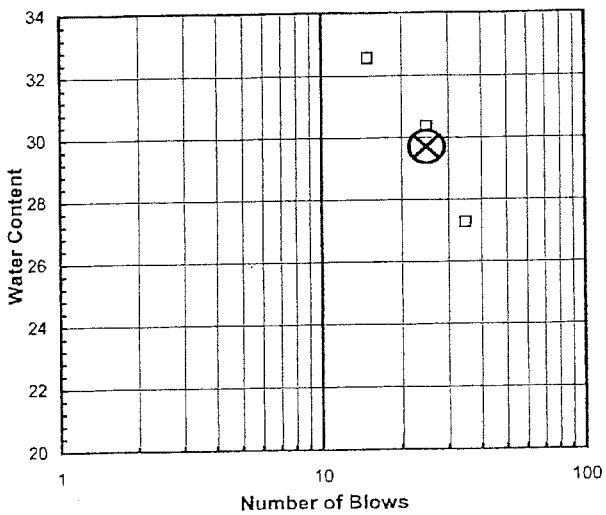
MULTIPOINT

| **Plastic Limit Test** | **1** | **2** | **Range** |
|---|---|---|---|
| Tare Number | A-U | A-C | |
| Wt. of Tare & WS (gm) | 21.51 | 21.92 | |
| Wt. of Tare & DS (gm) | 20.30 | 20.69 | |
| Wt. of Tare (gm) | 15.60 | 15.57 | |
| Wt. of Water (gm) | 1.2 | 1.2 | |
| Wt. of DS (gm) | 4.7 | 5.1 | |
| **Moisture Content (%)** | **25.7** | **24.0** | **1.7** |

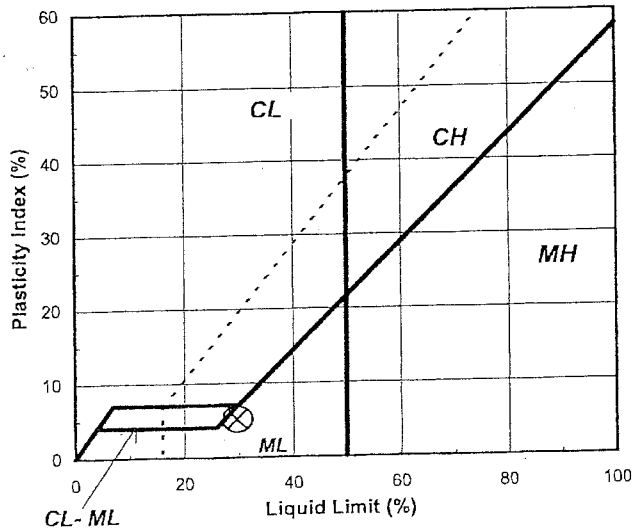
*Note: The acceptable range of the two Moisture contents is ± 2.6*

| **Test Results** | |
|---|---|
| **Liquid Limit (%)** | **30** |
| **Plastic Limit (%)** | **25** |
| **Plasticity Index (%)** | **5** |
| **USCS Symbol** | **ML** |

**Flow Curve**




**Plasticity Chart**




*Tested By* JBD *Date* 2/21/2007 *Checked By* GEM *Date* 2-22-07

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# ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 10 |
| Project No. | 2007-538-01 | Sample No. | P-38 |
| Lab ID | 2007-538-01-08 | Soil Description | **BROWN LEAN CLAY** |
| | | | ( Minus No. 40 sieve material, Airdried) |

***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 .***

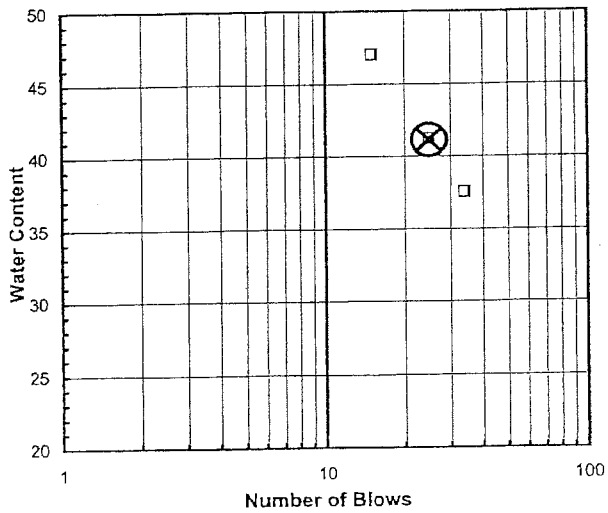
| **Liquid Limit Test** | **1** | **2** | **3** | |
|---|---|---|---|---|
| Tare Number | W | S | T | MULTIPOINT |
| Wt. of Tare & WS (gm) | 34.76 | 32.18 | 32.83 | |
| Wt. of Tare & DS (gm) | 28.50 | 27.23 | 28.03 | |
| Wt. of Tare (gm) | 15.18 | 15.22 | 15.23 | |
| Wt. of Water (gm) | 6.3 | 5.0 | 4.8 | |
| Wt. of DS (gm) | 13.3 | 12.0 | 12.8 | |
| **Moisture Content (%)** | **47.0** | **41.2** | **37.5** | |
| **Number of Blows** | **15** | **25** | **34** | |

| **Plastic Limit Test** | **1** | **2** | **Range** |
|---|---|---|---|
| Tare Number | A-O | A-L | |
| Wt. of Tare & WS (gm) | 21.29 | 21.08 | |
| Wt. of Tare & DS (gm) | 20.28 | 20.05 | |
| Wt. of Tare (gm) | 15.49 | 15.53 | |
| Wt. of Water (gm) | 1.0 | 1.0 | |
| Wt. of DS (gm) | 4.8 | 4.5 | |
| **Moisture Content (%)** | **21.1** | **22.8** | **-1.7** |

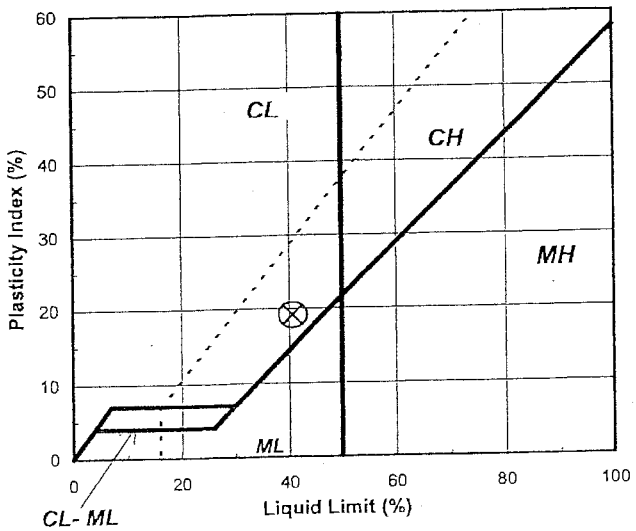
*Note: The acceptable range of the two Moisture contents is ± 2.6*

| **Test Results** | |
|---|---|
| **Liquid Limit (%)** | **41** |
| **Plastic Limit (%)** | **22** |
| **Plasticity Index (%)** | **19** |
| **USCS Symbol** | **CL** |

**Flow Curve**




**Plasticity Chart**




*Tested By* KMR *Date* 2/23/2007 *Checked By* GCM *Date* 3-1-07

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# FLEXIBLE WALL PERMEABILITY TEST

geotechnics
INTEGRITY IN TESTING

## PERMOMETER METHOD

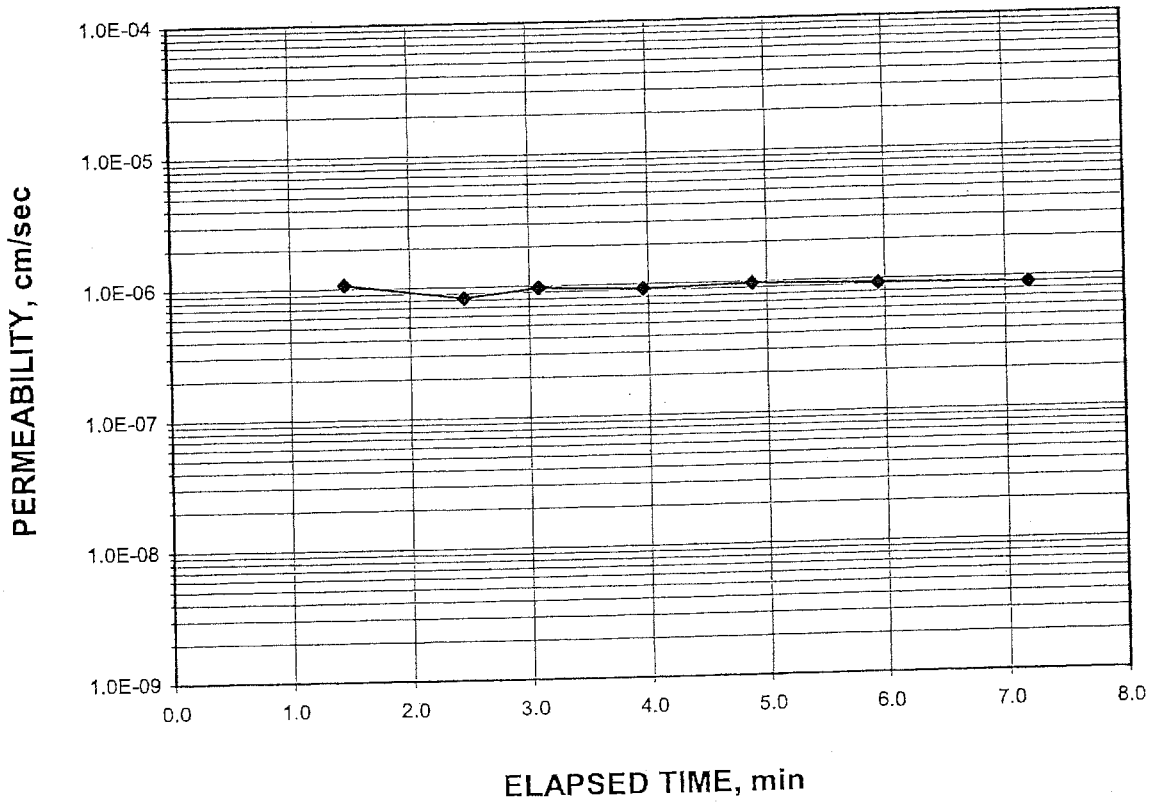
ASTM D 5084-97
(SOP-S22C)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Project | COBLE SANDROCK LF | Depth (ft.) | 2-4 |
| Project No. | 2007-538-01 | Sample No. | P-35 |
| Lab ID No. | 2007-538-01-05 | | |

Visual Description: TAN SANDY LEAN CLAY

**AVERAGE PERMEABILITY = 9.2E-07 cm/sec @ 20°C**
**AVERAGE PERMEABILITY = 9.2E-09 m/sec @ 20°C**

## PERMEABILITY vs. TIME




Tested By: TMS Date: 2/27/2007 Checked By: GBM Date: 3-12-07



DCN: CT-22A DATE:12-21-98 REVISION: 4 \\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-05 PREMOM.xls]Sheet1

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# FLEXIBLE WALL PERMEABILITY TEST

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INTEGRITY IN TESTING

## PERMOMETER METHOD

ASTM D 5084-97
(SOP-S22A & B)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Project | COBLE SANDROCK LF | Depth (ft.) | 2-4 |
| Project No. | 2007-538-01 | Sample No. | P-35 |
| Lab ID No. | 2007-538-01-05 | | |

| Test Pressures | | Final Sample Dimensions | |
|---|---|---|---|
| Cell Pressure(psi) | 60.0 | Sample Length (cm), L | 8.96 |
| Back Pressure(psi) | 50.0 | Sample Area ($cm^2$), A | 38.77 |
| Eff. Cons. Pressure(psi) | 10.0 | Pipette Area ($cm^2$), $a_p$ | 0.03142 |
| Response (%) | 95 | Annulus Area ($cm^2$), $a_a$ | 0.76712 |
| | | Equilibrium Level (cm), $R_{eq}$ | 1.75 |

**AVERAGE PERMEABILITY = 9.2E-07 cm/sec @ 20°C**
**AVERAGE PERMEABILITY = 9.2E-09 m/sec @ 20°C**

| DATE (mm/dd/yy) | TIME (hr) | TIME (min) | ELAPSED TIME t (min) | PIPETTE READING $R_p$ (cm) | INCREMENT GRADIENT i (cm/cm) | FLOW CONDITION ( 0 flow ) ( 1 stop ) | TEMP. (°C) | INCREMENTAL PERMEABILITY @ 20°C (cm/sec) |
|---|---|---|---|---|---|---|---|---|
| 2/27/2007 | 13 | 17.87 | 0 | 9.8 | 11.7 | 0 | 21.8 | NA |
| 2/27/2007 | 13 | 19.33 | 1 | 8.5 | 9.8 | 0 | 21.8 | 1.1E-06 |
| 2/27/2007 | 13 | 20.33 | 2 | 7.9 | 9.0 | 0 | 21.8 | 8.3E-07 |
| 2/27/2007 | 13 | 20.95 | 3 | 7.5 | 8.4 | 0 | 21.8 | 9.6E-07 |
| 2/27/2007 | 13 | 21.83 | 4 | 7.0 | 7.7 | 0 | 21.8 | 9.2E-07 |
| 2/27/2007 | 13 | 22.75 | 5 | 6.5 | 6.9 | 0 | 21.8 | 9.7E-07 |
| 2/27/2007 | 13 | 23.82 | 6 | 6.0 | 6.2 | 0 | 21.8 | 9.2E-07 |
| 2/27/2007 | 13 | 25.07 | 7 | 5.5 | 5.5 | 1 | 21.8 | 8.9E-07 |

Tested By: TMS Date: 2/27/2007 Checked By: GEM Date: 3-12-07



DCN: CT-22A DATE:12-21-98 REVISION: 4\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-05 PREMOM.xls]Sheet1

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# PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Project | COBLES SANDROCK LF | Depth (ft.) | 2.6-3.1 |
| Project No. | 2007-538-01 | Sample No. | P-37 |
| Lab ID No. | 2007-538-01-07 | | |
| | | Specific Gravity | 2.71 Measured |
| | | Sample Condition | Remolded |

Visual Description: ORANGE BROWN CLAYEY SAND

*NOTE: Permeability based on initial dimensions due to sample being used for Triaxial Strength testing too.

| **MOISTURE CONTENT:** | BEFORE TEST | AFTER TEST |
|---|---|---|
| Tare Number | SS-5 | 311 |
| Wt. of Tare & WS (gm.) | 138.32 | 583.28 |
| Wt. of Tare & DS (gm.) | 133.60 | 495.13 |
| Wt. of Tare (gm.) | 99.65 | 84.24 |
| Wt. of Water (gm.) | 4.72 | 88.15 |
| Wt. of DS (gm.) | 33.95 | 410.89 |
| Moisture Content (%) | **13.9** | **21.5** |

| **SPECIMEN:** | BEFORE TEST | AFTER TEST |
|---|---|---|
| Wt. of Tube & WS (gm.) | 1567.22 | NA |
| Wt. of Tube (gm.) | 395.34 | NA |
| Wt. of WS (gm.) | 1171.88 | 1249.56 |
| Length 1 (in.) | 5.561 | 5.561 |
| Length 2 (in.) | 5.567 | 5.567 |
| Length 3 (in.) | 5.565 | 5.565 |
| Top Diameter (in.) | 2.818 | 2.818 |
| Middle Diameter (in.) | 2.810 | 2.810 |
| Bottom Diameter (in.) | 2.837 | 2.837 |
| Average Length (in.) | 5.56 | 5.56 |
| Average Area (in.$^2$) | 6.25 | 6.25 |
| Sample Volume (cm$^3$) | 570.18 | 570.18 |
| Unit Wet Wt. (gm./ cm$^3$) | 2.06 | 2.19 |
| Unit Wet Wt. (pcf) | 128.3 | 136.8 |
| Unit Dry Wt. (pcf) | 112.6 | 112.6 |
| Unit Dry Wt. (gm./ cm$^3$) | 1.80 | 1.80 |
| Void Ratio, e | 0.50 | 0.50 |
| Porosity, n | 0.33 | 0.33 |
| Pore Volume (cm$^3$) | 190.5 | 190.5 |

Tested By: MPS Date: 3/5/2007 Checked By: GM Date: 3-7-07



DCN: CT-22 DATE: 01-08-99 REVISION:2 \\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-07 PERM R 1A.xls]Sheet1

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INTEGRITY IN TESTING

# CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

ASTM D - 4767 (SOP-S28)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | | |
| Client Reference | COBLES SANDROCK LF | | |
| Project No. | 2007-538-01 | | |
| Lab ID | 2007-538-01-07 | Specific Gravity (measured) | 2.71 |

Visual Description: ORANGE BROWN CLAYEY SAND (UNDISTURBED)

## SAMPLE CONDITION SUMMARY

| | | | |
|---|---|---|---|
| Boring No. | NA | B-7 | B-7 |
| Depth (ft) | 2.6-3.1 | 3.1-3.6 | 2.1-2.6 |
| Sample No. | P-37 | P-37 | P-37 |
| Test No. | T1 | T2 | T3 |
| Deformation Rate (in/min) | 0.005 | 0.005 | 0.005 |
| Back Pressure (psi) | 50.6 | 56 | 45 |
| Consolidation Time (days) | 1 | 1 | 1 |
| Initial State (w%) | 24.9 | 24.9 | 24.9 |
| Total Unit Weight (pcf) | 127.8 | 125.4 | 131.8 |
| Dry Unit Weight (pcf) | 102.3 | 100.4 | 105.5 |
| Final State (w%) | 21.5 | 22.7 | 21.4 |
| Initial State Void Ratio,e | 0.653 | 0.685 | 0.603 |

Tested By MPS Date 3/1/2007 Input Checked By GSM Date 3-12-07



DCN: CT-S28 DATE 6-25-98 REVISION 1 \\Lab01\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-07 TRIAX SUMMARY.XLS]Sheet1

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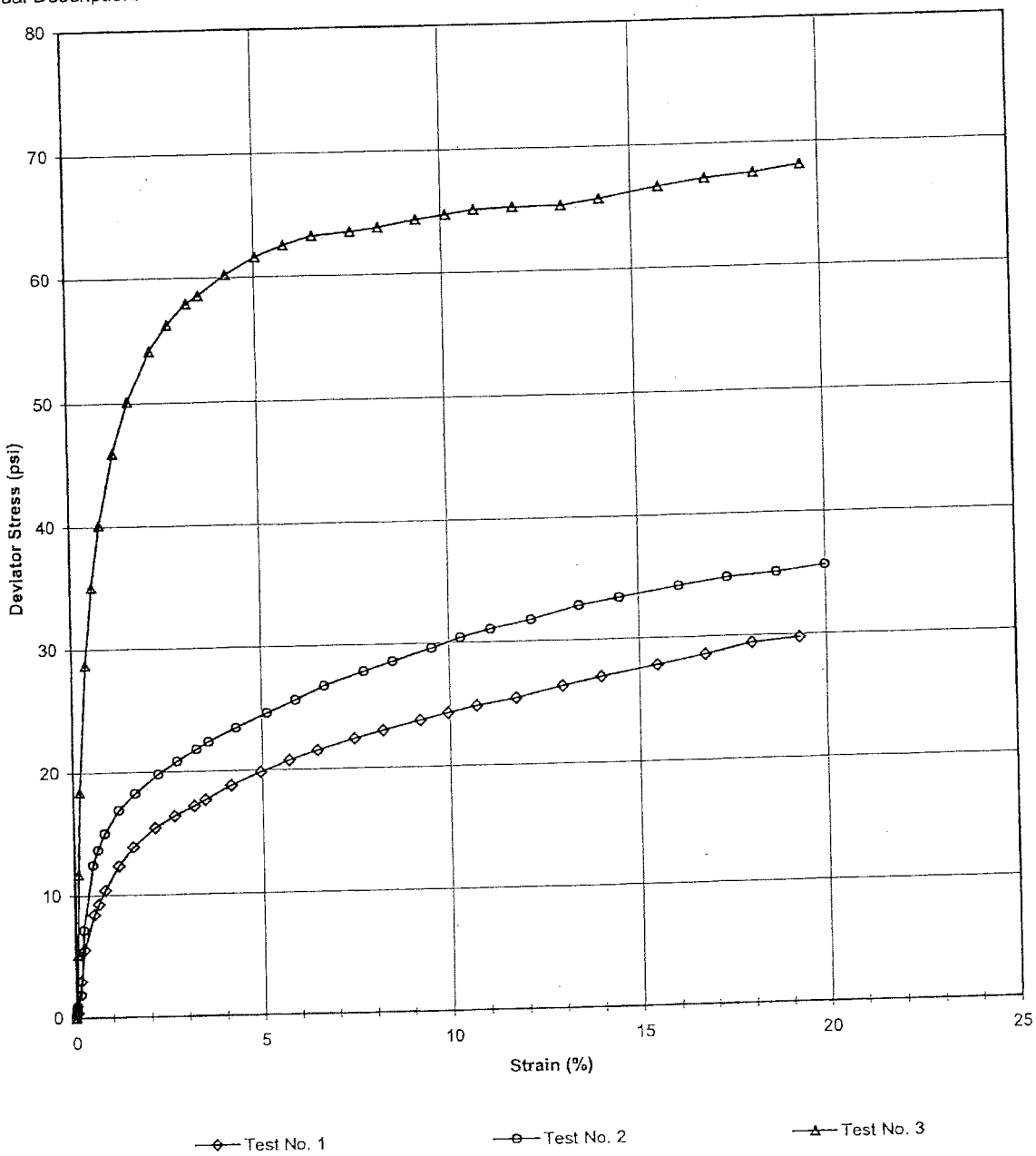
## CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

ASTM D4767-95 / AASHTO T297-94 (SOP-S28)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth(ft.) | 2.1-2.6 |
| Project No. | 2007-538-01 | Sample No. | P-37 |
| Lab ID | 2007-538-01-07 | | |
| Visual Description: | ORANGE BROWN CLAYEY SAND (UNDISTURBED) | | |




Tested By MPS Date 3/1/07 Approved By DB Date 3/7/07



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**CONSOLIDATED UNDRAINED TRIAXIAL TEST**
**WITH PORE PRESSURE READINGS**
ASTM D4767-95 / AASHTO T297-94 (SOP-S28)

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| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth(ft.) | 2.6-3.1 |
| Project No. | 2007-538-01 | Sample No. | P-37 |
| Lab ID | 2007-538-01-07 | | |

Visual Description: ORANGE BROWN CLAYEY SAND (UNDISTURBED)

| | | | |
|---|---|---|---|
| *Effective Confining Pressure (psi)* | 4.8 | *Stage No.* | 1 |
| | | *Test No* | 1 |

**INITIAL DIMENSIONS**

| | |
|---|---|
| Initial Sample Length (in.) | 5.56 |
| Initial Sample Diameter (in.) | 2.82 |
| Initial Sample Area (in^2) | 6.25 |
| Initial Sample Volume (in^3) | 34.79 |

**VOLUME CHANGE**

| | |
|---|---|
| Volume After Consolidation (in^3) | 34.32 |
| Length After Consolidation (in) | 5.53 |
| Area After Consolidation (in^2) | 6.203 |

| Strain (%) | Deviation Stress | $\Delta U$ | $\overline{\sigma}_1$ | $\overline{\sigma}_3$ | Effective Principle Stress Ratio | $\overline{A}$ | $\overline{P}$ | Q |
|---|---|---|---|---|---|---|---|---|
| 0.02 | 0.26 | 0.06 | 5.01 | 4.7 | 1.055 | 0.21 | 4.88 | 0.13 |
| 0.04 | 0.38 | 0.04 | 5.14 | 4.8 | 1.081 | 0.11 | 4.95 | 0.19 |
| 0.15 | 2.96 | 0.72 | 7.05 | 4.1 | 1.726 | 0.24 | 5.56 | 1.48 |
| 0.25 | 5.55 | 1.22 | 9.12 | 3.6 | 2.552 | 0.22 | 6.35 | 2.77 |
| 0.52 | 8.42 | 1.55 | 11.66 | 3.2 | 3.593 | 0.18 | 7.45 | 4.21 |
| 0.65 | 9.27 | 1.62 | 12.45 | 3.2 | 3.917 | 0.18 | 7.81 | 4.63 |
| 0.82 | 10.39 | 1.65 | 13.53 | 3.1 | 4.301 | 0.16 | 8.34 | 5.19 |
| 1.19 | 12.39 | 1.50 | 15.69 | 3.3 | 4.760 | 0.12 | 9.49 | 6.20 |
| 1.57 | 13.91 | 1.19 | 17.52 | 3.6 | 4.850 | 0.09 | 10.57 | 6.95 |
| 2.16 | 15.47 | 0.69 | 19.58 | 4.1 | 4.768 | 0.04 | 11.84 | 7.74 |
| 2.68 | 16.40 | 0.33 | 20.87 | 4.5 | 4.664 | 0.02 | 12.67 | 8.20 |
| 3.19 | 17.19 | -0.04 | 22.03 | 4.8 | 4.555 | 0.00 | 13.43 | 8.60 |
| 3.49 | 17.67 | -0.21 | 22.68 | 5.0 | 4.529 | -0.01 | 13.84 | 8.84 |
| 4.18 | 18.79 | -0.68 | 24.27 | 5.5 | 4.430 | -0.04 | 14.88 | 9.40 |
| 4.97 | 19.82 | -1.12 | 25.74 | 5.9 | 4.350 | -0.06 | 15.83 | 9.91 |
| 5.74 | 20.76 | -1.54 | 27.10 | 6.3 | 4.274 | -0.07 | 16.72 | 10.38 |
| 6.49 | 21.50 | -1.94 | 28.24 | 6.7 | 4.189 | -0.09 | 17.49 | 10.75 |
| 7.48 | 22.39 | -2.40 | 29.59 | 7.2 | 4.112 | -0.11 | 18.39 | 11.19 |
| 8.24 | 23.02 | -2.71 | 30.53 | 7.5 | 4.063 | -0.12 | 19.02 | 11.51 |
| 9.24 | 23.79 | -3.04 | 31.62 | 7.8 | 4.036 | -0.13 | 19.73 | 11.89 |
| 9.97 | 24.33 | -3.31 | 32.44 | 8.1 | 3.998 | -0.14 | 20.28 | 12.16 |
| 10.73 | 24.86 | -3.53 | 33.19 | 8.3 | 3.983 | -0.14 | 20.76 | 12.43 |
| 11.75 | 25.42 | -3.90 | 34.11 | 8.7 | 3.922 | -0.15 | 21.41 | 12.71 |
| 12.98 | 26.29 | -4.21 | 35.30 | 9.0 | 3.919 | -0.16 | 22.15 | 13.15 |
| 14.00 | 26.96 | -4.55 | 36.32 | 9.4 | 3.883 | -0.17 | 22.83 | 13.48 |
| 15.49 | 27.78 | -4.91 | 37.49 | 9.7 | 3.861 | -0.18 | 23.60 | 13.89 |
| 16.77 | 28.54 | -5.29 | 38.63 | 10.1 | 3.828 | -0.19 | 24.36 | 14.27 |
| 18.01 | 29.37 | -5.65 | 39.83 | 10.5 | 3.811 | -0.19 | 25.14 | 14.69 |
| 19.28 | 29.72 | -5.97 | 40.49 | 10.8 | 3.759 | -0.20 | 25.63 | 14.86 |

Tested By MPS Date 3/1/07 Input Checked By DB Date 3/7/07


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**CONSOLIDATED UNDRAINED TRIAXIAL TEST**
**WITH PORE PRESSURE READINGS**
ASTM D4767-95 / AASHTO T297-94 (SOP-S28)

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INTEGRITY IN TESTING

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth(ft.) | 3.1-3.6 |
| Project No. | 2007-538-01 | Sample No. | P-37 |
| Lab ID | 2007-538-01-07 | | |

Visual Description: ORANGE BROWN CLAYEY SAND (UNDISTURBED)

| | | | |
|---|---|---|---|
| *Effective Confining Pressure (psi)* | 20.0 | *Stage No.* | 1 |
| | | *Test No* | 2 |

**INITIAL DIMENSIONS**

| | |
|---|---|
| Initial Sample Length (in.) | 5.81 |
| Initial Sample Diameter (in.) | 2.83 |
| Initial Sample Area (in^2) | 6.30 |
| Initial Sample Volume (in^3) | 36.59 |

**VOLUME CHANGE**

| | |
|---|---|
| Volume After Consolidation (in^3) | 35.68 |
| Length After Consolidation (in) | 5.76 |
| Area After Consolidation (in^2) | 6.193 |

| Strain (%) | Deviation Stress | $\Delta U$ | $\overline{\sigma}_1$ | $\overline{\sigma}_3$ | Effective Principle Stress Ratio | $\overline{A}$ | $\overline{P}$ | Q |
|---|---|---|---|---|---|---|---|---|
| 0.02 | 0.72 | 0.11 | 20.61 | 19.9 | 1.036 | 0.16 | 20.25 | 0.36 |
| 0.04 | 0.92 | 0.13 | 20.79 | 19.9 | 1.046 | 0.14 | 20.33 | 0.46 |
| 0.14 | 1.85 | 0.46 | 21.39 | 19.5 | 1.095 | 0.26 | 20.46 | 0.93 |
| 0.23 | 7.16 | 3.40 | 23.76 | 16.6 | 1.431 | 0.49 | 20.18 | 3.58 |
| 0.51 | 12.45 | 8.05 | 24.40 | 12.0 | 2.041 | 0.67 | 18.17 | 6.22 |
| 0.64 | 13.68 | 9.18 | 24.50 | 10.8 | 2.264 | 0.69 | 17.66 | 6.84 |
| 0.82 | 15.04 | 10.26 | 24.78 | 9.7 | 2.543 | 0.70 | 17.26 | 7.52 |
| 1.21 | 16.93 | 11.54 | 25.38 | 8.5 | 3.002 | 0.70 | 16.92 | 8.46 |
| 1.64 | 18.26 | 12.18 | 26.07 | 7.8 | 3.335 | 0.69 | 16.95 | 9.13 |
| 2.26 | 19.80 | 12.57 | 27.24 | 7.4 | 3.664 | 0.65 | 17.34 | 9.90 |
| 2.77 | 20.81 | 12.64 | 28.17 | 7.4 | 3.827 | 0.63 | 17.77 | 10.41 |
| 3.28 | 21.77 | 12.60 | 29.17 | 7.4 | 3.940 | 0.60 | 18.29 | 10.88 |
| 3.59 | 22.38 | 12.54 | 29.84 | 7.5 | 3.999 | 0.58 | 18.65 | 11.19 |
| 4.32 | 23.46 | 12.35 | 31.11 | 7.7 | 4.066 | 0.54 | 19.38 | 11.73 |
| 5.16 | 24.63 | 12.07 | 32.55 | 7.9 | 4.106 | 0.51 | 20.24 | 12.31 |
| 5.92 | 25.62 | 11.80 | 33.82 | 8.2 | 4.126 | 0.47 | 21.01 | 12.81 |
| 6.69 | 26.73 | 11.50 | 35.23 | 8.5 | 4.146 | 0.44 | 21.86 | 13.37 |
| 7.75 | 27.81 | 11.09 | 36.72 | 8.9 | 4.122 | 0.41 | 22.82 | 13.91 |
| 8.53 | 28.58 | 10.80 | 37.78 | 9.2 | 4.107 | 0.39 | 23.49 | 14.29 |
| 9.56 | 29.59 | 10.38 | 39.21 | 9.6 | 4.075 | 0.36 | 24.41 | 14.79 |
| 10.33 | 30.39 | 10.08 | 40.31 | 9.9 | 4.064 | 0.34 | 25.11 | 15.19 |
| 11.12 | 31.04 | 9.78 | 41.26 | 10.2 | 4.036 | 0.32 | 25.74 | 15.52 |
| 12.17 | 31.72 | 9.41 | 42.30 | 10.6 | 3.995 | 0.31 | 26.45 | 15.86 |
| 13.44 | 32.79 | 8.94 | 43.85 | 11.1 | 3.966 | 0.28 | 27.45 | 16.40 |
| 14.51 | 33.35 | 8.59 | 44.77 | 11.4 | 3.922 | 0.27 | 28.09 | 16.68 |
| 16.08 | 34.18 | 8.08 | 46.10 | 11.9 | 3.868 | 0.24 | 29.01 | 17.09 |
| 17.37 | 34.77 | 7.69 | 47.08 | 12.3 | 3.823 | 0.23 | 29.70 | 17.38 |
| 18.70 | 35.09 | 7.29 | 47.80 | 12.7 | 3.760 | 0.21 | 30.25 | 17.54 |
| 20.00 | 35.59 | 6.94 | 48.66 | 13.1 | 3.724 | 0.20 | 30.86 | 17.80 |

Tested By MPS Date 3/1/07 Input Checked By DB Date 3/7/07



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# CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

ASTM D4767-95 / AASHTO T297-94 (SOP-S28)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth(ft.) | 2.1-2.6 |
| Project No. | 2007-538-01 | Sample No. | P-37 |
| Lab ID | 2007-538-01-07 | | |

Visual Description: ORANGE BROWN CLAYEY SAND (UNDISTURBED)

| | | | |
|---|---|---|---|
| *Effective Confining Pressure (psi)* | 50.0 | *Stage No.* | 1 |
| | | *Test No* | 3 |

**INITIAL DIMENSIONS**

| | |
|---|---|
| Initial Sample Length (in.) | 5.43 |
| Initial Sample Diameter (in.) | 2.79 |
| Initial Sample Area (in^2) | 6.13 |
| Initial Sample Volume (in^3) | 33.29 |

**VOLUME CHANGE**

| | |
|---|---|
| Volume After Consolidation (in^3) | 31.37 |
| Length After Consolidation (in) | 5.33 |
| Area After Consolidation (in^2) | 5.890 |

| Strain (%) | Deviation Stress | $\Delta U$ | $\overline{\sigma}_1$ | $\overline{\sigma}_3$ | Effective Principle Stress Ratio | $\overline{A}$ | $\overline{P}$ | Q |
|---|---|---|---|---|---|---|---|---|
| 0.02 | 0.91 | 0.14 | 50.77 | 49.9 | 1.018 | 0.16 | 50.32 | 0.45 |
| 0.06 | 5.14 | 1.30 | 53.85 | 48.7 | 1.106 | 0.26 | 51.28 | 2.57 |
| 0.10 | 11.73 | 3.89 | 57.84 | 46.1 | 1.254 | 0.34 | 51.98 | 5.87 |
| 0.17 | 18.41 | 7.71 | 60.70 | 42.3 | 1.435 | 0.43 | 51.50 | 9.21 |
| 0.37 | 28.72 | 14.76 | 63.96 | 35.2 | 1.815 | 0.53 | 49.60 | 14.36 |
| 0.57 | 35.05 | 19.06 | 65.99 | 30.9 | 2.133 | 0.56 | 48.47 | 17.52 |
| 0.81 | 40.12 | 22.22 | 67.90 | 27.8 | 2.444 | 0.57 | 47.84 | 20.06 |
| 1.20 | 45.94 | 25.36 | 70.58 | 24.6 | 2.864 | 0.57 | 47.61 | 22.97 |
| 1.60 | 50.10 | 27.13 | 72.96 | 22.9 | 3.191 | 0.56 | 47.91 | 25.05 |
| 2.21 | 54.15 | 28.34 | 75.81 | 21.7 | 3.500 | 0.54 | 48.74 | 27.07 |
| 2.70 | 56.24 | 28.67 | 77.57 | 21.3 | 3.636 | 0.53 | 49.45 | 28.12 |
| 3.20 | 57.90 | 28.66 | 79.24 | 21.3 | 3.713 | 0.51 | 50.29 | 28.95 |
| 3.52 | 58.55 | 28.57 | 79.98 | 21.4 | 3.732 | 0.50 | 50.70 | 29.27 |
| 4.25 | 60.18 | 28.19 | 81.99 | 21.8 | 3.759 | 0.48 | 51.90 | 30.09 |
| 5.05 | 61.58 | 27.65 | 83.92 | 22.3 | 3.756 | 0.46 | 53.14 | 30.79 |
| 5.79 | 62.50 | 27.09 | 85.41 | 22.9 | 3.728 | 0.45 | 54.16 | 31.25 |
| 6.57 | 63.21 | 26.51 | 86.70 | 23.5 | 3.690 | 0.43 | 55.10 | 31.60 |
| 7.60 | 63.49 | 25.90 | 87.59 | 24.1 | 3.635 | 0.42 | 55.84 | 31.74 |
| 8.34 | 63.78 | 25.53 | 88.25 | 24.5 | 3.606 | 0.41 | 56.36 | 31.89 |
| 9.36 | 64.35 | 25.11 | 89.24 | 24.9 | 3.586 | 0.40 | 57.06 | 32.18 |
| 10.13 | 64.69 | 24.87 | 89.83 | 25.1 | 3.574 | 0.40 | 57.48 | 32.35 |
| 10.89 | 65.07 | 24.56 | 90.51 | 25.4 | 3.558 | 0.39 | 57.98 | 32.53 |
| 11.90 | 65.19 | 24.24 | 90.95 | 25.8 | 3.531 | 0.38 | 58.35 | 32.60 |
| 13.18 | 65.25 | 23.93 | 91.32 | 26.1 | 3.503 | 0.38 | 58.70 | 32.62 |
| 14.17 | 65.73 | 23.59 | 92.13 | 26.4 | 3.489 | 0.37 | 59.27 | 32.86 |
| 15.73 | 66.60 | 22.83 | 93.76 | 27.2 | 3.451 | 0.35 | 60.47 | 33.30 |
| 16.99 | 67.17 | 22.14 | 95.03 | 27.9 | 3.411 | 0.34 | 61.45 | 33.59 |
| 18.28 | 67.53 | 21.22 | 96.31 | 28.8 | 3.346 | 0.32 | 62.54 | 33.76 |
| 19.54 | 68.10 | 20.30 | 97.80 | 29.7 | 3.293 | 0.31 | 63.75 | 34.05 |

Tested By MPS Date 3/1/07 Input Checked By DB Date 3/7/07



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# WASH SIEVE ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 6 |
| Project No. | 2007-538-01 | Sample No. | P-31 |
| Lab ID | 2007-538-01-01 | Soil Color | **TAN** |

| Moisture Content of Passing 3/4" Material | | Water Content of Retained 3/4" Material | |
|---|---|---|---|
| Tare No. | 211 | Tare No. | NA |
| Wgt.Tare + Wet Specimen (gm) | 598.46 | Wgt.Tare + Wet Specimen (gm) | NA |
| Wgt.Tare + Dry Specimen (gm) | 582.94 | Wgt.Tare + Dry Specimen (gm) | NA |
| Weight of Tare (gm) | 171.22 | Weight of Tare (gm) | NA |
| Weight of Water (gm) | 15.52 | Weight of Water (gm) | NA |
| Weight of Dry Soil (gm) | 411.72 | Weight of Dry Soil (gm) | NA |
| **Moisture Content (%)** | **3.8** | **Moisture Content (%)** | **NA** |

| | | | |
|---|---|---|---|
| Wet Weight -3/4" Sample (gm) | NA | Weight of the Dry Specimen (gm) | 411.72 |
| Dry Weight - 3/4" Sample (gm) | 342.0 | Weight of minus #200 material (gm) | 69.70 |
| Wet Weight +3/4" Sample (gm) | NA | Weight of plus #200 material (gm) | 342.02 |
| 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 | 0.0 | 0.0 | 100.0 | **100.0** |
| 6" | 150 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3" | 75 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 2" | 50 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1 1/2" | 37.5 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1" | 25.0 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3/4" | 19.0 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1/2" | 12.50 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3/8" | 9.50 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| #4 | 4.75 | 20.90 | 5.1 | 5.1 | 94.9 | **94.9** |
| #10 | 2.00 | 92.26 | 22.4 | 27.5 | 72.5 | **72.5** |
| #20 | 0.850 | 98.70 | 24.0 | 51.5 | 48.5 | **48.5** |
| #40 | 0.425 | 56.00 | 13.6 | 65.1 | 34.9 | **34.9** |
| #60 | 0.250 | 28.17 | 6.8 | 71.9 | 28.1 | **28.1** |
| #140 | 0.106 | 34.98 | 8.5 | 80.4 | 19.6 | **19.6** |
| #200 | 0.075 | 11.01 | 2.7 | 83.1 | 16.9 | **16.9** |
| Pan | - | 69.70 | 16.9 | 100.0 | - | - |

Tested By KMR Date 2/21/2007 Checked By GEM Date 2-27-07



DCN: CT-S3C DATE 6-25-98 REVISION: 2

*\\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2006-538-01-01 SIEVE.XLS]Sheet1*

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# WASH SIEVE ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 10 |
| Project No. | 2007-538-01 | Sample No. | P-32 |
| Lab ID | 2007-538-01-02 | Soil Color | **TAN** |

| Moisture Content of Passing 3/4" Material | | Water Content of Retained 3/4" Material | |
|---|---|---|---|
| Tare No. | 217 | Tare No. | NA |
| Wgt.Tare + Wet Specimen (gm) | 436.17 | Wgt.Tare + Wet Specimen (gm) | NA |
| Wgt.Tare + Dry Specimen (gm) | 420.52 | Wgt.Tare + Dry Specimen (gm) | NA |
| Weight of Tare (gm) | 171.01 | Weight of Tare (gm) | NA |
| Weight of Water (gm) | 15.65 | Weight of Water (gm) | NA |
| Weight of Dry Soil (gm) | 249.51 | Weight of Dry Soil (gm) | NA |
| **Moisture Content (%)** | 6.3 | **Moisture Content (%)** | **NA** |

| | | | |
|---|---|---|---|
| Wet Weight -3/4" Sample (gm) | NA | Weight of the Dry Specimen (gm) | 249.51 |
| Dry Weight - 3/4" Sample (gm) | 140.1 | Weight of minus #200 material (gm) | 109.38 |
| Wet Weight +3/4" Sample (gm) | NA | Weight of plus #200 material (gm) | 140.13 |
| 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 | 0.0 | 0.0 | 100.0 | **100.0** |
| 6" | 150 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3" | 75 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 2" | 50 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1 1/2" | 37.5 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1" | 25.0 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3/4" | 19.0 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1/2" | 12.50 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3/8" | 9.50 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| #4 | 4.75 | 4.18 | 1.7 | 1.7 | 98.3 | **98.3** |
| #10 | 2.00 | 17.17 | 6.9 | 8.6 | 91.4 | **91.4** |
| #20 | 0.850 | 32.86 | 13.2 | 21.7 | 78.3 | **78.3** |
| #40 | 0.425 | 25.91 | 10.4 | 32.1 | 67.9 | **67.9** |
| #60 | 0.250 | 22.60 | 9.1 | 41.2 | 58.8 | **58.8** |
| #140 | 0.106 | 27.99 | 11.2 | 52.4 | 47.6 | **47.6** |
| #200 | 0.075 | 9.42 | 3.8 | 56.2 | 43.8 | **43.8** |
| Pan | - | 109.38 | 43.8 | 100.0 | - | - |

Tested By KMR Date 2/21/2007 Checked By GEM Date 2-27-07



DCN: CT-S3C DATE 6-25-98 REVISION: 2

\\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-02 SIEVE.XLS]Sheet1

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# WASH SIEVE ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 5 |
| Project No. | 2007-538-01 | Sample No. | P-36 |
| Lab ID | 2007-538-01-06 | Soil Color | **TAN** |

| Moisture Content of Passing 3/4" Material | | Water Content of Retained 3/4" Material | |
|---|---|---|---|
| Tare No. | P-12 | Tare No. | NA |
| Wgt.Tare + Wet Specimen (gm) | 601.78 | Wgt.Tare + Wet Specimen (gm) | NA |
| Wgt.Tare + Dry Specimen (gm) | 572.90 | Wgt.Tare + Dry Specimen (gm) | NA |
| Weight of Tare (gm) | 196.87 | Weight of Tare (gm) | NA |
| Weight of Water (gm) | 28.88 | Weight of Water (gm) | NA |
| Weight of Dry Soil (gm) | 376.03 | Weight of Dry Soil (gm) | NA |
| **Moisture Content (%)** | **7.7** | **Moisture Content (%)** | **NA** |

| | | | |
|---|---|---|---|
| Wet Weight -3/4" Sample (gm) | NA | Weight of the Dry Specimen (gm) | 376.03 |
| Dry Weight - 3/4" Sample (gm) | 287.6 | Weight of minus #200 material (gm) | 88.39 |
| Wet Weight +3/4" Sample (gm) | NA | Weight of plus #200 material (gm) | 287.64 |
| 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 | 0.0 | 0.0 | 100.0 | **100.0** |
| 6" | 150 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3" | 75 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 2" | 50 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1 1/2" | 37.5 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1" | 25.0 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3/4" | 19.0 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1/2" | 12.50 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3/8" | 9.50 | 1.78 | 0.5 | 0.5 | 99.5 | **99.5** |
| #4 | 4.75 | 13.53 | 3.6 | 4.1 | 95.9 | **95.9** |
| #10 | 2.00 | 62.26 | 16.6 | 20.6 | 79.4 | **79.4** |
| #20 | 0.850 | 84.41 | 22.4 | 43.1 | 56.9 | **56.9** |
| #40 | 0.425 | 50.58 | 13.5 | 56.5 | 43.5 | **43.5** |
| #60 | 0.250 | 26.99 | 7.2 | 63.7 | 36.3 | **36.3** |
| #140 | 0.106 | 35.87 | 9.5 | 73.2 | 26.8 | **26.8** |
| #200 | 0.075 | 12.22 | 3.2 | 76.5 | 23.5 | **23.5** |
| Pan | - | 88.39 | 23.5 | 100.0 | - | - |

Tested By KMR Date 2/12/2007 Checked By GEM Date 2-22-07



DCN: CT-S3C DATE 6-25-98 REVISION: 2

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# WASH SIEVE ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 25 |
| Project No. | 2007-538-01 | Sample No. | P-38 |
| Lab ID | 2007-538-01-09 | Soil Color | **BROWN** |

| Moisture Content of Passing 3/4" Material | | Water Content of Retained 3/4" Material | |
|---|---|---|---|
| Tare No. | 216 | Tare No. | NA |
| Wgt.Tare + Wet Specimen (gm) | 261.20 | Wgt.Tare + Wet Specimen (gm) | NA |
| Wgt.Tare + Dry Specimen (gm) | 253.03 | Wgt.Tare + Dry Specimen (gm) | NA |
| Weight of Tare (gm) | 170.83 | Weight of Tare (gm) | NA |
| Weight of Water (gm) | 8.17 | Weight of Water (gm) | NA |
| Weight of Dry Soil (gm) | 82.20 | Weight of Dry Soil (gm) | NA |
| **Moisture Content (%)** | **9.9** | **Moisture Content (%)** | **NA** |

| | | | |
|---|---|---|---|
| Wet Weight -3/4" Sample (gm) | NA | Weight of the Dry Specimen (gm) | 82.20 |
| Dry Weight - 3/4" Sample (gm) | 54.0 | Weight of minus #200 material (gm) | 28.17 |
| Wet Weight +3/4" Sample (gm) | NA | Weight of plus #200 material (gm) | 54.03 |
| 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 | 0.0 | 0.0 | 100.0 | **100.0** |
| 6" | 150 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3" | 75 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 2" | 50 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1 1/2" | 37.5 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1" | 25.0 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 3/4" | 19.0 | 0.00 | 0.0 | 0.0 | 100.0 | **100.0** |
| 1/2" | 12.50 | 3.69 | 4.5 | 4.5 | 95.5 | **95.5** |
| 3/8" | 9.50 | 2.18 | 2.7 | 7.1 | 92.9 | **92.9** |
| #4 | 4.75 | 4.22 | 5.1 | 12.3 | 87.7 | **87.7** |
| #10 | 2.00 | 5.75 | 7.0 | 19.3 | 80.7 | **80.7** |
| #20 | 0.850 | 12.55 | 15.3 | 34.5 | 65.5 | **65.5** |
| #40 | 0.425 | 9.23 | 11.2 | 45.8 | 54.2 | **54.2** |
| #60 | 0.250 | 6.34 | 7.7 | 53.5 | 46.5 | **46.5** |
| #140 | 0.106 | 7.44 | 9.1 | 62.5 | 37.5 | **37.5** |
| #200 | 0.075 | 2.63 | 3.2 | 65.7 | 34.3 | **34.3** |
| Pan | - | 28.17 | 34.3 | 100.0 | - | - |

Tested By KMR Date 2/21/2007 Checked By GAM Date 3-2-07



DCN: CT-S3C DATE 6-25-98 REVISION: 2

Z:\2007 PROJECTS\2007-543 CDM\[2007-538-01-09 SIEVE.XLS]Sheet1

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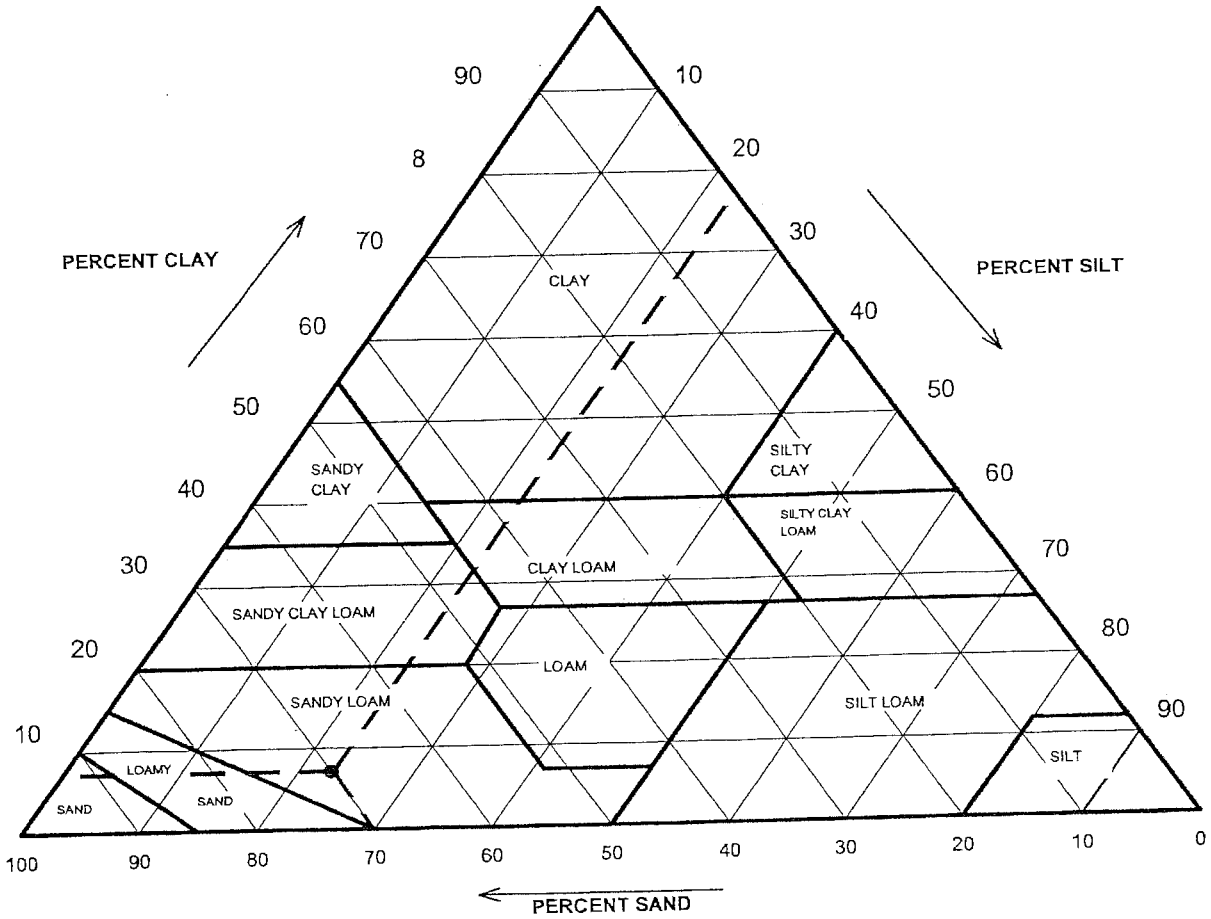
# USDA CLASSIFICATION CHART

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 6 |
| Project No. | 2007-538-01 | Sample No. | P-33 |
| Lab ID | 2007-538-01-03 | Soil Color | TAN |




| Particle Size (mm) | Percent Finer | USDA SUMMARY | Actual Percentage | Corrected % of Minus 2.0 mm material for USDA Classificat. |
|---|---|---|---|---|
| | | *Gravel* | 10.17 | **0.00** |
| 2 | 89.83 | *Sand* | 62.86 | **69.98** |
| 0.05 | 26.97 | *Silt* | 20.52 | **22.84** |
| 0.002 | 6.45 | *Clay* | 6.45 | **7.18** |

**USDA Classification:** ***SANDY LOAM***



DCN: CT-53P DATE:02/15/05 REVISION:8

Z:\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-03 SIEVE HYDRO.xls]Sheet1

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# HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 6 |
| Project No. | 2007-538-01 | Sample No. | P-33 |
| Lab ID | 2007-538-01-03 | Soil Color | **TAN** |

| Elapsed Time (min) | | R Measured | Temp. (°C) | Composite Correction | R Corrected | N (%) | K Factor | Diameter (mm) | N' (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | 30.0 | 30.0 | 20.4 | 4.84 | 25.2 | 26.1 | 0.01338 | 0.0319 | **23.5** |
| 5 | | 26.0 | 20.4 | 4.84 | 21.2 | 22.0 | 0.01338 | 0.0208 | **19.7** |
| 15 | | 21.0 | 20.5 | 4.81 | 16.2 | 16.8 | 0.01336 | 0.0124 | **15.1** |
| 30 | | 18.0 | 20.5 | 4.81 | 13.2 | 13.7 | 0.01336 | 0.0089 | **12.3** |
| 60 | | 16.0 | 20.8 | 4.72 | 11.3 | 11.7 | 0.01332 | 0.0064 | **10.5** |
| 250 | | 12.0 | 22.5 | 4.23 | 7.8 | 8.1 | 0.01305 | 0.0031 | **7.2** |
| 1440 | | 11.0 | 20.4 | 4.84 | 6.2 | 6.4 | 0.01338 | 0.0013 | **5.7** |

| Soil Specimen Data | | Other Corrections | |
|---|---|---|---|
| Tare + Dry Material (gm) | 95.40 | a - Factor | 0.99 |
| Weight of Tare (gm) | 0 | | |
| Weight of Deflocculant (gm) | 5.0 | Percent Finer than # 10 | 89.83 |
| Weight of Dry Material (gm) | 95.40 | | |
| | | Specific Gravity | 2.7 Assumed |

***Note:***

Tested By KMR Date 3/1/07 Checked By GEM Date 3-2-07



DCN: CT-S3P DATE:02/15/05 REVISION:8

Z:\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-03 SIEVE HYDRO.xls]Sheet1

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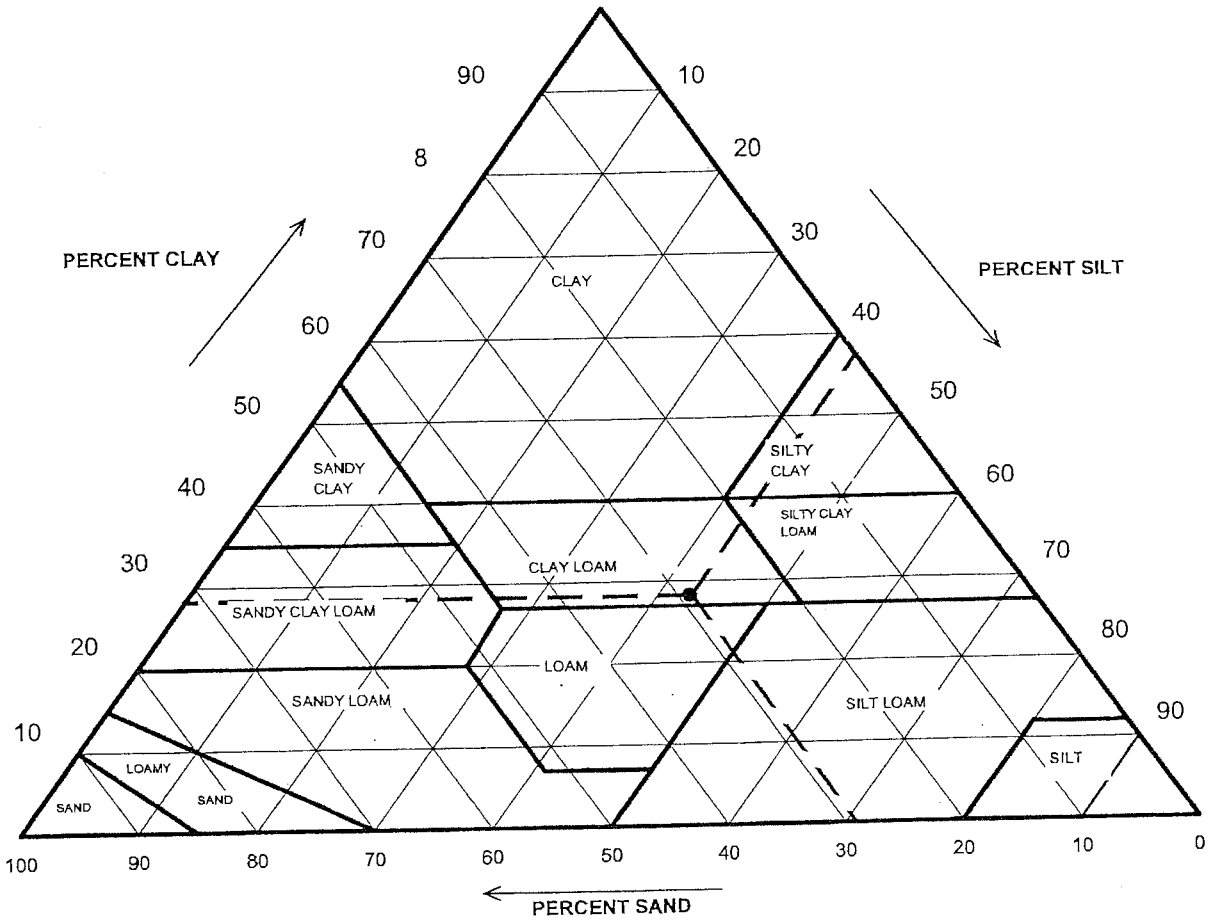
# USDA CLASSIFICATION CHART

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 10 |
| Project No. | 2007-538-01 | Sample No. | P-34 |
| Lab ID | 2007-538-01-04 | Soil Color | TAN |




| Particle Size (mm) | Percent Finer | USDA SUMMARY | Actual Percentage | Corrected % of Minus 2.0 mm material for USDA Classificat. |
|---|---|---|---|---|
| | | *Gravel* | 2.28 | **0.00** |
| 2 | 97.72 | *Sand* | 28.31 | **28.97** |
| 0.05 | 69.42 | *Silt* | 41.81 | **42.78** |
| 0.002 | 27.61 | *Clay* | 27.61 | **28.25** |

**USDA Classification:** ***CLAY LOAM***



DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-04 SIEVE HYDRO.xls]Sheet1

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# HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 10 |
| Project No. | 2007-538-01 | Sample No. | P-34 |
| Lab ID | 2007-538-01-04 | Soil Color | **TAN** |

| Elapsed Time (min) | | R Measured | Temp. (°C) | Composite Correction | R Corrected | N (%) | K Factor | Diameter (mm) | N' (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | 36.0 | 36.0 | 20.6 | 4.78 | 31.2 | 65.0 | 0.01335 | 0.0304 | **63.6** |
| 5 | | 33.0 | 20.6 | 4.78 | 28.2 | 58.8 | 0.01335 | 0.0197 | **57.5** |
| 15 | | 28.0 | 20.6 | 4.78 | 23.2 | 48.4 | 0.01335 | 0.0118 | **47.3** |
| 30 | | 26.0 | 20.7 | 4.75 | 21.2 | 44.3 | 0.01333 | 0.0084 | **43.3** |
| 60 | | 23.0 | 20.9 | 4.70 | 18.3 | 38.1 | 0.01330 | 0.0061 | **37.3** |
| 250 | | 19.0 | 22.6 | 4.20 | 14.8 | 30.8 | 0.01303 | 0.0030 | **30.1** |
| 1440 | | 17.0 | 20.6 | 4.78 | 12.2 | 25.5 | 0.01335 | 0.0013 | **24.9** |

| Soil Specimen Data | | Other Corrections | |
|---|---|---|---|
| Tare + Dry Material (gm) | 47.51 | a - Factor | 0.99 |
| Weight of Tare (gm) | 0 | | |
| Weight of Deflocculant (gm) | 5.0 | Percent Finer than # 10 | 97.72 |
| Weight of Dry Material (gm) | 47.51 | | |
| | | Specific Gravity | 2.7 Assumed |

***Note:***

Tested By KMR Date 3/1/2007 Checked By GM Date 3-2-07



DCN: CT-S3P DATE:02/15/05 REVISION:8 *\\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-04 SIEVE HYDRO.xls]Sheet1*

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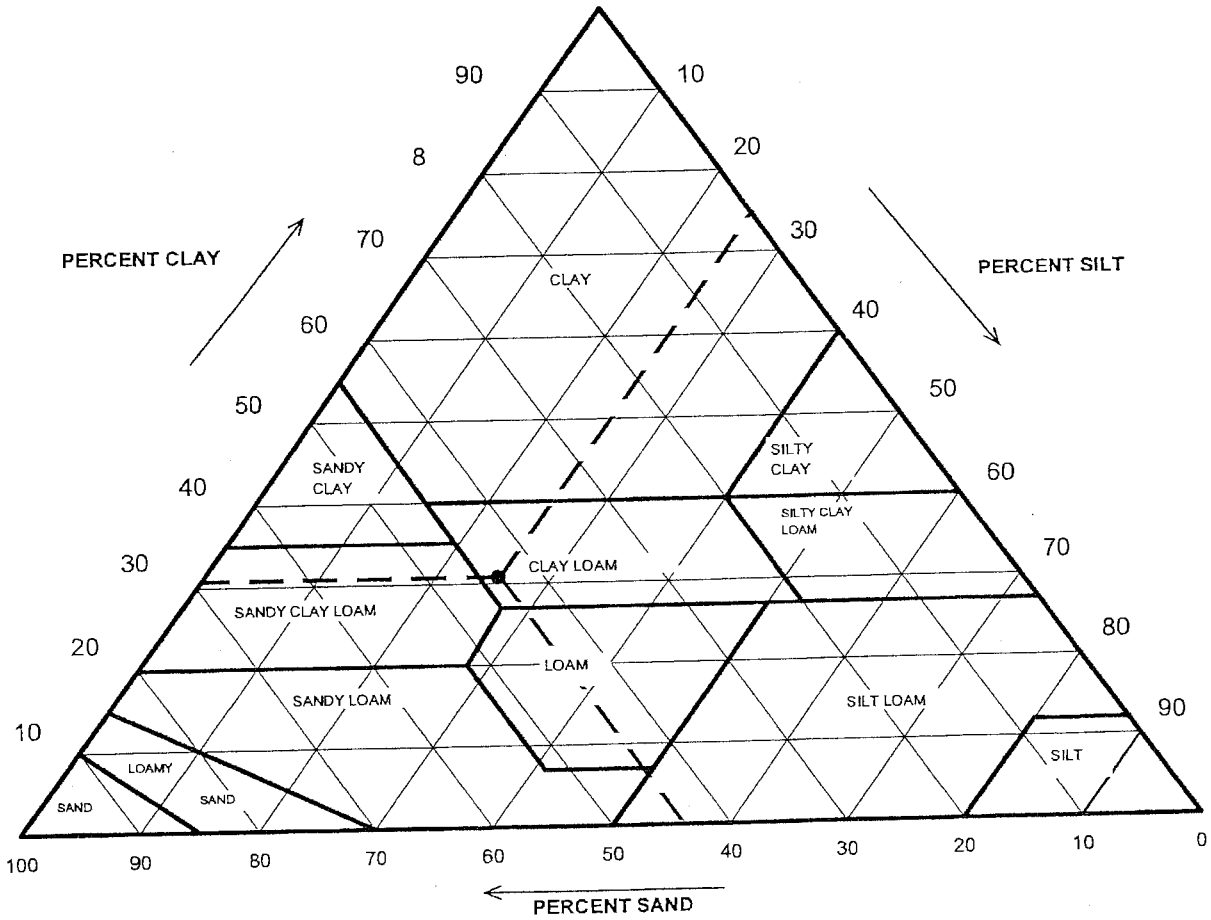
# USDA CLASSIFICATION CHART

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 2-4 |
| Project No. | 2007-538-01 | Sample No. | P-35 |
| Lab ID | 2007-538-01-05 | Soil Color | TAN |




| Particle Size (mm) | Percent Finer | USDA SUMMARY | Actual Percentage | Corrected % of Minus 2.0 mm material for USDA Classificat. |
|---|---|---|---|---|
| | | *Gravel* | 8.79 | 0.00 |
| 2 | 91.21 | *Sand* | 39.96 | 43.81 |
| 0.05 | 51.25 | *Silt* | 23.15 | 25.38 |
| 0.002 | 28.09 | *Clay* | 28.09 | 30.80 |

**USDA Classification:** ***CLAY LOAM***



DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-05 SIEVE HYDRO.xls]Sheet1

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# HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 2-4 |
| Project No. | 2007-538-01 | Sample No. | P-35 |
| Lab ID | 2007-538-01-05 | Soil Color | **TAN** |

| Elapsed Time (min) | | R Measured | Temp. (°C) | Composite Correction | R Corrected | N (%) | K Factor | Diameter (mm) | N' (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | 56.0 | 56.0 | 20.0 | 4.96 | 51.0 | 51.2 | 0.01321 | 0.0249 | **46.7** |
| 5 | | 53.0 | 20.0 | 4.96 | 48.0 | 48.1 | 0.01321 | 0.0163 | **43.9** |
| 15 | | 47.0 | 20.2 | 4.90 | 42.1 | 42.2 | 0.01318 | 0.0100 | **38.5** |
| 30 | | 43.0 | 20.4 | 4.84 | 38.2 | 38.2 | 0.01315 | 0.0073 | **34.9** |
| 60 | | 40.0 | 20.5 | 4.81 | 35.2 | 35.3 | 0.01313 | 0.0053 | **32.2** |
| 250 | | 36.0 | 22.5 | 4.23 | 31.8 | 31.8 | 0.01283 | 0.0026 | **29.0** |
| 1440 | | 32.0 | 22.0 | 4.37 | 27.6 | 27.7 | 0.01290 | 0.0011 | **25.3** |

| Soil Specimen Data | | Other Corrections | |
|---|---|---|---|
| Tare + Dry Material (gm) | 97.58 | a - Factor | 0.978 |
| Weight of Tare (gm) | 0 | | |
| Weight of Deflocculant (gm) | 5.0 | Percent Finer than # 10 | 91.21 |
| Weight of Dry Material (gm) | 97.58 | | |
| | | Specific Gravity | 2.76 Measured |

***Note:***

Tested By JBD Date 3/5/2007 Checked By GOM Date 3-12-07



DCN: CT-S3P DATE:02/15/05 REVISION:6 \\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-05 SIEVE HYDRO.xls]Sheet1

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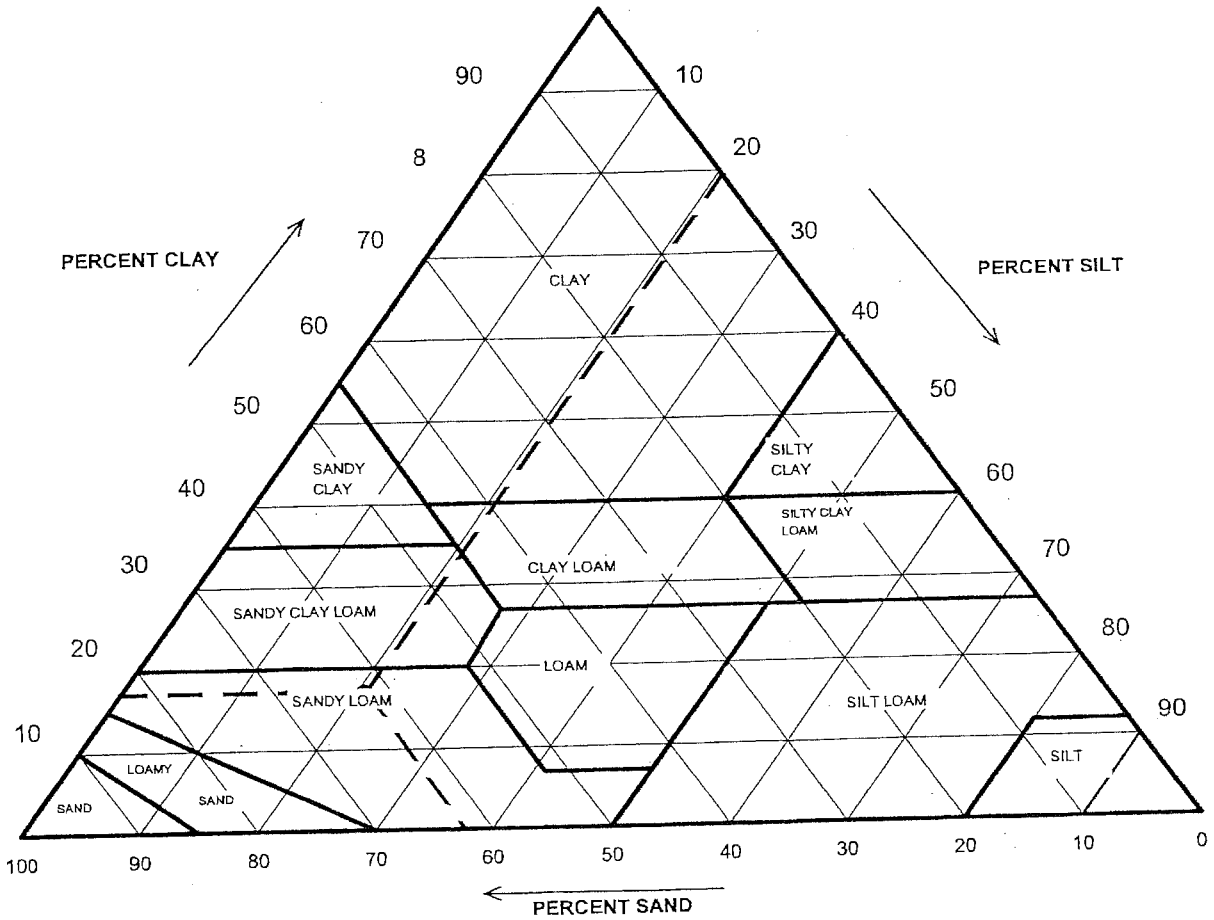
# USDA CLASSIFICATION CHART

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 2-4 |
| Project No. | 2007-538-01 | Sample No. | P-37 |
| Lab ID | 2007-538-01-07 | Soil Color | ORANGE BROWN |




| Particle Size (mm) | Percent Finer | USDA SUMMARY | Actual Percentage | Corrected % of Minus 2.0 mm material for USDA Classificat. |
|---|---|---|---|---|
| | | *Gravel* | 6.62 | **0.00** |
| 2 | 93.38 | *Sand* | 58.13 | **62.26** |
| 0.05 | 35.24 | *Silt* | 19.28 | **20.65** |
| 0.002 | 15.96 | *Clay* | 15.96 | **17.09** |

**USDA Classification:** ***SANDY LOAM***



DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Lab1\c\2007 PROJECTS\2007-538 JOYCE\[2007-538-01-07 SIEVE HYDRO.xls]Sheet1

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# HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING, INC. | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 2-4 |
| Project No. | 2007-538-01 | Sample No. | P-37 |
| Lab ID | 2007-538-01-07 | Soil Color | **ORANGE BROWN** |

| Elapsed Time (min) | | R Measured | Temp. (°C) | Composite Correction | R Corrected | N (%) | K Factor | Diameter (mm) | N' (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | 35.0 | 35.0 | 22.0 | 4.37 | 30.6 | 35.0 | 0.01309 | 0.0301 | **32.7** |
| 5 | | 32.0 | 22.0 | 4.37 | 27.6 | 31.6 | 0.01309 | 0.0195 | **29.5** |
| 15 | | 28.0 | 22.0 | 4.37 | 23.6 | 27.0 | 0.01309 | 0.0116 | **25.2** |
| 30 | | 26.0 | 22.0 | 4.37 | 21.6 | 24.7 | 0.01309 | 0.0083 | **23.1** |
| 60 | | 23.0 | 22.1 | 4.35 | 18.7 | 21.3 | 0.01307 | 0.0060 | **19.9** |
| 250 | | 20.0 | 22.2 | 4.32 | 15.7 | 17.9 | 0.01306 | 0.0030 | **16.8** |
| 1440 | | 19.0 | 20.2 | 4.90 | 14.1 | 16.1 | 0.01337 | 0.0013 | **15.1** |

| Soil Specimen Data | | Other Corrections | |
|---|---|---|---|
| Tare + Dry Material (gm) | 86.33 | a - Factor | 0.988 |
| Weight of Tare (gm) | 0 | | |
| Weight of Deflocculant (gm) | 5.0 | Percent Finer than # 10 | 93.38 |
| Weight of Dry Material (gm) | 86.33 | | |
| | | Specific Gravity | 2.71 Measured |

***Note:***

Tested By JBD Date 3/7/2007 Checked By GEM Date 3-12-07



DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Lab1\c\2007 PROJECTS\2007-538 JOYCE\2007-538-01-07 SIEVE HYDRO.xls]Sheet1

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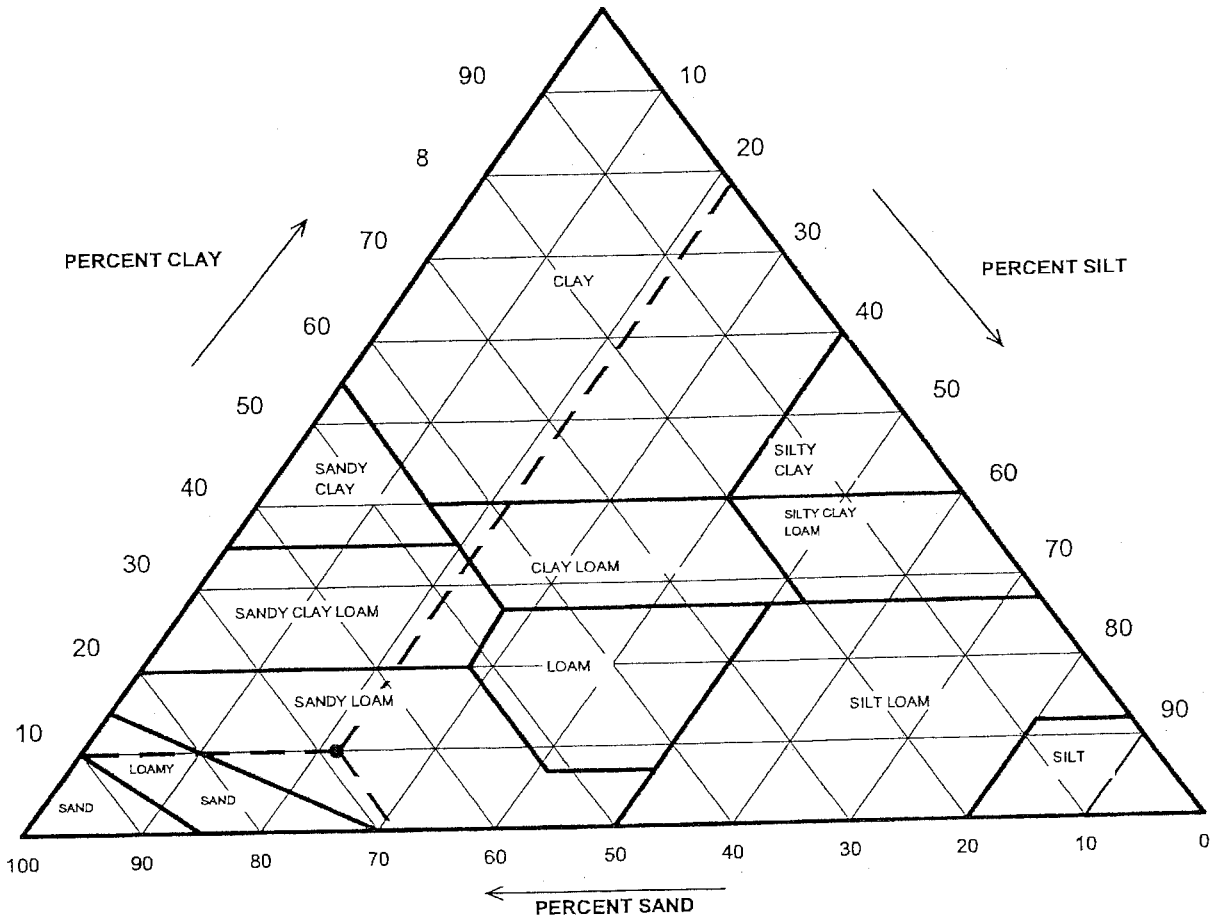
# USDA CLASSIFICATION CHART

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 10 |
| Project No. | 2007-538-01 | Sample No. | P-38 |
| Lab ID | 2007-538-01-08 | Soil Color | BROWN |




| Particle Size (mm) | Percent Finer | USDA SUMMARY | Actual Percentage | Corrected % of Minus 2.0 mm material for USDA Classificat. |
|---|---|---|---|---|
| | | *Gravel* | 24.03 | **0.00** |
| 2 | 75.97 | *Sand* | 52.01 | **68.45** |
| 0.05 | 23.97 | *Silt* | 16.43 | **21.63** |
| 0.002 | 7.53 | *Clay* | 7.53 | **9.91** |

**USDA Classification:** ***SANDY LOAM***



DCN: CT-S3P DATE:02/15/05 REVISION:8

Z:\2007 PROJECTS\2007-543 CDM\[2007-543-01-11 Proctor.XLS]Sheet1

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# HYDROMETER ANALYSIS

ASTM D 422-63 (SOP-S3)

| | | | |
|---|---|---|---|
| Client | JOYCE ENGINEERING | Boring No. | NA |
| Client Reference | COBLES SANDROCK LF | Depth (ft) | 10 |
| Project No. | 2007-538-01 | Sample No. | P-38 |
| Lab ID | 2007-538-01-08 | Soil Color | **BROWN** |

| Elapsed Time (min) | | R Measured | Temp. (°C) | Composite Correction | R Corrected | N (%) | K Factor | Diameter (mm) | N' (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | 32.0 | 32.0 | 20.2 | 4.90 | 27.1 | 27.0 | 0.01341 | 0.0315 | **20.5** |
| 5 | | 28.0 | 20.2 | 4.90 | 23.1 | 23.0 | 0.01341 | 0.0205 | **17.5** |
| 15 | | 23.0 | 20.2 | 4.90 | 18.1 | 18.1 | 0.01341 | 0.0123 | **13.7** |
| 30 | | 21.0 | 20.3 | 4.87 | 16.1 | 16.1 | 0.01340 | 0.0088 | **12.2** |
| 60 | | 18.0 | 20.6 | 4.78 | 13.2 | 13.2 | 0.01335 | 0.0063 | **10.0** |
| 250 | | 15.0 | 22.4 | 4.26 | 10.7 | 10.7 | 0.01307 | 0.0031 | **8.1** |
| 1440 | | 14.0 | 20.4 | 4.84 | 9.2 | 9.1 | 0.01338 | 0.0013 | **6.9** |

| Soil Specimen Data | | Other Corrections | |
|---|---|---|---|
| Tare + Dry Material (gm) | 99.22 | a - Factor | 0.99 |
| Weight of Tare (gm) | 0 | | |
| Weight of Deflocculant (gm) | 5.0 | Percent Finer than # 10 | 75.97 |
| Weight of Dry Material (gm) | 99.22 | | |
| | | Specific Gravity | 2.7 Assumed |

***Note:***

Tested By KMR Date 2/27/2007 Checked By GBM Date 3-2-07



DCN: CT-S3P DATE:02/15/05 REVISION:8

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# APPENDIX DH-10

## Analytical Requirements

# North Carolina Appendix I and II Constituents

| NC App. I & II - Total Metals | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number | NC App. # | ANALYTE | CLASS | CAS RN | SW-846 ANALYTICAL | NC SWSL | NC 2L | EPA MCL | GWP STD. | Notes |
| 1 | App. I | Antimony | metal | Total | 7041 | 6 | - | 6 | 1.4 | (RCRA METAL) |
| 2 | App. I | Arsenic | metal | Total | 7060A | 10 | 50 | 10 | - | (RCRA METAL) |
| 3 | App. I | Barium | metal | Total | 6010B | 100 | 2000 | 2000 | - | |
| 4 | App. I | Beryllium | metal | Total | 6010B | 1 | - | 4 | 4 | (RCRA METAL) |
| 5 | App. I | Cadmium | metal | Total | 7131 | 1 | 1.75 | 5 | - | |
| 6 | App. I | Chromium | metal | Total | 7191 | 10 | 50 | 100 | - | (RCRA METAL) |
| 7 | App. I | Cobalt | metal | Total | 7201 | 10 | - | - | 2 | |
| 8 | App. I | Copper | metal | Total | 7211 | 10 | 1000 | 1300 | - | EPA MCL is an action level. |
| 9 | App. I | Lead | metal | Total | 7421 | 10 | 15 | 15 | - | EPA MCL is an action level. (RCRA METAL) |
| 10 | App. I | Nickel | metal | Total | 6010B | 50 | 100 | - | - | |
| 11 | App. I | Selenium | metal | Total | 7740 | 10 | 50 | 50 | - | (RCRA METAL) |
| 12 | App. I | Silver | metal | Total | 7761 | 10 | 17.5 | 100 | - | EPA MCL is a secondary standard. (RCRA METAL) |
| 13 | App. I | Thallium | metal | Total | 7841 | 5.5 | - | 2 | 0.28 | |
| 14 | App. I | Vanadium | metal | Total | 7911 | 25 | - | - | 25 | |
| 15 | App. I | Zinc | metal | Total | 7951 | 10 | 1050 | 5000 | - | EPA MCL is a secondary standard. |
| 16 | App. II | Mercury | metal | Total | 7470 | 0.2 | 1.05 | 2 | - | (RCRA METAL) |
| 17 | App. II | Tin | metal | Total | 7870 | 100 | - | - | - | |

| NC App. II - Cyanide/ Sulfide | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number | NC App. # | ANALYTE | CLASS | CAS RN | SW-846 ANALYTICAL | NC SWSL | NC 2L | EPA MCL | GWP STD. | Notes |
| 1 | App. II | Cyanide | inorganic | 57-12-5 | 9012A | 10 | 70 | 200 | - | |
| 2 | App. II | Sulfide | inorganic | 18496-25-8 | 9030B | 1000 | - | - | - | |

| NC App. I & II - Method 8260 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number | NC App. # | ANALYTE | CLASS | CAS RN | SW-846 ANALYTICAL | NC SWSL | NC 2L | EPA MCL | GWP STD. | Notes |
| 1 | App. I | Acetone | volatile | 67-64-1 | 8260B | 100 | 700 | - | - | |
| 2 | App. I | Acrylonitrile | volatile | 107-13-1 | 8260B | 200 | - | - | - | |
| 3 | App. I | Benzene | volatile | 71-43-2 | 8260B | 1 | 1 | 5 | - | |
| 4 | App. I | Bromochloromethane | volatile | 74-97-5 | 8260B | 3 | - | - | 0.6 | |
| 5 | App. I | Bromodichloromethane | volatile | 75-27-4 | 8260B | 1 | 0.56 | 80 | 0.56 | *MCL for total trihalomethanes |
| 6 | App. I | Bromoform | volatile | 75-25-2 | 8260B | 3 | 4.43 | 80 | - | *MCL for total trihalomethanes |
| 7 | App. I | Carbon disulfide | volatile | 75-15-0 | 8260B | 100 | 700 | - | 700 | |
| 8 | App. I | Carbon tetrachloride | volatile | 56-23-5 | 8260B | 1 | 0.269 | 5 | - | |
| 9 | App. I | Chlorobenzene | volatile | 108-90-7 | 8260B | 3 | 50 | 100 | - | |
| 10 | App. I | Chloroethane | volatile | 75-00-3 | 8260B | 10 | 2800 | - | 2800 | |
| 11 | App. I | Chloroform | volatile | 67-66-3 | 8260B | 5 | 70 | 80 | - | *MCL for total trihalomethanes |
| 12 | App. I | Dibromochloromethane | volatile | 124-48-1 | 8260B | 1 | 0.41 | 80 | 0.41 | *MCL for total trihalomethanes |
| 13 | App. I | 1,2-Dibromo-3-chloropropane (DBCP) | volatile | 96-12-8 | 8260B | 1 | 0.025 | 0.2 | - | |
| 14 | App. I | 1,2-Dibromoethane (EDB) | volatile | 106-93-4 | 8260B | 1 | 0.004 | 0.05 | - | |
| 15 | App. I | o-Dichlorobenzene / 1,2-Dichlorobenzene | volatile | 95-50-1 | 8260B | 5 | 24 | 600 | - | |
| 16 | App. I | p-Dichlorobenzene / 1,4-Dichlorobenzene | volatile | 106-46-7 | 8260B | 1 | 1.4 | 75 | - | |
| 17 | App. I | trans-1,4-Dichloro-2-butene | volatile | 110-57-6 | 8260B | 100 | - | - | - | |
| 18 | App. I | 1,1-Dichloroethane | volatile | 75-34-3 | 8260B | 5 | 70 | - | - | |
| 19 | App. I | 1,2-Dichloroethane | volatile | 107-06-2 | 8260B | 1 | 0.38 | 5 | - | |
| 20 | App. I | 1,1-Dichloroethylene | volatile | 75-35-4 | 8260B | 5 | 7 | 7 | - | |
| 21 | App. I | cis-1,2-Dichloroethylene | volatile | 156-59-2 | 8260B | 5 | - | 70 | - | |
| 22 | App. I | trans-1,2-Dichloroethylene | volatile | 156-60-5 | 8260B | 5 | - | 100 | - | |
| 23 | App. I | 1,2-Dichloropropane | volatile | 78-87-5 | 8260B | 1 | 0.51 | 5 | - | |
| 24 | App. I | cis-1,3-Dichloropropene | volatile | 10061-01-5 | 8260B | 1 | 0.19 | - | 0.2 | |
| 25 | App. I | trans-1,3-Dichloropropene | volatile | 10061-02-6 | 8260B | 1 | 0.19 | - | 0.2 | |
| 26 | App. I | Ethylbenzene | volatile | 100-41-4 | 8260B | 1 | 550 | 700 | - | |
| 27 | App. I | 2-Hexanone / Methyl butyl ketone (MBK) | volatile | 591-78-6 | 8260B | 50 | 280 | - | 280 | |

# North Carolina Appendix I and II Constituents

| Number | NC App. # | ANALYTE | CLASS | CAS RN | SW-846 ANALYTICAL | NC SWSL | NC 2L | EPA MCL | GWP STD. | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| 28 | App. I | **Methyl bromide / Bromomethane** | **volatile** | **74-83-9** | **8260B** | **10** | **-** | **-** | **-** | |
| 29 | App. I | **Methyl chloride / Chloromethane** | **volatile** | **74-87-3** | **8260B** | **1** | **2.6** | **-** | **2.6** | |
| 30 | App. I | **Methylene bromide / Dibromomethane** | **volatile** | **74-95-3** | **8260B** | **10** | **-** | **-** | **-** | |
| 31 | App. I | **Methylene chloride / Dichloromethane** | **volatile** | **75-09-2** | **8260B** | **1** | **4.6** | **5** | **-** | |
| 32 | App. I | **Methyl ethyl ketone / 2-Butanone (MEK)** | **volatile** | **78-93-3** | **8260B** | **100** | **4200** | **-** | **-** | |
| 33 | App. I | **Methyl iodide / Iodomethane** | **volatile** | **74-88-4** | **8260B** | **10** | **-** | **-** | **-** | |
| 34 | App. I | **4-Methyl-2-pentanone / Methyl isobutyl ketone** | **volatile** | **108-10-1** | **8260B** | **100** | **-** | **-** | **560** | |
| 35 | App. I | **Styrene** | **volatile** | **100-42-5** | **8260B** | **1** | **100** | **100** | **-** | |
| 36 | App. I | **1,1,1,2-Tetrachloroethane** | **volatile** | **630-20-6** | **8260B** | **5** | **-** | **-** | **1.3** | |
| 37 | App. I | **1,1,2,2-Tetrachloroethane** | **volatile** | **79-34-5** | **8260B** | **1** | **0.17** | **-** | **0.17** | |
| 38 | App. I | **Tetrachloroethylene (PCE)** | **volatile** | **127-18-4** | **8260B** | **1** | **0.7** | **5** | **-** | |
| 39 | App. I | **Toluene** | **volatile** | **108-88-3** | **8260B** | **1** | **1000** | **1000** | **-** | |
| 40 | App. I | **1,1,1-Trichloroethane** | **volatile** | **71-55-6** | **8260B** | **1** | **200** | **200** | **-** | |
| 41 | App. I | **1,1,2-Trichloroethane** | **volatile** | **79-00-5** | **8260B** | **5** | **-** | **5** | **0.6** | |
| 42 | App. I | **Trichloroethylene** | **volatile** | **79-01-6** | **8260B** | **1** | **2.8** | **5** | **-** | |
| 43 | App. I | **Trichlorofluoromethane (CFC-11)** | **volatile** | **75-69-4** | **8260B** | **1** | **2100** | **-** | **-** | |
| 44 | App. I | **1,2,3-Trichloropropane** | **volatile** | **96-18-4** | **8260B** | **1** | **0.005** | **-** | **0.018** | |
| 45 | App. I | **Vinyl acetate** | **volatile** | **108-05-4** | **8260B** | **50** | **-** | **-** | **88** | |
| 46 | App. I | **Vinyl chloride** | **volatile** | **75-01-4** | **8260B** | **1** | **0.015** | **2** | **-** | |
| 47 | App. I | **Xylenes (total)** | **volatile** | **see note** | **8260B** | **4** | **530** | **10000** | **-** | Includes o-xylene, p-xylene, and unspecified xylenes [dimethyl benzenes (CAS RN 1330-20-7]. |
| 48 | App. II | Acetonitrile (methyl cyanide) | volatile | 75-05-8 | 8260B | 55 | - | - | 42 | |
| 49 | App. II | Acrolein | volatile | 107-02-8 | 8260B | 53 | - | - | 3.5 | |
| 50 | App. II | Allyl chloride (3-chloroprene) | volatile | 107-05-1 | 8260B | 10 | - | - | - | |
| 51 | App. II | Chloroprene | volatile | 126-99-8 | 8260B | 20 | - | - | - | |
| 52 | App. II | m-Dichlorobenzene / 1,3-Dichlorobenzene | volatile | 541-73-1 | 8260B | 5 | - | - | - | |
| 53 | App. II | Dichlorodifluoromethane | volatile | 75-71-8 | 8260B | 5 | 1400 | - | - | |
| 54 | App. II | 1,3-Dichloropropane | volatile | 142-28-9 | 8260B | 1 | - | - | - | |
| 55 | App. II | 2,2-Dichloropropane | volatile | 594-20-7 | 8260B | 15 | - | - | - | |
| 56 | App. II | 1,1-Dichloropropene | volatile | 563-58-6 | 8260B | 5 | - | - | - | |
| 57 | App. II | Isobutyl alcohol | volatile | 78-83-1 | 8260B | 100 | - | - | - | |
| 58 | App. II | Methacrylonitrile | volatile | 126-98-7 | 8260B | 100 | - | - | - | |
| 59 | App. II | Methyl methacrylate | volatile | 80-62-6 | 8260B | 30 | - | - | - | |
| 60 | App. II | Propionitrile | volatile | 107-12-0 | 8260B | 150 | - | - | - | |
| 61 | App. II | 1,2,4-Trichlorobenzene | volatile | 120-82-1 | 8260B | 10 | 70 | 70 | 70 | |
| 62 | App. II | Naphthalene | volatile | 91-20-3 | 8260B or 8270C | 10 | 21 | - | - | |
| 63 | App. II | Hexachlorobutadiene | semi-volatile | 87-68-3 | 8270C or 8260B | 10 | - | - | 0.44 | |
| 64 | App. II | Ethyl methacrylate | semi-volatile | 97-63-2 | 8270C or 8260B | 10 | - | - | - | |

| NC App. II - Method 8270 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number | NC App. # | ANALYTE | CLASS | CAS RN | SW-846 ANALYTICAL | NC SWSL | NC 2L | EPA MCL | GWP STD. | Notes |
| 1 | App. II | Acenaphthene | semi-volatile | 83-32-9 | 8270C | 10 | 80 | - | 80 | |
| 2 | App. II | Acenaphthylene | semi-volatile | 208-96-8 | 8270C | 10 | 210 | - | 210 | |
| 3 | App. II | Acetophenone | semi-volatile | 98-86-2 | 8270C | 10 | - | - | - | |
| 4 | App. II | 2-Acetylaminofluorene | semi-volatile | 53-96-3 | 8270C | 20 | - | - | - | |
| 5 | App. II | 4-Aminobiphenyl | semi-volatile | 92-67-1 | 8270C | 15 | - | - | - | |
| 6 | App. II | Anthracene | PAH | 120-12-7 | 8270C | 10 | 2100 | - | 2100 | |

# North Carolina Appendix I and II Constituents

| Number | NC App. # | ANALYTE | CLASS | CAS RN | SW-846 ANALYTICAL | NC SWSL | NC 2L | EPA MCL | GWP STD. | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | App. II | Benz[a]anthracene; Benzanthracene | PAH | 56-55-3 | 8270C | 10 | 0.048 | - | 0.048 | |
| 8 | App. II | Benzo[b]fluoranthene | PAH | 205-99-2 | 8270C | 10 | 0.048 | - | 0.048 | |
| 9 | App. II | Benzo[k]fluoranthene | PAH | 207-08-9 | 8270C | 10 | 0.48 | - | 0.48 | |
| 10 | App. II | Benzo[ghi]perylene | PAH | 191-24-2 | 8270C | 10 | 210 | - | 210 | |
| 11 | App. II | Benzo[a]pyrene | PAH | 50-32-8 | 8270C | 10 | 0.0048 | 0.2 | 0.0048 | |
| 12 | App. II | Benzyl alchohol | semi-volatile | 100-51-6 | 8270C | 20 | - | - | 3500 | |
| 13 | App. II | Bis(2-chloroethoxy)methane | semi-volatile | 111-91-1 | 8270C | 10 | - | - | - | |
| 14 | App. II | Bis(2-chloroethyl)ether | semi-volatile | 111-44-4 | 8270C | 10 | 0.031 | - | 0.031 | |
| 15 | App. II | Bis(2-chloro-1-methylethyl)ether | semi-volatile | 108-60-1 | 8270C | 10 | - | - | - | Bis (2-chloroisopropyl) ether |
| 16 | App. II | Bis(2-ethylhexyl)phthalate | semi-volatile | 117-81-7 | 8270C | 15 | - | 6 | - | |
| 17 | App. II | 4-Bromophenyl phenyl ether | semi-volatile | 101-55-3 | 8270C | 10 | - | - | - | |
| 18 | App. II | Butyl benzyl phthalate | semi-volatile | 85-68-7 | 8270C | 10 | 100 | - | - | |
| 19 | App. II | p-Chloroaniline (4-Chloroaniline) | semi-volatile | 106-47-8 | 8270C | 20 | - | - | - | |
| 20 | App. II | Chlorobenzilate (4-chloro-3-methylphenol) | semi-volatile | 510-15-6 | 8270C | 10 | - | - | - | |
| 21 | App. II | p-Chloro-m-cresol | semi-volatile | 59-50-7 | 8270C | 20 | - | - | - | |
| 22 | App. II | 2-Chloronaphthalene | semi-volatile | 91-58-7 | 8270C | 10 | - | - | - | |
| 23 | App. II | 2-Chlorophenol | semi-volatile | 95-57-8 | 8270C | 10 | 0.36 | - | - | |
| 24 | App. II | 4-Chlorophenyl phenyl ether | semi-volatile | 7005-72-3 | 8270C | 10 | - | - | - | |
| 25 | App. II | Chrysene | PAH | 218-01-9 | 8270C | 10 | 4.79 | - | 5 | |
| 26 | App. II | m-Cresol | semi-volatile | 108-39-4 | 8270C | 10 | 35 | - | 35 | |
| 27 | App. II | o-Cresol | semi-volatile | 95-48-7 | 8270C | 10 | - | - | 35 | |
| 28 | App. II | p-Cresol | semi-volatile | 106-44-5 | 8270C | 10 | 3.5 | - | 3.5 | |
| 29 | App. II | Diallate | semi-volatile | 2303-16-4 | 8270C | 10 | - | - | - | |
| 30 | App. II | Dibenz[a,h]anthracene | PAH | 53-70-3 | 8270C | 10 | 0.0047 | - | 0.0047 | |
| 31 | App. II | Dibenzofuran | semi-volatile | 132-64-9 | 8270C | 10 | 28 | - | 28 | |
| 32 | App. II | Di-n-butyl phthalate | semi-volatile | 84-74-2 | 8270C | 10 | 700 | - | - | |
| 33 | App. II | 3,3'-Dichlorobenzidine | semi-volatile | 91-94-1 | 8270C | 20 | - | - | - | |
| 34 | App. II | 2,4-Dichlorophenol | semi-volatile | 120-83-2 | 8270C | 10 | - | - | - | |
| 35 | App. II | 2,6-Dichlorophenol | semi-volatile | 87-65-0 | 8270C | 10 | - | - | - | |
| 36 | App. II | Diethyl phthalate | semi-volatile | 84-66-2 | 8270C | 10 | 5000 | - | - | |
| 37 | App. II | O,O-Diethyl O-2-pyrazinyl phosphorothioate | OP pesticide | 297-97-2 | 8270C | 20 | - | - | - | Thionazine |
| 38 | App. II | Dimethoate | OP pesticide | 60-51-5 | 8270C | 20 | - | - | - | |
| 39 | App. II | p-(Dimethylamino)azobenzene | semi-volatile | 60-11-7 | 8270C | 10 | - | - | - | |
| 40 | App. II | 7,12-Dimethylbenz[a]anthracene | semi-volatile | 57-97-6 | 8270C | 10 | - | - | - | |
| 41 | App. II | 3,3'-Dimethylbenzidine | semi-volatile | 119-93-7 | 8270C | 10 | - | - | - | |
| 42 | App. II | 2,4-Dimethylphenol (M-xylenol) | semi-volatile | 105-67-9 | 8270C | 10 | 140 | - | 140 | |
| 43 | App. II | Dimethyl phthalate | semi-volatile | 131-11-3 | 8270C | 10 | - | - | - | |
| 44 | App. II | m-Dinitrobenzene | semi-volatile | 99-65-0 | 8270C | 20 | - | - | - | |
| 45 | App. II | 4,6-Dinitro-o-cresol (2-methyl 4,6-dinitrolphenol | semi-volatile | 534-52-1 | 8270C | 50 | - | - | - | |
| 46 | App. II | 2,4-Dinitrophenol | semi-volatile | 51-28-5 | 8270C | 50 | - | - | - | |
| 47 | App. II | 2,4-Dinitrotoluene | semi-volatile | 121-14-2 | 8270C | 10 | - | - | | |
| 48 | App. II | 2,6-Dinitrotoluene | semi-volatile | 606-20-2 | 8270C | 10 | - | - | | |
| 49 | App. II | Di-n-octyl phthalate | semi-volatile | 117-84-0 | 8270C | 10 | 140 | - | 140 | |
| 50 | App. II | Diphenylamine | semi-volatile | 122-39-4 | 8270C | 10 | - | - | - | |
| 51 | App. II | Disulfoton | OP pesticide | 298-04-4 | 8270C | 10 | 0.28 | - | 0.28 | |
| 52 | App. II | Ethyl methanesulfonate | semi-volatile | 62-50-0 | 8270C | 20 | - | - | - | |
| 53 | App. II | Famphur | semi-volatile | 52-85-7 | 8270C | 20 | - | - | - | |
| 54 | App. II | Fluoranthene | PAH | 206-44-0 | 8270C | 10 | 280 | - | 280 | |
| 55 | App. II | Fluorene | PAH | 86-73-7 | 8270C | 10 | 280 | - | - | |
| 56 | App. II | Hexachlorobenzene | semi-volatile | 118-74-1 | 8270C | 10 | 0.02 | 1 | - | |
| 57 | App. II | Hexachlorocylopentadiene | semi-volatile | 77-47-4 | 8270C | 10 | - | 50 | 50 | |
| 58 | App. II | Hexachloroethane | semi-volatile | 67-72-1 | 8270C | 10 | - | - | - | |
| 59 | App. II | Hexachloropropene | semi-volatile | 1888-71-7 | 8270C | 10 | - | - | - | |
| 60 | App. II | Indeno[1,2,3-cd]pyrene | PAH | 193-39-5 | 8270C | 10 | 0.0479 | - | 0.047 | |

# North Carolina Appendix I and II Constituents

| Number | NC App. # | ANALYTE | CLASS | CAS RN | SW-846 ANALYTICAL | NC SWSL | NC 2L | EPA MCL | GWP STD. | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| 61 | App. II | Isodrin | semi-volatile | 465-73-6 | 8270C | 20 | - | - | - | |
| 62 | App. II | Isophorone | semi-volatile | 78-59-1 | 8270C | 10 | 36.8 | - | 36.8 | |
| 63 | App. II | Isosafrole | semi-volatile | 120-58-1 | 8270C | 10 | - | - | - | |
| 64 | App. II | Kepone | pesticide | 143-50-0 | 8270C | 20 | - | - | - | |
| 65 | App. II | Methapyrilene | semi-volatile | 91-80-5 | 8270C | 100 | - | - | - | |
| 66 | App. II | 3-Methylcholanthrene | semi-volatile | 56-49-5 | 8270C | 10 | - | - | - | |
| 67 | App. II | Methyl methanesulfonate | semi-volatile | 66-27-3 | 8270C | 10 | - | - | - | |
| 68 | App. II | 2-Methylnaphthalene | semi-volatile | 91-57-6 | 8270C | 10 | 14 | - | 28 | |
| 69 | App. II | Methyl parathion | semi-volatile | 298-00-0 | 8270C | 10 | - | - | - | |
| 70 | App. II | 1,4-Naphthoquinone | semi-volatile | 130-15-4 | 8270C | 10 | - | - | - | |
| 71 | App. II | 1-Naphthylamine | semi-volatile | 134-32-7 | 8270C | 10 | - | - | - | |
| 72 | App. II | 2-Naphthylamine | semi-volatile | 91-59-8 | 8270C | 10 | - | - | - | |
| 73 | App. II | o-Nitroaniline (2-Nitroaniline) | semi-volatile | 88-74-4 | 8270C | 50 | - | - | - | |
| 74 | App. II | m-Nitroaniline (3-Nitroaniline) | semi-volatile | 99-09-2 | 8270C | 50 | - | - | - | |
| 75 | App. II | p-Nitroaniline (4-Nitroaniline) | semi-volatile | 100-01-6 | 8270C | 20 | - | - | - | |
| 76 | App. II | Nitrobenzene | semi-volatile | 98-95-3 | 8270C | 10 | - | - | - | |
| 77 | App. II | 5-Nitro-o-toluidine | semi-volatile | 99-55-8 | 8270C | 10 | - | - | - | |
| 78 | App. II | o-Nitrophenol (2-Nitrophenol) | semi-volatile | 88-75-5 | 8270C | 10 | - | - | - | |
| 79 | App. II | p-Nitrophenol (4-Nitrophenol) | semi-volatile | 100-02-7 | 8270C | 50 | - | - | - | |
| 80 | App. II | N-Nitrosodiethylamine | semi-volatile | 55-18-5 | 8270C | 20 | - | - | - | |
| 81 | App. II | N-Nitrosodimethylamine | semi-volatile | 62-75-9 | 8270C | 10 | 0.0007 | - | 0.0007 | |
| 82 | App. II | N-Nitrosodi-n-butylamine | semi-volatile | 924-16-3 | 8270C | 10 | - | - | - | |
| 83 | App. II | N-Nitrosodiphenylamine | semi-volatile | 86-30-6 | 8270C | 10 | - | - | - | |
| 84 | App. II | N-Nitrosodipropylamine | semi-volatile | 621-64-7 | 8270C | 10 | - | - | - | |
| 85 | App. II | N-Nitrosomethylethylamine | semi-volatile | 10595-95-6 | 8270C | 10 | - | - | - | |
| 86 | App. II | N-Nitrosopiperidine | semi-volatile | 100-75-4 | 8270C | 20 | - | - | - | |
| 87 | App. II | N-Nitrosopyrrolidine | semi-volatile | 930-55-2 | 8270C | 10 | - | - | - | |
| 88 | App. II | Parathion | OP pesticide | 56-38-2 | 8270C | 10 | - | - | - | |
| 89 | App. II | Pentachlorobenzene | semi-volatile | 608-93-5 | 8270C | 10 | - | - | - | |
| 90 | App. II | Pentachloronitrobenzene | semi-volatile | 82-68-8 | 8270C | 20 | - | - | - | |
| 91 | App. II | Phenacetin | semi-volatile | 62-44-2 | 8270C | 20 | - | - | - | |
| 92 | App. II | Phenanthrene | PAH | 85-01-8 | 8270C | 10 | 210 | - | - | |
| 93 | App. II | Phenol | semi-volatile | 108-95-2 | 8270C | 10 | 300 | - | - | |
| 94 | App. II | p-Phenylenediamine | semi-volatile | 106-50-3 | 8270C | 10 | - | - | - | |
| 95 | App. II | Phorate | OP pesticide | 298-02-2 | 8270C | 10 | 1.4 | - | 1.4 | |
| 96 | App. II | Pronamide | semi-volatile | 23950-58-5 | 8270C | 10 | - | - | - | |
| 97 | App. II | Pyrene | PAH | 129-00-0 | 8270C | 10 | 210 | - | 210 | |
| 98 | App. II | Safrole | semi-volatile | 94-59-7 | 8270C | 10 | - | - | - | |
| 99 | App. II | 1,2,4,5-Tetrachlorobenzene | semi-volatile | 95-94-3 | 8270C | 10 | - | - | - | |
| 100 | App. II | 2,3,4,6-Tetrachlorophenol | semi-volatile | 58-90-2 | 8270C | 10 | 210 | - | 210 | |
| 101 | App. II | o-Toluidine | semi-volatile | 95-53-4 | 8270C | 10 | - | - | - | |
| 102 | App. II | 2,4,5-Trichlorophenol | semi-volatile | 95-95-4 | 8270C | 10 | - | - | 350 | |
| 103 | App. II | 2,4,6-Trichlorophenol | semi-volatile | 88-06-2 | 8270C | 10 | - | - | - | |
| 104 | App. II | O,O,O-Triethyl phosphorothioate | semi-volatile | 126-68-1 | 8270C | 10 | - | - | - | |
| 105 | App. II | 1,3,5-Trinitrobenzene | semi-volatile | 99-35-4 | 8270C | 10 | - | - | - | |
| 106 | App. II | Hexachlorobutadiene | semi-volatile | 87-68-3 | 8270C or 8260 | 10 | - | - | 0.44 | |
| 107 | App. II | Ethyl methacrylate | semi-volatile | 97-63-2 | 8270C or 8270 | 10 | - | - | - | |
| 108 | App. II | Naphthalene | volatile | 91-20-3 | 8260B or 8270 | 10 | 21 | - | - | |
| 109 | App. II | Pentachlorophenol | herbicide | 87-86-5 | 8151 or 8270 | 25 | 0.29 | 1 | - | |

# North Carolina Appendix I and II Constituents

| Number | NC App. # | ANALYTE | CLASS | CAS RN | SW-846 ANALYTICAL | NC SWSL | NC 2L | EPA MCL | GWP STD. | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **NC App. II - Pesticides Method 8081** | | | | | | | | | | |
| **Number** | **NC App. #** | **ANALYTE** | **CLASS** | **CAS RN** | **SW-846 ANALYTICAL** | **NC SWSL** | **NC 2L** | **EPA MCL** | **GWP STD.** | **Notes** |
| 1 | App. II | Aldrin | pesticide | 309-00-2 | 8081A | **0.05** | - | - | - | |
| 2 | App. II | alpha-BHC | pesticide | 319-84-6 | 8081A | **0.05** | - | - | 0.006 | |
| 3 | App. II | beta-BHC | pesticide | 319-85-7 | 8081A | **0.05** | - | - | 0.019 | |
| 4 | App. II | delta-BHC | pesticide | 319-86-8 | 8081A | **0.05** | - | - | 0.019 | |
| 5 | App. II | gamma-BHC (Lindane) | pesticide | 58-89-9 | 8081A | **0.05** | 0.2 | 0.2 | - | |
| 6 | App. II | Chlordane | pesticide | see note | 8081A | **0.5** | 0.1 | 2 | - | This entry includes alpha-chlordane (CAS RN 5103-71-9), beta chlordane (CAS RN 5103-74-2), gamma-chlordane (CAS RN 566-34-7), and constituents of chlordane (CAS RN 57-74-9 and 12672-29-6). |
| 7 | App. II | 4,4'-DDD | pesticide | 72-54-8 | 8081A | **0.1** | 0.14 | - | 0.14 | |
| 8 | App. II | 4,4'-DDE | pesticide | 72-55-9 | 8081A | **0.1** | - | - | - | |
| 9 | App. II | 4-4'-DDT | pesticide | 50-29-3 | 8081A | **0.1** | 0.1 | - | 0.1 | |
| 10 | App. II | Dieldrin | pesticide | 60-57-1 | 8081A | **0.075** | 0.0022 | - | 0.0022 | |
| 11 | App. II | Endosulfan I | pesticide | 959-96-8 | 8081A | **0.1** | - | - | - | |
| 12 | App. II | Endosulfan II | pesticide | 33213-65-9 | 8081A | **0.1** | 42 | - | 42 | |
| 13 | App. II | Endosulfan sulfate | pesticide | 1031-07-8 | 8081A | **0.1** | - | - | - | |
| 14 | App. II | Endrin | pesticide | 72-20-8 | 8081A | **0.1** | 2 | 2 | 2.1 | |
| 15 | App. II | Endrin aldehyde | pesticide | 7421-93-4 | 8081A | **0.1** | 2.1 | - | 2.1 | |
| 16 | App. II | Heptachlor | pesticide | 76-44-8 | 8081A | **0.05** | 0.0078 | 0.4 | - | |
| 17 | App. II | Heptachlor epoxide | pesticide | 1024-57-3 | 8081A | **0.075** | 0.0038 | 0.2 | - | |
| 18 | App. II | Methoxychlor | pesticide | 72-43-5 | 8081A | **1** | 35 | 40 | - | |
| 19 | App. II | Toxaphene | pesticide | see note | 8081A | **1.5** | 0.031 | 3 | - | Includes congener chemicals contained in technical toxaphene (CAS RN 8001 35-2) such as chlorinated camphene. |

| **NC App. II - PCB's Method 8082** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Number** | **NC App. #** | **ANALYTE** | **CLASS** | **CAS RN** | **SW-846 ANALYTICAL** | **NC SWSL** | **NC 2L** | **EPA MCL** | **GWP STD.** | **Notes** |
| 1-6 | App. II | Polychlorinated Biphenyls (PCBs) | PCB | see note | 8082 | **2** | - | 0.5 | - | This category contains congener chemicals, including constituents of Aroclor 1016 (CAS RN 12674-11-2), Aroclor 1221 (CAS RN 11104-28-2), Aroclor 1232 (CAS RN 11141-16-5), Aroclor 1242 (CAS RN 53469-21-9), Aroclor 1248 (CAS RN 12672-29-6), Aroclor 1254 (CAS RN 11097-69-1)). Value given for the NC 2L Standard is the GWP for the Solid Waste Section. |

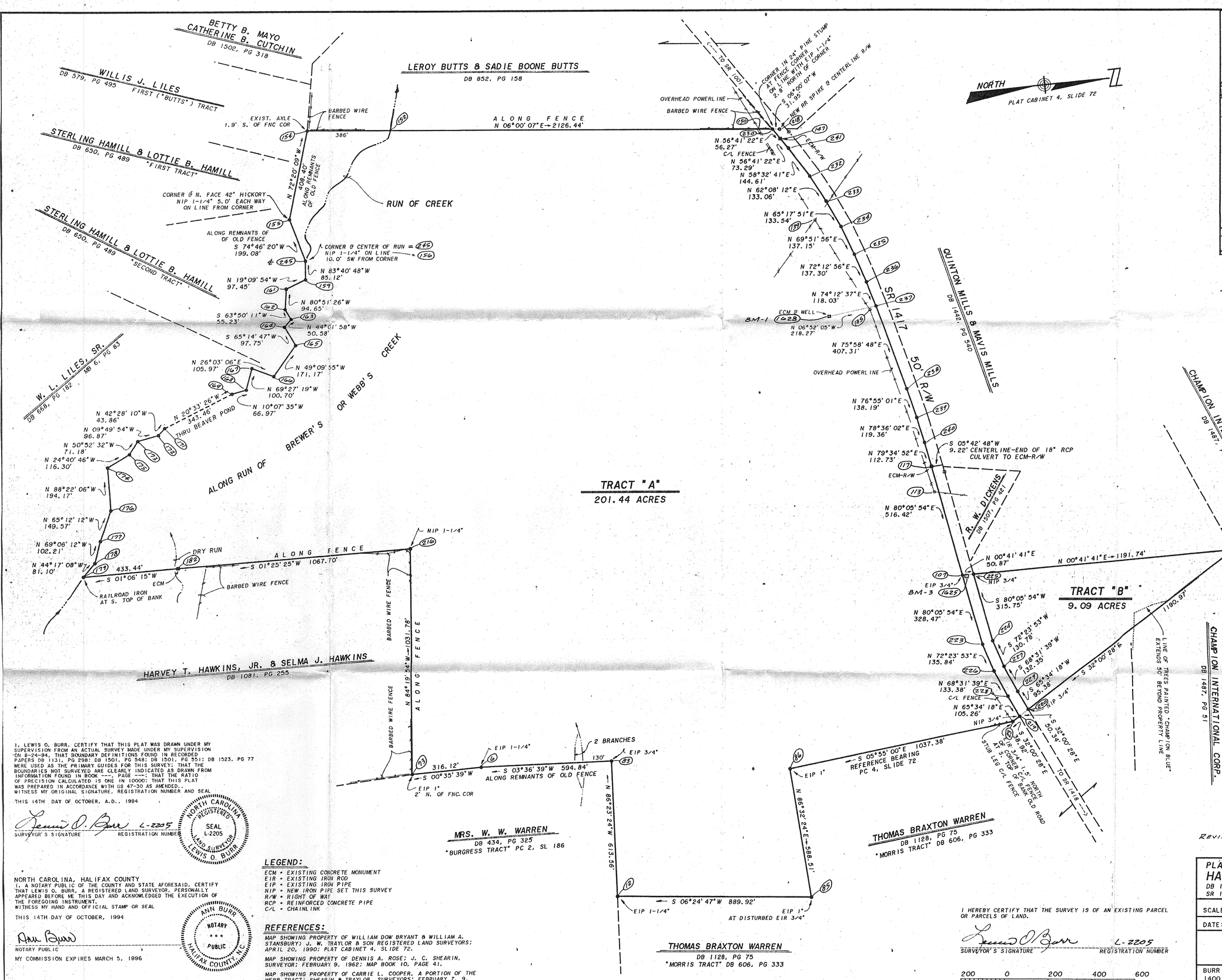
| **NC App. II - Herbicides 8151** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Number** | **NC App. #** | **ANALYTE** | **CLASS** | **CAS RN** | **SW-846 ANALYTICAL** | **NC SWSL** | **NC 2L** | **EPA MCL** | **GWP STD.** | **Notes** |
| 1 | App. II | 2,4-Dichlorophenoxyacetic acid (2,4-D) | herbicide | 94-75-7 | 8151A | 2 | 70 | 70 | - | |
| 2 | App. II | Dinoseb (DNBP); 2-sec-Butyl-4,6-dinitrophenol | herbicide | 86-85-7 | 8151A | 1 | - | 7 | 7 | |
| 3 | App. II | Silvex (2,4,5-TP) | herbicide | 93-72-1 | 8151A | 2 | 50 | 50 | - | |
| 4 | App. II | 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T) | herbicide | 93-76-5 | 8151A | 2 | - | - | - | |
| 5 | App. II | Pentachlorophenol | herbicide | 87-86-5 | 8151 or 8270 | 25 | 0.29 | 1 | - | |

**Notes:**

No shading denotes NC App. I Constituents

Shading denotes remaining NC App. II Constituents

1. Bolded, shaded analytes are those listed in Appendix 5.5 of the Virginia Solid Waste Management Regulations (Detection Monitoring).
2. CAS RN: Chemical Abstracts Service Registry Number. Where 'Total' is entered, all species that contain the element are included.
3. Class: General type of compound
4. OP = orthophosphate
5. PAH = polynuclear aromatic hydrocarbon
6. Volatile EQL of 1 ug/L is based on a 25-mL purge per SW-846, Final Update III, Revision 2, December 1996, page 8260B-35 (most recent revision to method 8260 in SW-846).
7. " - " = not available/not applicable
8. Revised 03/13/07.
9. Revised 05/14/07




## LAND AREA SUMMARY:

TRACT "A" SOUTH OF SR 1417 = 201.44 ACRES
TRACT "B" NORTH OF SR 1417 = 9.09
TOTAL LAND AREA THIS SURVEY = 210.53 ACRES

I, LEWIS O. BURR, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION ON 8-24-94, THAT BOUNDARY DEFINITIONS FOUND IN RECORDED PAPERS DB 1131, PG 298; DB 1501, PG 548; DB 1501, PG 551; DB 1523, PG 77 WERE USED AS THE PRIMARY GUIDES FOR THIS SURVEY; THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND IN BOOK ---, PAGE ---; THAT THE RATIO OF PRECISION CALCULATED IS ONE IN 10000; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH GS 47-30 AS AMENDED.. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL

THIS 14TH DAY OF OCTOBER, A.D., 1994

Lewis O. Burr L-2205
SURVEYOR'S SIGNATURE REGISTRATION NUMBER

NORTH CAROLINA REGISTERED SEAL L-2205 LAND SURVEYOR LEWIS O. BURR

NORTH CAROLINA, HALIFAX COUNTY
I, A NOTARY PUBLIC OF THE COUNTY AND STATE AFORESAID, CERTIFY THAT LEWIS O. BURR, A REGISTERED LAND SURVEYOR, PERSONALLY APPEARED BEFORE ME THIS DAY AND ACKNOWLEDGED THE EXECUTION OF THE FOREGOING INSTRUMENT.
WITNESS MY HAND AND OFFICIAL STAMP OR SEAL

THIS 14TH DAY OF OCTOBER, 1994

Ann Burr
NOTARY PUBLIC

MY COMMISSION EXPIRES MARCH 5, 1996

ANN BURR NOTARY PUBLIC HALIFAX COUNTY, N.C.

## LEGEND:

ECM = EXISTING CONCRETE MONUMENT
EIR = EXISTING IRON ROD
EIP = EXISTING IRON PIPE
NIP = NEW IRON PIPE SET THIS SURVEY
R/W = RIGHT OF WAY
RCP = REINFORCED CONCRETE PIPE
C/L = CHAINLINK

## REFERENCES:

MAP SHOWING PROPERTY OF WILLIAM DOW BRYANT & WILLIAM A. STANSBURY; J. W. TRAYLOR & SON REGISTERED LAND SURVEYORS; APRIL 20, 1990; PLAT CABINET 4, SLIDE 72.

MAP SHOWING PROPERTY OF DENNIS A. ROSE; J. C. SHEARIN, SURVEYOR; FEBRUARY 9, 1962; MAP BOOK 10, PAGE 41.

MAP SHOWING PROPERTY OF CARRIE L. COOPER, A PORTION OF THE WEBB TRACT; SHEARIN & TRAYLOR, SURVEYORS; FEBRUARY 7, 9, 1951; MAP BOOK 6, PAGE 83.

I HEREBY CERTIFY THAT THE SURVEY IS OF AN EXISTING PARCEL OR PARCELS OF LAND.

Lewis O. Burr L-2205
SURVEYOR'S SIGNATURE REGISTRATION NUMBER

200 0 200 400 600
GRAPHIC SCALE - FEET

REVISED 2-5-96: ADDED POINT NUMBERS DUMP83 LB

PLAT SHOWING PROPERTY STANDING IN THE NAME OF
# HALIFAX COUNTY
DB 1131, PG 298; DB 1501, PG 548; DB 1501, PG 551; DB 1523, PG 77
SR 1417 BETWEEN SR 1001 AND SR 1418 JUST NORTH OF NC ROUTE 48

| | | |
|---|---|---|
| SCALE: 1" = 200' | APPROVED: | DRAWN BY: L.B. |
| DATE: 10-1-94 | | REVISED: 2-5-96 |

BUTTERWOOD TOWNSHIP HALIFAX COUNTY NORTH CAROLINA

BURR & ASSOCIATES, P.A.
1400 GEORGIA AVENUE
ROANOKE RAPIDS, NC 27870
(919) 537-0369

DRAWING NUMBER: B & A 6-223

# COBLE'S SANDROCK, INC.
# ALAMANCE COUNTY, NORTH CAROLINA

# DESIGN HYDROGEOLOGIC REPORT
# PHASE 3

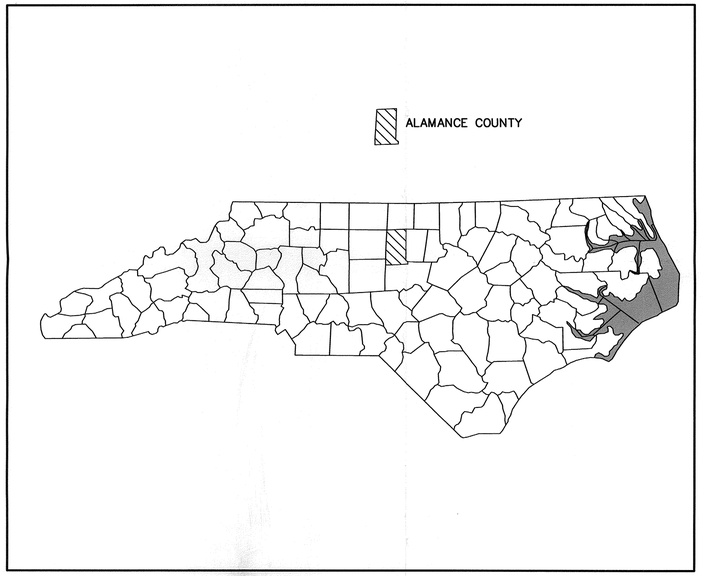
JUNE 2007

PREPARED FOR:

COBLE'S SANDROCK
5833 FOSTER STORE ROAD
LIBERTY, NORTH CAROLINA

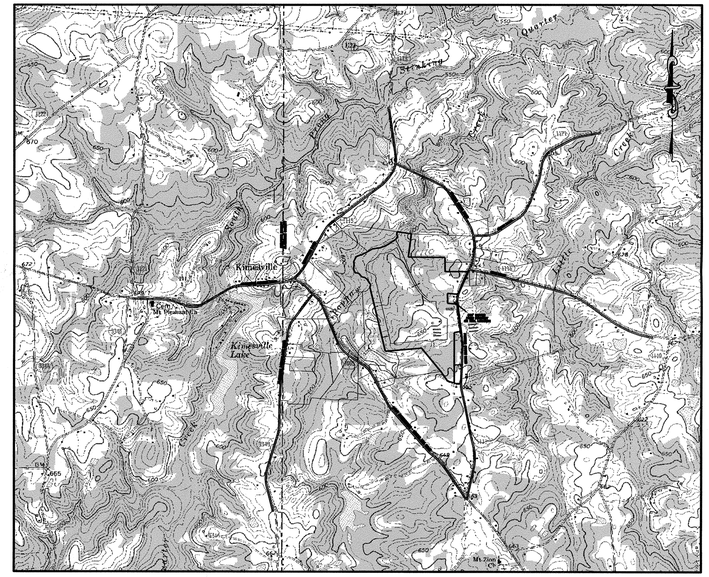
PREPARED BY:

JOYCE
ENGINEERING, INC.
2211 W. MEADOWVIEW RD., STE. 101
GREENSBORO, NC 27407
PHONE: (336) 323-0092




## NORTH CAROLINA

COUNTY LOCATION MAP
N.T.S.




## LOCATION MAP

APPROXIMATE SCALE: 1"=2000'

### INDEX TO DRAWINGS


| SHEET | DESCRIPTION |
|---|---|
| DH-0 | TITLE PAGE |
| DH-1 | DRAWING INDEX, NOTES, LEGEND, AND ABBREVIATIONS |
| DH-2 | EXISTING CONDITIONS MAP WITH BORING AND WELL LOCATIONS |
| DH-3 | GROUNDWATER SURFACE ELEVATION MAP-MARCH 6, 2007 |
| DH-4 | BEDROCK SURFACE CONTOUR MAP WITH PROPOSED BASE GRADES |
| DH-5 | SEASONAL HIGH WATER TABLE MAP WITH PROPOSED BASE GRADES |
| DH-6 | HYDROGEOLOGIC CROSS SECTION LINES OF SECTION |
| DH-7A | HYDROGEOLOGIC CROSS-SECTIONS A-A' AND B-B' |
| DH-7B | HYDROGEOLOGIC CROSS-SECTIONS C-C', D-D' AND E-E' |
| DH-8 | WATER QUALITY MONITORING PLAN |


### LEGEND

- PROPOSED FACILITY BOUNDARY
- CURRENT PERMITTED FACILITY BOUNDARY
- EXISTING 10 FT CONTOUR — 700 —
- EXISTING 2 FT CONTOUR
- PROPOSED BASE GRADE CONTOUR
- STREAM
- TREELINE
- ACCESS ROAD
- EXISTING ROAD
- UTILITY POLE
- FENCE
- EXISTING CELL BOUNDARY
- PROPOSED CELL BOUNDARY
- GROUNDWATER SURFACE CONTOUR (APPROXIMATE) 5 FT. CONTOUR INTERVAL — 645
- BEDROCK SURFACE CONTOUR (APPROXIMATE) 5 FT. CONTOUR INTERVAL — 645
- GROUNDWATER FLOW DIRECTION WITH GRADIENT CALCULATION SEGMENT
- SEGMENT USED FOR GRADIENT CALCULATIONS
- PIEZOMETER LOCATION AND IDENTIFICATION — P-1
- GROUNDWATER MONITORING WELL LOCATION AND IDENTIFICATION — MW-10
- BORING LOCATIONS AND IDENTIFICATION — B-5
- CORING LOCATION AND IDENTIFICATION — C-3
- HAND AUGER PIEZOMETER LOCATION — P-28
- RESIDENTIAL WELL LOCATION — WW-1
- PROPOSED MONITORING WELL — MW-11
- CORING LOCATION WITH TEMPORARY WELL — TW-2
- SURFACE WATER MONITORING PLAN — SMP-1

GENERAL NOTES:

1. COORDINATE SYSTEM FOR ALL DIGITAL MAPPING IS NC83F.
2. VICINITY MAP REFERENCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE FOR KIMESVILLE, NORTH CAROLINA, 1982.

| DATE | REVISIONS AND RECORD OF ISSUE | NO | BY | CK | APP |
|---|---|---|---|---|---|

DESIGNED VB
DRAWN CADD/RFB
CHECKED VB
APPROVED VB
DATE 05/30/07

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GREENSBORO, NC 27407
PHONE: (336) 323-0092

COBLE'S SANDROCK, INC.
KIMESVILLE, NORTH CAROLINA

DRAWING INDEX, NOTES
LEGENDS, AND ABBREVIATIONS

PROJECT NO.
419.00.27

SCALE
N.T.S.

DRAWING NO.
DH-1

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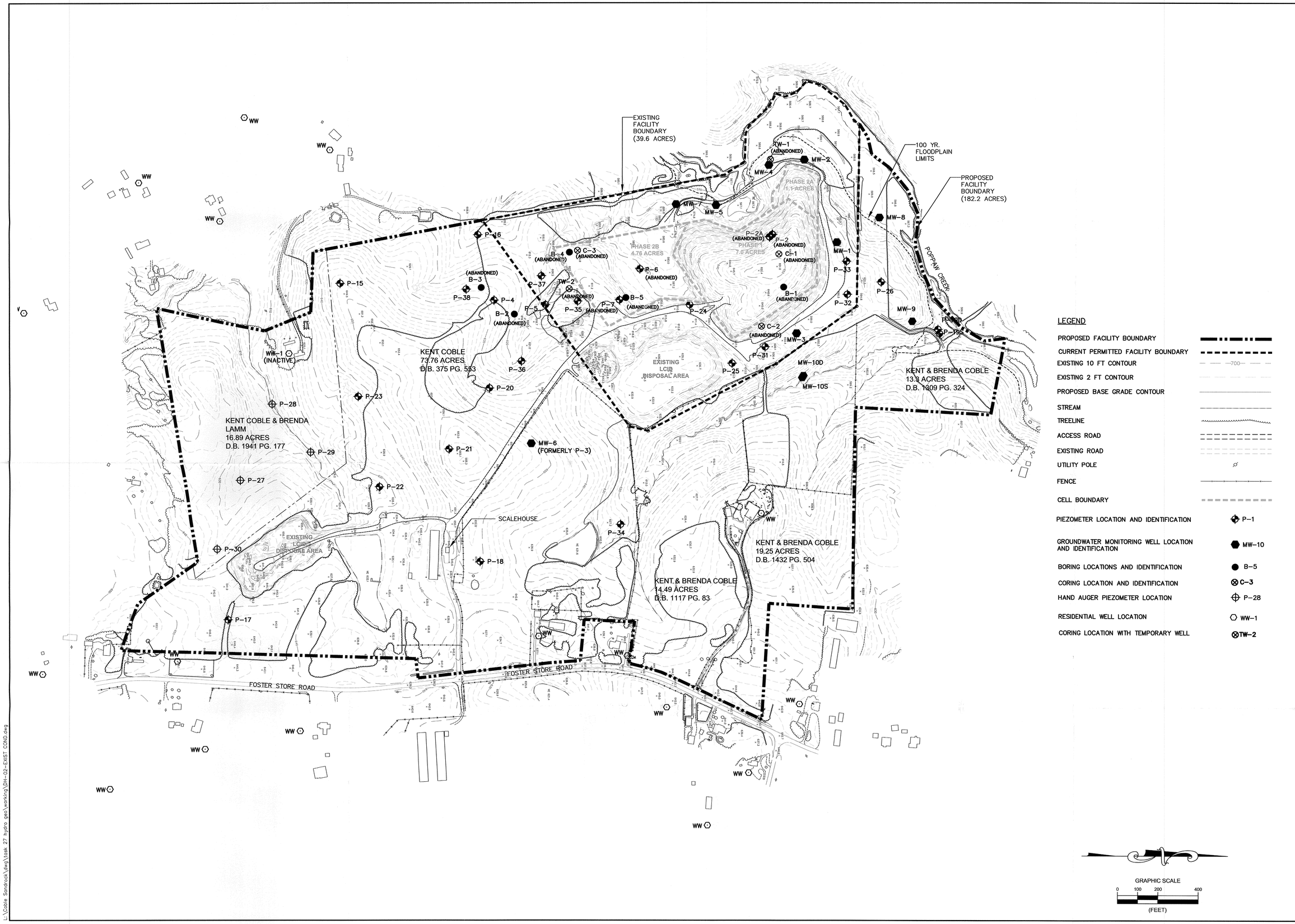


| DATE | REVISIONS AND RECORD OF ISSUE | NO | BY | CK | APP |
|---|---|---|---|---|---|

DESIGNED VB
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DATE 05/30/07

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PHONE: (336) 323-0092

COBLE'S SANDROCK, INC.
KIMESVILLE, NORTH CAROLINA

EXISTING CONDITIONS MAP WITH BORING AND WELL LOCATIONS

PROJECT NO.
419.00.27

SCALE
1"=200'

DRAWING NO.
DH-2

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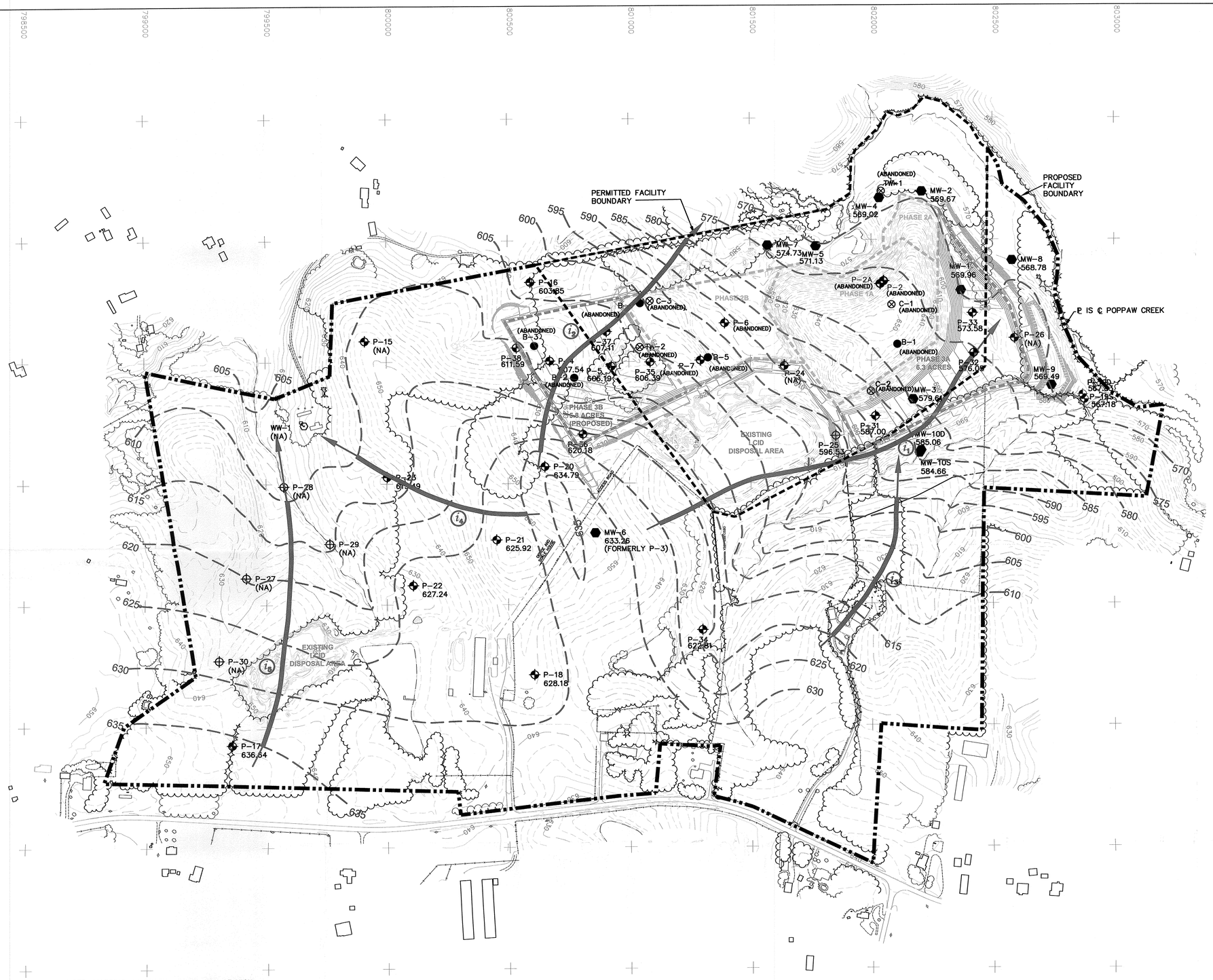


NOTES:

1. TOPOGRAPHIC CONTOUR INTERVAL = 2 FEET.
2. GROUNDWATER SURFACE CONTOUR INTERVAL = 5 FEET.
3. STATIC WATER LEVELS MEASURED ON MARCH 6, 2007.

## LEGEND

- EXISTING 10 FT. CONTOUR
- EXISTING 2 FT. CONTOUR
- PROPOSED FACILITY BOUNDARY
- CURRENT PERMITTED FACILITY BOUNDARY
- EXISTING CELL BOUNDARY
- PROPOSED CELL BOUNDARY
- PROPOSED BASE GRADES
- STREAM
- EXISTING TREELINE
- GROUNDWATER SURFACE CONTOURS (FEET ABOVE SEA LEVEL) — 625
- GROUNDWATER FLOW DIRECTION WITH GRADIENT CALCULATION SEGMENT
- EXISTING ROAD
- ACCESS ROAD
- SEGMENT USED FOR GRADIENT CALCULATIONS — $i_2$
- COMPLIANCE WELL LOCATION — MW-1
- PIEZOMETER LOCATION — P-5
- BORING LOCATION — B-5
- CORING LOCATION — C-3
- HAND AUGER PIEZOMETER LOCATION — P-28
- RESIDENTIAL WELL LOCATION — WW-1
- CORING LOCATION WITH TEMPORARY WELL — TW-2

GRAPHIC SCALE
0 100 200 400
(FEET)

NOTE: MAPPING BY SPATIAL DATA, INC. OF HIGH POINT, NORTH CAROLINA. DATES OF AERIAL FLYOVER ARE 03/02/00 AND 01/24/05.

OUTER PROPERTY LINE DIGITIZED BASED ON DRAWING MP-1 FROM THE MASTER SITE PLAN BY ECOLOGIC ASSOCIATES, P.C. DATED 1/13/99. PROPERTY LINE SHOULD BE CONSIDERED APPROXIMATE.

PROPERTY LINE FOR 39.6 ACRE PROPERTY FROM A SURVEY PROVIDED BY TRIGON ENGINEERING, INC. ADJACENT PROPERTY LINES SURVEYED AND TIED INTO NORTH CAROLINA STATE PLANE COORDINATES BY TRITECH CIVIL ENVIRONMENTAL, P.C.

| DATE | REVISIONS AND RECORD OF ISSUE | NO | BY | CK | APP |
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PHONE: (336) 323-0092

COBLE'S SANDROCK
KIMESVILLE, NORTH CAROLINA

# GROUNDWATER ELEVATION CONTOUR MAP

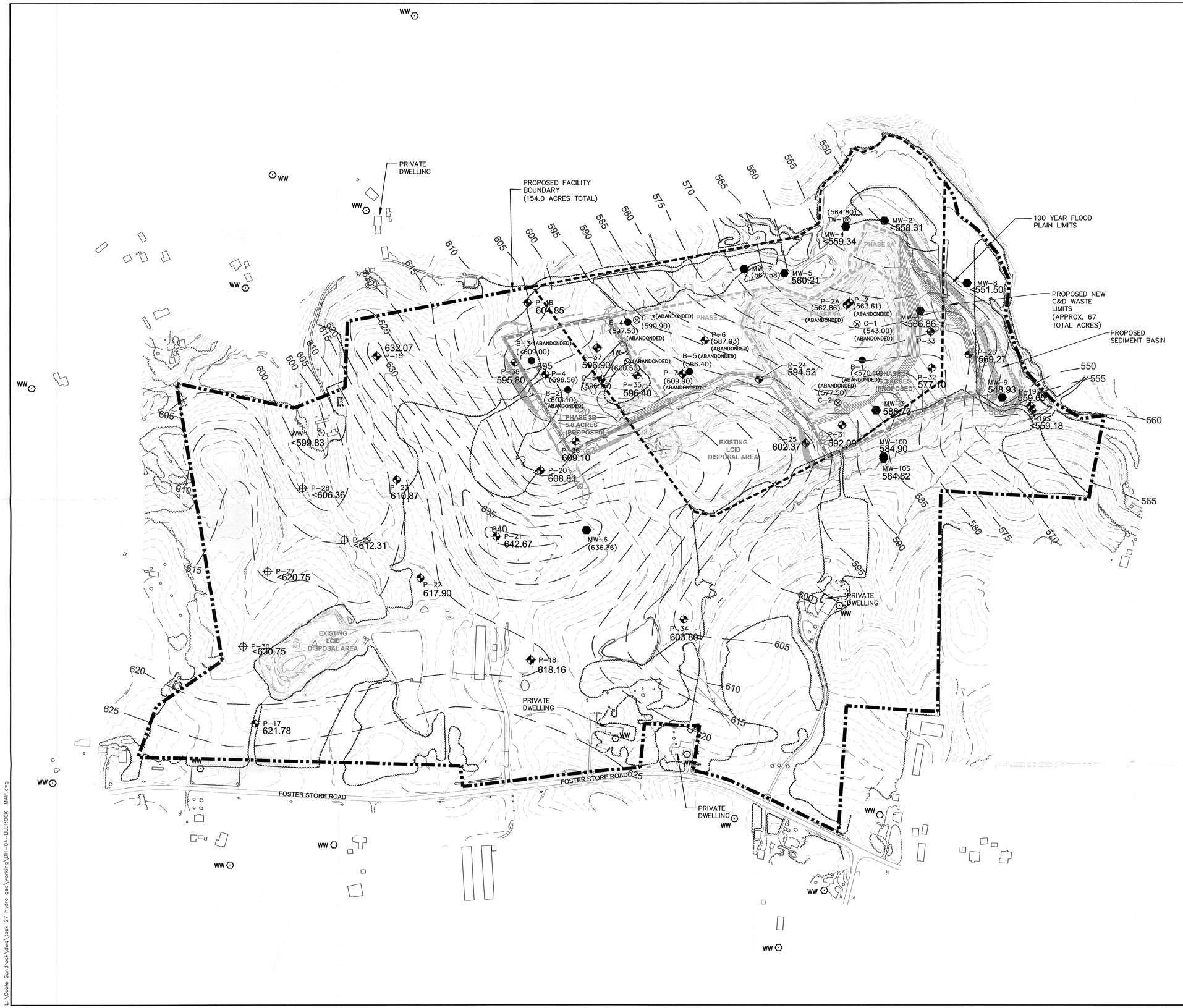
MARCH 6, 2007

PROJECT NO. 419.00.27

SCALE 1"=200'

DRAWING NO. DH-3

L:\Coble Sandrock\dwg\task 27 hydro geo\working\DH-3 GW ELEVATION CONTOUR MAP.dwg




LEGEND

| | |
|---|---|
| EXISTING 2' CONTOURS | |
| EXISTING 10' CONTOURS | |
| BEDROCK CONTOURS | |
| PROPOSED BASE GRADES | |
| EXISTING CELL BOUNDARY | |
| PROPOSED CELL BOUNDARY | |
| PIEZOMETER LOCATION AND IDENTIFICATION | P-1 |
| GROUNDWATER MONITORING WELL LOCATION AND IDENTIFICATION | MW-10 |
| BORING LOCATIONS AND IDENTIFICATION | B-5 |
| CORING LOCATION AND IDENTIFICATION | C-3 |
| HAND AUGER PIEZOMETER LOCATION | P-28 |
| RESIDENTIAL WELL LOCATION | WW-1 |
| CORING LOCATION WITH TEMPORARY WELL | TW-2 |

| | |
|---|---|
| BEDROCK ELEVATION BASED ON AUGER REFUSAL OR BLOW COUNT >50/.2' | 596.90 |
| MAXIMUM BEDROCK ELEVATION BASED ON AUGER REFUSAL NOT REACHED. | <603.10 |
| ESTIMATED BEDROCK ELEVATION FOR BORINGS NOT ADVANCED WITH AUGERS, OR DATA DISCOUNTED DUE TO LACK OF SURVEY DATA. | (596.26) |

NOTES

1. TOPOGRAPHIC CONTOUR INTERVAL = 2 FEET.
2. BEDROCK SURFACE CONTOUR INTERVAL = 5 FEET.

GRAPHIC SCALE
0 100 200 400
(FEET)

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COBLE'S SANDROCK, INC.
KIMESVILLE, NORTH CAROLINA

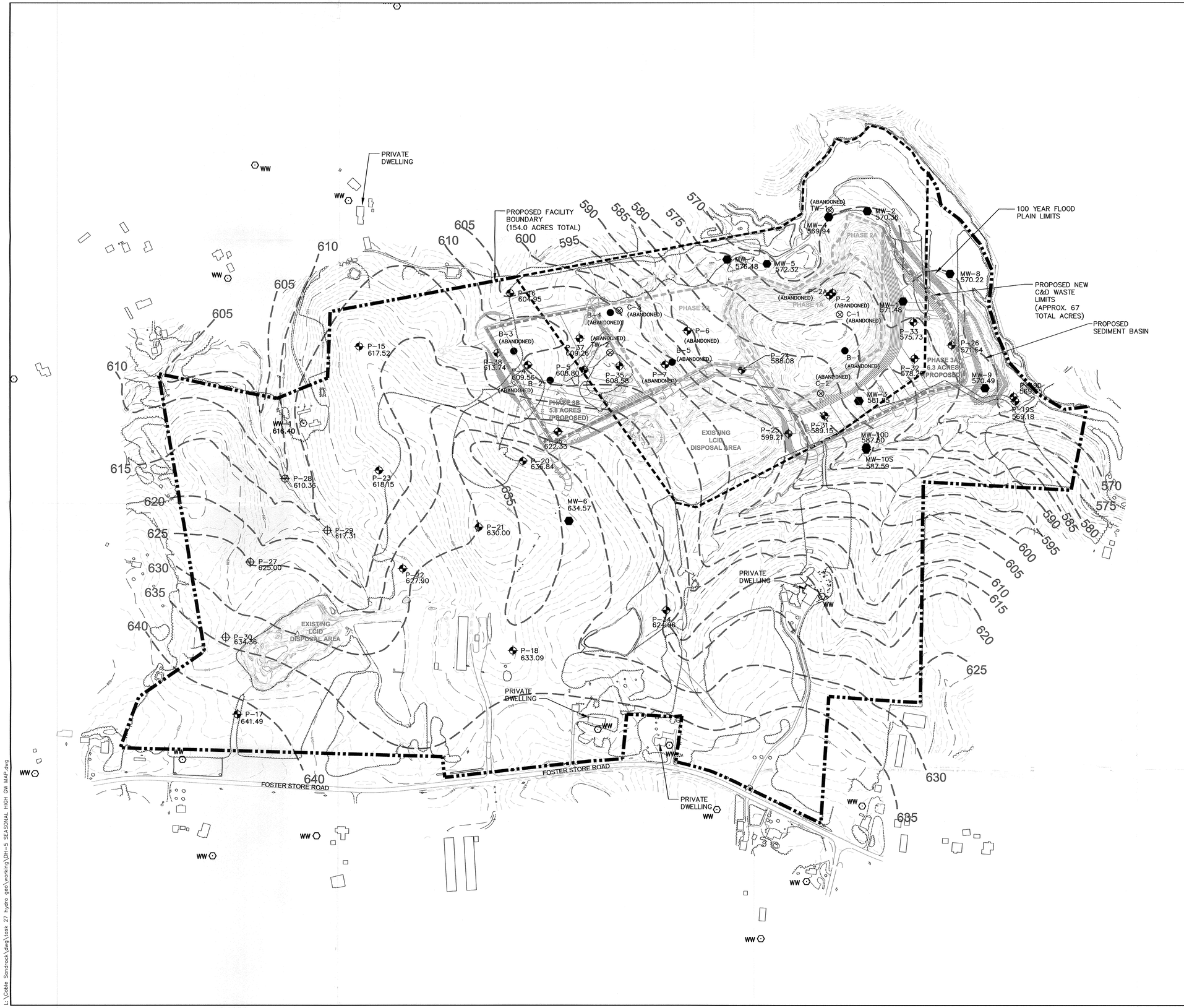
BEDROCK ELEVATIONS

PROJECT NO.
419.00.27

SCALE
1"=200'

DRAWING NO.
DH-4

L:\Coble Sandrock\dwg\task 27 hydro geo\working\DH-04-BEDROCK MAP.dwg




LEGEND

| | |
|---|---|
| EXISTING 2' CONTOURS | |
| EXISTING 10' CONTOURS | |
| SEASONAL HIGH GROUND-WATER CONTOURS | |
| SUBGRADE CONTOURS | |
| EXISTING CELL BOUNDARIES | |
| PROPOSED CELL BOUNDARIES | |
| PIEZOMETER LOCATION AND IDENTIFICATION | P-1 |
| GROUNDWATER MONITORING WELL LOCATION AND IDENTIFICATION | MW-10 |
| BORING LOCATIONS AND IDENTIFICATION | B-5 |
| CORING LOCATION AND IDENTIFICATION | C-3 |
| HAND AUGER PIEZOMETER LOCATION | P-28 |
| RESIDENTIAL WELL LOCATION | WW-1 |
| CORING LOCATION WITH TEMPORARY WELL | TW-2 |

NOTES

1. TOPOGRAPHIC CONTOUR INTERVAL = 2 FEET.
2. GROUNDWATER SURFACE CONTOUR INTERVAL = 5 FEET.

GRAPHIC SCALE
0 100 200 400
(FEET)

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COBLE'S SANDROCK, INC.
KIMESVILLE, NORTH CAROLINA

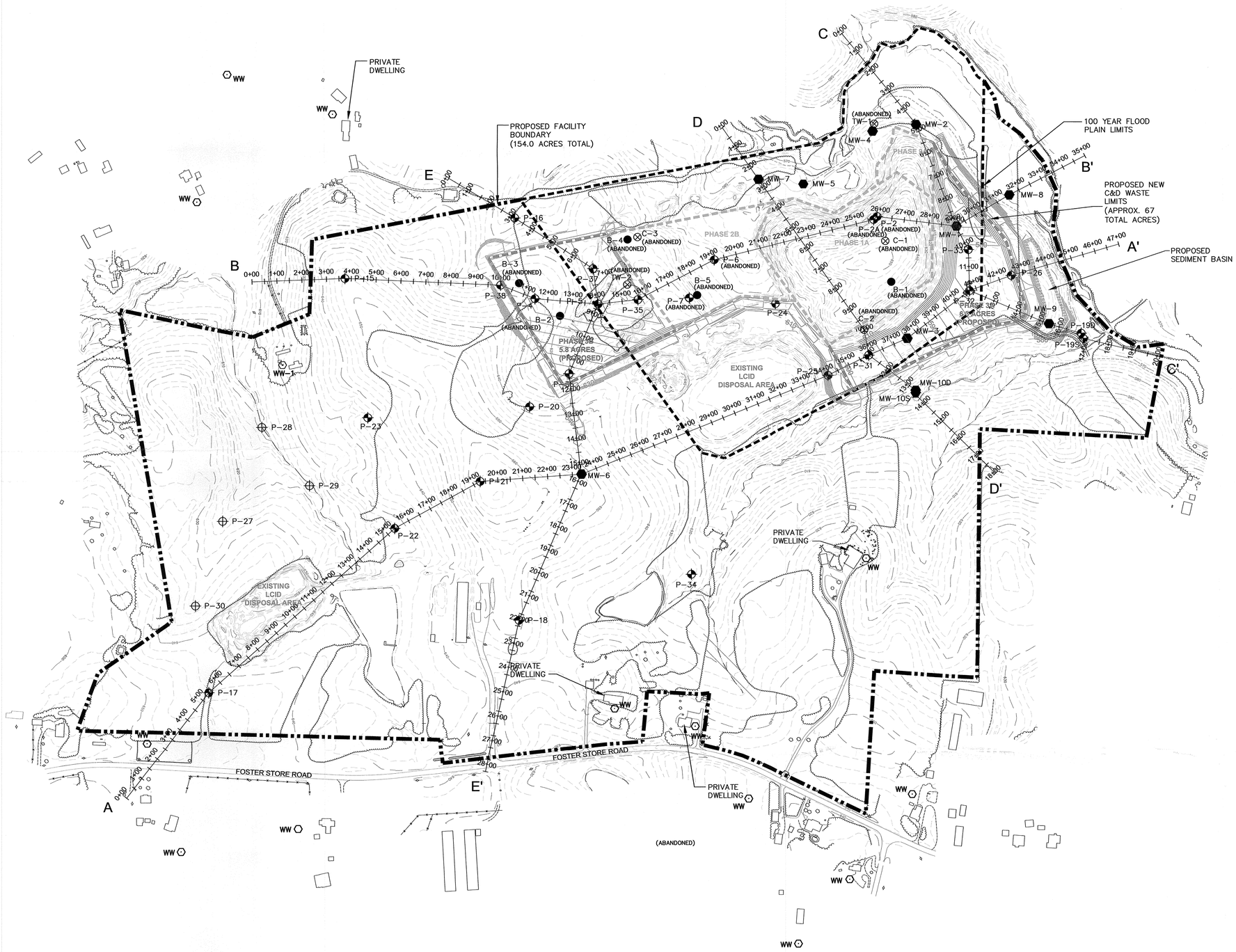
ESTIMATED SEASONAL HIGH GROUNDWATER

PROJECT NO. 419.00.27

SCALE 1"=200'

DRAWING NO. DH-5

L:\Coble Sandrock\dwg\tcsk. 27 hydro geo\working\DH-5 SEASONAL HIGH GW MAP.dwg




LEGEND

| | |
|---|---|
| EXISTING 2' CONTOURS | |
| EXISTING 10' CONTOURS | |
| PROPOSED SUBGRADE | |
| EXISTING CELL BOUNDARIES | |
| PROPOSED CELL BOUNDARIES | |
| PIEZOMETER LOCATION AND IDENTIFICATION | P-1 |
| GROUNDWATER MONITORING WELL LOCATION AND IDENTIFICATION | MW-10 |
| BORING LOCATIONS AND IDENTIFICATION | B-5 |
| CORING LOCATION AND IDENTIFICATION | C-3 |
| HAND AUGER PIEZOMETER LOCATION | P-28 |
| RESIDENTIAL WELL LOCATION | WW-1 |
| CORING LOCATION WITH TEMPORARY WELL | TW-2 |

NOTES

1. TOPOGRAPHIC CONTOUR INTERVAL = 2 FEET.
2. BEDROCK SURFACE CONTOUR INTERVAL = 5 FEET.

GRAPHIC SCALE
0 100 200 400
(FEET)

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COBLE'S SANDROCK, INC.
KIMESVILLE, NORTH CAROLINA

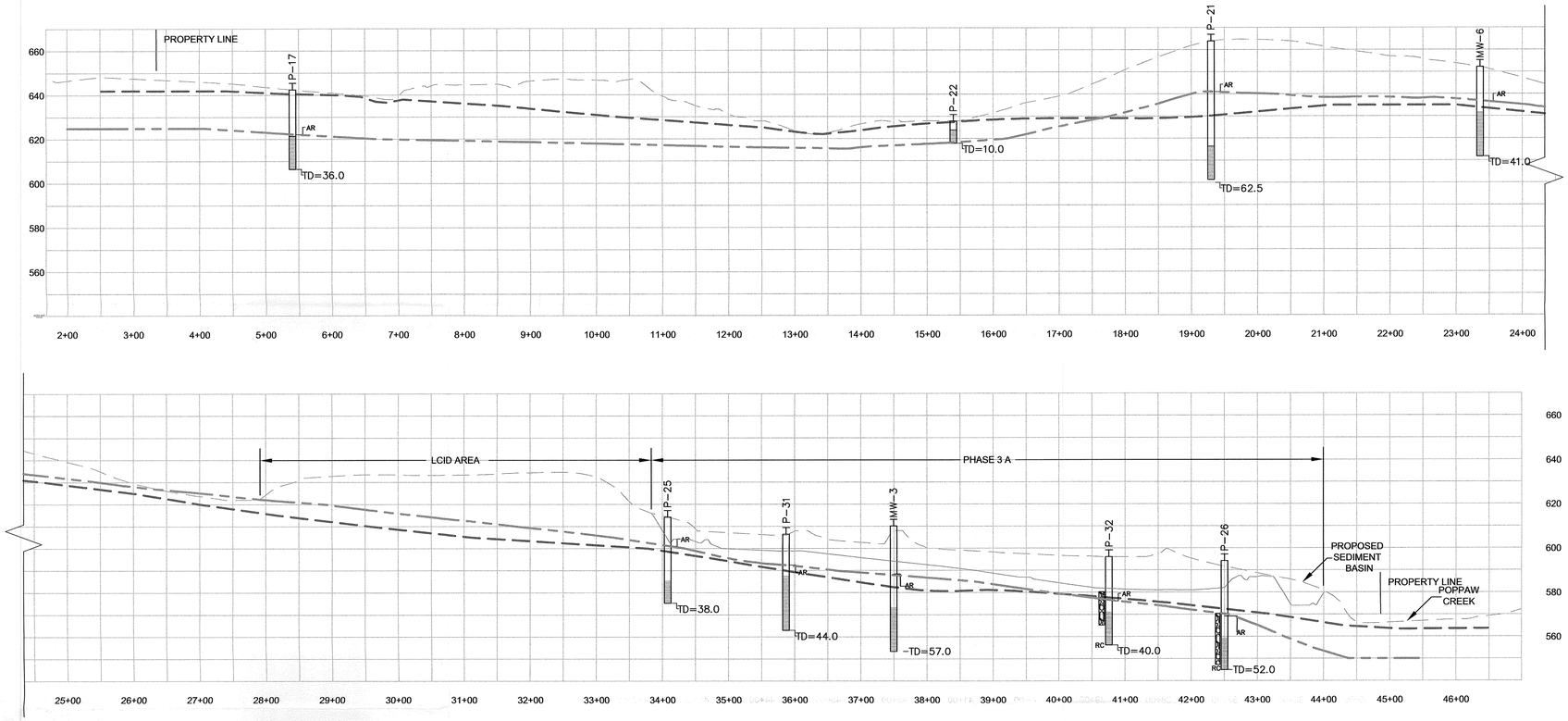
HYDROGEOLOGIC CROSS-SECTIONS
LINES OF SECTION

PROJECT NO.
419.00.27

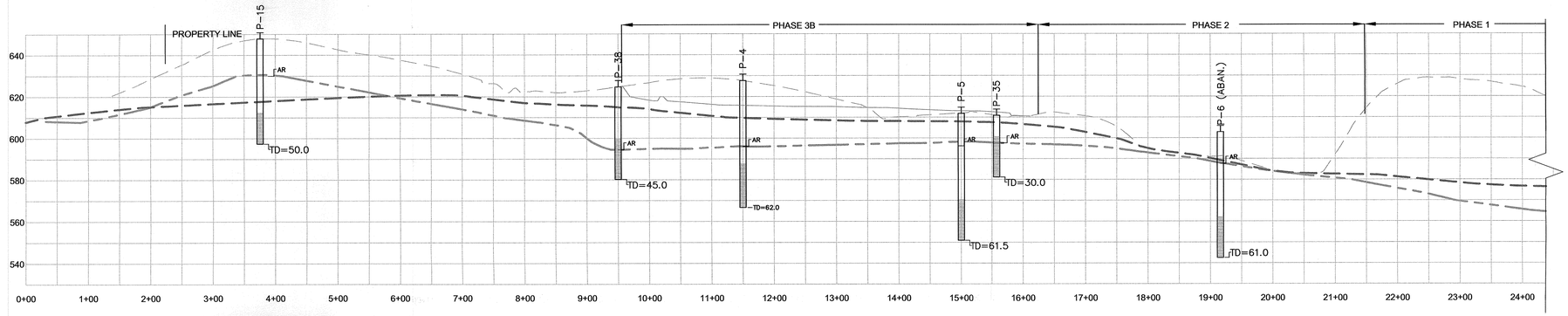
SCALE
1"=200'

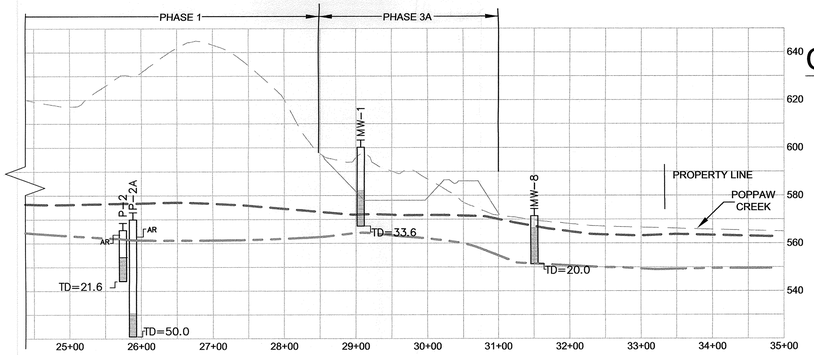
DRAWING NO.
DH-6

L:\Coble Sandrock\dwg\task 27 hydro geo\working\DH 6 - 7 GEOLOGIC CROSS SECTION.dwg




## CROSS SECTION A-A'




## CROSS SECTION B-B'

PROPOSED SUBGRADE

SEASONAL HIGH WATER LEVEL

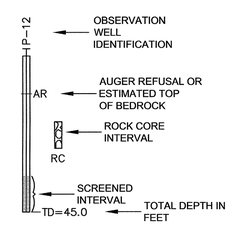
BEDROCK

TOP OF GROUND

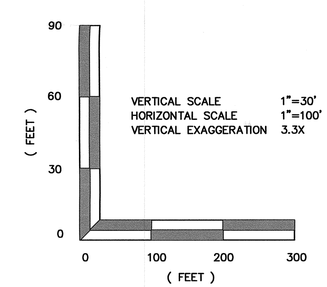
MONITORING WELL MW-6

BORING B-10

PIEZOMETER P-10




SCALE




VERTICAL SCALE 1"=30'
HORIZONTAL SCALE 1"=100'
VERTICAL EXAGGERATION 3.3X

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COBLE'S SANDROCK, INC.
KIMESVILLE, NORTH CAROLINA

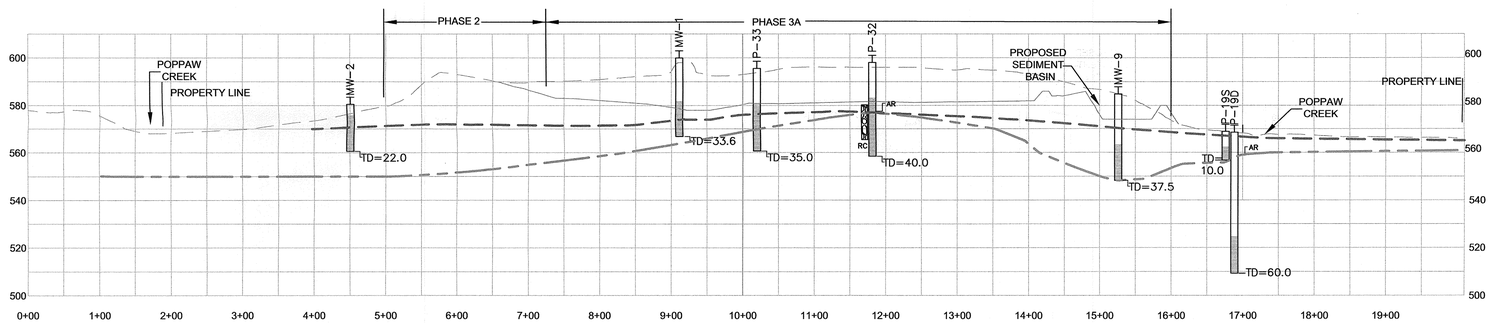
HYDROGEOLOGIC CROSS-SECTIONS
A-A' AND B-B'

PROJECT NO.
419.27

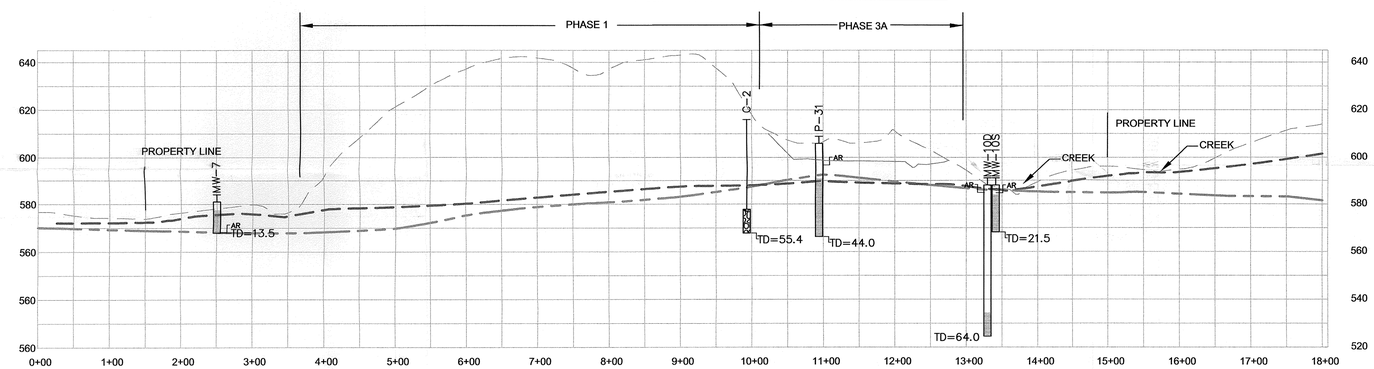
SCALE
1"=200'

DRAWING NO.
DH-7A

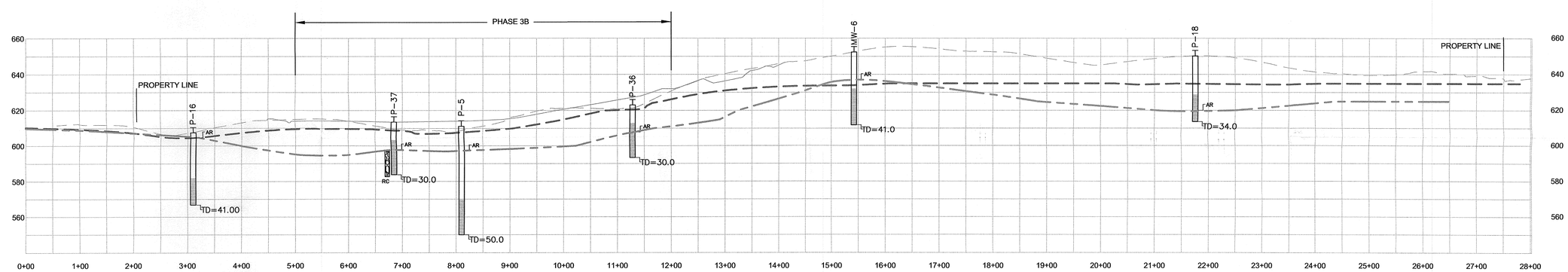
L:\Coble Sandrock\dwg\task 27 hydro geo\working\DH 6- 7 GEOLOGIC CROSS SECTION.dwg



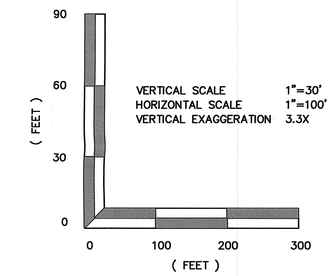

## CROSS SECTION C-C'




## CROSS SECTION D-D'

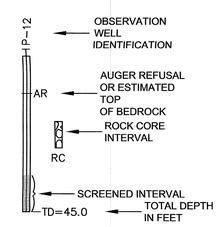



## CROSS SECTION E-E'




PROPOSED SUBGRADE
SEASONAL HIGH WATER LEVEL
BEDROCK
TOP OF GROUND

MONITORING WELL MW-6
BORING B-10
PIEZOMETER P-10

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COBLE'S SANDROCK, INC.
KIMESVILLE, NORTH CAROLINA

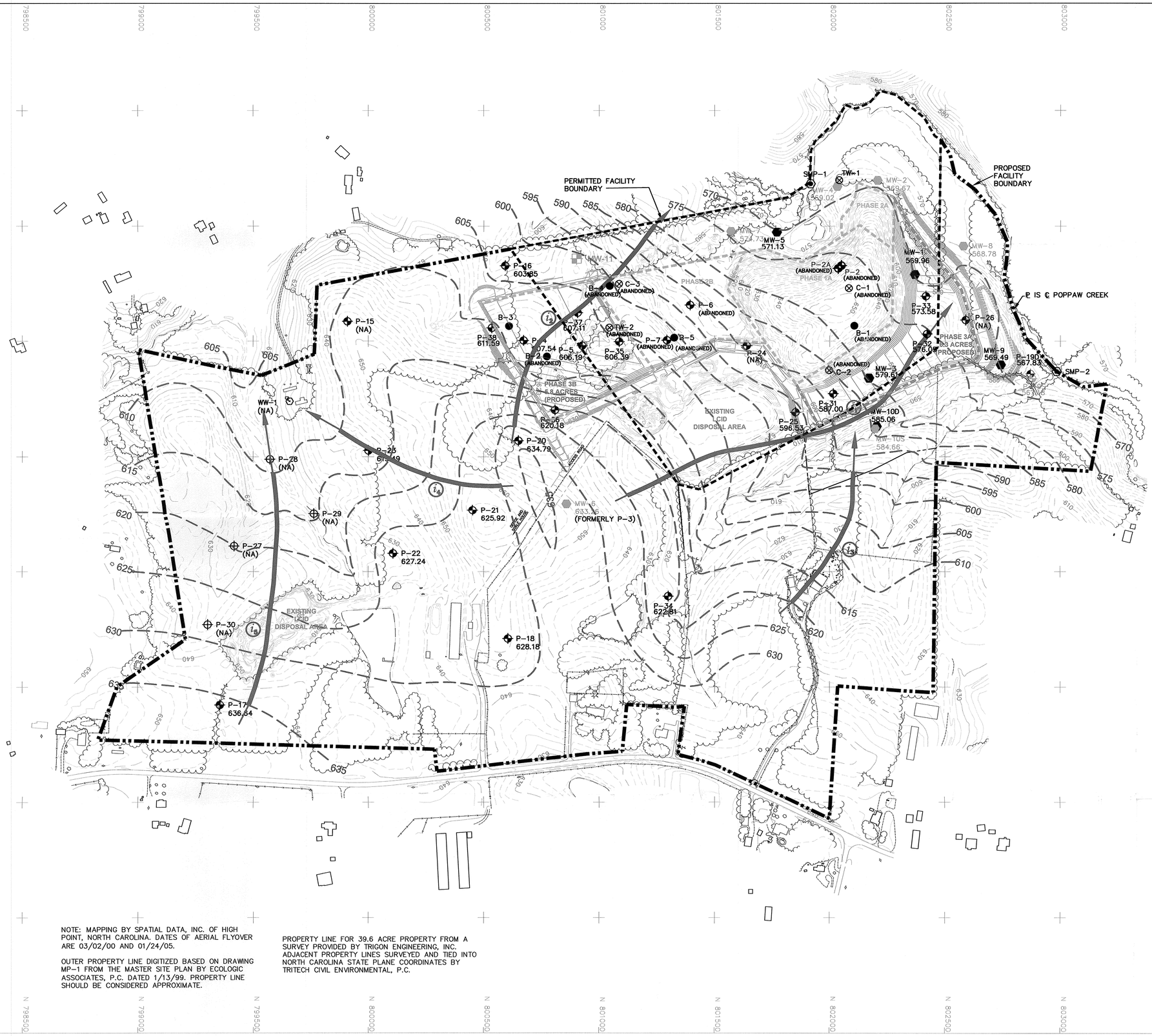
HYDROGEOLOGIC CROSS-SECTIONS
C-C', D-D' AND E-E'

PROJECT NO.
419.27

SCALE
1"=200'

DRAWING NO.
DH-7B

L:\Coble Sandrock\dwg\task 27 hydro geo\working\DH 6- 7 GEOLOGIC CROSS SECTION.dwg




NOTE: MAPPING BY SPATIAL DATA, INC. OF HIGH POINT, NORTH CAROLINA. DATES OF AERIAL FLYOVER ARE 03/02/00 AND 01/24/05.

OUTER PROPERTY LINE DIGITIZED BASED ON DRAWING MP-1 FROM THE MASTER SITE PLAN BY ECOLOGIC ASSOCIATES, P.C. DATED 1/13/99. PROPERTY LINE SHOULD BE CONSIDERED APPROXIMATE.

PROPERTY LINE FOR 39.6 ACRE PROPERTY FROM A SURVEY PROVIDED BY TRIGON ENGINEERING, INC. ADJACENT PROPERTY LINES SURVEYED AND TIED INTO NORTH CAROLINA STATE PLANE COORDINATES BY TRITECH CIVIL ENVIRONMENTAL, P.C.

**Proposed Compliance Well Network**

| Well ID | Date Installed | Screened Interval (Ft. BGS) | Geologic Unit | Comments |
|---|---|---|---|---|
| MW-2 | 3/26/1997 | 5 - 20 | Saprolite/PWR | |
| MW-4 | 4/1/1997 | 6.3 - 21.3 | Saprolite/PWR | |
| MW-6 | 8/5/1997 | 21 - 41 | Bedrock | Background Well |
| MW-7 | 12/19/2002 | 3.5 - 13.5 | Saprolite/PWR | |
| MW-8 | 3/21/2005 | 5 - 20 | Saprolite/PWR | |
| MW-10S | 3/22/2005 | 6.5 - 21.5 | Bedrock | |
| P-19S | 1/31/2002 | 4 - 10 | Saprolite | |
| MW-11 | --- | 10 - 30 * | PWR/Bedrock * | To be installed prior to construction of Phase 3B |

* Anticipated
Ft. BGS = Feet below ground surface.
PWR = Partially Weathered Rock.

The eight compliance wells and two surface water monitoring points will be sampled semiannually. Both groundwater and surface water samples will be analyzed for the constituents listed in Appendix I of 40 CFR Part 258, plus mercury, chloride, manganese, sulfate, iron, alkalinity, and total dissolved solids. In addition, field analyses for temperature, pH, and specific conductance will be performed for each sample.

## NOTES:

1. TOPOGRAPHIC CONTOUR INTERVAL = 2 FEET.
2. GROUNDWATER SURFACE CONTOUR INTERVAL = 5 FEET.
3. STATIC WATER LEVELS MEASURED ON MARCH 6, 2007.

## LEGEND

- EXISTING 10 FT. CONTOUR
- EXISTING 2 FT. CONTOUR
- PROPOSED FACILITY BOUNDARY
- PERMITTED FACILITY BOUNDARY
- CELL BOUNDARY
- STREAM
- EXISTING TREELINE
- GROUNDWATER SURFACE CONTOURS (FEET ABOVE SEA LEVEL) — 625
- GROUNDWATER FLOW DIRECTION WITH GRADIENT CALCULATION SEGMENT
- EXISTING ROAD
- ACCESS ROAD
- SEGMENT USED FOR GRADIENT CALCULATIONS — $i_2$
- COMPLIANCE WELL LOCATION — MW-8
- MONITORING WELL LOCATION — MW-1
- PIEZOMETER LOCATION — P-5
- BORING LOCATION — B-5
- CORING LOCATION — C-3 OR TW-2
- HAND AUGER PIEZOMETER LOCATION — P-28
- RESIDENTIAL WELL LOCATION — WW-1
- PROPOSED MONITORING WELL — MW-11
- SURFACE WATER MONITORING POINT — SMP-1

GRAPHIC SCALE
0 100 200 400
(FEET)

| DATE | REVISIONS AND RECORD OF ISSUE | NO | BY | CK | APP |
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COBLE'S SANDROCK
KIMESVILLE, NORTH CAROLINA

WATER QUALITY MONITORING PLAN

PROJECT NO.
419.00.27

SCALE
1"=200'

DRAWING NO.
DH-8

L:\Coble Sandrock\dwg\task 27 hydro geo\working\DH-8 PROPOSED MONITORING PLAN.dwg

## MAP UNITS CORRELATED WITH TOPOGRAPHIC FEATURES AND MINERAL RESOURCE USES

| Geologic Unit | Description | Topography | Mineral Resource Uses: Past | Present | Potential |
|---|---|---|---|---|---|
| Alluvium | Unconsolidated sand, silt, and clay | Broad to narrow lowlands adjacent to streams (floodplains) | Sand | Sand | Sand |
| Terrace Deposits | Unconsolidated alluvial sand, silt, and clay; in places containing pebbles and cobbles of quartz | Flat to moderately sloping divides and benches adjacent to floodplains | | | Sand and Gravel |
| Triassic Sediments | Interbedded conglomerate, sandstone, siltstone, mudrocks, coal, and mudstone | Gently rolling northeast-sloping lowland; low relief except between Madison and Stoneville | Lightweight Aggregate<br>Crushed Stone Coal | Lightweight Aggregate | Lightweight Aggregate<br>Crushed Stone |
| Diabase | Dark-gray to black, fine-grained, dense dike rocks | Most have no topographic expression; In places forms narrow, elongated, gently to steeply sloping hills and ridges; In places controls stream channels | Brick and Tile Clay | Brick and Tile Clay | Brick and Tile Clay<br>Uranium<br>Crushed Stone |
| Porphyritic Granite<br>Felsic Intrusives<br>Felsic Intrusive Complex | White to light-gray, massive, coarse-grained granitic rocks | Rolling dissected hills; slight to moderate slopes | Sand and Gravel<br>Metallic Minerals<br>Crushed Stone | Sand and Gravel<br>Crushed Stone | Sand and Gravel<br>High-potassium Feldspar (porphyritic granite)<br>Metallic Minerals<br>Crushed Stone |
| Intermediate Intrusives | Dark-gray to greenish-gray, massive, coarse-grained dioritic rocks | Rolling dissected hills; slight to moderate slopes | Crushed Stone | Crushed Stone | Crushed Stone<br>Brick and Tile Clay |
| Mafic Intrusives | Black to greenish-black, massive, coarse-grained gabbroic rocks | Rolling dissected hills; small rounded hills; slight to steep slopes | Crushed Stone | Crushed Stone | Crushed Stone<br>Brick and Tile Clay |
| Ultramafics | Black to greenish-black, massive, coarse-grained rocks | Small rounded hills; slightly to steeply sloping | | | |
| Argillite | Light-gray, brown, and bluish-gray, fine-grained, thinly laminated, metasedimentary rock | Rolling hills and lowlands | Brick and Tile Clay<br>Flagstone<br>Metallic Minerals | Brick and Tile Clay<br>Flagstone | Brick and Tile Clay<br>Flagstone<br>Metallic Minerals |
| Volcaniclastic-Epiclastic Rocks | Coarse-grained, metamorphosed sediments such as arkose, graywackes, and conglomerates | Rolling hills and lowlands | Crushed Stone | Crushed Stone | Crushed Stone |
| Felsic Flows<br>Felsic Volcanics | Dense, medium- to light-gray, metamorphosed volcanic rocks | Gently rolling hills and steeply sloping elongate hills | Metallic Minerals<br>Pyrophyllite<br>Brick and Tile Clay | Brick and Tile Clay | Metallic Minerals<br>Pyrophyllite<br>Brick and Tile Clay<br>Crushed Stone |
| Intermediate Volcanics | Medium- to dark grayish-green, dense, fine-grained metamorphosed volcanic rocks; well developed cleavage | Steeply sloping hills and elongate ridges | | | Brick and Tile Clay |
| Mafic Volcanics | Fine- to medium-grained, medium grayish-green to dark-green to black, metamorphosed volcanic rocks | Gently rolling hills and steeply sloping elongate ridges | Crushed Stone<br>Brick and Tile Clay | Crushed Stone<br>Brick and Tile Clay | Crushed Stone<br>Brick and Tile Clay |
| Sericite Phyllite | Fine-grained, medium- to light-gray to greenish-gray to white, schistose rocks | Most are not of large enough extent to control topography | Blended with Pyrophyllite | Blended with Pyrophyllite | Blended with Pyrophyllite |
| Hornblende Gneiss | Medium- to coarse-grained, dark, massive to foliated metamorphic rocks | Moderately to steeply sloping hills | | | |
| Mica Gneiss | Dark-colored, medium- to coarse-grained, foliated metamorphic rocks | Rolling, dissected hills | Mica (pegmatites)<br>Crushed Stone | Crushed Stone | High-potassium Feldspar (pegmatites)<br>Crushed Stone |
| Felsic Gneiss | Light-colored, fine- to medium-grained metamorphic rocks with indistinct layering and foliation | Rolling, dissected hills | Crushed Stone<br>Mica (pegmatites) | Crushed Stone | Crushed Stone<br>High-potassium Feldspar (pegmatites) |
| Muscovite and Biotite Schist | Fine- to coarse-grained, schistose metamorphic rocks | Rolling, dissected hills | Mica (pegmatities) | | High-potassium Feldspar (pegmatites) |
| Quartz Veins (not shown individually on geologic map) | Light-colored, dense, siliceous veins | Steeply sloping ridges where veins are extensive enough | Crushed Stone for building facings<br>Metallic Minerals | Crushed Stone for building facings | Crushed Stone for building facings<br>Metallic Minerals |
| Siliceous Breccia | Light-colored, fragmental rock containing cavities lined with quartz and tiny veinlets of quartz | Low ridges | | | |

## PHYSICAL CHARACTERISTICS OF SOILS

| Rock Type | Soil Series | Natural Drainage | Succeptibility to Erosion | Permeability | Shrink-Swell Characteristics | Thickness of Soil Solum (inches) | Depth to Bedrock (feet) | Slopes (percent) |
|---|---|---|---|---|---|---|---|---|
| Felsic intrusives, felsic intrusive complexes | Appling | Good | Slight to Moderate | Moderate | Low | 40–60 | 6–15 | 0–15 |
| Argillite | Badin | Good | Slight to Moderate | Moderate | Low | 20–40 | 2–4 | 2–45 |
| Felsic intrusives | Cecil | Good | Moderate to Severe | Moderate | Low | 40–60 | 6–40 | 0–25 |
| Alluvium | Chewacla | Poor | Slight | Moderate | Low | 36–>72 | 5–>10 | 0–2 |
| Alluvium | Congaree | Good | Slight | Moderate | Low | | 8–20 | 0–4 |
| Mafic to intermediate intrusives, mafic volcanics | Coronaca | Good | Slight to Moderate | Moderate | Low | 60–>100 | >10 | 2–15 |
| Mafic and intermediate intrusives, mafic volcanics | Davidson | Good | Moderate to Severe | Moderate | Low | 60–>100 | 6–25 | 2–25 |
| Felsic intrusives | Durham | Good | Slight to Moderate | Moderate | Low | | 6–15 | 2–10 |
| Intermediate intrusives, felsic intrusives mixed with mafic dikes, volcaniclastic-epiclastics | Enon | Good | Moderate to Severe | Slow | Moderate to High | 20–44 | 3–8 | 2–25 |
| Felsic, intermediate and mafic volcanics, argillite | Georgeville | Good | Severe | Moderate | Low | 40–70 | 10 | 2–25 |
| Felsic volcanics | Goldston | Good | Moderate to Severe | Moderately Rapid | Low | 20 | 1.5–3.5 | 2–45 |
| Triassic sandstone, siltstone, and shales | Hanceville | Good | Moderate to Severe | Moderate | Low to Moderate | 40–72 | 5–9 | 0–40 |
| Felsic intrusives mixed with mafic dikes | Helena | Fair | Moderate to Severe | Slow | Moderate | 46 | 4 | 0–15 |
| Felsic volcanics | Herndon | Good | Moderate to Severe | Moderate | Low | >30 | 4–8 | 2–15 |
| Mafic and intermediate intrusives or mixed felsic and mafic intrusives | Hiwassee | Good | Slight to Moderate | Moderate | Low | 40–>60 | >5 | 2–25 |
| Mafic volcanics, intermediate and mafic intrusives, and diabase | Iredell | Fair | Moderate to Severe | Slow | High | 20–40 | 2–8 | 0–15 |
| Triassic sediments | Leaksville | Poor | Slight | Slow | Moderate to High | 20–40 | 2–5 | 0–4 |
| Sheared felsic volcanics, volcaniclastic-epiclastics | Lignum | Poor | Moderate | Moderately Slow to Slow | Moderate | 20–40 | >3.5 | 0–15 |
| Porphyritic granite | Lockhart | Good | Moderate | Moderately Rapid | Low | 30–72 | 6–15 | 6–40 |
| Mica gneisses and schists | Madison | Good | Moderate to Severe | Moderate | Low | 20–40 | >5 | 2–35 |
| Triassic sediments | Mayodan | Good | Moderate to Severe | Moderate | Low | 40–60 | >5<br>up to 10 | 1–25 |
| Intermediate and mafic intrusives and mafic volcanics | Mecklenburg | Good | Moderate to Severe | Slow | Moderate | 20–40 | 4–15 | 2–20 |
| Felsic volcanics, phyllite, argillite, volcaniclastic-epiclastics | Nason | Good | Moderate to Severe | Moderate | Moderate | 25–50 | 3.5–5 | 0–25 |
| Felsic volcanics | Orange | Fair | | Slow | High | 20–40 | 3.5–5.5 | 0–15 |
| Felsic intrusives, felsic gneisses | Pacolet | Good | Severe | Moderate | Low | 18–30 | >5 | 2–40 |
| Triassic sediments | Pinkston | Good | Severe | Moderately Rapid | Low | 12–35 | 1.5–3.5 | 0–45 |
| Terrace deposits | Roanoke | Poor | Slight | Slow | Moderate | 40–60 | >10 | 0–2 |
| Mixed felsic and mafic intrusives | Sedgefield | Fair | Slight to Moderate | Slow | High | 20–40 | >4 | 0–10 |
| Triassic sediments | Spray | Good | Slight | Moderate | Low to Moderate | 10–20 | >5 | 0–5 |
| Argillite, phyllite | Tatum | Good | Moderate to Severe | Moderate | Low | 25–50 | 3.5–5 | 2–30 |
| Felsic intrusives | Vance | Good | Moderate to Severe | Slow | Moderate | 24–40 | 6–>10 | 2–25 |
| Triassic sediments | Wadesboro | Good | Moderate to Severe | Moderate | Low | 15–40 | 3.5–5 | 2–40 |
| Felsic intrusives | Wedowee | Good | Moderate to Severe | Moderate | Moderate | 20–40 | >4 | 5–60 |
| Alluvium | Wehadkee | Poor | Slight | Moderate | Low | 30–60 | 8–20 | 0–2 |
| Felsic intrusives with mafic dikes, intermediate intrusives, hornblende gneiss | Wilkes | Good | Moderate to Severe | Moderate | Low | 10–20 | 3.5–7 | 4–60 |

### SHRINK-SWELL POTENTIAL

Shrink-swell behavior is that quality of the soil that determines its volume change with respect to moisture content. Building foundations, roads and other structures may be severely damaged by the shrinking and swelling of soils. The volume change of soils is influenced by the amount of moisture change and the amount and kind of clay present in the soil.

The methods used in determining the shrink-swell potential of soils are (1) the Coefficient of Linear Extensibility (COLE) used by soil scientists; (2) the Shrinkage Index used by soil engineers; and (3) the Potential Volume Change (PVC) used by the Federal Housing Administration.

Three classes are used to help interpret soil maps for shrink-swell behavior — low, moderate, and high. In rare instances, a rating of very high may be justified.

**Shrink-Swell Potential:**

| | Low | Moderate | High |
|---|---|---|---|
| COLE | .03 | .03 to .06 | .06 |
| Shrinkage Index | 15 | 15 to 30 | 30 |
| PVC | 2 | 2 to 4 | 4 |

Good, Fair and Poor — These terms are parallel to slight, moderate and severe definitions.

### PERMEABILITY

Permeability relates only to movement of water downward through undisturbed materials. These values should be expressed in terms of inches per hour.

The following classes are used to rate the soil permeability:

| Permeability Class | Grouping for Report |
|---|---|
| Very slow | Less than 0.06 |
| Slow | 0.06 to 0.2 |
| Moderately slow | 0.2 to 0.6 |
| Moderate | 0.6 to 2.0 |
| Moderately rapid | 2.0 to 6.0 |
| Rapid | 6.0 to 20 |
| Very rapid | Over 20 |

## ENGINEERING INTERPRETATIONS OF SOILS

| Soil Series | Sewerage Systems (Lagoons) | Septic Tank Absorption Fields | Sanitary Landfills | Small Commercial Buildings | Local roads and Streets | Shallow Excavations | Camp Sites | Picnic Areas | Play-Grounds | General Agriculture | Woods |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Appling | Moderate to Severe SC,S | Moderate SP,S | Slight to Moderate S | Slight to Severe S | Slight to Moderate S | Moderate C,S | Slight to Moderate S | Slight to Moderate S | Slight to Severe | Good | Good |
| Badin | Severe R,S | Severe R,S | Severe R,S | Moderate to Severe SS,S | Severe LS,S | Moderate to Severe R,C,S | Moderate to Severe SM,S | Moderate to Severe SM,S | Severe SM,S | Good | Good |
| Cecil | Moderate to Severe PS,S | Moderate SP | Slight to Moderate S | Moderate to Severe LS,SS,S | Moderate to Severe LS,SS,S | Moderate to Severe C,S | Slight to Severe S,SM | Slight to Severe S,C | Slight to Severe S,C | Good | Good |
| Chewacla | Severe W,F | Severe W,F | Severe W,F | Severe W,F | Severe W,F | Severe W,F | Severe W,F | Severe F | Severe W,F | Good | Good |
| Congaree | Severe F | Severe F | Severe F | Severe F | Severe F | Severe F | Severe F | Moderate F | Severe F | Good | Good |
| Coronaca | Moderate to Severe SE,S | Moderate SP,S | Slight to Moderate S | Slight to severe S | Severe LS | Moderate C,S | Slight to Moderate S | Slight to Moderate S | Moderate to Severe S | Good | Good |
| Davidson | Moderate to Severe S | Moderate to Severe SP,S | Slight to Severe S | Slight to Severe S | Moderate to Severe LS,S | Moderate to Severe C,S | Slight to Severe C,S | Slight to Severe C,S | Moderate to Severe C,S | Good | Good |
| Durham | | Moderate SP | | | Slight | | Slight to Moderate S | Slight | Moderate S | Good | Good |
| Enon | Moderate to Severe S | Severe SP,S | Slight to Severe S | Severe SS,LS,S | Severe SS,LS,S | Severe C,S | Moderate to Severe SP,S,C | Slight to Severe C,S | Moderate to Severe SP,S | Good | Good |
| Georgeville | Moderate to Severe SP,S | Moderate to Severe SP,S | Slight to Severe S | Slight to Severe S | Severe LS,S | Moderate to Severe C,S | Slight to Severe S,SM | Slight to Severe S,SM | Moderate to Severe S,SM | Good | Good |
| Goldston | Severe R | Severe R | Severe SE | Moderate to Severe R,S | Moderate to Severe R,S | Severe R | Moderate to Severe SM,S | Moderate to Severe SM,S | Moderate to Severe R,S | Fair | Good |
| Hanceville | Moderate to Severe SE,S | Slight to Severe S | Slight to Severe S | Moderate to Severe SS,S | Severe LS,S | Moderate to Severe C,S | Slight to Severe S | Slight to Severe S | Slight to Severe S | Good | Good |
| Helena | Slight to Severe S | Severe SP,W | Slight to Moderate S | Severe SS,S,W | Severe SS,LS | Severe C | Moderate SP,W,C | Moderate W,S,C | Moderate SP,W,C | Good | Good |
| Herndon | Moderate to Severe SE,S | Moderate SP,S S | Slight to Moderate S | Slight to Severe | Severe LS | Moderate C,S | Slight to Moderate S | Slight to Moderate S | Moderate to Severe ST,S | Good | Good |
| Hiwassee | Moderate to Severe S | Moderate to Severe SP,S | Slight to Severe L | Moderate to Severe LS,S | Moderate to Severe LS,S | Moderate to Severe C,S | Slight to Severe C,S | Slight to Severe C,S | Moderate to Severe S | Good | Good |
| Iredell | Severe W,S | Severe SP,W | Severe W | Severe W,SS,S | Severe LS,SS | Severe W | Severe W | Moderate W,SM | Severe W,S,SM | Good | Good |
| Leaksville | Severe R,W | Severe SP,W,R | Severe W | Severe W,SS,LS | Severe LS,SS,W | Severe R,W,C | Severe W | Severe W | Severe W | Poor | Poor |
| Lignum | Severe W,S | Severe SP,W | Severe W | Severe W,S | Severe LS | Severe W | Severe W | Moderate W,SM,S | Severe W,SM,S | Poor | Good |
| Lockhart | Moderate to Severe S,SM | Slight to Severe S | Slight to Severe S | Moderate to Severe S | Slight to Severe S | Moderate to Severe SM,S | Moderate to Severe S,SM | Moderate to Severe S,SM | Severe S,SM | Poor | Good |
| Madison | Moderate to Severe S,SE | Moderate to Severe SP,S | Slight to Severe S | Slight to Severe S | Moderate to Severe LS,S | Moderate to Severe C,S | Slight to Severe C,S | Slight to Severe C,S | Moderate to Severe C,S,SM | Good | Good |
| Mayodan | Moderate to Severe SE,S | Moderate to Severe SP,S | Slight to Severe S | Moderate to Severe LS,S | Moderate to Severe S,LS | Moderate to Severe C,S | Slight to Severe S | Slight to Severe S | Slight to Severe S | Good | Good |
| Mecklenburg | Moderate to Severe R,S | Severe SP,S | Slight to Severe S | Severe LS,S | Severe LS,S | Severe C,S | Slight to Severe S,SM | Slight to Severe S,SM | Moderate to Severe S,SM | Good | Good |
| Nason | Moderate to Severe R,SE,S | Moderate to Severe R,SP,S | Moderate to Severe R,S | Moderate to Severe SS,S | Severe LS,S | Moderate to Severe C,S | Slight to Severe S | Slight to Severe S | Moderate to Severe SM,S | Good | Good |
| Orange | Severe W,S | Severe SP,W | Severe W | Severe W,SS,S | Severe LS,SS | Severe W | Severe W | Moderate W,SP,S | Severe W,S | Fair | Good |
| Pacolet | Moderate to Severe SE,S | Moderate to Severe SP,S | Slight to Severe S | Slight to Severe S | Severe L,S | Moderate to Severe C,S | Slight to Severe S,SM | Slight to Severe S,SM | Moderate to Severe S,SM | Fair | Good |
| Pinkston | Severe R,S | Severe R,S | Severe SE,S | Moderate to Severe R,S | Moderate to Severe R,S | Severe R,S | Slight to Moderate S,SM | Slight to Moderate S,SM | Slight to Severe S,R,SM | Fair | Good |
| Roanoke | Slight | Severe F,SP,W | Severe F,W | Severe F,LS,W | Severe F,LS,W | Severe F,W,C | Severe F,W,SP | Severe W | Severe F,W,SP | Poor | Fair |
| Sedgefield | Slight to Severe S | Severe SP,W | Moderate W | Severe SS | Severe SS | Severe C,W | Moderate SP | Moderate W | Moderate SP,W | Good | Good |
| Spray | Moderate SE,S | Moderate SP | Slight | Moderate LS,S | Moderate LS | Moderate C | Slight to Moderate C,D | Slight to Moderate C,D | Slight to Moderate S,C,D | Fair | Good |
| Tatum | Moderate to Severe SE,R | Moderate to Severe R,SP,S | Moderate to Severe R,S | Moderate to Severe SS,S | Severe LS,S | Moderate to Severe C,S | Slight to Severe SM,S | Slight to Severe SM,S | Moderate to Severe S,SM | Fair | Good |
| Vance | Moderate to Severe SP,S | Severe SP,S | Slight to Severe S | Severe LS,S | Severe LS,S | Severe C,S | Moderate to Severe SP,S | Slight to Severe S | Moderate to Severe SP,S | Good | Good |
| Wadesboro | Moderate to Severe R,SE,S | Moderate to Severe R,SP,S | Moderate to Severe R,S,C | Moderate to Severe SS,S | Severe LS,S | Moderate to Severe C,S | Slight to Severe S | Slight to Severe S | Moderate to Severe S | Good | Good |
| Wedowee | Moderate to Severe S | Moderate to Severe SP,S | Slight to Severe S | Moderate to Severe LS,SS,S | Moderate to Severe LS,SS,S | Moderate to Severe C,S | Slight to Severe C,S | Slight to Severe C,S | Moderate to Severe S,C | Good | Good |
| Wehadkee | Severe W,F | Severe W | Severe SE,W,F | Severe W,F | Severe W,F | Severe F,W | Severe W,F | Severe W | Severe W,F | Poor | Poor |
| Wilkes | Moderate to Severe S,R | Severe R,S | Severe SE,S | Moderate to Severe S,SS | Slight to Severe S | Moderate to Severe R,S | Moderate to Severe SP,S | Slight to Severe S | Moderate to Severe S,SP | Fair | Good |

**Abbreviations**

**C** — Too Clayey
**D** — Dusty
**F** — Floods
**FA** — Frost Action
**LS** — Low Strength
**MP** — Moderate Permeability
**PR** — Percolates Rapidly
**R** — Depth to Rock (soil shallowness)
**S** — Slope
**SE** — Seepage
**SM** — Small Rocks
**SP** — Slow Percolation
**SS** — Shrink — Swell
**ST** — Large Stones
**W** — Wetness

A **slight** limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome.

A **moderate** limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design.

A **severe** limitation indicates one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Good, Fair and Poor — These terms are parallel to slight, moderate and severe definitions.

Physical characteristics and engineering properties were furnished by the U.S. Department of Agriculture, Soil Conservation Service. Appreciation is expressed to Hubert J. Byrd and Ernest N. Hayhurst, Soil Conservation Service, and O. Don Philen, Natural Resources and Community Development, Soil Survey Section, for their help in preparing these charts.

# SUPPLEMENT TO GEOLOGIC MAP OF REGION G

## ENGINEERING INTERPRETATIONS OF SOILS

## PHYSICAL CHARACTERISTICS OF SOILS

## MAP UNITS CORRELATED WITH TOPOGRAPHIC FEATURES AND MINERAL RESOURCE USES

By
P. Albert Carpenter, III
1982

MINERAL RESOURCES
MINES AND QUARRIES
DESCRIPTION OF MAP UNITS
STRUCTURAL SYMBOLS
MAJOR GEOLOGIC SUBDIVISIONS
SELECTED REFERENCES
INDEX TO GEOLOGIC MAPPING
EXPLANATION
GENERALIZED AEROMAGNETIC MAP
SALAMONOMOUNTAINS
SALAMONOMOUNTAINS AND SILTON BELT
DAN RIVER BASIN
CAROLINA SLATE BELT
CHARLOTTE BELT
CHARLOTTE SLATE BELT
CHARLOTTE BELT
CHARLOTTE SLATE BELT
CHARLOTTE BELT
CHARLOTTE

## MAGNOMETER SURVEY

52000
51800
51700
51600
51500
51400
51300
51200
51100
51000
50800
50500

MAGNETOMETER SURVEY – RESPONSE OF TOP SENSOR (DATA = TOTAL MAGNETIC FIELD STRENGTH IN GAMMAS. DATA FILTERED TO REMOVE ALL DATA WITH A VERTICAL GRADIENT OF > 500 GAMMAS.)

## LEGEND

- EXISTING 10 FT. CONTOUR
- EXISTING 2 FT. CONTOUR
- PROPERTY BOUNDARY
- PERMITTED FACILITY BOUNDARY
- CELL BOUNDARY
- STREAM
- EXISTING TREELINE
- EXISTING ROAD
- ACCESS ROAD
- POSSIBLE DIKE
- COMPLIANCE WELL LOCATION — MW-1
- PIEZOMETER LOCATIONS — P-5
- PROPOSED PIEZOMETER LOCATIONS — P-24
- BORING LOCATIONS — B-5
- CORING LOCATIONS — C-3 OR TW-2
- BASE STATION

| PROPERTY BOUNDARY LINE TABLE | | |
|---|---|---|
| LINE | LENGTH | BEARING |
| L1 | 47.98 | N14°06'41"E |
| L2 | 57.46 | N12°37'48"W |
| L3 | 47.08 | N58°03'52"W |
| L4 | 26.89 | N39°47'37"E |

NOTE: MAPPING BY SPATIAL DATA, INC. OF HIGH POINT, NORTH CAROLINA. DATE OF AERIAL FLYOVER WAS 03/02/00.

OUTER PROPERTY LINE DIGITIZED BASED ON DRAWING MP-1 FROM THE MASTER SITE PLAN BY ECOLOGIC ASSOCIATES, P.C. DATED 1/13/99. PROPERTY LINE SHOULD BE CONSIDERED APPROXIMATE.

PROPERTY LINE FOR 39.6 ACRE PROPERTY FROM A SURVEY PROVIDED BY TRIGON ENGINEERING, INC. ADJACENT PROPERTY LINES SURVEYED AND TIED INTO NORTH CAROLINA STATE PLANE COORDINATES BY TRITECH CIVIL ENVIRONMENTAL, P.C.

GRAPHIC SCALE
0 100 200 400
(FEET)

| NO. | BY | DATE | REVISIONS AND RECORD OF ISSUE |
|---|---|---|---|

DESIGNED VB
DRAWN CADD/RFB
CHECKED VB
APPROVED VB
DATE 03/24/06

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JOYCE ENGINEERING, INC.
2301 WEST MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE (336) 323-0092

COBLE'S SANDROCK
KIMESVILLE, NORTH CAROLINA

MAGNOMETER SURVEY PLAN

PROJECT NO. 419.19

SCALE 1"=200'

DRAWING NO. 1

L:\Coble Sandrock\dwg\Magnetometer Survey\MAGNOMETER SURVEY.dwg