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VOLUME ONE
SITE APPLICATION

SECTION II

HYDROGEOLOGIC REPORT & GROUNDWATER MONITORING PLAN

MRR OF HIGH POINT, LLC

CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL

HIGH POINT, NORTH CAROLINA

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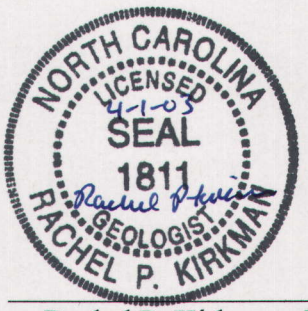

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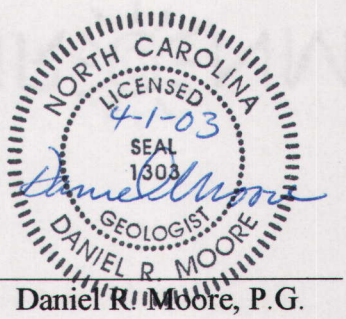

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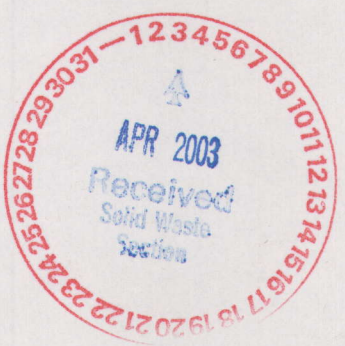

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1.0 INTRODUCTION AND OVERVIEW

In accordance with the NC Solid Waste Management Rules (NCSWMR) § .0504(1)(c and g), Material Recovery and Reclamation of High Point, LLC (MRR) is submitting this portion of the Site Application for a construction and demolition debris (C&D) landfill, which includes the Hydrogeologic Report and Groundwater Monitoring Plan. 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 proposed C&D facility consists of approximately 154 acres in Guilford County in southeastern High Point, NC. There is one disposal area, which is approximately 46 acres, and a recycling center proposed on the facility property. The first five-year phase of the proposed facility is approximately 12 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). For the reviewer's clarification, please note that the legend for the drawings referred to in the above documents is provided on Drawing No. 1. Use of the word "site" during the following discussions includes all acreage 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&D Landfill. The geophysical data indicate that the diabase dikes on site do not inhibit the ability to effectively monitor and predict groundwater flow. 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&D disposal area. There is no significant threat to current or potential groundwater users downgradient of the proposed facility. Further, the site provides an ideal setting for a landfill, as much of the surrounding land is agricultural or owned by the City of High Point and utilized for their Kersey Valley Landfill.

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 proposed facility encompasses approximately 154 acres and is located in southwest Guilford County, North Carolina, within the city limits of High Point, along Riverdale Road (Drawing No. 2). The site location, property boundaries, and surrounding topography are shown on Figure 1. The site is located in the central portion of the Piedmont physiographic province on a group of knolls and valleys, the highest elevations of which rise approximately 120 feet above the floodplain of Richland Creek.

A small northeast-trending drainage that transects the eastern portion of the site, a central north/northeast-trending drainage that bisects the site, and a small northeast-trending stream that flows along the northwestern border of the site all flow into an unnamed tributary to Richland Creek, which forms the southern border of the site and generally has a northwest orientation. The northeast trending drainage and the central drainage have springheads at their upstream limits (S-1 and S-2, respectively; Drawing No.2). The springhead S-2 is within a small pond. There is also a larger man-made pond between these two drainages.

Much of the eastern portion of the site has previously been cultivated for agricultural purposes. Trees and heavy brush occupy the western portion of the site from the ridgeline to the creek. Grass and scrub make up the vegetation in the remainder of the area in and around the proposed cells.

3.0 HYDROGEOLOGIC REPORT

3.1 Previous Investigations

Although there have been no apparent previous investigations for landfill suitability at this site, there have been previous investigations on part of the proposed facility acreage. These are assumed to be related to the adjacent Kersey Valley Municipal Solid Waste Landfill, located to the northwest of the proposed facility. One piezometer was discovered during the investigation near the current northwest property boundary. No records or identification could be found for the piezometer located on this acreage, and it was therefore designated as P-U (for piezometer-unnamed). A small triangular area was previously owned by the City of High Point and was likely investigated for use by the Kersey Valley facility. This acreage was acquired by Material Recovery of High Point, LLC in 2001.

Several data were available for the adjacent Kersey Valley facility, including monitoring well and piezometer water levels and their associated boring logs. Details of the Kersey Valley investigations that are pertinent to this study are described in more detail are subsequent sections.

3.2 Scope of Current Investigation

The field activities for this investigation were performed in February through December 2002. The initial fieldwork consisted of the installation of 21 piezometers, a field survey of the new piezometers, the drilling of three geotechnical borings, the excavation and investigation of 20 test pits, well development and aquifer testing of selected piezometers, measurement of groundwater elevations, general site reconnaissance to locate outcrops, and performance of a magnetometer survey. Four additional piezometers were installed in December 2002 and subsequently surveyed, developed and slug tested.

3.2.1 Subsurface Investigations

The field activities outlined above are described in detail below. Interpretation of the data collected during these activities is provided in subsequent sections of the report.

3.2.1.1 Drilling Program

Nineteen piezometers (P-1 through P-3, P-4A, P-5 through P-12, P-13S, P-13D, P-14, P-15S, P-15D, P-16 and P-17) were installed in and around the proposed C&D footprint from February 12-21, 2002. Bedford Well Drilling of Bedford, Virginia performed drilling and well installation activities. The drilling equipment consisted of an Acker Soil Max drilling rig equipped with 4.25-inch ID hollow-stem augers and an Ingersoll Rand T3W drilling rig equipped with a 6.0-inch OD air hammer. A licensed JEI geologist was present to observe the drilling and rock coring, log the boreholes and supervise the piezometer construction. An experienced JEI technician developed selected piezometers, i.e. those proposed for aquifer testing. The drilling and piezometer construction data are summarized in **Table 1**. The locations of these piezometers and those discussed below are provided on **Drawing No. 2.**

As part of the drilling program, five additional borings were completed (B-1 through B-5). Three of these encountered shallow bedrock and were abandoned with bentonite and cuttings as described on the individual boring logs. Two of the borings, B-1 and B-4 encountered shallow water and were converted into piezometers (P-16 and P-17, respectively).

Also during this drilling program, three locations were chosen for rock coring, with a concentration in and surrounding the first proposed phase of development. Rock core was taken at P-10, P-13 and P-15D. Approximately 15 feet of rock core were obtained from P-10 and approximately 10 feet of rock core were obtained from each location at P-13 and P-15D. Coring was performed using an Acker Soil Max drilling rig equipped with an NQ wire-line rock coring device. The rock core data are summarized in Table 2.

Two additional shallow piezometers (HA-1 and HA-2) were installed on February 22, 2002 within two of the site drainages. These piezometers were installed using a hand auger by an experienced JEI technician. A licensed JEI geologist was present to log the boreholes and supervise the piezometer construction.

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 5-foot intervals and logged by the geologist for all of the boreholes.

Piezometers P-2, HA-1 and HA-2 were installed in saprolite and range in depth from 4.5 to 10 feet with screens that range from 2.5 to 5 feet. Piezometers P-3, -4A, -13S, -16 and -17 were installed at the saprolite/partially weathered rock (PWR) transition zone and range in depth from 7 to 25 feet with screens that range from 5 to 15 feet. Piezometers P-5 and -7 were installed in PWR and are 7 and 17 feet in depth, respectively, with screened intervals of 5 to 10 feet in length, respectively. Piezometer P-15S was installed in the PWR/bedrock transition has a depth of 20 feet and a screened interval of 15 feet in length. Piezometers P-1, -6, -8, -9 and -10, -11, -13D, -14 and -15D were installed in bedrock and range in depth from 10 to 80 feet with screened intervals that range from 10

to 35 feet in length. One piezometer, P-12, was installed in all three units (saprolite, PWR and bedrock) with a 15-foot screen.

Lockable expansion caps were installed into the top of each well casing. Piezometers P-1, -11, -12, -15S and -15D were covered by lockable steel standpipes installed into 4 x 4 x 0.5-foot concrete aprons to protect their integrity. All other piezometers that may be converted into permanent monitoring wells will have lockable steel standpipes and pads installed prior to the first sampling event. Piezometers were grouted to the surface and lockable expansion caps installed in each casing. The **well construction information and boring logs** for the groundwater monitoring wells and piezometers are contained in **Appendix 1.**

Following construction, monitoring wells P-2, -3, -4A, -6, -7, -9, -12 and -15S were developed with a bailer to remove accumulated sediments resulting from the drilling and construction process, and to hydraulically connect the piezometers with the surrounding soils. A submersible pump and surge block could not be used productively due to very slow recharge in the majority of the piezometers. Approximately 10 to 45 gallons (or up to 7 casing volumes) of water, depending on recharge rates, were removed from each piezometer during the development process. All other piezometers that will be converted into permanent monitoring wells will be developed using these procedures prior to the first sampling event.

The above piezometers, existing springheads, and water elevation of the central pond were surveyed in March 2002 by Robert E. Wilson, Inc. of Greensboro, North Carolina. Elevations and horizontal locations were referenced to the N.C. Grid Coordinate System. Two permanent site benchmarks were also installed at this time. The piezometer survey map prepared by Robert E. Wilson, Inc. is provided in Appendix 2.

A historical **summary of the static groundwater elevations** for all wells and piezometers is included in **Table 3.** Static water level measurements were collected at the time of drilling, approximately 24 hours after construction (for all but five piezometers), and on or about seven days after construction. As noted on Table 3, groundwater elevations for HA-1, HA-2, P-4A and P-5 were taken at the time of drilling and after 72 hours. The time of drilling, 24-hour and 7-day groundwater elevations were unavailable for P-U. It is important to note that several piezometer water levels took several weeks to stabilize. Water levels were measured for all existing site monitoring wells and C&D investigation piezometers during 30 additional site visits through June 2002.

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. Water levels measured on April 23, 2002 in new and existing piezometers were used to prepare a groundwater contour map for the site **(Drawing No. 3).** These measurements provided the earliest stabilized readings, with the exception of two piezometers. Water levels had still not stabilized for piezometers P-1 and P-11 at that time. Inferences were made as to the stabilized water levels for these wells for the purposes of constructing groundwater contours, as noted on Drawing No. 3.

Additional water level information was collected utilizing a pressure transducer in piezometer P-1. This transducer was set to take continuous water level readings once an hour from April 16, 2002 through June 12, 2002. A Model SSP-100 In-Situ Mini-Troll™ with a 15 pounds per square inch (psi) pressure transducer and logging device was used to take and record the water levels. These data provide fluctuations over a two-month period for the bedrock hydrogeologic unit. This piezometer is also the one in closest proximity to a nearby rock quarry, which is located less than a mile from the proposed facility. The raw water level data are provided on a compact disc and a summary is included as Appendix 3.

Four additional piezometers (P-18, -19, -20 and -21) were installed December 4-17, 2002 within or near the Phase 1 area. J&L Drilling, Inc. performed drilling and well installation activities. The drilling equipment consisted of a CME 75 drilling rig equipped with 6.25-inch ID hollow-stem augers and a 6-inch OD downhole hammer, with an external air compressor. An experienced JEI geologist was present to observe the drilling and rock coring, log the boreholes and supervise the piezometer construction. Split-spoon samples were obtained at 5-foot intervals and logged by the geologist for all of the boreholes. Approximately 17 feet of additional rock core were taken from P-19 and P-20. Coring was performed using an NQ rock-coring device. The rock core data are summarized in Table 2.

Following construction, the four additional piezometers were developed with a bailer to remove accumulated sediments resulting from the drilling and construction process, and to hydraulically connect them with the surrounding soils. Approximately 5 to 30 gallons (or up to 21 casing volumes) of water, depending on recharge rates, were removed from each piezometer during the development process. All of the boring, well construction and well development logs are included in Appendix 1. These four piezometers were surveyed in December 2002 by Fleming Engineering, Inc. of Greensboro, North Carolina. Elevations and horizontal locations were referenced to the N.C. Grid Coordinate System. The piezometer survey map prepared by Fleming Engineering, Inc. is provided in Appendix 2. Additional water levels were measured for all piezometers during 4 additional site visits in November and December 2002 (Table 3).

3.2.1.2 Test Pits

Twenty test pits were excavated utilizing a Kobelco Mark IV SK 130LC Track Excavator on March 27-29, 2002. The purpose of these test pits was to obtain further information about depth to groundwater in areas where unusually high water levels were found in piezometers. The approximate locations of T-1A, T-1B, T-1C, T-2 through T-7, T-8A, -8B, and T-9 through T-17 as determined by measurements from surveyed piezometers are shown on Drawing No. 2. A licensed JEI geologist was present to inspect the test pits and confirm the presence of PWR, bedrock, dikes and groundwater, and to log the data. The boring logs for the 20 test pits are included in Appendix 1. A summary of estimated bedrock and groundwater elevations for each of these test pits is shown on Table 4.

3.2.1.3 Magnetometer Survey

The proposed site lies within a region that is characterized by the intrusion of both regional- and small-scale diabase dikes (refer to Section 3.3 for a detailed discussion). These dikes present the potential for complications related to site characterization and groundwater monitoring network design due to the fracture zones that are commonly associated with them. JEI performed a geophysical survey of the study area in order to delineate diabase dikes at the site. The results of this survey are included as Appendix 4.

As described in the detailed report, the magnetic survey was performed with a portable Geometrics G-856AX Proton Precession Magnetometer. This instrument was used to locate magnetic anomalies by measuring total magnetic field strength. The survey was completed over transects of surveyed roads and streams, oriented roughly perpendicular to magnetic north in order to intercept the dikes, which characteristically have a strike of approximately north to northeast in this region. The data were collected along these paths and locations were estimated and logged using surveyed locations such as piezometers.

3.2.2 Hydrogeologic Testing

Following rigorous development, eight piezometers (P-2, -3, -4A, -6, -7, -9, -12, and -15S) were chosen for aquifer testing during the field investigation. The purpose of the testing was to assess the values of horizontal hydraulic conductivity at various locations within the aquifers 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.

Slug tests were conducted from March 19-April 2, 2002 by an experienced JEI technician. Rising- and falling-head tests were performed on piezometers P-2, -3, -4A, and -15S. Only rising head tests were performed for the other piezometers because the water table intersected the well screen at the time of testing. Therefore, the results for a falling head test for these wells were not considered to provide an accurate estimate of hydraulic conductivity.

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. A 15 pounds per square inch (psi) pressure transducer was then lowered inside the well casing and placed approximately 1 foot from the bottom of the well. The pressure transducer was then attached to an In-Situ SE 1000C electronic data logger. A polyvinyl chloride (PVC) slug measuring 5 feet in length was then used to displace water inside the wells.

The first portion of the test was a falling head test that measured the rate water levels fell back to static after the injection of the PVC 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 at least 99% of their pre-test level, with the exception of the test for P-2. The water level

had only recovered to 82% after 90 minutes due to the extremely slow recovery time for this well. A rising head test was performed on each well after the falling head test was completed or after the water level had equilibrated, for those piezometers that only had rising head tests performed. 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 checked with hand held readings, and the test was terminated after water levels had recovered to within at least 99% of the pre-test level except for the test for P-2. The recovery for this well was approximately 94%.

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 15-30 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. Computer software produced by Starpoint Software, Inc. was utilized to assist in the analysis and plotting of data. The individual data points, computer plots of time versus water level change, and associated formulae are presented in Appendix 5. A summary of all aquifer testing performed at the site is included in Table 5.

In order to obtain a qualitative estimate of 'hydraulic conductivity' for three slowly recovering bedrock piezometers, the water levels for piezometers P-1, P-11, and P-15D were examined. The water level measurements were plotted and the corresponding hydraulic conductivities were calculated. These data span the time from twenty-four hours after well construction through June 12, 2002. These plots are also included in Appendix 5.

Three additional slug tests for piezometers within and near the Phase 1 area (P-13D, -18, and -20) were performed December 23-30, 2002 by an experienced JEI technician. Rising- and falling-head tests were performed on piezometers P-13D and -18. Only a rising head test was performed for P-20 because the water table intersected the well screen at the time of testing. These data are also summarized on Table 5 and the plots are included in Appendix 5. A geometric mean for the K values was calculated for each of the three hydrogeologic units described below as shown on Table 5.

3.3 Regional and Local Geology

This section of the report describes the geology of the site, with respect to the performance of engineered features upon the land surface in the proposed cell areas, and 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, which is in the Central Piedmont physiographic province. The relevant geological features are shown on Figure 1. Geologic unit designations and descriptions used in this report are defined on the 1:126,720-scale *Geologic Map of*

Region G, North Carolina (P. Albert Carpenter, III, 1982) and in *The Central Piedmont* (Butler and Secor, 1991).

Generally, the regional geology of the Carolina Slate Belt consists of Late Proterozoic to Cambrian volcanic and greenschist-facies metasedimentary rocks intruded by plutonic suites (Butler and Secor, 1991). The general regional geology is shown on the geologic map contained in Appendix 6. The site geology is characterized by a regional-scale felsic intrusive complex, which consists of several rock types. The felsic intrusive complex is dominated by white to gray, fine- to coarse-grained, massive to foliated metamorphosed granitic rocks. In several areas granodiorite, quartz diorite, and quartz monzonite are also present. Local shearing is common within Guilford County. Small-scale mafic dikes are also associated with this complex, and in places comprise the dominant rock type. Several small gold mines are mapped within the area (P. Albert Carpenter, III, 1982); however, no evidence of mining activity was found at the site.

During this site investigation, several exposures of massive granite were found on hillsides and in stream exposures (Photograph 1 in Appendix 7). In general, the granite is coarse-grained and contains biotite, feldspar, and quartz. A strong preferential foliation was noted in rock core from P-13, as defined by the biotite schlieren, while only a slight preferential orientation was noted for the rock cores from P-10, -13 and -15D (Photographs 2-4 in Appendix 7). Other outcrops of granite were massive in nature, with very little to no observed structure or foliation. Quartz veins of varying sizes were noted in test pit T-1B and in severely weathered outcrops near the pond (Photograph 5 in Appendix 7). One severely weathered outcrop of a fine-grained, contact metamorphic phyllite was also noted near the pond. Several small metavolcanic dikes were noted in cuttings for piezometers P-9, -10 and -11 as well as in test pits T-13, -1B, -1C and -5. This rock is fine-grained and light to dark green in color.

This region is also characterized by regional- and small-scale Mesozoic diabase dikes, although no large-scale dikes are mapped within the area in and around the site (Figure 2). Most of the dikes are near vertical in dip and trend north-south to northeast-southwest and are characterized by plagioclase, augite and olivine (Ragland, 1991). The diabase found in site exposures is weathered and fine-grained (Photographs 6 and 7 in Appendix 7). The lithology appears to be generally consistent with that described by Ragland (1991).

Bedrock elevation contours, based on auger refusal depths and additional information obtained from rock coring, are shown on Drawing No. 4. In general, auger refusal defines the top of bedrock for the site. However, as noted on the drawing, the top of bedrock was based on the assumed top of competent (i.e., non-rippable) bedrock in the two areas near P-10 and P-13. In both of these borings, rock core indicated that competent bedrock did not coincide with auger refusal.

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 in Figure 1. The orientation of many first and second order stream segments may have been determined by geomorphological development of slopes draining to the Deep River tributaries, rather than by fracture control. Because of this, the utility of topographic fracture trace analyses is limited. However, from inspection of the topography, the drainage patterns in and surrounding the site and locally around the site appear to be controlled by the regional northeast strike of the Carolina Slate belt bedrock. Many of the drainages are oriented from approximately north-south to northeast. The other dominant orientation of these drainages is an approximate west-northwest trend. Several of these trends, based on topography, can be seen on Figure 1.

Of the rock exposures found in place, none contained significant fractures or fabrics that could be measured for the purposes of determining preferential fracture orientations. The locations of the outcrops of diabase and granite are noted on Drawing No. 2. 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 also seen in outcrop that would allow for this determination. However, generally the fractures within the granite were few in number and randomly oriented. The only preferred orientation noted in 10 fractures was that the majority of them were subhorizontal to horizontal (Figure 3), suggestive of extension fractures, or sheeting, in the massive plutonic rock, in response to load release as the rock is exposed to the earth's surface.

Diabase dikes in this region are widely characterized as forming fracture zones in the country rock adjacent to their contacts. No evidence of such fracture zones was observed at the site. Based on these observations it is doubtful that the dikes have a significant impact on the site-wide groundwater flow regime. Moreover, the observed contacts between dikes and granite at this site suggest that both rocks were at similar temperatures at the time of dike intrusion, which resulted in a 'swarm-like' effect without significant fracturing or contact metamorphism of the granite. The dikes present have a dominant north to northeast trend, as seen in the density contour and rose diagram plots in Appendix 8. This trend is consistent with the general regional trend of diabase dikes (Ragland, 1991).

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 here will allow description of a general conceptual model of groundwater flow in the site area. 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 6, Table 6A and Appendix 9, to the slug tests summarized in Table 5, and to drilling information contained in Appendix 1. Because some of the groundwater flow at this site occurs in fractures, and because the subsurface is heterogeneous, utility of the numbers contained in those tables is limited, and properties are assigned, in large part, on the basis of geologic considerations described in the above sections.

3.3.3.1 Saprolite Hydrogeologic Unit

In eleven of the piezometers, the uppermost aquifer occurs in the saprolite hydrogeologic unit. However, in four of these piezometers, the water levels did not represent the true water table as discussed in section 3.4.2. All of the borings encountered saprolite except for P-5, which encountered bedrock just below surficial sediments. Distinct differences in the thickness of this unit were observed across the site. Split-spoon samples and auger cuttings of this material are described in boring logs as silty sands, sandy silts, clayey sands, sandy clays and clayey silts.

The clayey sands, sandy clays and clayey silts were only observed within the water table in P-2 and P-3, where there was the most significant development of a saprolitic horizon. These soils were also found in other borings and test pits and were saturated above the true water table as discussed in section 3.4.2. These soils are discontinuous and vary in thickness and generally occur within 5 feet of ground surface. They are easily distinguishable in the field by their mottled appearance. These soils appear to be interlayered with the silty sands and sandy silts and their laboratory-derived hydraulic characteristics were indistinguishable from the other saprolite. This clay-rich horizon obviously contributes to the vertical retention of percolating water but has little, if any affect upon the site's groundwater flow regime. Thus, this horizon was not considered as a separate unit.

Laboratory soils classifications of two split-spoon samples, one bulk sample and one undisturbed (Shelby tube) sample were defined as sandy clays (Table 6; Appendix 9). Although the laboratory-derived porosities determined from one undisturbed sample and one bulk sample were approximately 0.32-0.39 (Table 6), calculated effective porosities range from 0.20-0.31 (Table 6A). These effective porosities are similar to those typically assigned to Piedmont saprolite of approximately 0.20 (Harned and Daniel, 1989). Hydraulic conductivities are expected to be on the order of 10^{-4} to 10^{-5} cm/s, based on slug test data from two piezometers screened completely within saprolite and three piezometers screened across the saprolite/partially weathered rock transition zone (Table 5). The saprolite is considered to represent a significant hydrogeologic unit for the area in and around the proposed disposal area.

3.3.3.2 Partially Weathered Rock Hydrogeologic Unit

The uppermost aquifer surrounding the proposed disposal area in five of the piezometers occurs in what is defined as 'partially weathered rock' (PWR). The composition of the PWR is similar to the silty sands and clayey sands that overly it. Laboratory soil classifications of two split-spoon samples and one undisturbed (Shelby tube) sample collected from this unit were defined as silty sands and silty clay (Table 6; Appendix 9) and its hydraulic properties are similar to those of the saprolite unit. Therefore, the PWR is difficult to distinguish from the saprolite unit based solely on its soil classifications and hydraulic properties. However, it is visually distinct from the saprolite unit due to the prominent granitic fabric and fresh feldspar, quartz, and biotite grains as seen in split spoon samples (Photograph 8 in Appendix 7). Also, a significant increase in blow counts is associated with the transition into the PWR unit as seen in the boring logs in Appendix 1.

The base of the PWR unit is defined to coincide with auger refusal as noted in the boring logs. However, in two locations (P-10 and P-13) in the western half of the site, information provided by rock core was used to define the top of competent bedrock. In these two isolated areas, rather than defining the top of bedrock as auger refusal, the rock quality designations (RQDs) and recoveries during rock coring were used to distinguish between highly-weathered, rippable rock and true (i.e., competent) bedrock. The difference between auger refusal and the depth to competent rock as determined by rock core was approximately 10 feet at P-10 and 3 feet at P-13. For both of these locations, the rock coring data showed 0 % recovery and 0% RQD for the upper portions of these core runs (refer to boring logs in Appendix 1). Therefore, in this area, the rock core data were used in favor of the auger refusal data, as indicated on the bedrock contour map shown on Drawing No. 4. The thickness of this unit is relatively thin across the site and ranges from approximately 1.5 to 20 feet in thickness where present.

Groundwater within the upper five to ten feet of the PWR unit in most areas of the site is expected to be stored and transmitted in pore spaces, and the material can be reasonably described as hydraulically isotropic. Below this depth, groundwater will tend to be stored and transmitted in fractures. Hydraulic conductivities of the PWR unit are estimated to be similar to those estimated by slug tests in piezometers performed during the current investigation (Table 5), and also reported for saprolite at typical Piedmont sites, or approximately 10^{-4} to 10^{-5} cm/sec. Not enough undisturbed sample was available of the PWR unit to determine laboratory-derived porosity. However, the calculated effective porosities for samples within this unit as shown on Table 6A were slightly less than those calculated for saprolite samples. In general, the characterization at this site demonstrated only minor differences in hydraulic properties between the saprolite and PWR hydrogeologic units, contrary to the widely accepted 'Piedmont model.'

3.3.3.3 Bedrock Hydrogeologic Unit

The lowermost hydrogeologic unit defined for the site subsurface is defined as the bedrock unit (bedrock). Bedrock is shallow at the site along the ridgeline that runs roughly north-south in the northwestern portion of the site as well as other areas shown on Drawing No. 2 where granite is exposed at the surface, such as near P-5 and P-15S and -15D. In these areas, this unit occurs beneath a very thin layer of saprolite with little transition into PWR, as seen in several of the piezometers and borings, and on Drawing No. 4.

Hydraulic conductivities estimated by slug tests in bedrock wells as well as hydraulic conductivities reported for other Piedmont sites, are in the range of 10^{-5} to 10^{-8} cm/sec (Table 5). Hydraulic conductivities of the fractured bedrock unit are expected to fall within this range, and vary locally with fracture intensity. However, many of the hydraulic conductivities measured for bedrock piezometers at this site are very slow as compared with other Piedmont sites. This is further supported by the highly competent nature of the granite that underlies the site, as noted above in section 3.2.2 and in the RQDs shown on Table 2.

No evidence of fracture zones, significant fractures in core samples, or extensive joint patterns was found on site. Structural mapping of outcrops identified no significant fracture patterns or fabrics

that could result in preferential groundwater flow. A horizontal/subhorizontal fracture pattern was observed in outcrops, typical of massive plutonic rocks. Based on our data and observations, very few fractures appear to occur beneath the upper 15-20 feet of bedrock, depending on the degree of weathering. In general, the observed trend of fractures as seen in the granitic rock core at this site is that the RQD increases with depth (Figure 4). Therefore, groundwater movement through this unit is predicted to be very limited with increasing depth. The hydraulic conductivities derived from measurements of water levels in three wells with very slow recoveries are expected to be more representative of true values in areas where bedrock fracture size and density is small. Effective porosity of bedrock at the site is expected to be one percent or less (Heath, 1989).

3.3.4 Weathering Profile

Within some of the east-central portion of the site, completely weathered and severely weathered granite has resulted in sandy silts, silty sands, sandy clays and clayey sands that range up to 14 feet in thickness. Other areas are characterized by a thicker zone (up to 20 feet) of partially weathered rock with relatively fresh feldspar, quartz and muscovite crystals and a definitive granitic fabric. A few borings encountered saprolite interlayered with partially weathered rock.

The interface between PWR rock and unweathered bedrock is generally abrupt, and occurs over intervals of a few feet, as demonstrated by Rock Quality Designations (RQDs), fracture counts, and descriptions of rock core from site borings (Table 2; Appendix 3). Standard penetration tests (SPT) and auger refusal information (Appendix 3) are highly variable over short intervals. The SPT blow counts typically change from very low to very high (i.e., single digit counts to 50/X counts) over a relatively limited depth range.

3.4 Site Hydrogeology

The following section discusses the hydrogeological aspects of the site, with emphasis on the proposed C&D disposal area. A significant amount of hydrogeologic investigation was performed on the site including a geophysical survey for diabase dikes, and the installation of 25 piezometers, 3 borings, 20 test pits, and 5 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 120 feet above the floodplain of the Deep River (Figure 1). Regionally, surface water and groundwater both flow south to southwest towards Richland Creek, a major tributary to the Deep River. This tributary is approximately 1300 feet south of the property line and the Deep River is approximately 0.5 mile east of the site. In the vicinity of the proposed C&D area, groundwater flow is generally to the southwest, and discharges to the surrounding tributaries that eventually flow to the Deep River. Groundwater beneath the site flows in three vertically interconnected hydrogeologic units, a saprolite, a PWR and a bedrock aquifer.

3.4.2 Unsaturated Zone Water Accumulation

During the initial drilling program, it was noted that unusually high water levels were present in several locations. These anomalous measurements prompted the installation of additional piezometers and lead to the excavation of numerous test pits as mentioned in section 3.2.1.2. It should also be noted that these observations were made during relatively normal spring climatic conditions. Excessive rainfall events did not precede the observations outlined in the following paragraphs.

Initially five borings were completed in addition to the original piezometers in order to supplement depth to bedrock information. Water was discovered in two of these boreholes, B-1 and B-4, and they were subsequently converted to piezometers P-16 and P-17 (refer to boring log/construction diagrams in Appendix 1). Based on the water level data in the surrounding piezometers and streams, the water levels in these two piezometers were anomalous. Another anomalous water level was noted in piezometer P-12. The borehole was originally drilled with hollow stem augers to refusal and water entered the borehole to a depth of approximately 2.5 feet below ground surface. After advancing the borehole with air drilling methods, the water level in this boring dropped approximately 5 feet, where it stabilized after piezometer construction (refer to hydrograph for P-12 in Appendix 10). The water level in piezometer P-4A also rose to an unexpected high level. In order to further investigate the anomalous high water levels, two piezometers were constructed in the borehole for piezometer P-13. The shallow well was screened in the shallow water that was encountered a few feet below ground surface. The deeper well was sealed off from this horizon and screened in the PWR/bedrock transition zone, approximately 10 feet below the upper water level, where the true water table was anticipated to occur. The stabilized water levels for these two piezometers are several feet apart (refer to hydrograph for P-13S/-D in Appendix 10).

Due to the anomalous water level readings in these piezometers, 20 test pits were excavated to further characterize the true water table throughout the site. Most of these test pits were located near existing piezometers where stabilized water levels had been established, and/or in areas of anomalously high water levels (Drawing No. 2). As shown on Table 4 and the hydrographs in Appendix 10, a few of the test pits were dry upon excavation and remained dry, and several had water at the time of excavation and then went dry. A cluster of test pits, T-1A, -1B and -1C together with piezometer P-4A revealed that water was present in only T-1B and P-4A, despite the fact that the other two test pits were excavated to lower elevations (refer to boring logs in Appendix 1, Table 4 and Drawing Nos. 5 and 6).

Upon observation of the test pits, water was noted to seep in from very shallow depths (i.e., approximately 3-5 feet below ground surface) that often coincided with the occurrence of orange/gray mottled clayey sand or sandy clay horizons. In nearly all of the test pits where water accumulated, the depth at which water entered the excavation was well above any reasonable estimation of a stabilized water table. Further, the water levels in many of the test pits as well as in piezometers P-4A, -16 and -17 dropped off significantly over time. In fact, the water level in P-4A dropped off rapidly over the course of a few hours after test pit T-1B was excavated approximately 10 feet beside the piezometer as water drained into the pit.

Based on the data collected from piezometers and test pits, a working model was developed in order to explain the anomalously high water levels. A graphical interpretation of this model is presented as Figure 5. As shown in the figure, the anomalously high water levels can be explained by accumulation of water percolating through the unsaturated zone. Due to the very low permeability of some of the clay-rich saprolitic horizons, surface runoff and precipitation infiltrates into the saprolite and accumulates in these horizons of low permeability.

The potential for groundwater to rise up through capillary action into the unsaturated zone has also been considered to explain the anomalous, shallow water levels. However, based on the soil types present at this site, the impact from capillary rise is not significant enough to explain most of the elevated water levels. Typical values of capillary rise for fine-grained silts and clays are on the order of 1-6 feet at most (Schulz, 1989). Thus, while capillarity may have some influence on the model as a whole, the low permeability horizons are thought to dominate the processes contributing to localized elevated water levels at the site. This model provides a reasonable explanation of the anomalous water levels found during the site investigation.

It is apparent from the test pit data that water accumulated in this shallow horizon may also locally migrate sub-horizontally before eventually infiltrating to the water table. Based on observation of test pits during excavation, dikes and quartz veins locally capture and channel percolating water. Differential weathering of the dikes and veins relative to the saprolite results in localized groundwater flow path alterations within the overall saprolite unit.

3.4.3 Site Groundwater Flow Regime

The surficial aquifer at this site occurs within all three hydrogeologic units. The potentiometric surface based on water level readings taken on April 23, 2002 is shown on Drawing No. 3. Several cross-sections are provided to illustrate the vertical component of groundwater flow (Drawing Nos. 5, 5A, 6 and 6A). The seasonal high groundwater contour map (Drawing No. 7) described in detail below in section 3.5.1.4 was also used to determine site-specific groundwater flow velocities as shown on Drawing No. 7A.

The upper parts of saprolite and PWR are expected to behave, as a whole, as a relatively isotropic, porous medium, where groundwater flow directions conform to the potentiometric surface defined by water table wells. With increasing depth through the PWR and upper portions of bedrock, groundwater flow is expected to be governed increasingly by fracture pathways. No preferred fracture orientations were noted for the PWR or bedrock unit at the scale of several split spoon samples, seven rock cores, and structural mapping of outcrops. Due to the lack of prominent fabric or preferred fracture orientations, groundwater within bedrock is also expected to mimic the site's topographic features.

Given the competence of the bedrock unit, it is expected that a significant amount of *interflow* occurs in the unsaturated zone, thus limiting the amount of aquifer recharge occurring in the bedrock aquifer areas of this site. As discussed in Fetter (Applied Hydrogeology, Second Edition, 1988, p. 38):

"If the unsaturated zone is uniformly permeable, most of the infiltrated water percolates vertically. Should layers of soil with a lower vertical hydraulic conductivity occur beneath the surface, then the infiltrated water may be move horizontally in the unsaturated zone. This ***interflow*** *may be substantial in some drainage basins and contribute significantly to total streamflow. Thin permeable soil overlying fractured bedrock of low permeability would provide a geologic condition contributing to significant interflow."*

The western boundary of the proposed C&D area is bordered by one northeast and one northwest trending unnamed tributaries that eventually discharge to the Deep River (Figure 1). Given the generally unfractured nature of the bedrock, groundwater in all three hydrogeologic units beneath the proposed disposal areas will flow towards and discharge to these unnamed tributaries.

3.4.3.1 Horizontal Gradient Calculations

Horizontal hydraulic gradients for the proposed C&D disposal areas were calculated using gradient segments from the seasonal high groundwater surface contours shown on Drawing No. 7A. These gradient segments were selected to represent gradients within the uppermost aquifers of the three hydrogeologic units. The gradient calculations were focused within the Phase 1 area. Other future phases may show more variability in gradients due to differences in topography.

Estimates of hydraulic conductivity obtained from slug tests, long-term data logger measurements, and periodic water level measurements. Hydraulic conductivity values generated by slug test recovery data on individual wells at this site are considered to be higher than actual conductivities for site-scale movement of groundwater. Curves generated by the slug test recovery data indicate that the data are dominated by near-field, or skin effects, and are reflective, in part, of the properties of the well screen filter pack judged to have greater hydraulic conductivity than the surrounding in-situ soils. The hydraulic conductivities (Ks), as determined by the single well aquifer tests, range from 1.1×10^{-4} to 9.5×10^{-8} cm/sec. The geometric mean of K values was calculated for each of the three hydrogeologic units (saprolite = 7.4×10^{-5}; PWR = 9.7×10^{-5}; bedrock = 2.7×10^{-6}) and used for groundwater flow calculations.

The average horizontal gradients for gradient calculation segments along with the geometric mean for available K values were used to estimate linear groundwater flow velocities. Average linear groundwater flow velocities were computed using the following modified Darcy equation:

$$V = Ki/n_e$$

where V = average linear velocity (feet per day), K = hydraulic conductivity (ft/day), i = horizontal hydraulic gradient, and n_e = effective porosity. Effective porosity values were calculated for each of the three hydrogeologic units, as described in section 3.3.3.2 and shown on Table 6A.

Data and calculations for the horizontal gradients are presented in Table 7. The calculated horizontal gradients from all of the well pairs in the vicinity of the proposed C&D areas range from approximately 0.034 to 0.083 ft/ft. Calculated linear groundwater velocities are approximately 9 to

11 ft/year for the bedrock unit, 57 to 64 ft/year for the PWR unit, and 26 to 31 ft/year for the saprolite unit.

An average linear groundwater flow velocity was calculated for bedrock wells using the equation mentioned above, although these values are not considered valid for groundwater flow in fractured media (Parker et al., 1994). Groundwater flow velocities within the fractured bedrock aquifer are likely to be highly variable, and, in some cases, less than those velocities calculated for the saprolite and PWR units. The latter was true for several bedrock wells at the site that took several weeks to reach a stabilized water level. The available hydraulic conductivity values for bedrock wells range from 6.1×10^{-5} to 4.1×10^{-8} cm/sec, which is consistent with values for slightly fractured to unfractured bedrock.

3.4.3.2 Vertical Gradient Calculations

One nested piezometer pair (P-15S and -15D) was utilized for purpose of measuring a vertical hydraulic gradient. This pair is located downgradient of the proposed Phase 1 area near the confluence of the two main drainage features at the site. Calculations were performed using water levels measured on four different dates. Vertical gradients were calculated using the vertical distance between the screen midpoints of the pairs. The screen midpoint for the shallow well was based on the portion of the screen that was below the water table for each given date, if the screen was not completely within the water table. Vertical gradients calculated for the well pair indicate a strong upward gradient and therefore suggest that groundwater discharge is taking place in this area. A summary of all available vertical gradient data is presented in Table 8. Several cross-sections are also provided to illustrate the vertical component of groundwater flow (Drawing Nos. 5, 5A, 6 and 6A).

3.4.3 Diabase Dikes

The geophysical survey identified one relatively large, area of discontinuous magnetic anomalies trending through the middle of the site (Drawing No. 2). One other relatively large north-northeast trending magnetic anomaly was identified near the eastern property line. Two smaller anomalies were also identified – one in the central area of the proposed Phase 1 disposal area and one near the drainage along the southern border of the disposal area, adjacent to P-5. These anomalies are interpreted to represent diabase dike swarms, which are common through the region and noted in some site exposures, rather than linear features characteristic of Triassic diabase dikes. Details of these anomalies are found in the report in Appendix 4 and on Drawing No. 2. The largest anomaly is approximately 200 feet at its widest point, while the smaller anomalies are on the order of 50 feet or less. The mapped anomalies shown in red on Drawing No. 2 do not appear to be linear and the fluctuating nature of the measurements taken within these areas are in agreement with the swarm-like occurrence of the diabase noted in outcrops as described below.

It is important to note, as outlined in Appendix 4, that the anomalies do not strictly correlate to the presence of diabase. The only surficial evidence of these anomalies was found in sparse diabase float. Evidence of diabase was also noted in test pit T-14 and the boring for piezometer P-10. As

mentioned in the magnetometer report in Appendix 4, the only outcrops of diabase were found along the stream oriented northwest along the southern property border. These dikes appear as small, interconnected dike swarms with lenses of granite (refer to photographs in Appendix 4). Significant fractures within the country rock were not observed, nor were they expected, based on the small size of the dikes (refer to section 3.3.2). It is also important to note that diabase was not found in any of the borings and test pits within the mapped anomalies.

These data suggest that diabase throughout the site occurs as small, discontinuous, dike swarms intermingled with granite. The highly-localized fracture zones associated with these dikes, if present, are interpreted to have little significant impact on groundwater flow. Impacts are generally limited to localized control of water flow in the saprolite. This conclusion is also supported by the groundwater contour map (Drawing No. 3) and the cross sections (Drawing No. 6 and 6A), which demonstrate that there are no evident discontinuities in the water table surface in areas where magnetic anomalies were detected.

3.5 Site Suitability

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

3.5.1 Relationship of Geology and Groundwater to Waste Disposal Units

Numerous borings, rock corings, piezometers and test pits have been drilled or excavated on site, and the area has been adequately characterized. The geologic characteristics of the site are typical of the Piedmont, with the exception of the unsaturated zone accumulation of water and the significant interflow inferred at the site. Neither of these conditions poses challenges to, nor will require unusual monitoring requirements.

3.5.1.1 Vertical Separation from Bedrock

The top of bedrock contours and top of bedrock elevations in all available site borings and rock corings are based on the determinations described in detail in section 3.3.3.2. The data are shown on Drawing No. 4. Proposed base grade contours are also shown on this drawing to allow comparison of the vertical separation from bedrock. As shown on the drawing, the proposed base grades are at least 4 feet above the top of competent bedrock. In the area beneath the proposed footprint, the occurrence of bedrock is generally below the water table except in the areas noted in section 3.3.3.2, where bedrock is shallow. This is illustrated on the hydrogeologic cross-sections identified on Drawing Nos. 5 and 5A, and shown on Drawing Nos. 6 and 6A.

3.5.1.2 Vertical Separation From Seasonal High Water Table

At the time design base grades for the C&D area were finalized in June 2002, limited seasonal groundwater data were available for the site piezometers. Many of the piezometers screened in bedrock took up to 3 months to reach static water levels. Therefore, predictions of the seasonal

range of water levels for the site were based on the recorded ranges of available measurements from existing site monitoring wells at the adjacent Kersey Valley Landfill, located just west-northwest of the proposed site. These data were supplemented with precipitation records for the area, as described in the following paragraphs. The data referred to below are contained within Tables 9, 10 and 10A, Figure 6, and Appendix 11 to this report.

The original seasonal high groundwater calculations submitted in June 2002 were based on data available from the nearby Kersey Valley Landfill wells, which were obtained from the available semiannual groundwater reports and the most recent site characterization study for the landfill expansion prepared in March 1999. The available water level data available for the June 2002 estimates, which were from 1994-2001, were examined and evaluated with respect to the average precipitation value for Guilford County, North Carolina for the same time period. The average precipitation for 1994-2001 is slightly below the long-term average for Guilford County (Piedmont Triad International Airport), based on data from 1931-2001, as shown on Table 9.

Next, each of the piezometers in and around the proposed C&D areas were compared to the Kersey Valley Landfill wells, by grouping the wells and piezometers based on similar topographic settings and proximity to surface drainages. The average water level deviations from wells in each group were calculated based on these data. The seasonal high water elevations were then calculated by adding 2 to 6 feet to the elevation measured on April 23, 2002 for a given piezometer, depending on the factors mentioned above. The original (June 2002) seasonal high groundwater elevations are shown on Table 10A.

After the installation of 4 new piezometers in December 2002 and 4 months of above average rainfall in September-December 2002, the seasonal high groundwater estimates were re-evaluated. As shown in Table 9, the total rainfall for 2002 is approximately equal to the average for the 1931-2002 period. Also, 2002 rainfall data from Martin Marietta's rock quarry, which is located less than a mile north of the site, were evaluated (Table 9). The average rainfall for 2002 based on these data is well above normal (Figure 6). It is important to note that the rain gauge data collected at the quarry represent the minimum totals, as data are not consistently collected on weekends. Given these conditions, it was inferred that the fall 2002 water levels on site are at or above seasonal high conditions.

As shown in Table 10A, the original estimates were similar, if not conservative, as compared with actual seasonal high conditions during fall 2002, with one exception. The water level measured in P-13D, which is inferred to represent seasonal high or higher as discussed above, was approximately 2 feet higher than the predicted high. The data from the Kersey Valley Landfill were also re-evaluated, including 2002 data that were not available for the original (June 2002) estimates. Based on these calculations, the seasonal high adjustments are generally still very conservative as compared to actual observed fluctuations near the site. To confirm this finding, data from the White Street Landfill in Greensboro, NC were also evaluated using this approach, with similar results. Tables that summarize these calculations are included in Appendix 11. The re-calculated seasonal high groundwater estimates are shown in Table 10. The stabilized groundwater elevations for P-18, -19, -20 and -21 were used as supplemental seasonal high values. Other seasonal high values were the

same as the original values, except for P-13D, which was adjusted for 6 feet of increase rather than 4 feet as originally estimated.

The revised seasonal high groundwater map is included as Drawing No. 7. Water levels from piezometers P-4A, P-16 and P-17 were not included in the seasonal high water table map, as described on Drawing No. 7 and in section 3.4.2 above. These seasonal high adjustments are conservative based on the data described above and presented in Table 9 and Appendix 9. Proposed cell basegrades elevations are at least 4 feet above the estimated seasonal high groundwater levels, as seen on the groundwater map (Drawing No. 7) and in cross-sections on Drawing No. 6.

3.5.2 Potential Groundwater Receptors

Two occupied houses exist in the northeastern portion of the proposed site. The northernmost house is currently supplied by public water, although a well is located on the property (identified as WW-2 on Drawing No. 2). The other house has an associated water well that is currently in use (identified as WW-1 on Drawing No. 2). Well WW-2 and the associated structures will be abandoned prior to or during construction of the reclamation pad. Well WW-1 will be abandonded prior to or during construction of disposal phases within a 500-foot radius. Specific well abandonment activities are summarized in section 4.0 of this report.

Several other residences are located on the north side of Riverdale Drive, opposite the proposed site. These homes must be considered as potential receptors. Although a public supply of water is available, use of groundwater is not precluded. These houses are located upgradient of the proposed site and the appropriate dwelling/water well buffers have been incorporated into the landfill design.

A small subdivision consisting of approximately 14 residential dwellings is located northwest of the proposed site. While several private water wells were noted along this road, public water is also available. Based on the groundwater flow paths and the fact that a significant drainage separates the proposed waste disposal area from this development, it is not anticipated that groundwater would flow in this direction. Furthermore, these homes have been purchased by Material Recovery and Reclamation of High Point, LLC since the original submittal in June 2002 and will be demolished prior to waste disposal within 500-feet of the nearest residence.

As shown in continuous water levels taken from piezometer P-1 as described in Section 3.2.1.1, it is not likely that the aquifers within the site are affected by any significant local pumping, either from private potable wells or industrial pumping of groundwater. Water levels from piezometer P-1 steadily increased over a period of several weeks before reaching static water levels. No appreciable decreases or increases in water levels were noted for this well other than precipitation-related changes (Table 9). If the uppermost aquifer at the site were being influenced by groundwater withdrawal activities, it is likely that some anomalous signature would be present in the pressure transducer data logs from this well.

3.5.3 Ability to Effectively Monitor Groundwater

No known or potential significant sources of contamination have been identified within 2000 feet of the property boundary. Groundwater flowing southwest 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&D disposal areas. The discharge features along the western and southwestern facility boundary serve as effective groundwater flow boundaries between the proposed cell and potential receptors. Surface water monitoring points are included in the proposed monitoring program as additional safeguards for detecting a release from the facility.

3.6 Conclusions

The purpose of the Hydrogeologic Report is to present the assessment of geologic and hydrogeologic characteristics of the proposed site, especially as they relate to proposed C&D construction. Furthermore, the report must present data in support (or non-support) of the site's use for C&D waste management activities. This report presents the 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.

In summary, a review of the geologic and hydrogeologic data indicates that the site is located within typical Piedmont terrane. The only exceptions to this are that the water levels in several piezometers are affected by the unsaturated zone accumulation of water, and the amount of interflow inferred for this area appears to be relatively high. However, as described above, it is not anticipated that the zones of low permeability will be a significant hydrogeologic issue because they are shallow and will be largely excavated during construction of the cell basegrades. The condition of interflow serves to reduce the infiltration of groundwater into bedrock, increasing the effectiveness of the proposed monitoring system. Depths to groundwater and bedrock are well defined in and around the site.

Study of the regional structural setting indicates a potential for regional preferential flow paths. These regional preferential flow paths include the north-south/northeast-southwest trending regional-scale diabase dikes. Although similar trends are reflected in the site drainages, no other site-specific preferential fractures were noted in the rock core collected or outcrops observed during this study. In fact, bedrock fractures were only observed in the uppermost horizons. Below the PWR, the rock is very competent with few fractures and the hydraulic conductivity is very low. Because these conditions are well-defined, the design of an effective groundwater monitoring system for the facility is possible.

4.0 GROUNDWATER MONITORING PLAN

4.1 Introduction and Purpose

This Groundwater Monitoring Plan was prepared to serve as a guidance document for collecting and analyzing groundwater samples, managing groundwater analytical results, and monitoring for any potential releases to the uppermost aquifer from the proposed C&D Landfill. The Plan is submitted in conjunction with the Hydrogeologic Report, in accordance with NCSWMR Subchapter 13B, .0504(1)(g)(iv) as part of the Site Application for the facility. This Plan also addresses the requirements for surface water monitoring specified in Rule .0602, and 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*). The necessary geologic and hydrogeologic characteristics of the proposed C&D area are summarized in this Plan and are supported by detailed descriptions provided in the Hydrogeologic Report, Section 3.0.

Given the waste capacity of this proposed facility, the groundwater monitoring network described herein is designed to monitor the first five-year phase at the facility. The proposed compliance monitoring network will be installed prior to and/or during construction of the first landfill phase. Magnetic anomalies identified in several areas of the site may be associated with diabase dikes, prompting the strategic placement of monitoring wells. In such areas, well installation will follow the basegrade excavation in order to identify and map the presence of any potential dikes. Well placements may be modified in the event that preferential flow pathways are identified in the cell subgrade. As the facility develops eastward and additional phases of the proposed facility are developed, additional monitoring wells will be proposed and this monitoring plan will be amended as necessary.

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 and proposed groundwater monitoring wells are included as Appendix 12 to this report. A summary of well construction specifications is provided on Table 11.

4.2.1 Background and Compliance Monitoring Wells

Monitoring well MW-1 is proposed as the upgradient background monitoring well for the facility. Two new wells (MW-2 and MW-3) and three existing wells (MW-4S, MW-5 and MW-6) are proposed as downgradient compliance monitoring wells. Well MW-4D is not part of the compliance network; however, water levels will be obtained from this well. The proposed monitoring well network is shown on Drawing No. 8 with the potentiometric surface contours for reference.

Background monitoring well MW-1 is located upgradient from and approximately 350 feet north of the closest proposed waste boundary. The well will be screened within bedrock and PWR to intersect the water table.

Each compliance well, with the exception of the existing wells MW-4S and -6, will be or is located approximately 125 feet from the waste unit boundary, and a minimum of 50 feet from the property line. Wells MW-4S and -6 were installed during the site characterization and are located approximately 175 and 113 feet from the proposed waste boundary, respectively. In the event that the proposed locations are shifted more than 25 feet in any direction due to field conditions, the Solid Waste Section will be notified prior to drilling and well construction. Approval of the altered location will be obtained, or an alternate location will be agreed upon. Each well will be or is screened across the water table with a well screen 15 feet in length, except for MW-6, which has a 7-foot screen. Given average climatic conditions, approximately 10 to 12 feet of well screen will be placed below the water table for all wells except for MW-6.

With the absence of major structural lineaments traversing the disposal areas, many of the monitoring well locations were chosen based on localized topographic features. These features are generally a representation of the water table and as such, are useful in predicting areas of groundwater flow convergence. These features provide well-spaced downgradient monitoring points along the western side of the proposed disposal area. Proposed locations of wells MW-2 and MW-3 are shown on Drawing No. 8. Each of these wells is anticipated to be screened within PWR and bedrock. Well MW-4S is located downgradient of the proposed southwestern corner of the landfill. and is screened across the interface of PWR and bedrock. Monitoring well MW-5 is located downgradient from and south of the disposal area. The location of this well was chosen to intercept the potential groundwater flow associated with the north-south trending magnetic anomaly identified in the Phase 1 area as well as to intercept the shallow groundwater flow converging on the related drainage. The well is screened within saprolite, PWR and bedrock. Well MW-6 is located downgradient and southwest of the disposal area, between wells MW-4S and MW-5.

4.2.2 Installation and Maintenance of Groundwater Monitoring Network

Monitoring wells MW-4S, -4D and -5 were installed in February 2002, while MW-6 was installed in December 2002 by JEI. 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). Details of well drilling and construction are presented in Section 3.2.1. The additional proposed wells will also be 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). The proposed 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, as necessary, identification labels, cement pad condition, locking caps and locks, and access to the wells. Should it be determined that the background or a compliance monitoring well no longer provides samples representative of the quality of groundwater passing the relevant point of compliance, the Solid Waste Section will be notified. The owner will reevaluate 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 will be collected and analyzed according to the methods and analyses outlined in the Solid Waste Section's January 1995 memorandum entitled *Sampling and Analysis Requirements, Construction and Demolition Landfills and Closed Sanitary Landfills*. The list of analytes provided in that memo includes the North Carolina Appendix I list of volatile organic constituents (VOCs) and the 8 RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver). Additional field parameters including pH, specific conductivity, and temperature will be collected during each event. 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 one independent groundwater sample will be collected from the background and compliance wells prior to the start of disposal operations in the respective areas at the proposed C&D facility.

4.3.2 Groundwater Sampling Methodology

Groundwater samples will be collected in accordance with the Solid Waste Section's draft document titled *North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities* (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 will be 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 above the screen in 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 and cause an accelerated loss of volatiles.

In high-yield wells a minimum of three well volumes will be evacuated from the well prior to sampling. A well volume is defined as the water contained within the well itself. The well volume will be calculated using the following formula:

$$V_{well} = V_c$$

where:

V_{well} = total well volume

V_c = volume in the well casing

$$V_c = \left(\frac{d_c^2}{4}\right) \times h_w \times 7.48 \text{ gal/ft.}$$

$$V_c = 0.163\ h_w \text{ gals}$$

where:

d_c = casing diameter in feet ($d_c = 0.167$)

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 Teflon® 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. Clean disposable gloves will be worn by sampling personnel.

The upgradient/background well will always 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 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.

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.

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 sampling quarter.

The field log will contain sheets documenting the following information:

- Identification of the well;
- Well depth;
- Static water level depth;
- Presence of immiscible layers;
- Purge volume (given in gallons or number of bailers);
- Time well was purged;
- Date and time of collection;
- Well sampling sequence;
- Field analysis data and methods;
- Field observations on sampling event;
- Name of collector(s); and
- Climatic conditions including air temperatures.

A copy of the log sheet will be maintained with the event files and provided to the Solid Waste Section.

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;
- 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 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 blank will be prepared in the field from lab pure water (Type II reagent grade water) supplied by the laboratory. One field blank will be prepared for each sampling event. The field 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 blank(s). The field blank will be subjected to the same analysis(es) as the groundwater samples. As with all other samples, the time(s) of the field blank collection will be recorded so that the sampling sequence is documented. The field 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.

Concentration levels of any contaminants found in the field 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 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 samples from the facility will be analyzed by a laboratory certified by the NCDENR. Analyses will be performed in accordance with U.S. EPA SW 846 methods. Method numbers and Practical Quantitation Limits (PQLs) to be used will be those listed in the January 1995 memorandum entitled *Sampling and Analysis Requirements, Construction and Demolition Landfills and Closed Sanitary Landfills*. This memorandum is included as Appendix 13.

4.3.3.2 Reporting and Record Keeping

The laboratory analytical results will be submitted to the DWM 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 footprint will be overdrilled before they are grouted. Other wells that will potentially interfere with clearing and construction activities will be grouted in place without overdrilling. Refer to Table 12 for details of proposed abandonment procedures.

All borings (B-2, B-3, B-5) were abandoned by back-filling bentonite and cuttings into the boreholes immediately following drilling. None of these borings encountered the water table. These details of the amounts of bentonite and cuttings used to abandon these borings are summarized on Table 13.

4.4 Surface Water Monitoring

Four surface water monitoring points are proposed for the facility as shown on Drawing No. 8. Each surface water sampling location will be marked with a metal fence post located on the stream bank normal to the sampling location.

Surface water point SW-1 is located to monitor water quality in the unnamed tributary of Richland Creek, shortly after it enters the site. The sample location is approximately 150 feet inside the property line, just upstream of an existing stream crossing. Surface water monitoring point SW-2 will serve as a downstream monitoring point for the same tributary. Samples from this point will be collected at the property line. Surface water monitoring point SW-3 will be the upstream monitoring point for the larger (northwest-southeast) tributary and samples will be collected at the westernmost property line. Surface water point SW-4 will serve as the downstream monitoring point for the larger (northwest-southeast) tributary. Samples from this point will be collected at a location near the southeastern property line.

The surface water will be sampled for the constituents as outlined above for groundwater (section 4.3) that are required for C&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&D Disposal Area

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&D cells.

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TABLES

TABLE 1
Piezometer Completion Summary
MRR of High Point, LLC

PIEZOMETER NUMBER	DATE INSTALLED	CASING DIAMETER inches	WELL ELEVATIONS		TOTAL DEPTH DRILLED		TOP OF BEDROCK		SCREENED INTERVAL		SCREENED INTERVAL		LITHOLOGY OF SCREENED INTERVAL
			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	
P-1	02/21/02	2	817.64	820.04	50.5	767.14	6	811.64	30.5	50.5	787.14	767.14	Bedrock
P-2	02/13/02	2	794.31	796.78	10	784.31	>10	<784.31	5	10	789.31	784.31	Saprolite
P-3	02/12/02	2	787.62	790.06	25	762.62	>25	<762.62	10	25	777.62	762.62	Saprolite/PWR
P-4A	02/15/12	2	793.04	795.43	16	777.04	16	777.04	6	16	787.04	777.04	Saprolite/PWR
P-5	02/15/02	2	760.56	763.84	7	753.56	7	753.56	2	7	758.56	753.56	PWR
P-6	02/20/02	2	797.15	799.72	35.5	761.65	8.5	788.65	10.5	35.5	786.65	761.65	Bedrock
P-7	02/13/02	2	784.08	787.07	17	767.08	17	767.08	7	17	777.08	767.08	PWR
P-8	02/20/02	2	792.56	794.90	25	767.56	8	784.56	10	25	782.56	767.56	Bedrock
P-9	02/20/02	2	808.11	810.92	40	768.11	11	797.11	20	40	788.11	768.11	Bedrock
P-10	02/20/02	2	791.20	794.07	30.5	760.70	15	776.20	15.5	30.5	775.70	760.70	Bedrock
P-11	02/20/02	2	778.21	780.29	40	738.21	10	768.21	25	40	753.21	738.21	Bedrock
P-12	02/19/02	2	741.16	743.44	20	721.16	10	731.16	5	20	736.16	721.16	Saprolite/PWR/Bedrock
P-13S	02/19/02	2	775.55	778.11	9.5	766.05	13	762.55	2.5	9.5	773.05	766.05	Saprolite/PWR
P-13D	02/19/02	2	775.55	778.09	23	752.55	13	762.55	13	23	762.55	752.55	Bedrock
P-14	02/19/02	2	782.80	785.11	50	732.80	12	770.80	15	50	767.80	732.80	Bedrock
P-15S	02/20/02	2	731.60	733.76	20	711.60	7	724.60	5	20	726.60	711.60	PWR/Bedrock
P-15D	02/19/02	2	731.88	734.23	80	651.88	7	724.88	60	80	671.88	651.88	Bedrock
P-16	02/18/02	2	773.29	775.77	7	766.29	7	766.29	2	7	771.29	766.29	Saprolite/PWR
P-17	02/18/02	2	780.96	783.54	9	771.96	9	771.96	4	9	776.96	771.96	Saprolite/PWR
P-18	12/17/02	2	733.53	735.23	15.5	718.03	9	724.53	8.5	15.5	725.03	718.03	PWR/Bedrock
P-19	12/17/02	2	749.41	751.78	15.5	733.91	6	743.41	7.5	15.5	741.91	733.91	Bedrock
P-20	12/17/02	2	792.79	795.59	25.5	767.29	9	783.79	15.5	25.5	777.29	767.29	Bedrock
P-21	12/17/02	2	764.47	766.51	15.5	748.97	13	751.47	13	15.5	751.47	748.97	Bedrock
HA-1	02/22/02	2	770.71	773.08	4.5	766.21	>4.50	<766.21	2	4.5	768.71	766.21	Saprolite
HA-2	02/22/02	2	783.06	784.67	5.9	777.16	>5.90	<777.26	3.4	5.9	779.66	777.16	Saprolite

NOTES:
1. All elevations are referenced to mean sea level (M.S.L.); depths are referenced to ground surface (G.S.).
2. na = not applicable
3. B.G.S. = below ground surface
4. M.S.L = mean sea level
5. T.O.C. = top of casing
6. PWR = partially weathered rock
7. All piezometers were installed by Joyce Engineering, Inc. on February 13-22, 2002 and December 17,2002.
8. Piezometers HA-1 and HA-2 were installed using a hand auger.
9. Top of bedrock for P-10 and P-13 does not = auger refusal (of 5 and 10 feet B.G.S, respectively). Core data (%RQD and %Recovery) were used to determine depths of 15 and 13 feet B.G.S., respectively).

TABLE 2
Summary of Rock Core Data
Material Recovery and Reclamation of High Point, LLC

BORING LOCATION	CORED INTERVAL (feet)	% RECOVERY	% RQD
P-10	5-15	0.02	0
	15-20	97	93
P-13S & P-13D	10-13	0.03	0
	13-18	66	55
	18-23	94	87
P-15D	7-13	46	38
	13-17	98	66
P-19	7-15	100	100
P-20	10-15	75	69
	15-19	98	96

NOTES:

1. Locations P-10, P-13S/-13D and P-15D were cored in February 2002 by Joyce Engineering, Inc., using an NQ wire-line rock coring device on an Acker Soil Max drilling rig.
2. Locations P-18 and P-20 were cored in December 2002 by Joyce Engineering, Inc., using an NQ rock coring device on a CME 75 drilling rig.
3. All rock core is granitic in composition.

TABLE 3
Summary of Bedrock and Water Level Elevations for Piezometers
MRR of High Point, LLC

Piezometer Number	GW Elev. 03/26/02	GW Elev. 03/28/02	GW Elev. 04/01/02	GW Elev. 04/02/02	GW Elev. 04/05/02	GW Elev. 04/08/02	GW Elev. 04/11/02	GW Elev. 04/16/02	GW Elev. 04/19/02	GW Elev. 04/23/02	GW Elev. 05/01/02	GW Elev. 05/09/02	GW Elev. 05/17/02	GW Elev. 05/23/02	GW Elev. 05/31/02	GW Elev. 06/07/02	GW Elev. 06/12/02	GW Elev. 11/12/02	GW Elev. 12/18/02	GW Elev. 12/23/02	GW Elev. 12/30/02	GW Elev. 02/07/03
P-1	780.74	na	782.76	783.06	783.96	784.88	785.81	787.37	789.60	**791.57**	793.81	794.64	794.99	795.00	795.07	794.97	794.93	794.89	796.47	796.72	796.98	797.78
P-2	793.38	793.54	793.50	793.47	792.72	792.40	792.23	792.11	791.93	**791.43**	791.21	790.88	790.65	790.29	790.02	789.87	789.70	793.44	793.78	794.18	794.27	794.35
P-3	785.80	785.74	785.78	785.83	785.62	785.53	785.40	785.41	785.33	**785.06**	784.90	784.59	784.38	784.11	783.94	783.65	783.58	785.71	786.47	786.73	786.79	786.94
P-4A	790.44	790.38	789.01	788.89	788.59	788.41	788.18	787.99	787.85	**787.66**	787.33	786.97	786.68	786.36	786.07	785.82	785.62	789.38	789.12	789.18	789.09	789.56
P-5	755.79	755.73	755.82	755.77	755.68	755.61	755.56	755.64	755.59	**755.49**	755.23	754.88	754.67	754.46	754.45	<753.56	<753.56	755.48	756.07	756.21	756.22	756.27
P-6	779.57	779.49	779.56	779.56	779.47	779.52	779.45	779.52	779.50	**779.32**	779.34	779.16	778.99	778.81	778.70	778.44	778.41	779.66	780.21	780.33	780.49	780.31
P-7	777.07	776.90	777.10	777.00	776.92	777.04	776.95	777.17	777.23	**777.12**	777.30	777.22	777.13	776.96	776.95	776.87	776.77	776.69	777.09	777.33	777.54	777.97
P-8	776.78	776.59	776.48	776.46	776.35	776.10	775.87	775.68	775.51	**775.29**	775.12	774.90	774.77	774.64	774.59	774.47	774.44	779.53	786.58	786.90	786.99	785.15
P-9	784.58	784.53	784.56	784.55	784.56	784.57	784.57	784.62	784.62	**784.62**	784.67	784.69	784.71	784.68	784.66	784.55	784.52	783.73	784.32	784.51	785.01	789.31
P-10	766.15	766.19	766.28	766.28	766.27	766.28	766.26	766.30	766.29	**766.29**	766.31	766.32	771.37	766.39	766.43	766.37	766.37	765.89	766.07	766.18	766.18	766.37
P-11	740.18	740.17	740.34	740.36	740.43	740.54	740.62	740.76	740.81	**740.89**	740.99	741.09	741.14	741.18	741.23	741.24	741.24	740.88	744.97	740.99	742.06	742.45
P-12	733.33	733.27	733.32	733.28	733.23	733.25	733.24	733.16	733.19	**732.99**	732.96	732.54	732.19	731.83	731.51	731.09	730.93	734.23	735.25	735.34	735.31	734.99
P-13S	773.44	773.51	773.71	773.54	773.09	773.03	772.80	772.63	772.51	**772.26**	771.68	771.59	771.94	771.95	771.18	772.65	772.27	775.37	774.80	774.83	774.86	775.29
P-13D	770.28	770.08	770.09	770.09	769.64	769.22	768.46	767.30	766.71	**765.65**	764.65	763.71	763.17	762.70	762.52	762.16	762.14	771.57	771.80	771.93	771.93	771.89
P-14	762.77	762.88	763.13	763.10	763.10	763.22	763.28	763.46	763.54	**763.41**	763.39	763.11	762.84	762.54	762.29	761.84	761.66	767.42	779.11	778.84	779.26	775.65
P-15S	727.85	727.84	727.77	727.79	727.71	727.69	727.62	727.59	727.52	**727.44**	727.20	727.13	726.86	726.56	725.91	725.43	725.16	728.73	729.36	729.33	729.41	729.00
P-15D	720.65	722.57	726.05	726.57	728.13	729.45	730.48	731.51	731.74	**731.81**	732.64	731.91	732.51	732.19	731.92	731.66	731.93	734.23	732.05	732.75	733.98	734.18
P-16	770.86	770.99	770.77	770.57	770.13	769.76	769.69	769.54	769.23	**768.46**	767.26	766.39	<766.29	<766.29	<766.29	<766.29	<766.29	771.47	770.86	770.81	770.78	770.38
P-17	780.14	780.03	780.18	780.08	779.68	779.50	779.36	779.27	778.99	**778.39**	777.55	776.99	775.84	775.12	774.42	773.87	773.33	780.33	780.19	780.54	780.54	780.48
HA-1	768.60	768.59	768.61	768.51	768.49	768.51	768.46	768.44	768.33	**768.28**	768.13	767.97	767.89	767.68	767.57	767.50	767.27	769.34	768.73	768.75	768.73	768.43
HA-2	782.31	782.49	782.65	782.55	782.15	781.87	781.89	781.74	781.42	**781.10**	780.75	780.67	780.67	780.34	780.10	780.19	779.97	782.74	782.47	782.50	782.48	782.80
P-U	na	na	na	na	na	na	746.92	na	746.82	**746.80**	746.68	746.25	746.45	746.28	745.94	744.64	745.35	748.70	749.25	749.15	749.28	747.72
P-18	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	[redacted]	727.90	732.75	729.26
P-19	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	[redacted]	742.39	742.79	740.99
P-20	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	[redacted]	772.92	774.84	779.52
P-21	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	758.11	[redacted]	758.75	758.21

NOTES:

1. A.R. = auger refusal
2. TOD = time of drilling
3. na = not available
4. Rock Elevations for P-10 and P-13 do not equal A.R. (of 5 feet and 10 feet below ground surface, respectively). Core data (%RQD and %Recovery) were used to determine depths to bedrock of 15 feet and 13 feet below ground surface, respectively.
5. 24 hour water elevations for HA-1, HA-2, P-4A and P-5 were taken after approximately 72 hours.
6. 7-day water elevations are shaded in yellow
7. 7-day groundwater elevations are not shown on this table for P-2 (792.86 on 02/20/02), P-3 (784.86 on 02/19/02), and P-7 (776.37 on 02/20/02)
8. 7-day water elevations were taken after 6 days for HA-1, HA-2, P-19, P-20 and P-21; after 8 days for P-12, -13S, -13D, -14, -15S, -15D, and -16; and after 9 days for P-18.
9. All elevations for P-U are approximate.

TABLE 3
Summary of Bedrock and Water Level Elevations for Piezometers
MRR of High Point, LLC

Piezometer Number	G.S. Elev.	Approximate Stickup	TOC Elev.	Depth to Rock; G.S. (=A.R.)	Rock Elev.	TOD GW Elev.	24hr GW Elev.	GW Elev. 02/21/02	GW Elev. 02/22/02	GW Elev. 02/25/02	GW Elev. 02/27/02	GW Elev. 02/28/02	GW Elev. 03/4/02	GW Elev. 03/6/02	GW Elev. 03/08/02	GW Elev. 03/11/02	GW Elev. 03/14/02	GW Elev. 03/15/02	GW Elev. 03/19/02	GW Elev. 03/21/02
P-1	817.64	2.40	820.04	6.00	**811.64**	<767.14	767.59	na	767.59	768.95	769.89		772.07	772.88	773.75	775.04	776.29	776.65	778.16	778.94
P-2	794.31	2.47	796.78	>10	**<784.31**	<784.31	790.90	793.07	793.10	792.78	792.78	792.54	793.71	793.51	793.36	793.13	793.52	793.13	793.71	793.90
P-3	787.62	2.44	790.06	>25	**<762.62**	781.71	785.67	785.00	784.92	784.82	784.91	784.74	785.25	785.29	785.35	785.29	785.46	785.56	785.69	785.92
P-4A	793.04	2.39	795.43	16.00	**777.04**	777.60	790.38	790.47		790.11	790.04	789.91	790.69	790.42	790.35	790.19	790.89	790.68	791.09	791.40
P-5	760.56	3.28	763.84	7.00	**753.56**	<753.56	754.72	755.07		755.18	755.34	755.18	756.65	755.88	755.62	755.51	755.69	755.67	755.68	755.81
P-6	797.15	2.57	799.72	8.50	**788.65**	<761.65	779.46	779.42	779.00	778.94	779.08		779.01	778.99	779.11	779.18	779.25	779.26	779.30	779.46
P-7	784.08	2.99	787.07	17.00	**767.08**	<767.08	775.86	776.50	776.40	776.37	776.57	776.40	776.50	776.42	776.54	776.62	776.71	776.60	776.74	776.97
P-8	792.56	2.34	794.90	8.00	**784.56**	<767.56	768.42	768.25	769.32	772.05		774.11	775.45	775.79	775.91	775.78	775.90	775.97	776.17	776.38
P-9	808.11	2.81	810.92	11.00	**797.11**	773.66	784.75	784.72	784.60	784.80		784.80	784.69	784.74	784.72	784.70	784.69	784.47	784.59	784.62
P-10	791.20	2.87	794.07	15.00	**776.20**	<760.70	<760.70	<760.70	761.08	761.74		762.40	763.22	763.56	763.97	764.51	765.01	765.13	765.63	765.85
P-11	778.21	2.08	780.29	10.00	**768.21**	<738.21	738.44	738.29	738.47	738.69		738.89	739.10	739.21	739.31	739.47	739.66	739.77	739.86	739.94
P-12	741.16	2.28	743.44	10.00	**731.16**	<721.16	733.74	733.66	733.19	733.04		732.93	733.17	733.24	733.31	733.27	733.40	733.19	733.14	733.30
P-13S	775.55	2.56	778.11	13.00	**762.55**	<766.05	767.99	768.42	769.92	772.15		772.31	774.30	773.81	773.60	773.38	774.16	773.81	773.87	774.36
P-13D	775.55	2.54	778.09	13.00	**762.55**	755.31	768.08	767.96	767.90	767.26		766.41	767.01	768.14	768.79	769.21	769.49	769.63	769.84	770.08
P-14	782.80	2.31	785.11	12.00	**770.80**	<732.80	752.28	756.56	758.83	759.80		760.10	760.35	760.54	760.87	761.22	761.54	761.59	761.93	762.23
P-15S	731.60	2.16	733.76	7.00	**724.60**	715.11	727.51	727.51	727.61	727.54		727.50	727.79	727.86	727.81	727.76	727.76	727.77	727.84	727.85
P-15D	731.88	2.35	734.23	7.00	**724.88**	<651.88	652.95	654.16	656.18	660.94		665.51	670.83	676.69	683.11	691.99	699.43	701.65	710.15	713.82
P-16	773.20	2.59	775.79	7.00	**766.20**	<766.29	767.88		770.72	770.60	770.58	770.46	771.14	770.98	770.96	770.89	771.24	771.14	771.14	771.42
P-17	780.96	2.58	783.54	9.00	**771.96**	<773.96	<773.96		777.11	777.81	778.43	778.45	779.32	779.39	779.76	779.69	780.20	780.15	780.25	780.53
HA-1	770.71	2.37	773.08	>4.5	**<766.21**	768.56	768.56	na	768.56	768.56	768.58		768.75	768.61	768.60	768.59	768.71	768.66	768.70	768.98
HA-2	783.06	1.61	784.67	>5.9	**<777.16**	777.22	781.91	na	777.22	781.91	782.07		782.50	782.42	782.33	782.20	782.67	782.59	782.70	782.82
P-U	753.00	2.50	755.50	na	**na**	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
P-18	733.53	1.70	735.23	9.00	**724.53**	719.80	730.18	na	na	na	na	na	na	na	na	na	na	na	na	na
P-19	749.41	2.37	751.78	6.00	**743.41**	739.87	742.62	na	na	na	na	na	na	na	na	na	na	na	na	na
P-20	792.79	2.80	795.59	9.00	**783.79**	<767.29	774.49	na	na	na	na	na	na	na	na	na	na	na	na	na
P-21	764.47	2.04	766.51	13.00	**751.47**	759.80	758.11	na	na	na	na	na	na	na	na	na	na	na	na	na

NOTES:

1. A.R. = auger refusal
2. TOD = time of drilling
3. na = not available
4. Rock Elevations for P-10 and P-13 do not equal A.R. (of 5 feet and 10 feet below ground surface, respectively). Core data (%RQD and %Recovery) were used to determine depths to bedrock of 15 feet and 13 feet below ground surface, respectively.
5. 24 hour water elevations for HA-1, HA-2, P-4A and P-5 were taken after approximately 72 hours.
6. 7-day water elevations are shaded in yellow
7. 7-day groundwater elevations are not shown on this table for P-2 (792.86 on 02/20/02), P-3 (784.86 on 02/19/02), and P-7 (776.37 on 02/20/02)
8. 7-day water elevations were taken after 6 days for HA-1, HA-2, P-19, P-20 and P-21; after 8 days for P-12, -13S, -13D, -14, -15S, -15D, and -16; and after 9 days for P-18.
9. All elevations for P-U are approximate.

TABLE 4
Summary of Bedrock and Water Level Elevations for
Additional Borings and Test Pits
MRR of High Point, LLC

Location	Approx. G.S. Elev.	Depth to Rock from G.S.	**Bedrock Elevation**	Groundwater Elevation 3/28/02	Groundwater Elevation 4/02/02	Groundwater Elevation 4/05/02	Groundwater Elevation 4/08/02	**Groundwater Elevation (date)**	Groundwater Elevation 4/16/02	Groundwater Elevation 4/19/02	**Groundwater Elevation 4/23/02**	Groundwater Elevation 5/1/02	Groundwater Elevation 05/09/02	Groundwater Elevation 05/17/02	Groundwater Elevation 05/23/02	Groundwater Elevation 05/31/02	Groundwater Elevation 06/07/02	Groundwater Elevation 06/12/02
P-4	793.0	6.0	***787.00**	---	---	---	---	**<787.00 (02/12/02)**	---	---	---	---	---	---	---	---	---	---
B-2	802.0	12.0	**790.00**	---	---	---	---	**<790.00 (02/15/02)**	---	---	---	---	---	---	---	---	---	---
B-3	752.0	6.0	**746.00**	---	---	---	---	**<746.00 (02/14/02)**	---	---	---	---	---	---	---	---	---	---
B-5	802.0	10.0	**792.00**	---	---	---	---	**<792.00 (02/13/02)**	---	---	---	---	---	---	---	---	---	---
T-1A	797.0	>12.0	**<785.00**	---	<785.00	---	---	**<785.00(04/03/02)**	---	---	---	---	---	---	---	---	---	---
T-1B	792.0	>12.5	**<779.50**	---	783.25	---	---	**783.35 (04/03/02)**	---	---	---	---	---	---	---	---	---	---
T-1C	795.4	>8.0	**<787.40**	---	<787.40	---	---	**<787.40 (04/03/02)**	---	---	---	---	---	---	---	---	---	---
T-2	804.0	>9.5	**<794.50**	795.86	796.83	796.67	796.75	796.60 (04/11/02)	796.50	796.35	**796.30**	795.60	795.10	<794.50	<794.50	<794.50	795.65	795.60
T-3	804.0	>10.5	**<793.50**	793.60	794.85	794.88	794.97	795.10 (04/11/02)	795.15	795.10	**795.10**	795.18	795.27	795.25	795.30	794.87	795.50	795.50
T-4	774.8	>6.5	**<768.30**	768.04	769.97	770.34	770.61	770.75 (04/11/02)	770.99	770.99	**771.01**	770.74	770.79	770.59	770.49	770.29	770.44	770.37
T-5	780.3	>9.5	**<770.80**	<770.80	772.04	772.03	772.04	772.05 (04/11/02)	772.04	771.96	**772.09**	<770.80	771.97	771.09	772.14	771.65	772.44	772.44
T-6	798.0	>7.0	**<791.00**	<791.00	<791.00	<791.00	<791.00	<791.00 (04/11/02)	<791.00	<791.00	**<791.00**	<791.00	<791.00	<791.00	791.03	791.70	791.45	791.45
T-7	782.0	>7.0	**<775.00**	---	775.15	775.15	775.13	775.20 (04/11/02)	775.10	775.10	**775.15**	775.00	775.20	775.10	775.10	775.10	775.30	775.40
T-8A	745.0	>10.5	**<734.50**	<734.50	<734.50	<734.50	<734.50	<734.50 (04/11/02)	<734.50	<734.50	**<734.50**	<734.50	<734.50	<734.50	<734.50	<734.50	<734.50	<734.50
T-8B	739.0	>6.0	**<733.00**	---	---	---	---	**738.00 (03/29/02)**	---	---	---	---	---	---	---	---	---	---
T-9	740.0	>10.0	**<730.00**	---	733.22	733.23	733.35	733.15 (04/11/02)	733.25	733.15	**732.40**	<730.00	<730.00	<730.00	<730.00	<730.00	<730.00	<730.00
T-10	775.0	>5.0	**<770.00**	770.35	770.85	770.86	771.00	771.05 (04/11/02)	770.90	770.75	**770.60**	<770.00	<770.00	<770.00	<770.00	<770.00	<770.00	<770.00
T-11	752.0	>6.5	**<745.50**	746.58	747.60	747.57	747.80	747.50 (04/11/02)	747.85	747.75	**747.30**	<745.50	<745.50	<745.50	<745.50	<745.50	746.60	<745.50
T-12	782.0	>8.0	**<774.00**	774.80	775.25	775.20	775.20	775.20 (04/11/02)	775.10	775.00	**<774.00**	<774.00	<774.00	<774.00	<774.00	<774.00	<774.00	<774.00
T-13	778.8	>7.5	**<771.30**	773.14	773.54	773.42	772.94	<771.30 (04/11/02)	<771.30	<771.30	**<771.30**	<771.30	<771.30	<771.30	<771.30	<771.30	<771.30	<771.30
T-14	760.0	>13.5	**<746.50**	747.95	749.80	750.15	750.40	750.50 (04/11/02)	750.60	750.55	**750.55**	750.20	749.90	748.80	749.60	749.22	749.45	749.30
T-15	746.0	>12.5	**<733.50**	<733.50	<733.50	<733.50	<733.50	<733.50 (04/11/02)	<733.50	<733.50	**<733.50**	<733.50	<733.50	<733.50	<733.50	<733.50	<733.50	<733.50
T-16	795.0	>9.0	**<786.00**	---	787.30	787.50	787.60	787.68 (04/11/02)	787.75	787.75	**787.70**	787.45	787.40	787.30	787.15	787.37	787.35	787.28
T-17	791.0	>5.0	**<786.00**	---	786.45	786.45	786.35	<786.00 (04/11/02)	<786.00	<786.00	**<786.00**	<786.00	<786.00	<786.00	<786.00	<786.00	786.95	786.80

NOTES:

1. G.S. = ground surface
2. All elevations are approximate as estimated from the topographic map and/or nearby surveyed piezometers.
3. Depth to Rock = Auger Refusal for P-4 and B-2, -3 and -5. Depth to competent rock was not reached in the test pits.

*4. A.R. listed for P-4 is not true auger refusal. True auger refusal is at 16 feet based on data obtained from P-4A, which is located 6.5 feet away. Boing P-4A was drilled after the drill cutting head had been exchanged for a newer one. Therefore the true bedrock elevation for this location is approximately 777.0 feet.

TABLE 5
Summary of Aquifer Test Data
MRR of High Point, LLC

PIEZOMETER NUMBER	SATURATED AQUIFER THICKNESS VALUE (feet)	SCREEN LENGTH (feet)	WELL DIAMETER (inches)	AQUIFER TEST TYPE	K (cm/s)	SCREENED LITHOLOGY
P-2	15	5	2	Rising	1.9E-05	Saprolite
P-2	15	5	2	Falling	1.2E-04	Saprolite
P-3	30	15	2	Rising	4.4E-05	Saprolite/PWR
P-3	30	15	2	Falling	2.0E-04	Saprolite/PWR
P-4A	30	10	2	Falling	1.1E-04	Saprolite/PWR
				Saprolite Geomean=	7.4E-05	
P-7	20	10	2	Rising	4.7E-05	PWR
P-12	30	15	2	Rising	6.6E-05	Saprolite/PWR/Bedrock
P-15S	30	15	2	Rising	1.4E-04	PWR/Bedrock
P-15S	30	15	2	Falling	1.1E-04	PWR/Bedrock
P-18	30	7	2	Rising	1.4E-04	PWR/Bedrock
P-18	30	7	2	Falling	1.2E-04	PWR/Bedrock
				PWR geomean=	9.7E-05	
P-6	25	25	2	Rising	2.7E-05	Bedrock
P-9	25	20	2	Rising	3.8E-05	Bedrock
P-13D	25	10	2	Rising	6.0E-05	Bedrock
P-13D	25	10	2	Falling	6.1E-05	Bedrock
P-20	25	10	2	Rising	2.6E-06	Bedrock
P-1	30	20	2	Rising	8.0E-08	Bedrock
P-11	30	15	2	Rising	9.5E-08	Bedrock
P-15D	90	20	2	Rising	4.1E-08	Bedrock
				Bedrock geomean=	2.7E-06	

Saprolite/PWR/Bedrock Geomean =	**2.0E-05**

TABLE 5
Summary of Slug Test Data
MRR of High Point, LLC

NOTES:

1. Aquifer analyses (slug tests) for P-3, -4A and -15S were performed by Joyce Engineering, Inc. on March 19, 2002.
2. Aquifer analyses (slug tests) for P-2, -9, and -12 were performed on March 21, 2002.
3. Aquifer analyses (slug tests) for P-6 and -7 were performed on April 2, 2002.
4. Aquifer analysis for P-1 was performed from April 16, 2002 - June 12, 2002 using a miniTROLLTM pressure transducer.
5. Aquifer analysis for P-11 was performed from February 21, 2002 - June 12, 2002 by using periodic water level measurements.
6. Aquifer analysis for P-15D was performed from February 20, 2002 - June 12, 2002 by using periodic water level measurements.
7. Aquifer analysis (slug test) for P-18 was performed by Joyce Engineering, Inc. on December 23, 2002.
8. Aquifer analysis (slug test) for P-13D was performed by Joyce Engineering, Inc. on December 27, 2002.
9. Aquifer analysis (slug test) for P-20 was performed by Joyce Engineering, Inc. on December 30, 2002.

TABLE 6
Summary of Laboratory Soils Test Data
Material Recovery and Reclamation of High Point, LLC

BORING NUMBER	UNIT	SAMPLE DEPTH (feet)	SAMPLE TYPE	USCS CLASSIFICATION	USCS SYMBOL	NATURAL MOISTURE CONTENT (%)	UNIT WEIGHT (pcf)		GRADATION RESULTS (% passing)						ATTERBERG LIMITS			POROSITY (percent)	PERMEABILITY (cm/sec)
							WET	DRY	3/8"	#4	#10	#40	#100	#200	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
P-1	Saprolite	0 - 2	Split Spoon	Sandy Clay	SC-SM	---	---	---	100	100	98	73.6	45.4	35.5	19	13	6	---	---
P-2	Saprolite	7 - 9	Undisturbed	Sandy Clay	SC	25.2	---	---	100	100	97.5	70.9	43	35.7	37	22	15	38.5	9.58E-08
P-3	Saprolite	0 - 10	Bulk	Sandy Clay	SC	---	120.2	12.0	100	98.8	95.1	67.3	45.4	37	36	23	13	32.4	8.76E-08
P-3	Saprolite	4.5 - 6.5	Split Spoon	Sandy Clay	SC	---	---	---	100	100	95.3	67.5	44.9	36.6	35	24	11	---	---
P-13	PWR	5 - 7	Split Spoon	Silty Sand	SM	---	---	---	100	99.6	91.9	51.3	31.1	24.1	22	21	1	---	---
P-14	PWR	10 - 11	Split Spoon	Silty Clay	CL	---	---	---	100	99.8	98.4	92.6	77.9	55	32	23	9	---	---
P-15D	PWR	5 - 7	Undisturbed	Silty Sand	ML	---	---	---	100	100	99.6	97.6	88.5	76.3	35	34	1	---	---

NOTES:

1. --- = no data available
2. Soils analysis performed by Trigon Engineering Consultants, Inc.
3. Inadequate sample was available from P-15D to determine porosity, permeability, and natural moisture content.

Table 6A
Summary of Effective Porosity Calculations

Well ID	Clay %	Sand %	Silt %	Unit
P-1	10	65	25	Saprolite
P-13 (0'-2')	14.5	67.8	17.7	Saprolite
P-13 (5'-7')	13	76	11	PWR
P-14	24	45	31	PWR
P-15D	28	24	48	PWR
P-19	9.4	80.7	9.9	PWR

Well ID	USCS Symbol	Effective Porosity %
P-1	SC-SM	20
P-13 (0'-2')	SM	16
P-13 (5'-7')	SM	18
P-14	CL	6
P-15D	ML	4.5
P-19	SM	24
	Average =	15

Hydrogeologic Unit	Average Effective Porosity %
Saprolite	18
PWR	13
Bedrock	1

Notes:

1. Average effective porosity value for saprolite includes P-1 and P-13 (0'-2').
2. Average effective porosity value for PWR includes P-13 (5'-7'), -14, and -15D.
3. Average effective porosity value for bedrock is based on total porosity values for fractured crystalline rock obtained from *Groundwater* (Freeze and Cherry 1979).

TABLE 7
Hydraulic Gradients and Linear Flow Velocities
MRR of High Point, LLC

GRADIENT SEGMENT	UNIT	HYDRAULIC CONDUCTIVITY (K, cm/s)	GRADIENT SEGMENT LENGTH (i, ft)	EFFECTIVE POROSITY (%, n_e)	FLOW DIRECTION	Seasonal High Groundwater Elevations		
						Elevation (ft, MSL)	Gradient (ft/ft)	Velocity (ft/yr)
i_1	Bedrock	2.7E-06	295.12	1	WSW	790 780	0.034	9
i_2	Bedrock	2.7E-06	518.03	1	SSW	780 760	0.039	11
i_3	PWR	9.7E-05	363.56	13	SSW	770 740	0.083	64
i_4	PWR	9.7E-05	271.58	13	NW	770 750	0.074	57
i_5	Saprolite	7.4E-05	273.59	18	SW	750 730	0.073	31
i_6	Saprolite	7.4E-05	327.06	18	SW	750 730	0.061	26

NOTES:
1. The geometric mean of K from individual well aquifer tests was used to calculate the hydraulic conductivity for each of the three hydrogeologic units.
2. An effective porosity was calculated for each of the hydrogeologic units as described in Table 6A.

TABLE 8
Summary of Vertical Gradients
MRR of High Point, LLC

		04/23/02			05/23/02			06/12/02			12/30/02		
WELL PAIR	SCREENED INTERVALS (feet)	DISTANCE BETWEEN SCREEN MIDPOINTS (feet)	ELEVATION ABOVE MEAN SEA LEVEL (feet)	VERTICAL GRADIENT (ft./ft.)	DISTANCE BETWEEN SCREEN MIDPOINTS (feet)	ELEVATION ABOVE MEAN SEA LEVEL (feet)	VERTICAL GRADIENT (ft./ft.)	DISTANCE BETWEEN SCREEN MIDPOINTS (feet)	ELEVATION ABOVE MEAN SEA LEVEL (feet)	VERTICAL GRADIENT (ft./ft.)	DISTANCE BETWEEN SCREEN MIDPOINTS (feet)	ELEVATION ABOVE MEAN SEA LEVEL (feet)	VERTICAL GRADIENT (ft./ft.)
P-15D	60-80	57.22	731.81	-0.076	57.20	732.19	-0.098	56.50	731.93	-0.120	57.22	733.98	-0.080
P-15S	5-20		727.44			726.56			725.16			729.41	

NOTES:

1. Positive vertical gradient values indicate downward flow direction and negative vertical gradient values indicate upward flow direction.

2. Groundwater elevations for 05/23/02 and 06/12/02 were within the screened interval for P-15S. Distances were calculated by taking the midpoint of the screened interval below the static water level.

Table 9
Historical Precipitation Data
Piedmont Triad International Airport

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual
1931	2.36	2.01	3.95	5.19	5.28	1.71	9.04	6.07	0.73	0.38	0.47	6.55	**43.74**
1932	4.41	2.74	5.51	1.81	2.17	6.51	2.26	0.79	5.90	6.77	4.67	5.25	**48.79**
1933	3.07	3.72	2.29	3.40	3.51	1.55	3.91	4.21	0.69	1.66	1.29	2.36	**31.66**
1934	1.79	5.32	5.90	3.28	4.32	6.39	7.63	3.51	8.35	1.31	4.08	3.47	**55.35**
1935	3.43	2.53	6.24	5.62	5.21	2.21	3.90	3.63	5.23	1.69	3.62	2.35	**45.66**
1936	8.40	5.09	6.08	5.45	0.93	7.28	8.01	1.56	4.56	5.71	1.81	4.60	**59.48**
1937	9.65	3.55	1.39	4.73	2.25	2.09	5.57	6.18	3.05	5.45	2.29	1.48	**47.68**
1938	2.66	1.55	2.17	2.50	2.72	5.11	5.62	2.97	1.05	0.94	5.57	3.98	**36.84**
1939	3.76	6.50	3.62	2.98	1.96	3.30	7.93	8.76	3.10	2.22	1.79	3.06	**48.98**
1940	3.36	2.63	2.54	2.67	5.25	3.43	3.54	6.71	2.16	0.76	6.57	3.28	**42.90**
1941	2.03	1.13	3.40	2.82	1.30	3.42	6.30	1.56	1.76	0.65	0.53	3.28	**28.18**
1942	1.79	3.70	4.13	1.06	6.09	8.95	4.28	4.14	4.70	3.41	1.23	3.84	**47.32**
1943	5.04	2.28	4.78	2.76	3.47	8.09	8.57	2.41	2.47	0.55	1.36	3.11	**44.89**
1944	3.26	4.62	7.27	5.02	1.72	2.64	4.65	2.50	8.70	2.49	3.23	2.14	**48.24**
1945	1.95	5.27	2.51	3.06	4.72	0.76	4.22	3.06	12.24	1.85	2.49	6.38	**48.51**
1946	2.88	4.85	1.77	2.95	6.92	2.45	5.59	4.16	2.09	2.43	2.41	1.80	**40.30**
1948	3.95	2.48	4.85	2.28	4.45	4.23	2.22	4.49	1.95	2.28	7.72	4.01	**44.91**
1949	2.75	2.95	2.45	3.93	3.06	1.89	7.13	11.71	2.22	5.36	1.60	1.29	**46.34**
1950	1.81	1.66	3.23	1.49	5.39	5.05	5.11	3.31	1.93	3.70	2.11	1.96	**36.75**
1951	1.60	1.98	2.99	4.16	0.42	7.96	2.40	5.19	1.66	0.68	2.84	5.29	**37.17**
1952	3.58	4.04	7.21	3.94	3.19	1.39	6.78	7.28	2.48	1.45	2.39	4.45	**48.18**
1953	4.34	5.50	4.96	3.07	0.91	7.90	0.98	2.27	4.12	0.27	0.44	4.55	**39.31**
1954	6.19	2.21	4.00	2.52	2.62	2.69	3.45	2.95	0.35	7.03	3.43	3.33	**40.77**
1955	1.84	3.99	2.33	3.67	2.50	1.86	3.03	6.64	4.11	1.93	1.81	0.33	**34.04**
1956	1.04	5.32	2.54	3.69	4.18	2.66	4.71	4.76	7.19	2.89	1.93	3.14	**44.05**
1957	5.09	3.95	2.15	3.79	1.96	5.33	2.14	3.28	5.27	1.54	6.18	2.49	**43.17**
1958	3.36	2.87	3.03	6.11	2.98	3.70	5.28	4.63	0.64	2.02	1.84	4.37	**40.83**
1959	3.01	3.32	3.10	4.37	3.07	2.47	9.81	3.69	5.55	9.60	1.57	2.86	**52.42**
1960	4.44	5.81	4.78	4.30	4.68	0.95	4.24	3.78	2.32	4.04	0.66	2.54	**42.54**
1961	2.35	3.43	4.86	3.95	4.31	6.21	3.30	7.17	0.20	1.02	1.70	5.30	**43.80**
1962	5.77	4.74	4.76	2.89	2.18	7.08	2.93	1.19	5.66	0.65	6.33	4.94	**49.12**
1963	2.41	2.96	6.46	2.49	2.92	3.54	3.49	2.34	4.01	0.26	4.77	1.54	**37.19**
1964	4.48	4.09	2.75	2.93	0.56	3.07	6.61	6.75	1.03	8.15	1.57	3.20	**45.19**
1965	2.27	2.80	5.04	3.07	1.00	7.99	9.08	3.91	4.31	3.72	1.29	0.64	**45.12**
1966	4.48	5.44	1.53	0.97	4.15	4.04	2.01	3.01	3.59	3.25	1.55	2.26	**36.28**
1967	1.84	2.76	1.21	2.03	4.03	2.11	3.11	5.43	2.39	1.23	1.40	6.34	**33.88**
1968	3.74	0.88	3.97	2.64	3.92	1.62	2.60	2.51	0.58	4.60	3.55	2.25	**32.86**
1969	2.01	3.01	3.72	2.30	3.17	7.86	4.11	3.95	3.44	1.89	1.41	4.93	**41.80**
1970	1.66	3.25	3.81	4.52	2.76	3.59	2.56	9.13	0.70	5.57	2.87	2.37	**42.79**
1971	1.80	4.46	3.32	2.74	5.37	2.99	3.88	4.22	2.51	6.71	2.58	1.61	**42.19**
1972	2.60	3.71	2.65	2.72	6.24	6.37	2.54	0.71	3.72	1.82	4.87	4.49	**42.44**
1973	3.50	3.53	5.69	4.31	5.71	4.88	5.30	2.72	1.15	2.31	1.24	6.44	**46.78**
1974	4.58	3.13	3.32	2.15	5.69	2.72	1.71	7.14	7.57	0.81	2.42	4.23	**45.47**
1975	5.31	3.15	8.76	2.00	6.23	1.71	12.35	1.48	7.29	2.62	1.81	3.80	**56.51**
1976	2.25	1.47	2.42	0.62	2.94	3.91	1.87	2.63	2.35	8.61	1.69	3.92	**34.68**
1977	2.27	1.69	2.79	2.25	0.70	1.54	1.52	4.03	6.35	4.67	3.11	3.30	**34.22**
1978	7.70	0.73	4.38	4.13	5.09	3.72	9.23	9.60	2.70	1.25	3.17	4.45	**56.15**
1979	5.87	5.03	2.95	3.21	4.46	2.72	4.30	1.13	13.08	2.64	4.78	1.12	**51.29**
1980	4.00	1.77	5.04	3.24	3.23	3.44	2.68	2.14	2.95	2.13	2.58	0.78	**33.98**
1981	0.66	3.61	2.59	1.13	2.78	2.92	8.99	2.60	6.35	3.63	0.35	5.60	**41.21**
1982	2.91	4.64	2.39	2.72	8.35	7.28	3.46	1.46	1.22	4.65	2.73	3.56	**45.37**
1983	1.31	3.82	5.75	5.16	4.12	5.15	2.78	1.44	2.68	4.09	5.37	4.38	**46.05**
1984	3.51	5.25	5.31	2.77	5.83	3.10	12.72	5.55	1.12	1.16	2.02	1.90	**50.24**
1985	4.34	3.77	0.67	0.94	4.32	2.25	4.31	4.86	0.00	1.92	8.26	1.46	**37.10**
1986	0.74	1.61	2.00	0.47	1.12	1.10	3.21	8.03	1.05	3.24	3.50	3.60	**29.67**
1987	3.77	4.72	3.24	8.03	2.48	1.20	5.80	3.55	7.22	0.71	3.66	3.38	**47.76**
1988	2.35	1.27	1.86	2.55	3.97	3.19	4.47	3.50	3.24	4.09	3.55	1.19	**35.23**
1989	0.93	4.48	5.71	3.23	6.36	7.09	2.96	2.31	6.08	5.04	2.92	3.53	**50.64**
1990	3.76	4.32	2.64	2.90	6.54	0.00	1.50	2.01	1.16	12.59	1.93	4.17	**43.52**
1991	4.53	1.15	7.75	6.66	3.89	1.96	3.95	1.91	3.66	1.90	1.67	2.80	**41.83**
1992	3.54	3.02	2.74	5.83	2.34	2.92	5.43	2.97	3.06	3.66	6.05	2.48	**44.04**
1993	3.65	3.40	7.61	6.08	2.95	3.14	3.28	2.31	2.82	1.25	2.58	3.28	**42.35**
1994	3.66	2.49	5.04	1.45	1.71	3.92	4.51	5.84	1.61	1.13	2.55	0.60	**34.51**
1995	2.94	3.59	1.84	0.41	2.15	9.53	2.39	5.41	2.26	5.98	3.49	1.36	**41.35**
1996	4.49	2.38	4.29	3.67	3.84	1.93	4.71	5.22	10.82	4.21	2.57	3.87	**52.00**
1997	2.89	3.43	4.06	7.22	1.79	3.33	3.03	1.97	3.88	2.38	2.65	2.17	**38.80**
1998	6.88	4.39	3.65	5.52	5.04	3.53	3.86	5.63	2.34	0.62	1.55	5.22	**48.23**
1999	5.39	1.50	1.96	4.37	1.00	4.26	4.14	5.00	8.62	2.32	1.28	2.04	**41.88**
2000	4.03	1.54	2.95	4.47	2.31	4.05	2.18	3.97	9.98	0.00	1.95	1.14	**38.57**
2001	2.53	2.51	5.05	1.81	2.69	3.09	4.06	3.08	2.05	0.41	0.34	2.21	**29.83**
2002	2.38	1.18	3.10	0.84	3.06	3.76	2.94	3.23	5.42	6.12	5.14	5.45	**42.62**
2002*	5.75	1.15	3.30	0.52	1.05	2.65	5.74	4.65	2.75	8.20	5.25	6.95	**47.96**
2003*	6.27	7.90	-	-	-	-	-	-	-	-	-	-	-
2003	2.44	2.28#	-	-	-	-	-	-	-	-	-	-	-
Monthly Averages	3.44	3.29	3.84	3.32	3.53	3.86	4.62	4.07	3.79	3.04	2.80	3.25	

1931-2001 Yearly Average: 42.87

1994-2001 Average: 40.65

1931-2002 Yearly Average: 42.87

1994-2002 Average: 40.87

41.46

Notes:

1. Data for 1931-2001 taken from National Climatic Data Center web page (http://www.ncdc.noaa.gov).
2. Data for 2002 taken from NOAA web page (http://www.ncdc.noaa.gov/cgi-bin/res40.pl?page=climvisgsod.html).
3. - = no data available
4. Data for 2002* and 2003* are taken from Martin Marietta's Riverdale Road Quarry database.
5. All data are recorded in inches.
6. # = Data for February 2003 are incomplete and represent only Feb. 1 - 22

TABLE 10
Estimated Seasonal High Groundwater Elevations
MRR of High Point, LLC

Piezometer Number	P-1	P-2	P-3	P-4A	P-5	P-6	P-7	P-8	P-9	P-10	P-11
G.S. Elev.	817.64	794.31	787.62	793.04	760.56	797.15	784.08	792.56	808.11	791.20	778.21
GW Elev. 04/23/02	*802	791.43	785.06	787.66	755.49	779.32	777.12	775.29	784.62	766.29	*752
Topographic Setting	High	Low	Low	-	Low	High	Mid	Mid	High	High	High
Adjustment for Seasonal High (ft)	6	3	3	-	3	6	5	5	6	6	6
Estimated Seasonal High GW Elev.	**808.00**	**794.43**	**788.06**	**-**	**758.49**	**785.32**	**782.12**	**780.29**	**790.62**	**772.29**	**758.00**

Piezometer Number	P-12	P-13S	P-13D	P-14	P-15S	P-15D	P-16	P-17	HA-1	HA-2	P-U
G.S. Elev.	741.16	775.55	775.55	782.80	731.60	731.88	773.20	780.96	770.71	783.06	753.00
GW Elev. 04/23/02	732.99	772.26	765.65	763.41	727.44	731.81	768.46	778.39	768.28	781.10	746.68
Topographic Setting	Low	-	High	Mid	Low	-	-	-	Low	Low	Low
Adjustment for Seasonal High (ft)	3	-	6	5	3	-	-	-	3	3	3
Estimated Seasonal High GW Elev.	**735.99**	**-**	**771.65**	**768.41**	**730.44**	**-**	**-**	**-**	**771.28**	**784.10**	**749.68**

Piezometer Number	P-18	P-19	P-20	P-21
G.S. Elev.	733.53	749.41	792.79	764.47
GW Elev. 12/30/02	732.75	742.79	774.84	758.75
Topographic Setting	Low	Low	High	Low
Adjustment for Seasonal High (ft)	3	3	6	3
Estimated Seasonal High GW Elev.	**735.75**	**745.79**	**780.84**	**761.75**

Notes:

1. Elevations are approximate for well P-U.
2. Groundwater elevations for all wells were measured on 04/23/02 except for P-18, -19, -20 and -21 which were measured on 12/30/02.
3. All elevations are expressed in feet above mean sea level.
4. No estimated seasonal high groundwater elevations were calculated for P-4A, -13S, -16 and -17, as explained in the text.
5. * Groundwater elevations for P-1 and P-11 are not from 04/23/02 because they had not stabilized. Rather, they were inferred based on known data taken from Drawing No. 3.

TABLE 10A
Estimated Seasonal High Groundwater Elevations - Calculated vs. Actual
MRR of High Point, LLC

Piezometer Number	P-1	P-2	P-3	P-4A	P-5	P-6	P-7	P-8	P-9	P-10	P-11
GW Elev. 04/23/02	*802	791.43	785.06	787.66	755.49	779.32	777.12	775.29	784.62	766.29	*752
GW Elev. 11/12/02	794.89	793.44	785.71	789.38	755.48	779.66	776.69	779.53	783.73	765.89	740.88
Adjustment for Seasonal High (ft)	6	2	2	-	2	6	4	4	6	6	6
Actual Seasonal Fluctuaion (delta 04/23/02 - 11/12/02)	*-7.11	2.01	0.65	-	-0.01	0.34	-0.43	4.24	-0.89	-0.40	*-11.12
June 2002 (Original) Estimated Seasonal High GW Elev.	**808.00**	**793.43**	**787.06**	-	**757.49**	**785.32**	**781.12**	**779.29**	**790.62**	**772.29**	**758.00**

Piezometer Number	P-12	P-13S	P-13D	P-14	P-15S	P-15D	P-16	P-17	HA-1	HA-2	P-U
GW Elev. 04/23/02	732.99	772.26	765.65	763.41	727.44	731.81	768.46	778.39	768.28	781.10	746.68
GW Elev. 11/12/02	734.23	775.37	771.57	767.42	728.73	734.23	771.47	780.33	769.34	782.74	748.70
Adjustment for Seasonal High (ft)	2	-	4	4	2	-	-	-	2	2	2
Actual Seasonal Fluctuaion (delta 04/23/02 - 11/12/02)	1.24	-	5.92	4.01	1.29	-	-	-	1.06	1.64	2.02
June 2002 (Original) Estimated Seasonal High GW Elev.	**734.99**	-	**769.65**	**767.41**	**729.44**	-	-	-	**770.28**	**783.10**	**748.68**

Notes:

1. Elevations are approximate for well P-U.
2. Groundwater elevations for all wells were measured on 04/23/02.
3. All elevations are expressed in feet above mean sea level.
4. No estimated seasonal high groundwater elevations were calculated for P-4A, -13S, -16 and -17, as explained in the text.
5. * Groundwater elevations for P-1 and P-11 are not from 04/23/02 because they had not stabilized. Rather, they were inferred based on known data taken from Drawing No. 3.
6. Estimated seasonal high was lower than actual seasonal high measured on November 12, 2002.

TABLE 11
Proposed Monitoring Well Completion Summary
MRR of High Point, LLC

WELL NUMBER	CASING DIAMETER (inches)	APPROXIMATE GROUND SURFACE ELEVATION (feet)	APPROXIMATE GROUNDWATER		ESTIMATED TOP OF BEDROCK		PROPOSED TOTAL DEPTH		PROPOSED SCREENED INTERVAL		PROPOSED SCREENED INTERVAL		LITHOLOGY OF SCREENED INTERVAL
			DEPTH feet B.G.S.	ELEV. feet M.S.L.	DEPTH feet B.G.S.	ELEV. feet M.S.L.	DEPTH feet B.G.S.	ELEV. feet M.S.L.	DEPTH B.G.S.		ELEVATION (feet M.S.L.)		
									from	to	from	to	
MW-1	2	810	15	795	10	800	25	785	10	25	800	785	Bedrock/PWR
MW-2	2	758	5	753	5	753	20	738	5	20	753	738	Bedrock/PWR
MW-3	2	750	10	740	15	735	20	730	5	20	745	730	Bedrock/PWR
MW-4S	2	732	6	726	7	725	20	712	5	20	727	712	Bedrock/PWR
MW-5	2	741	6	735	10	731	20	721	5	20	736	721	Bedrock/PWR/Saprolite
MW-6	2	734	1	733	9	725	15.5	719	8.5	15.5	725.5	718.5	Bedrock/PWR

NOTES:

1. All elevations are referenced to mean sea level (M.S.L.); depths are referenced to ground surface (G.S.).
3. na = not applicable
4. B.G.S. = below ground surface
5. T.O.C. = top of casing
6. PWR = partially weathered rock
7. MW-1, -2, and -3 will be installed prior to or during construction activities.
8. MW-4S was installed as piezometer P-15S on February 19-20, 2002.
9. MW-5 was installed as piezometer P-12 on February 19, 2002.
10. MW-6 was installed as piezometer P-18 on December 17, 2002.

TABLE 12
Proposed Piezometer, Test Pit and Well Abandonment Summary
MRR of High Point, LLC

IDENTIFICATION NUMBER	CASING DIAMETER (inches)	TO BE OVERDRILLED (WITHIN PROPOSED FOOTPRINT)	BACKFILL MATERIAL	TOTAL DEPTH (feet)
P-1	2	no	grout	50.5
P-9	2	yes	grout	40
P-10	2	yes	grout	30.5
P-11	2	no	grout	40
P-12	2	no	grout	20
P-13S	2	yes	grout	9.5
P-13D	2	yes	grout	23
P-14	2	no	grout	50
P-17	2	yes	grout	9
P-18	2	no	grout	15.5
P-19	2	yes	grout	15.5
P-20	2	yes	grout	25.5
P-21	2	yes	grout	15.5
WW-2	6	no	grout	na
WW-1	6	no	grout	na
T-2	-	-	cuttings	9.5
T-3	-	-	cuttings	10.5
T-4	-	-	cuttings	6.5
T-5	-	-	cuttings	9.5
T-6	-	-	cuttings	7
T-7	-	-	cuttings	7
T-8A	-	-	cuttings	10.5
T-9	-	-	cuttings	10
T-10	-	-	cuttings	5
T-11	-	-	cuttings	6.5
T-12	-	-	cuttings	8
T-13	-	-	cuttings	7.5
T-14	-	-	cuttings	13.5
T-15	-	-	cuttings	12.5
T-16	-	-	cuttings	9
T-17	-	-	cuttings	5

NOTES:

1. na = not available
2. P-2, -3, -4A, -5, -6, -7, -8, -9, -10, -11, -12, -13S, -13D, -14, -16, -17, HA-1, and HA-2 were installed by Joyce Engineering, Inc. in February 2002.
3. P-18, -19, -20, and -21 were installed by Joyce Engineering, Inc. in December 2002.
4. Installation record for WW-1 and WW-2 were unavailable.
5. Wells WW-1 and WW-2 are potable water wells with steel casing. If possible, the casing will be removed prior to abandonment. These wells will be abandoned in accordance with procedures for potable wells (i.e. they will be chlorinated and grouted to the surface without overdrilling).
6. All piezometers and wells will be abandoned prior to or during construction.

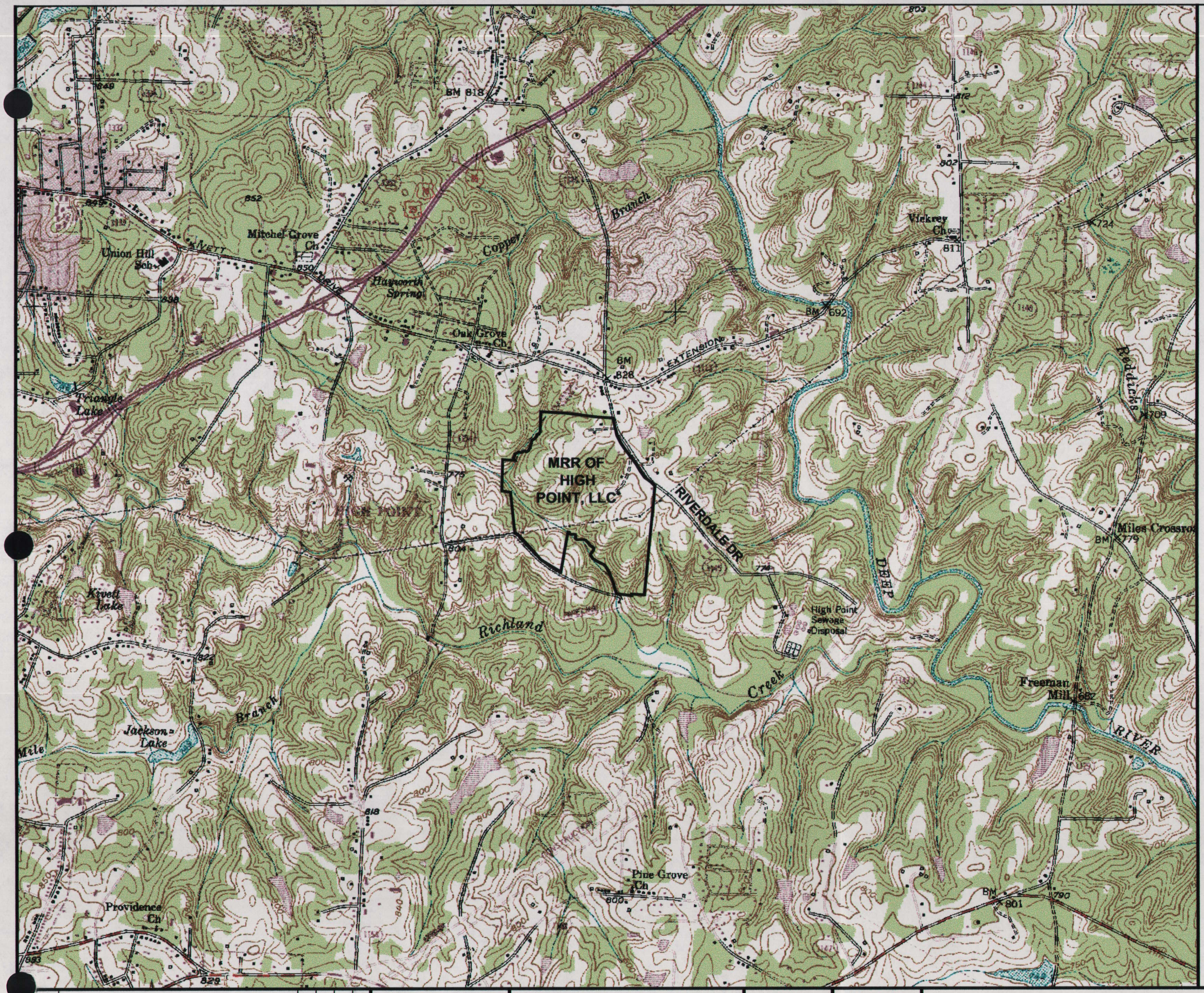
TABLE 13
Boring and Test Pit Abandonment Summary
MRR of High Point, LLC

BORING OR ROCK CORE LOCATION NUMBER	DATE ABANDONED	BACKFILL MATERIAL	TOTAL DEPTH (feet)
P-4	02/18/02	cuttings/grout	4/2
B-2	02/18/02	bentonite/cuttings	9/3
B-3	02/18/02	bentonite/cuttings	4/2
B-5	02/18/02	bentonite/cuttings	7/3
T-1A	04/03/02	cuttings	12
T-1B	04/03/02	cuttings	12.5
T-1C	04/03/02	cuttings	8
T-8B	03/29/02	cuttings	6

NOTES:

1. Borings B-2, -3, -5, and P-4 were completed and abandoned by Bedford Well Drilling, Inc. on February 12-18, 2002.
2. Test pits T-1A, -1B, -1C, and -8B were excavated on March 27-29 and abandoned on April 3, 2002 (T-1A, -1B, and -1C) and March 29, 2002 (T-8B).

FIGURES



NOTES

1. MAPPING SOURCE: U.S.G.S. 7.5 MINUTE QUADRANGLES FOR HIGH POINT EAST, PLEASANT GARDEN, GUILFORD, AND GREENSBORO, NORTH CAROLINA.
2. FACILITY PROPERTY BOUNDARY FROM A SURVEY BY MARK TERRY AND ASSOCIATES, INC. P.C. DATED MAY 15, 2001. ADDITIONAL PROPERTY LINES PROVIDED BY CITY OF HIGH POINT AND GUILFORD COUNTY GIS DEPARTMENTS.

GRAPHIC SCALE

0 1000 2000 4000

(FEET)

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED
DRAWN CADD
CHECKED
APPROVED
DATE

JOYCE ENGINEERING, INC.
2301 W. MEADOWVIEW RD, SUITE 203
GREENSBORO, NC 27407
PHONE: (336) 323-0092
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SCALE: 1"=2000'

PROJECT NO.: 600.04

MRR OF HIGH POINT, LLC
HIGH POINT, NORTH CAROLINA
SITE MAP

FIGURE NO.: 1

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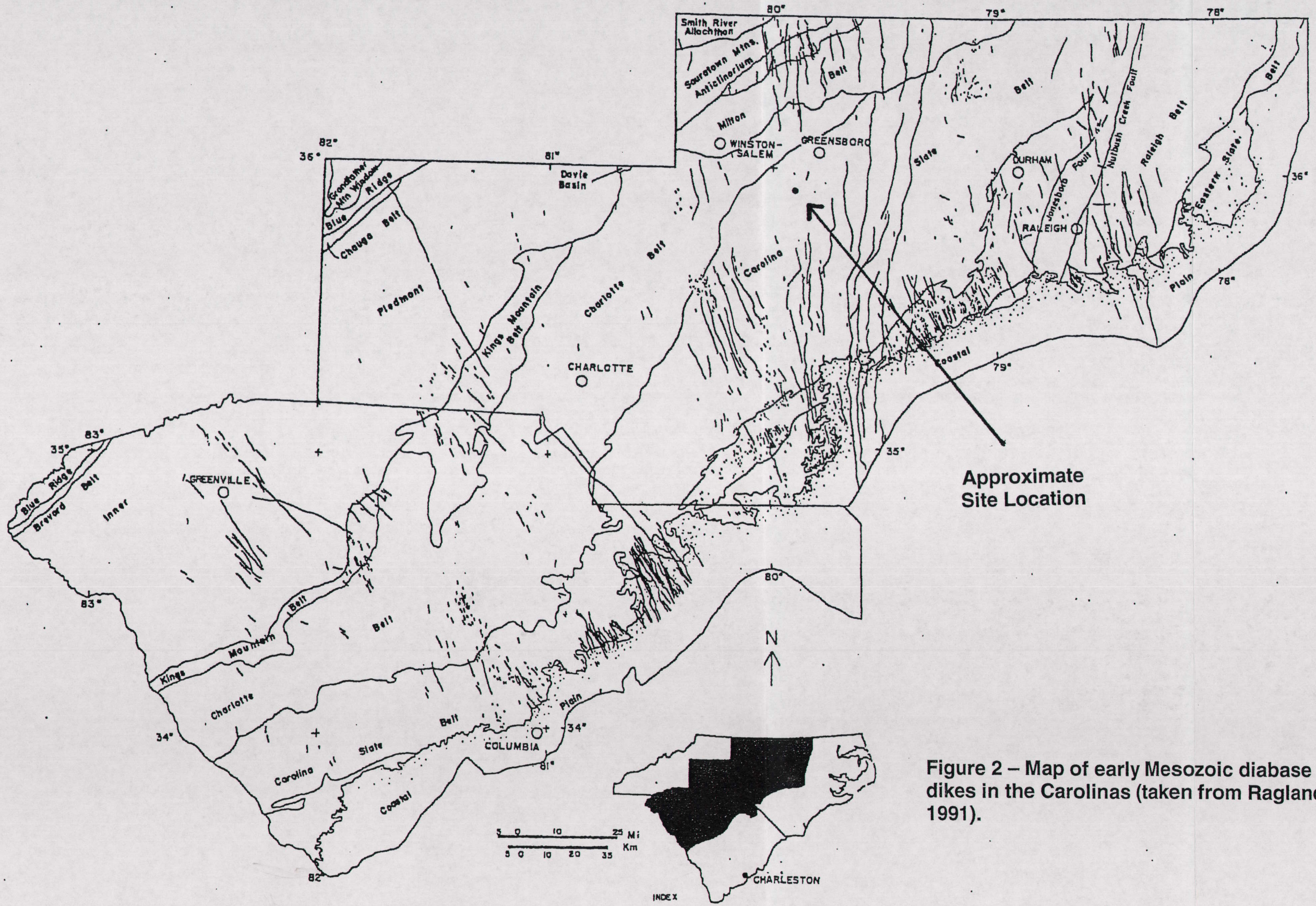
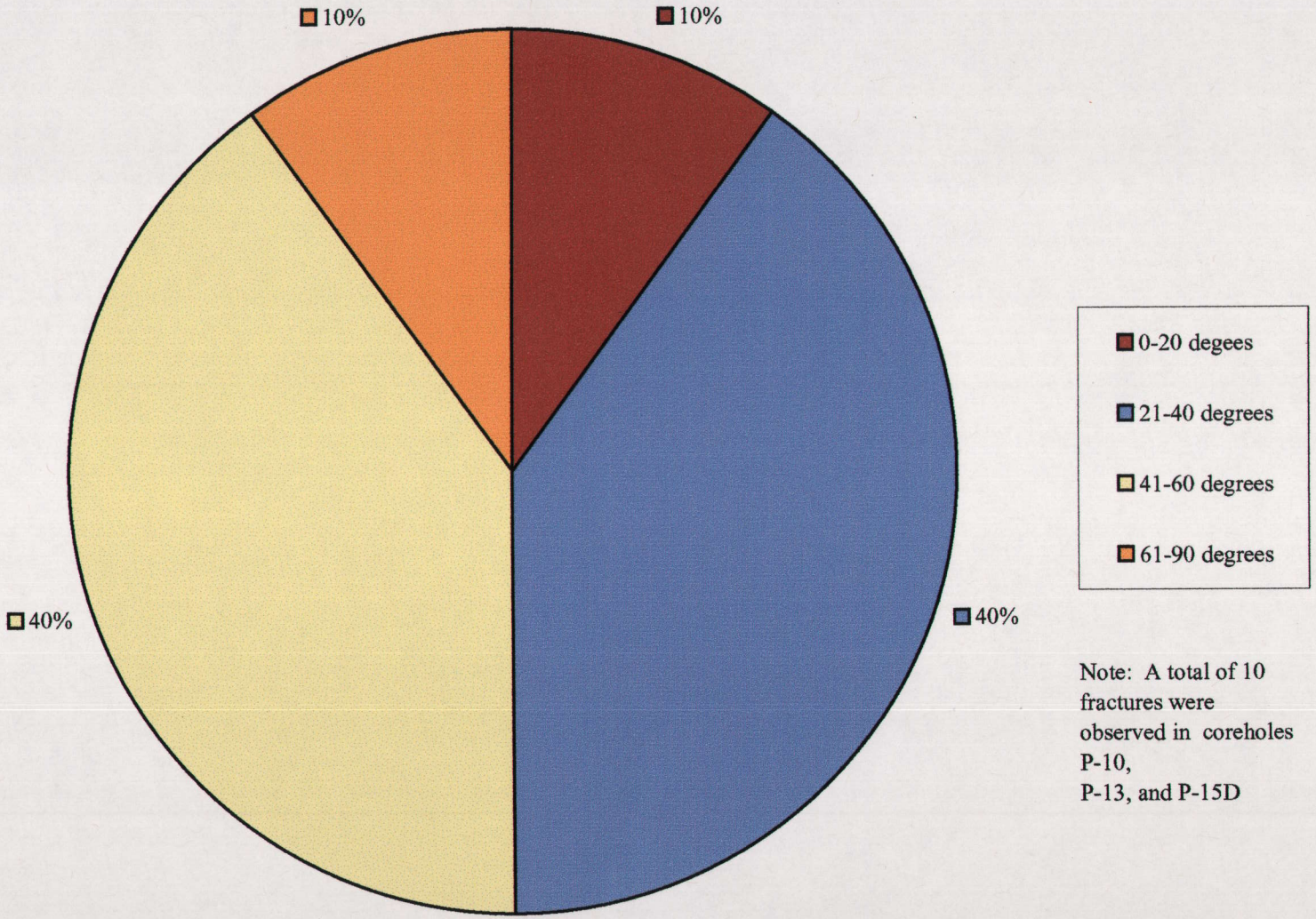


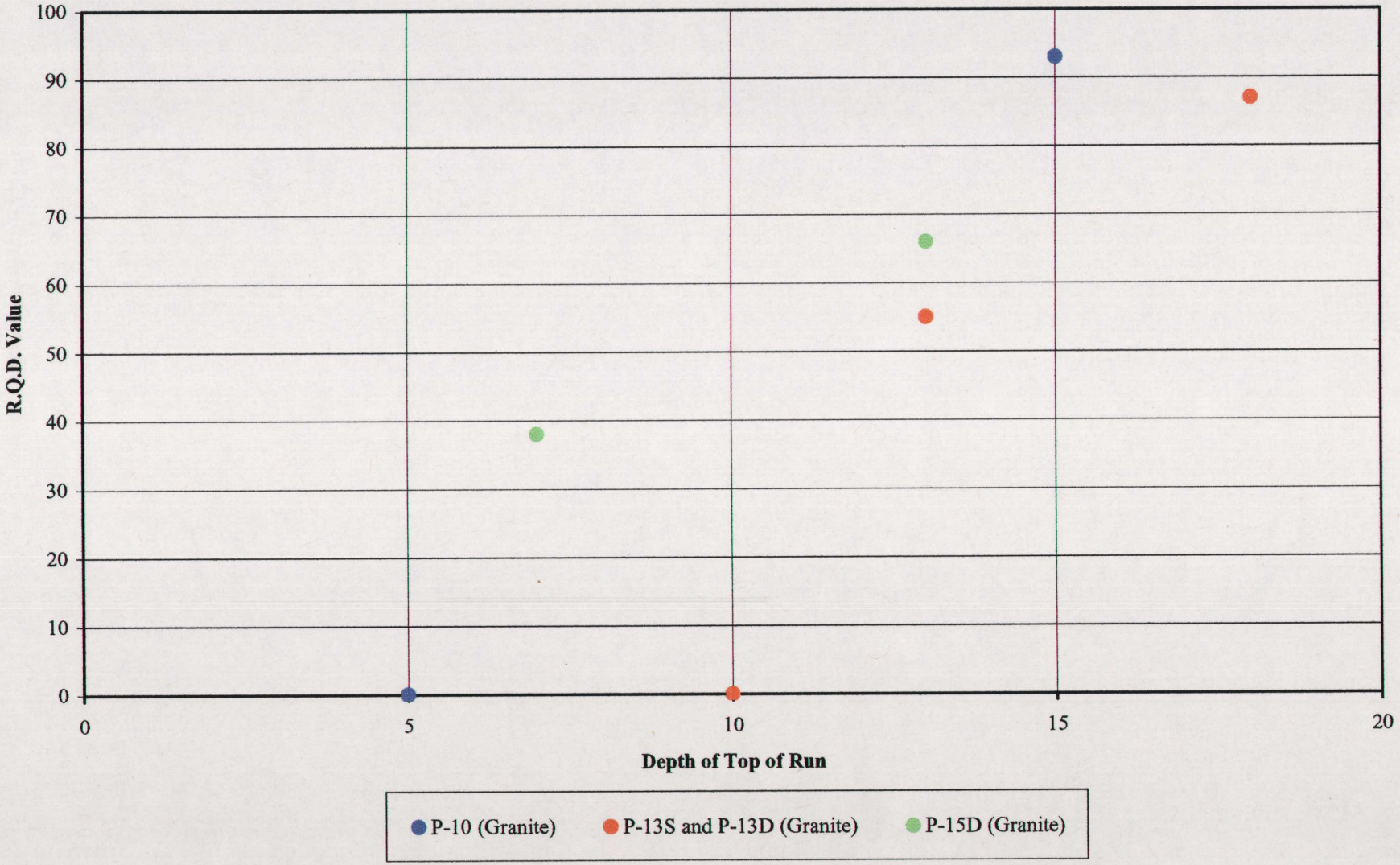
Figure 2 – Map of early Mesozoic diabase dikes in the Carolinas (taken from Ragland, 1991).

Figure 3. Fracture Orientations in Granite



Note: A total of 10 fractures were observed in coreholes P-10, P-13, and P-15D

Figure 4. R.Q.D. vs. Depth for Rock Core



JOYCE ENGINEERING, INC.

Waste Industry Experts

Job MRR of HIGH POINT, LLC

Job No. _____ Sheet No. ____ of ____

Calculated by DRM Date 7-2-02

Checked by _____ Date _____

Subject FIGURE 5 Scale _____

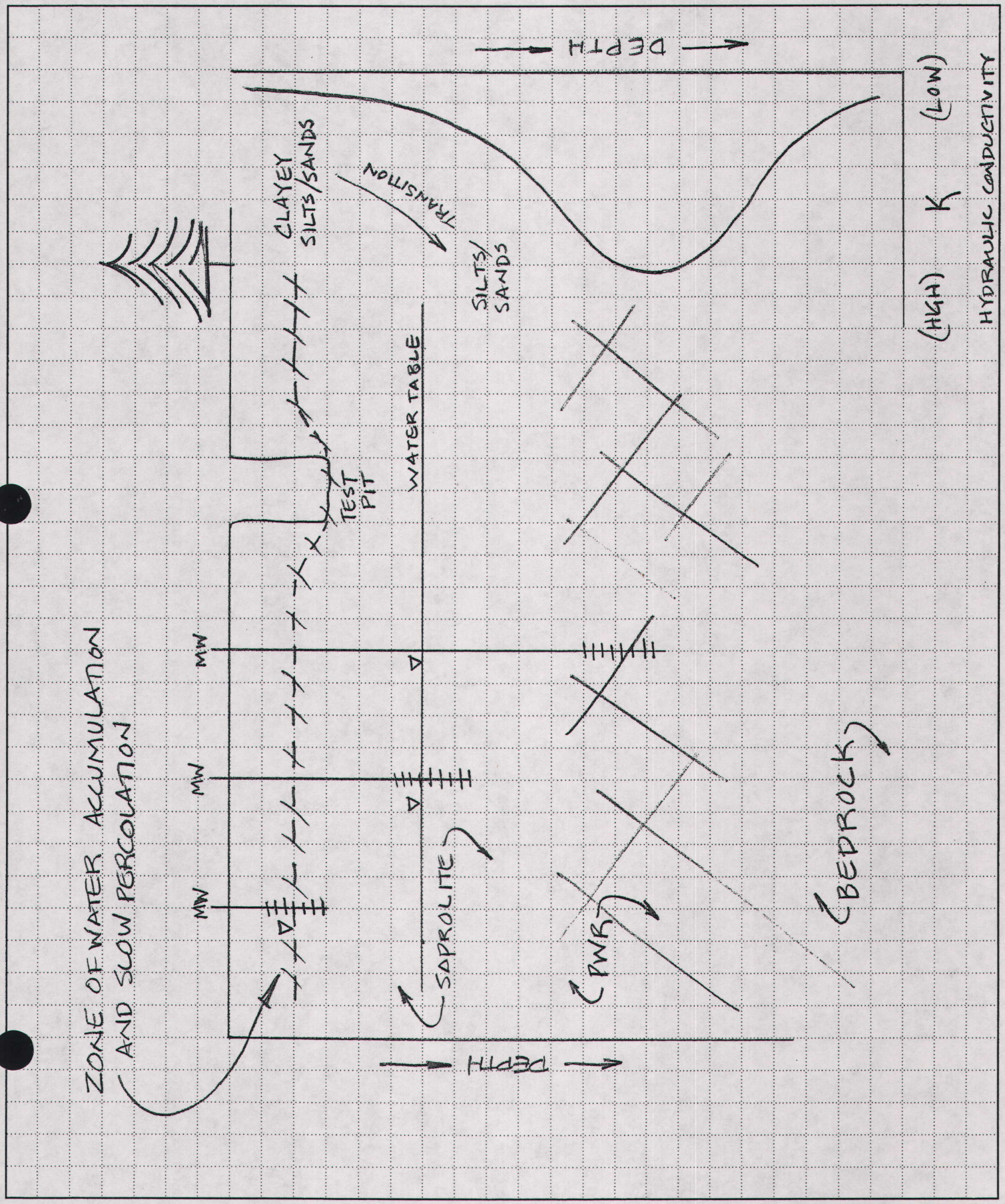
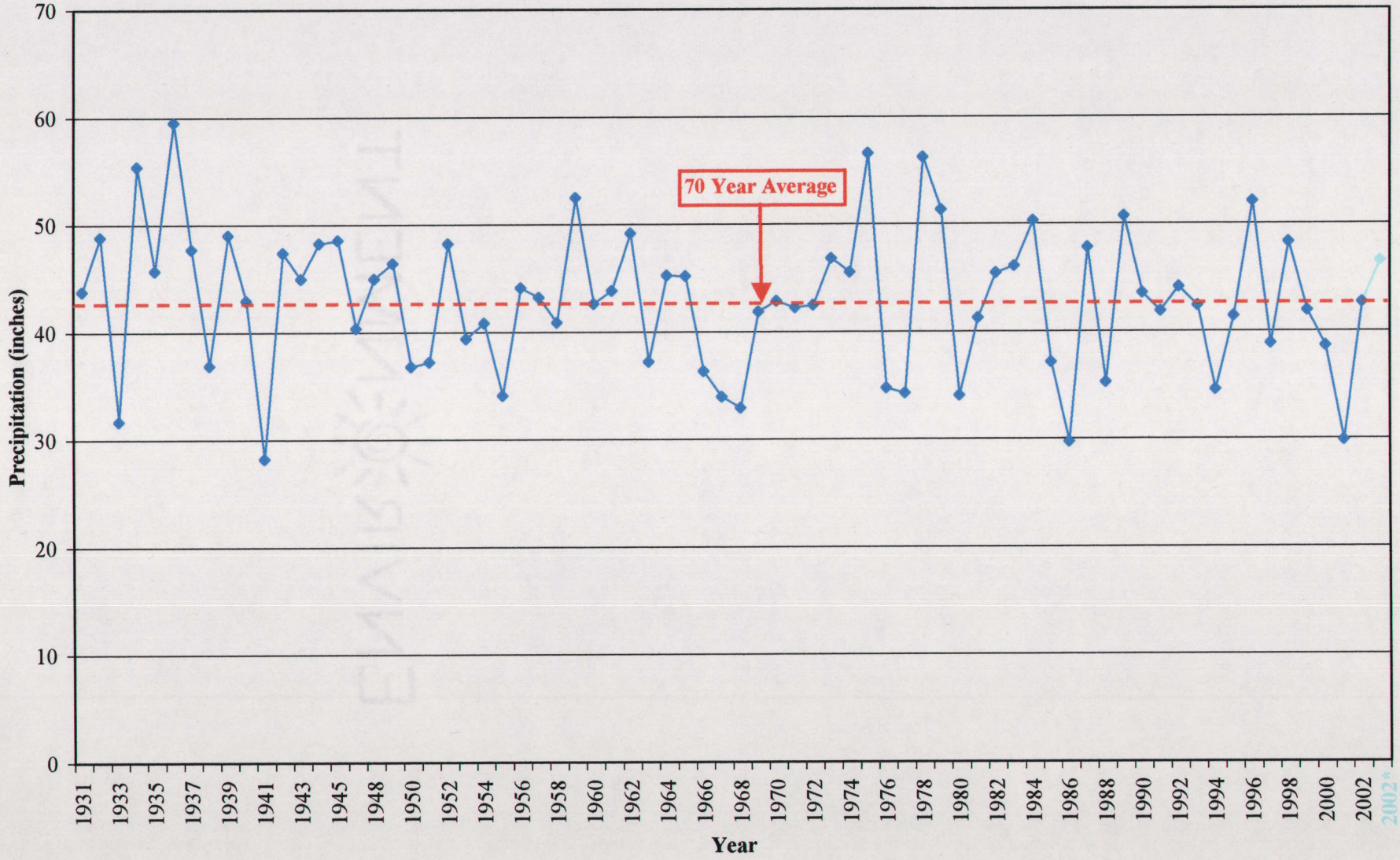


Figure 6
Average Annual Precipitation Data for
Piedmont Triad International Airport, NC



DRAWINGS

APPENDIX 1

Boring Logs for Piezometers, Boring and Test Pits, Well Construction Diagrams, Well Development Forms, Well Construction Records, and Field Logs

BORING LOGS AND WELL CONSTRUCTION RECORDS FOR PIEZOMETERS

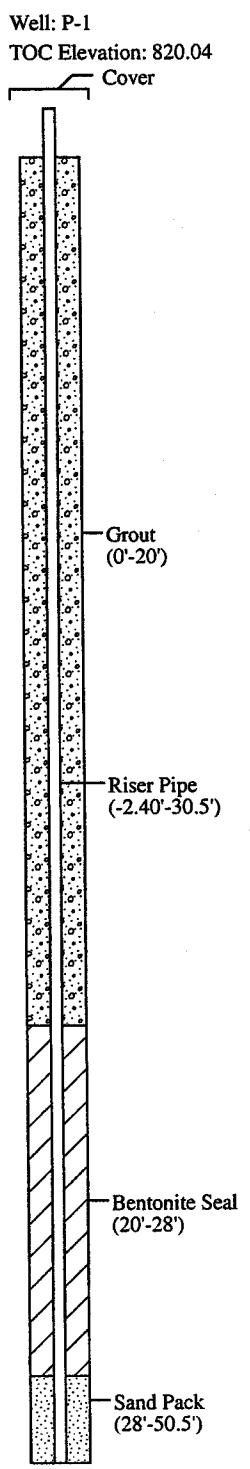
JOYCE ENGINEERING, INC.

LOG OF BORING P-1

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/15/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/21/02	Northing Coordinate	: 802817.9483
Hole Diameter(s)	: 8.25-inch, 6.25-inch	Easting Coordinate	: 1727194.0561
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, Cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 817.64	Blow Count	% Rec.	USCS	DESCRIPTION
0	817	1 1 2	100	SM	TOPSOIL - dark brown with organic matter SANDY SILT/SILTY SAND - tan, soft wet, fine-grained, loose
5	812	50/3	0	PWR	PARTIALLY WEATHERED ROCK no recovery in spoon; silty sand with small rock fragments in cuttings *Auger refusal at 6 feet* BEDROCK - light orange to gray rock flour with rock fragments, soft, weathered
10	807				
15	802			BR	Hard rock at 17 feet with light gray rock flour
20	797				Several small (<1 in.) fractures encountered from ~17'-22' with light brown rock flour
25	792				
30					



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/21/02
Hole Diameter(s)	: 8.25-inch/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.40-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 CASING

Type	: 4" X 4" Alum., locked

WELL PAD

Type	: 3' X 3' X 6" concrete

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at 6 feet. Borehole was advanced with an Ingersoll Rand T3W air rotary rig utilizing a 6-inch hammer to approximately 40 feet. The borehole was dry for approximately 20 hours, when mud was noted at the bottom of the borehole. Continued drilling to approximately 50.5 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 52.45 feet below TOC. Solid diamond represents 7-day water level of 49.68 feet below TOC and still rising.

3. Bedrock descriptions based on air rotary response and cuttings.

ENGINEERING, INC.

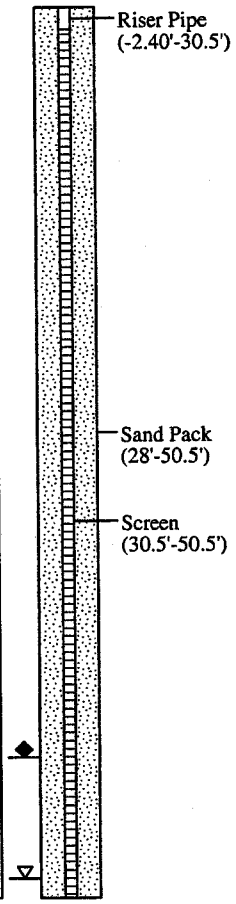
LOG OF BORING P-1

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/15/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/21/02	Northing Coordinate	: 802817.9483
Hole Diameter(s)	: 8.25-inch, 6.25-inch	Easting Coordinate	: 1727194.0561
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, Cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 817.64	Blow Count	% Rec.	USCS	DESCRIPTION
30	787				
35	782				
40	777			BR	
45	772				Continued dry rock flour
50	767				Drilling terminated at approximately 50.5 feet
55	762				
60					

Well: P-1
TOC Elevation: 820.04



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/21/02
Hole Diameter(s)	: 8.25-inch/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.40-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 CASING

Type : 4" X 4" Alum., locked

WELL PAD

Type : 3' X 3' X 6" concrete

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at 6 feet. Borehole was advanced with an Ingersoll Rand T3W air rotary rig utilizing a 6-inch hammer to approximately 40 feet. The borehole was dry for approximately 20 hours, when mud was noted at the bottom of the borehole. Continued drilling to approximately 50.5 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 52.45 feet below TOC. Solid diamond represents 7-day water level of 49.68 feet below TOC and still rising.

3. Bedrock descriptions based on air rotary response and cuttings.

JOYCE ENGINEERING, INC.

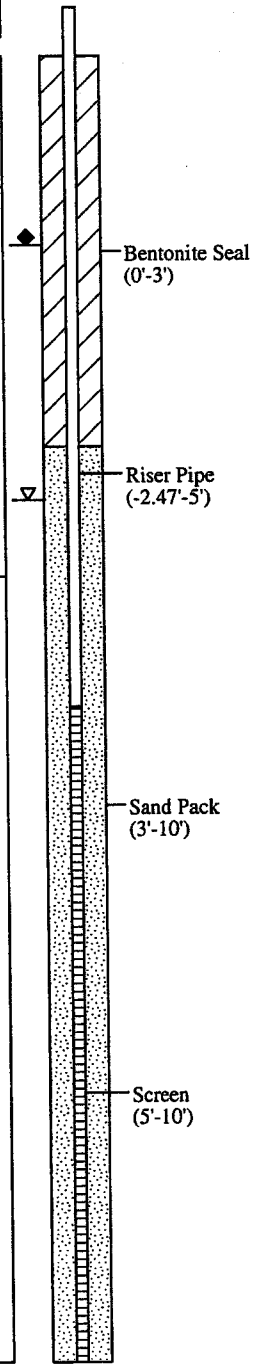
LOG OF BORING P-2

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/13/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/13/02	Northing Coordinate	: 802398.3632
Hole Diameter	: 8.25-inch	Easting Coordinate	: 1727489.5796
Drilling Method	: HSA	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: SS, Shelby Tube, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 794.31	Blow Count	% Rec.	USCS	DESCRIPTION
0	794	1			TOPSOIL - dark brown with organic matter
		1	65		SANDY SILT - brown with organics, wet, very loose
2	792	3		SM	
4	790	3			SANDY CLAY - gray to tan, very wet
		5	75		
6	788	6		SC	
8	786				
10					Boring terminated at approximatley 10 feet

Well: P-2
TOC Elevation: 796.78



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/13/02
Hole Diameter	: 8.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.47-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to approximately 10 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 5.88 feet below TOC. Solid diamond represents 7-day water level at 3.92 feet below TOC.

3. Pushed a Shelby tube from 7-9 feet with good recovery.

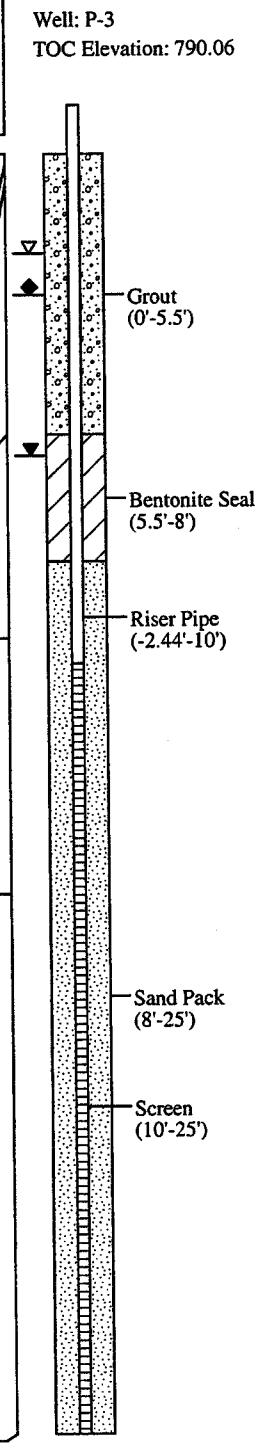
JOYCE ENGINEERING, INC.

LOG OF BORING P-3

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/12/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/12/02	Northing Coordinate	: 802083.2683
Hole Diameter	: 8.25-inch	Easting Coordinate	: 1727807.8522
Drilling Method	: HSA	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 787.62	Blow Count	% Rec.	USCS	DESCRIPTION
0	787	2 3 4	75	SC	TOPSOIL - dark brown with organic matter SANDY CLAY - brown, moist, loose
				SM	SILTY SAND/SANDY SILT - brown, very moist, loose
5	782	8 11 13	100	SC	SANDY SILT - light brown, stiff, moist quartz, feldspar, faint granitic texture SANDY CLAY - light brown/gray, stiff, moist
10	777	2 6 9	75	SM	SILTY SAND - light brown, coarse-grained, very moist, faint granitic texture
15	772	15 22 25	100	PWR	PARTIALLY WEATHERED ROCK silty sand, light brown/white, coarse-grained, slightly moist, stiff, prominent granitic fabric Drilling progess slowed (stiffer)
20	767	11 23 22	75		Water encountered at approximately 19 feet color change to light brown/white/ orange, moist, very prominent granitic fabric
25		38 50/5	30		color change to white/gray/light brown/orange, slightly moist, very stiff Boring terminated at approximately 25 feet



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/12/02
Hole Diameter	: 8.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.44-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

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to approximately 10 feet.

2. Solid triangle represents water level at time of drilling of 8.35 feet below TOC. Open triangle represents 24-hour water level at 4.39 feet below TOC. Closed diamond represents 7-day water level at 5.20 feet below TOC.

3. Bulk sample of sandy clay taken at approximatetly 10 feet for laboratory testing.

JOYCE ENGINEERING, INC.

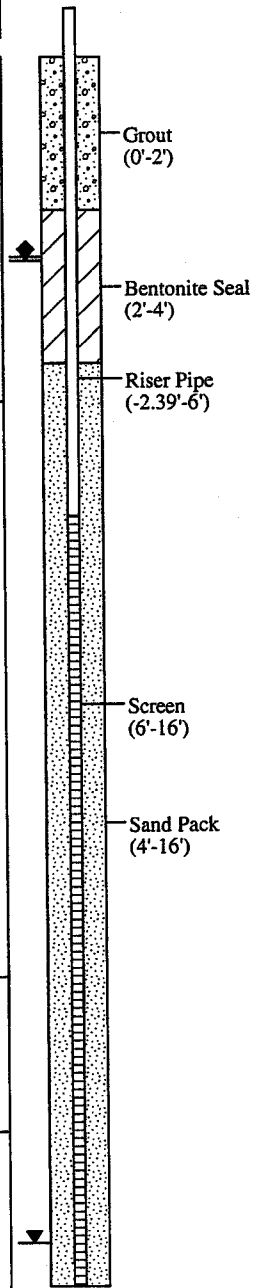
LOG OF BORING P-4A

(Page 1 of 1)

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/15/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/15/02	Northing Coordinate	: 801401.4060
Hole Diameter	: 8.25-inch	Easting Coordinate	: 1727819.6409
Drilling Method	: HSA	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 793.04	Blow Count	% Rec.	USCS	DESCRIPTION
0	793				TOPSOIL - dark brown with organics
				SM	SANDY SILT - brown to gray, moist
					color change to light gray clay, moist
4	789				
				PWR	PARTIALLY WEATHERED ROCK silty sand, tan to white, coarse-grained, slightly moist, prominent granitic fabric
					Drilling rate slowed to ~ 2-3 in./min. from 5-10 feet; very hard layers encountered
8	785				
		5			As above but very moist, moderate amounts of biotite, quartz, feldspar noted
		12	80		
		20			Water encountered at approximately 12 feet
12	781			CL	CLAYEY SILT - brown, very soft, saturated
				PWR	PARTIALLY WEATHERED ROCK silty sand, tan/white, coarse-grained, slightly moist, prominent granitic fabric, moderate amounts of biotite, quartz, feldspar, and rock fragments, much harder (drilling rate slowed to ~ 4 in./min.)
		50/4	5		
16		50/3	5		*Auger refusal at approximately 16 feet*



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/15/02
Hole Diameter	: 8.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.39-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 16 feet.

2. Solid triangle represents water level at time of drilling of 17.83 feet below TOC. Open triangle represents 72-hour water level at 5.05 feet below TOC. Solid diamond represents 7-day water level at 5.04 feet below TOC.

3. Soil descriptions for the upper 10 feet and PWR determinations based on log for P-4.

4. No SPT data collected for upper 10 feet as it is assumed to be similar to data from P-4.

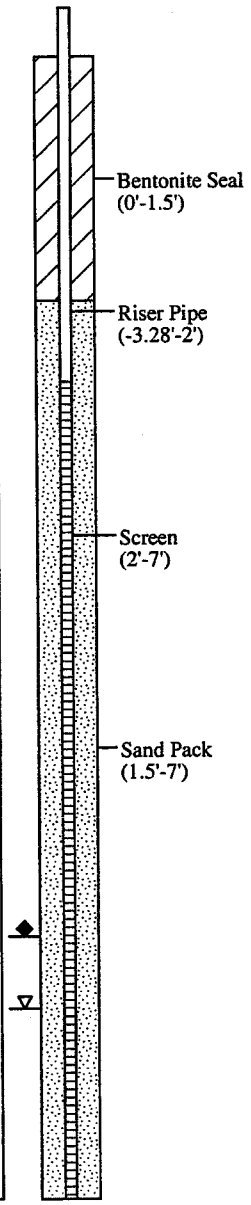
JOYCE ENGINEERING, INC.

LOG OF BORING P-5

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/15/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/15/02	Northing Coordinate	: 801163.9860
Hole Diameter	: 8.25-inch	Easting Coordinate	: 1727252.8980
Drilling Method	: HSA	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 760.56	Blow Count	% Rec.	USCS	DESCRIPTION
0	760	1			FILL
1		1	75		TOPSOIL - dark brown with organic matter
2	759	1		PWR	PARTIALLY WEATHERED ROCK sandy silt, tan to brown, coarse-grained, moist, with quartz, feldspar, and biotite, very prominent granitic fabric
3	758				
4	757				
5	756				
6	755				
7	754	50/1	5		very hard with rock fragments *Auger refusal at approximately 7 feet*
8	753				



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/15/02
Hole Diameter	: 8.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 3.28-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 7 feet.

2. Well was dry at time of drilling. Open triangle represents 72-hour water level at 9.12 feet below TOC. Solid diamond represents 7-day water level at 8.68 feet below TOC.

3. Attempted a Shelby tube from 5-7 feet. Only 0.5 foot was recovered before tube began to bend. Not enough undisturbed sample available for analysis.

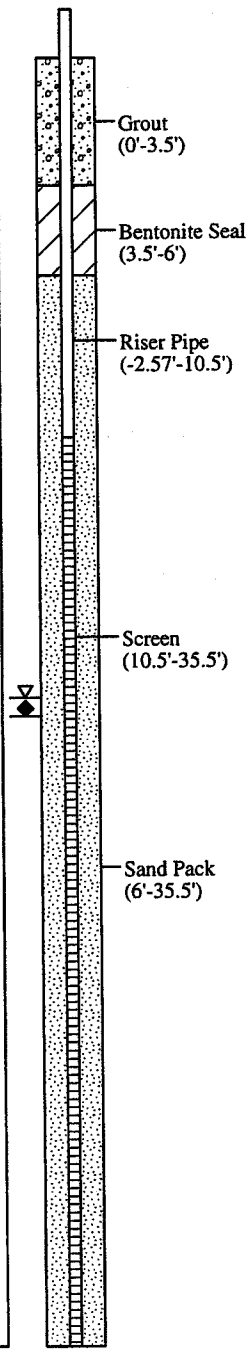
JOYCE ENGINEERING, INC.

LOG OF BORING P-6

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/12/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/20/02	Northing Coordinate	: 801577.4563
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1727463.1365
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 797.15	Blow Count	% Rec.	USCS	DESCRIPTION
0	797	1 1 3	75	SC	TOPSOIL - dark brown with organic matter SANDY CLAY - brown, moist Formation became very stiff at ~ 3.5 feet
5	792	21 35 50/6	100	PWR	PARTIALLY WEATHERED ROCK silty sand, tan to white, very coarse-grained, moist, prominent granitic fabric; gray powder with rock fragments from 5-8 feet *Auger refusal at 8.5 feet*
10	787			BR	BEDROCK - orange rock flour from ~ 10-35.5 feet
15	782				
20	777				
25	772				
30	767				Very soft and highly weathered from ~ 30-35 feet
35					Drilling terminated at aproximately 35.5 feet



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/21/02
Hole Diameter(s)	: 8.25-inch/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.57-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

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 8.5 feet. Borehole was advanced with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer to approximately 35.5 feet.

2. Borehole was dry at time of drilling on 02/20/02. Well was constructed on 02/21/02. Open triangle represents 24-hour water level at 20.26 feet below TOC. Solid diamond represents 7-day water level at 20.77 feet below TOC.

3. Bedrock descriptions based on air hammer response and cuttings.

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LOG OF BORING P-7

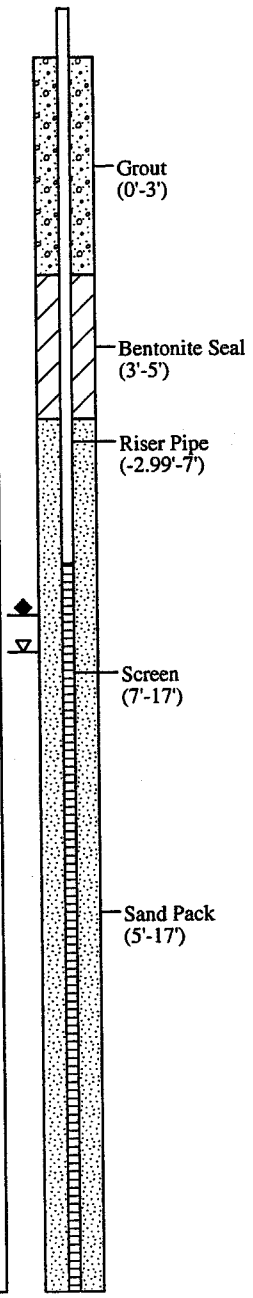
(Page 1 of 1)

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/12/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/13/02	Northing Coordinate	: 802042.0583
Hole Diameter	: 8.25-inch	Easting Coordinate	: 1727285.8203
Drilling Method	: HSA	Surveyed by	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 784.08	Blow Count	% Rec.	USCS	DESCRIPTION
0	784	3			TOPSOIL - dark brown with organic matter
		6	75		SANDY SILT - brown to orange, moist
		3			
2	782			SM	
4	780				
					PARTIALLY WEATHERED ROCK silty sand, tan, consolidated, very hard, with small granitic rock fragments
		50/4	10		
6	778				
8	776				
10	774			PWR	color change to brown, dry, very hard, with more rock fragments
12	772				
14	770				
16	768				*Auger refusal at approximately 17 feet*
		50/1	5		
18					

Well: P-7
TOC Elevation: 787.07



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/13/02
Hole Diameter	: 8.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.99-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 17 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 11.21 feet below TOC. Solid diamond represents 7-day water level at 10.70 feet below TOC

JOYCE ENGINEERING, INC.

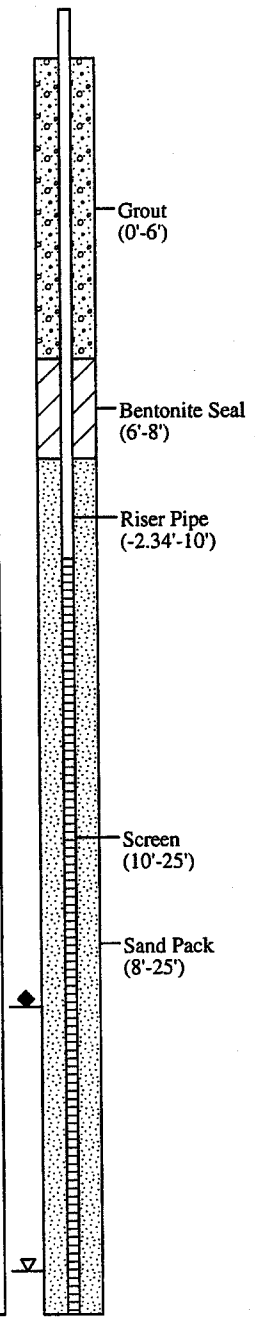
LOG OF BORING P-8

(Page 1 of 1)

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/13/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/20/02	Northing Coordinate	: 802874.3912
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726711.5530
Drilling Method(s)	: HSA / Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 792.56	Blow Count	% Rec.	USCS	DESCRIPTION
0	792	1 2 2	80	SM	TOPSOIL - dark brown with organic matter SILTY SAND - brown, moist, loose
5	787	21 35 50/5	35	PWR	PARTIALLY WEATHERED ROCK silty sand, coarse-grained, moist, prominent granitic fabric, with muscovite, quartz, and feldspar, very weathered
					Auger refusal at 8 feet
10	782	50/4	5	BR	BEDROCK - orange rock flour from 15-22 feet
15	777				
20	772				Harder rock, with gray rock flour at ~ 22 feet
25					Drilling terminated at approximately 25 feet



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/20/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.34-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 8 feet. Borehole was overdrilled with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and was progressed to approximately 25 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 26.48 feet below TOC. Solid diamond represents 7-day water level of 21.25 feet below TOC and still rising.

3. Bedrock descriptions based on air hammer response and cutting.

JOYCE ENGINEERING, INC.

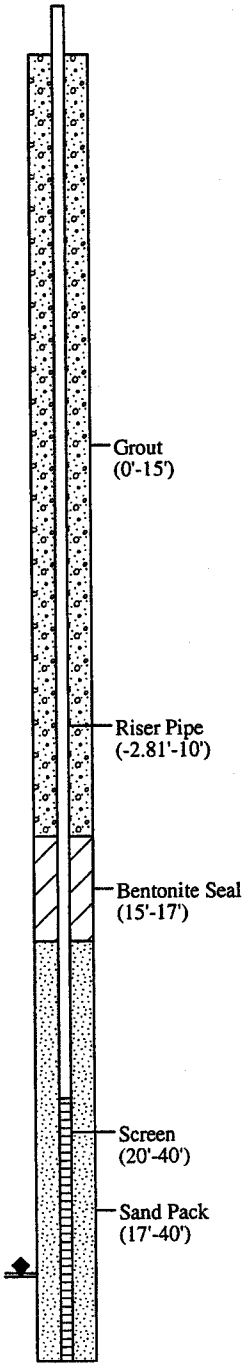
LOG OF BORING P-9

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/13/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/20/02	Northing Coordinate	: 802276.5352
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726766.1370
Drilling Method(s)	: HSA / Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 808.11	Blow Count	% Rec.	USCS	DESCRIPTION
0	808	1 2 3	25	SM	SILTY SAND - brown, very moist, loose
5	803	3		SM	SANDY SILT - dark green/brown (drastic color change), dry, hard
		44 50/3	75	PWR	SILTY SAND - tan, white, orange, slightly moist, faint granitic texture
10	798	50/5	25	BR	SANDY SILT - dark green/gray, dry, mafic rock fragments *Auger refusal at 11 feet* BEDROCK - light gray rock flour
15	793				
20	788				
25					

Well: P-9
TOC Elevation: 810.92



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/20/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.81-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 : No. 1 Portand grout

ANNULUS SEAL

Type : 3/8" Bentonite chips

1. Drilling performed with a Acker Soil Max utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 11 feet. Borehole was advanced with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer to approximately 40 feet.

2. Solid triangle represents water level at 37.26 feet below TOC at time of drilling. Open triangle represents 24-hour water level at 26.17 feet below TOC. Solid diamond represents 7-day water level at 26.13 feet below TOC.

3. Low % Recovery for the first split spoon due to loose soils that fell out of the spoon.

4. Bedrock descriptions based on air hammer response and cuttings.

JOYCE ENGINEERING, INC.

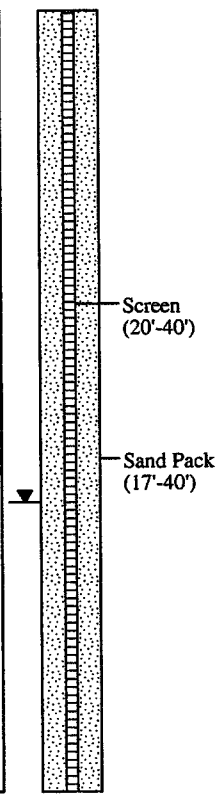
LOG OF BORING P-9

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/13/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/20/02	Northing Coordinate	: 802276.5352
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726766.1370
Drilling Method(s)	: HSA / Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 808.11	Blow Count	% Rec.	USCS	DESCRIPTION
25	783				
30	778				Hard rock at 30 feet with gray flour
				BR	Water at ~ 32 feet (dust died down with cool flow), orange/brown rock flour
35	773				
40	768				Drilling terminated at 40 feet
45	763				
50					

Well: P-9
TOC Elevation: 810.92



Well Construction Information

WELL CONSTRUCTION

Date Completed	: 02/20/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.81-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 : No. 1 Portand grout

ANNULUS SEAL

Type : 3/8" Bentonite chips

1. Drilling performed with a Acker Soil Max utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 11 feet. Borehole was advanced with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer to approximately 40 feet.

2. Solid triangle represents water level at 37.26 feet below TOC at time of drilling. Open triangle represents 24-hour water level at 26.17 feet below TOC. Solid diamond represents 7-day water level at 26.13 feet below TOC.

3. Low % Recovery for the first split spoon due to loose soils that fell out of the spoon.

4. Bedrock descriptions based on air hammer response and cuttings.

JOYCE ENGINEERING, INC.

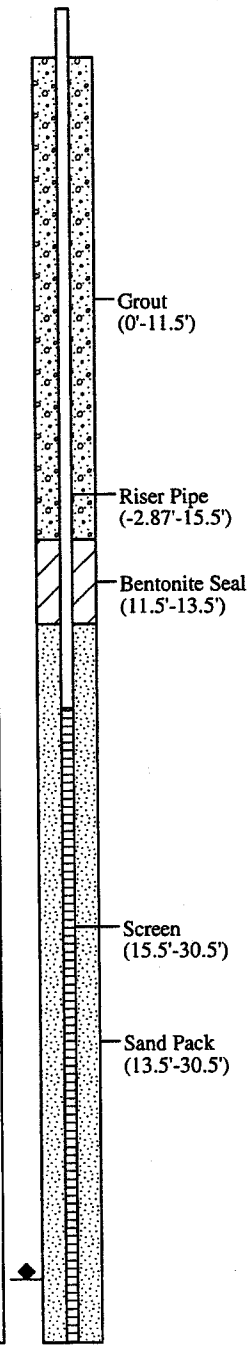
LOG OF BORING P-10

(Page 1 of 1)

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/13/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/20/02	Northing Coordinate	: 801873.7243
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726712.5984
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 791.20'	Blow Count	% Rec.	USCS	DESCRIPTION
0	791	1 5 7	75	SM	TOPSOIL - dark brown with organic matter SILTY SAND - tan/white/orange, coarse-grained, very moist *Auger refusal at 5 feet*
5	786	50/5	10	PWR	PARTIALLY WEATHERED ROCK silty sand, coarse-grained, slightly moist, with biotite, quartz, feldspar, faint granitic texture Core run from 5-15 feet: % REC = 0.02% % RQD = 0% coarse-grained granite, began getting harder at bottom
10	781				
15	776			BR	BEDROCK 15-20 foot core run: % REC = 97% % RQD = 93% coarse-grained granite, with biotite, feldspar, quartz; Fe-Mn stains on fractures, fracutres from 30-70 degrees; slight preferetial orientation seen in biotite Hard rock at 17 feet with dark gray rock flour
20	771				
25	766				brown/ dark gray/ black cuttings, some pyrite, mafic rock
30					Drilling terminated at 30.5 feet



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/20/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.87-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 : No. 1 Portand grout

ANNULUS SEAL

Type : 3/8" Bentonite chips

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 5 feet. Fifteen feet of rock core were obtained from 5-20 feet using an NQ-wireline coring device. The borehole was overdrilled with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and advanced to approximately 25 feet. The borehole was dry for appproximately 24 hours, when mud was noted at the bottom of the borehole. Continued drilling to approximatley 30.5 feet.

2. Well was dry at time of drilling and at the 24-hour interval. Solid diamond represents 7-day water level of 31.87 feet below TOC and still rising.

3. Top of bedrock based on rock core data.

4. Bedrock descriptions based on rock core obtained from 15-20 feet, air hammer response and cuttings.

JOYCE ENGINEERING, INC.

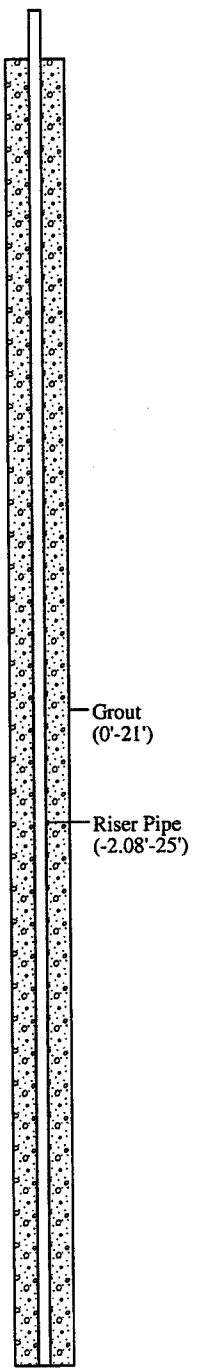
LOG OF BORING P-11

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/20/02	Northing Coordinate	: 801467.3402
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726561.7170
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 778.21	Blow Count	% Rec.	USCS	DESCRIPTION
0	778	2			TOPSOIL - dark brown with organic matter
		1	80		
		2		SM	SILTY SAND - tan/brown, moist, soft
5	773	50/4"	<5	PWR	PARTIALLY WEATHERED ROCK silty sand, tan to white, dry, hard, with small rock fragments
					As above with larger rock fragments
10	768				*Auger refusal at 10 feet*
		50/3	5	BR	BEDROCK - light gray rock flour
15	763				Slightly moist cuttings at ~ 15 feet
20					

Well: P-11
TOC Elevation: 780.29



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/20/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.08-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 Portand grout

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25 inch ID hollow stem augers to auger refusal at approximately 10 feet. The borehole was overdrilled with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and advanced to approximately 40 feet.

2. Well was dry at time of drillling. Open triangle represents 24-hour water level at 41.85 feet below TOC. Sollid diamond represents 7-day water level of 41.46 feet below TOC and still rising.

3. Bedrock descriptions based on air rotary response and cuttings.

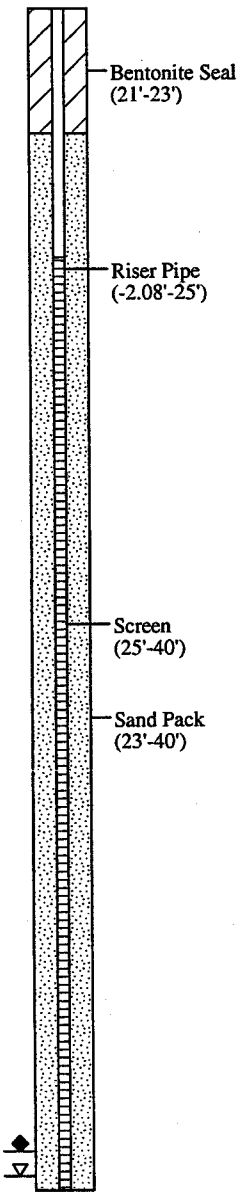
JOYCE ENGINEERING, INC.

LOG OF BORING P-11

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/20/02	Northing Coordinate	: 801467.3402
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726561.7170
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 778.21	Blow Count	% Rec.	USCS	DESCRIPTION
21	757				
					Moist, orange rock flour at ~ 25 feet
26	752				
					Dark green/gray rock flour from ~ 26-28 feet
					Hard rock at 28 feet
					Light gray rock flour
				BR	
31	747				
					Orange rock flour from ~ 37-38 feet
36	742				
					dark green/gray rock flour from ~ 38-40 feet
					Boring terminated at 40 feet
41					



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/20/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.08-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 Portand grout

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25 inch ID hollow stem augers to auger refusal at approximately 10 feet. The borehole was overdrilled with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and advanced to approximately 40 feet.

2. Well was dry at time of drillling. Open triangle represents 24-hour water level at 41.85 feet below TOC. Sollid diamond represents 7-day water level of 41.46 feet below TOC and still rising.

3. Bedrock descriptions based on air rotary response and cuttings.

JOYCE ENGINEERING, INC.

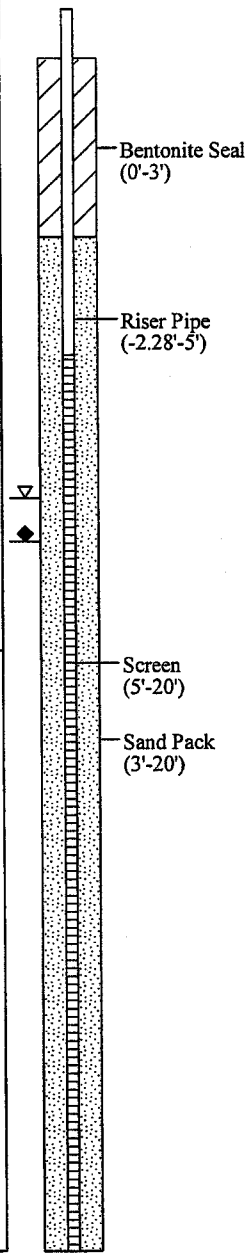
LOG OF BORING P-12

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/19/02	Northing Coordinate	: 801517.3101
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726103.7012
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 741.16	Blow Count	% Rec.	USCS	DESCRIPTION
0	741	1			TOPSOIL - dark brown with organic matter
		1	75		
		2		SM	SANDY SILT - dark brown, soft, slightly moist
5	736	12		SM	SILTY SAND - tan/brown, coarse-grained
		19	50		
		16		PWR	PARTIALLY WEATHERED ROCK silty sand, tan/brown/white, coarse-grained, granitic texture
					Auger refusal at 10 feet
10	731	50/1	0	BR	BEDROCK - Hard rock and light gray rock flour, slightly moist
					Very dry rock flour
15	726				
					Drilling terminated at approximately 20 feet
20					

Well: P-12
TOC Elevation: 743.44



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/19/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.28-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 10 feet. Cave-in to approximately 7 feet occured. Borehole was advanced with an Ingersol Rand T3W utilizing a 6-inch hammer to approximately 20 feet.

2. Borehole was dry at time of drilling after the initial 10 feet were drilled on 02/15/02, the water level rose to 6.98 feet below ground surface. The water level rose to 2.50 feet below ground surface on 02/18/02 and to 2.45 feet below ground surface on 02/19/02, prior to advancing the borehole with air rotary methods.

3. After well construction, well was dry. Open triangle represents 24-hour water level at 9.70 feet below TOC. Solid diamond represents 8-day water level at 10.43 feet below TOC.

4. Bedrock descriptions based on air hammer response and cuttings.

JOYCE ENGINEERING, INC.

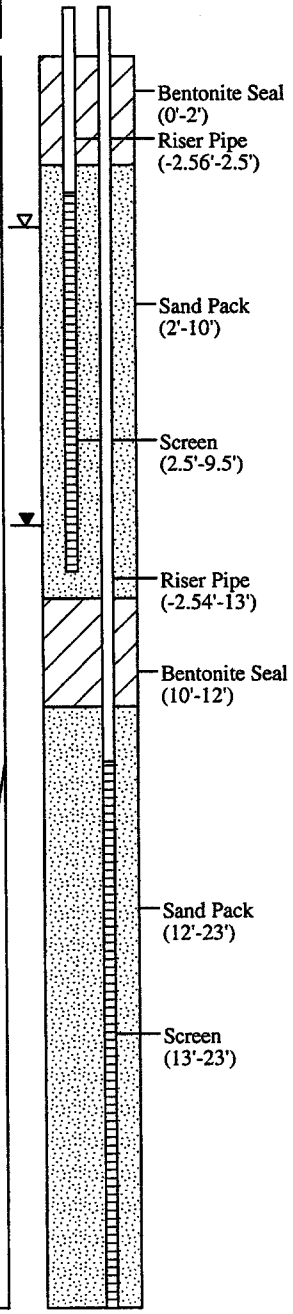
LOG OF BORING P-13S and P-13D

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/19/02	Northing Coordinate	: 801972.7145 (P-13S)
Hole Diameter	: 10.25-inch	Easting Coordinate	: 1726151.2569 (P-13S)
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 775.55	Blow Count	% Rec.	USCS	DESCRIPTION
0	775	1			TOPSOIL - dark brown with organic matter
		3	100		
2	773	4		SM	SILTY SAND - tan, fine grained, very moist, loose, with muscovite and quartz
4	771				
6	769	33	25		PARTIALLY WEATHERED ROCK silty sand, coarse-grained, slightly moist, hard, granitic texture, with feldspar, quartz, biotite, and Fe staining
		50/5			
8	767			PWR	
10	765	31			prominent granitic fabric *Auger refusal at 10 feet* Core run from 10-13 feet: %REC = 0.03% %RQD = 0% coarse-grained weathered granite with biotite, quartz, feldspar, epidote, and Fe stains, strong preferential orientation seen in biotite (schlieren) very brittle (orange rock flour during air rotary drilling)
		50/5	5		
12	763				
14	761				BEDROCK - light gray rock flour 13-18 foot core run: %REC= 66% %RQD = 55% granite (as above)
16	759				
18	757			BR	18-23 foot core run: %REC = 94% %RQD = 87% biotite granite, Fe-Mn stains on fractures and throughout upper 2 feet from horizontal to ~ 35 degrees
20	755				
22	753				Drilling terminated at 23 feet
24					

Well1: P-13S
Well2: P-13D
TOC Elevation: 778.11 (P-13S)
778.09 (P-13D)



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/19/02
Hole Diameter	: 10.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.54 & 2.56-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 a Acker Soil Max utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 10 feet. Thirteen feet of rock core were obtained using an NQ wire-line rock coring device. Borehole was overdrilled and advanced with an Ingersol Rand T3W utilizing a 10-inch hammer to aproximately 23 feet.

2. Water level of ~ 2.5 feet below ground surface prior to air rotary drilling was suspect due to core water. Water level at time of drilling was approximately 22.78 feet below TOC. Water level at 24-hour interval in P-13S was 10.12 feet below TOC and 10.01 feet below TOC in well P-13D.

3. Open triangle represents 8-day water level at 5.70 feet below TOC in well P-13S. Solid triangle represents 8-day water level at 11.21 feet below TOC in well P-13D.

4. Bedrock descriptions based on rock core obtained from 13-23 feet, air hammer response and cuttings. Top of bedrock based on rock core data.

5. Penetration rate during rock coring was aproximately 6in/20sec from 10-13 feet, 6in/1min from 13-18 feet and from 18-23 feet.

JOYCE ENGINEERING, INC.

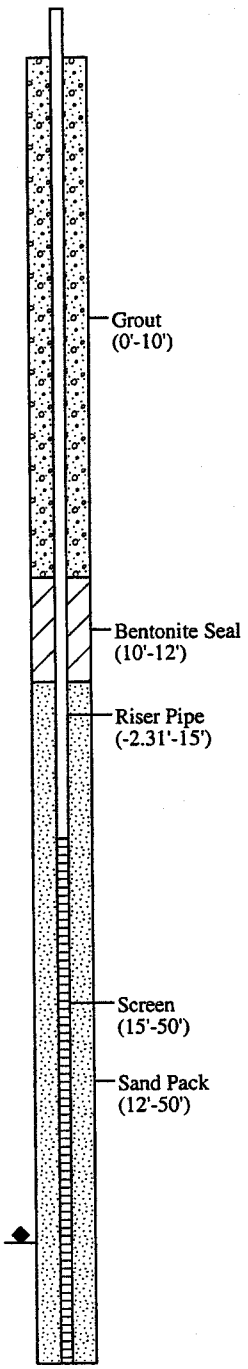
LOG OF BORING P-14

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/19/02	Northing Coordinate	: 802616.4977
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726411.5603
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 782.80	Blow Count	% Rec.	USCS	DESCRIPTION
0	782	2			TOPSOIL- dark brown with organic matter
		2	80	SM	SILTY SAND - tan, fine grained, moist, loose
		3			
5	777	50/5	10	PWR	PARTIALLY WEATHERED ROCK silty sand, tan/white, med to coarse-grained, dry, very dense
		18	75		
		50/4			
10	772			MH	SILT - brown, dry, with muscovite and small weathered granite fragments
				PWR	PARTIALLY WEATHERED ROCK silty sand, tan, with large quartz grains, dry, coarse-grained, slighty moist
		49	100		*Auger refusal at 12 feet*
15	767	50/5		BR	BEDROCK - hard rock, light gray rock flour, dry
20	762				
25					

Well: P-14
TOC Elevation: 785.11



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/19/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.31-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 12 feet. Borehole was advanced with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer to approximately 50 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 32.83 feet below TOC. Solid diamond represents 8-day water level at 25.00 feet below TOC.

3. Bedrock descriptions based on air hammer response and cuttings.

ENGINEERING, INC.

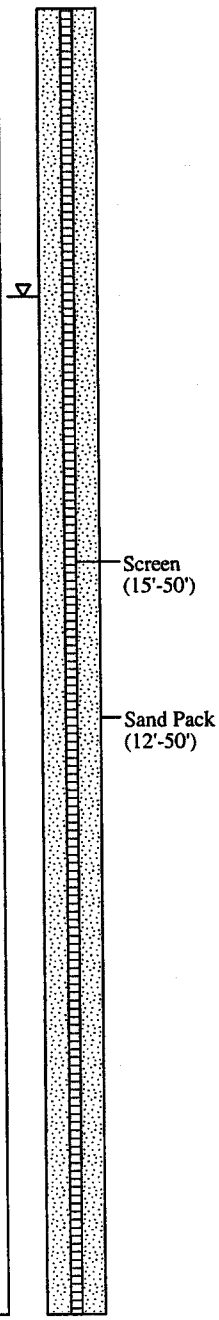
LOG OF BORING P-14

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/19/02	Northing Coordinate	: 802616.4977
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726411.5603
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 782.80	Blow Count	% Rec.	USCS	DESCRIPTION
25	757				
30	752				
35	747			BR	
40	742				
45	737				
50					Drilling terminated at approximately 50 feet

Well: P-14
TOC Elevation: 785.11



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/19/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.31-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 12 feet. Borehole was advanced with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer to approximately 50 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 32.83 feet below TOC. Solid diamond represents 8-day water level at 25.00 feet below TOC.

3. Bedrock descriptions based on air hammer response and cuttings.

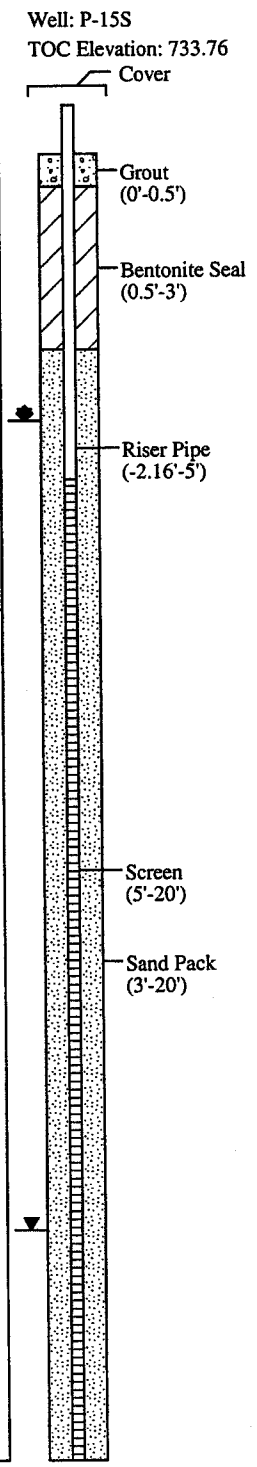
JOYCE ENGINEERING, INC.

LOG OF BORING P-15S

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/20/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/20/02	Northing Coordinate	: 801841.4130
Hole Diameter	: 6.25-inch	Easting Coordinate	: 1725570.0413
Drilling Method	: Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Cuttings, Shelby tube	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 731.60	USCS	DESCRIPTION
0	731	SM	SILTY SAND - tan, moist, loose, some alluvial sands?
2	729		
4	727		
6	725	PWR	PARTIALLY WEATHERED ROCK silty sand, tan/white, slightly moist *Auger refusal at 7 feet (based on P-15D)*
8	723	BR	BEDROCK - dry rock flour, light brown/gray
10	721		
12	719		
14	717		
16	715		
18	713		
20			Drilling terminated at 20 feet



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/20/02
Hole Diameter	: 6.25-inch
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.16-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 : No. 1 Portand grout

ANNULUS SEAL

Type : 3/8" Bentonite chips

PROTECTIVE CASING

Type : 4" X 4" Alum., locked

WELL PAD

Type : 3' X 3' X 6" concrete

1. Drilling was performed with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and borehole was progressed to approximately 20 feet.

2. Solid triangle represents water level at time of drilling at 18.65 feet below TOC. Open triangle represents 24-hour water level at 6.25 feet below TOC. Solid diamond represents 8-day water level at 6.26 feet below TOC.

3. Shelby tube was attempted from 5-7 feet. Approximatley 1 foot was recovered before tube began to bend. Not enough undisturbed sample for complete analysis.

4. Auger refusal was estimated to be approximately 7 feet based on data taken from P-15D.

5. Bedrock descriptions bsed on rock core data from P-15D, air hammer response, and cuttings.

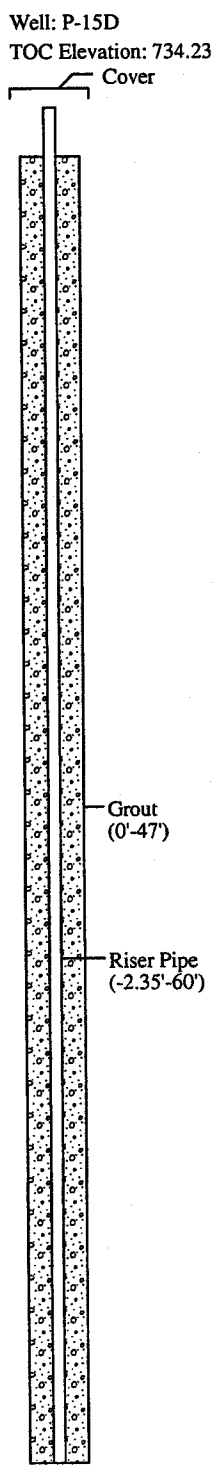
JOYCE ENGINEERING, INC.

LOG OF BORING P-15D

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/19/02	Northing Coordinate	: 801847.0387
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1725576.6237
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings, rock core	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 731.88	Blow Count	% Rec.	USCS	DESCRIPTION
0	731	1 1 1	75	SP	TOPSOIL - dark brown with organic matter SAND - tan, well sorted, slightly moist, soft, alluvial sands?
5	726	16 15 50/4	90	PWR	PARTIALLY WEATHERED ROCK silty sand, tan/white, moist, soft, faint granitic texture *Auger refusal at 7 feet*
10	721			BR	BEDROCK 7-13 foot core run: %REC = 46% %RQD = 38% biotite granite, with feldspar and quartz, medium-grained, slight preferential orientation in biotite, some quartz-rich veins and brittle zones, fractures from horizontal to ~ 30 degrees 13-17 foot core run: %REC = 98% %RQD = 66% as above Hard rock and dry, gray rock flour from 20-29 feet
15	716				
20	711				
25	706				
30	701				
35	696				
40					



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/19/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.35-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 : No. 1 Portand grout

ANNULUS SEAL

Type : 3/8" Bentonite chips

PROTECTIVE CASING

Type : 4" X 4" Alum., locked

WELL PAD

Type : 3' X 3' X 6" concrete

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 7 feet. Ten feet of rock core were obtained using an NQ wire-line rock coring device. Borehole was overdrilled with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and advanced to approximately 80 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 81.28 feet below TOC. Solid diamond represents 8-day water level at 70.16 feet below TOC and still rising.

3. Pentration rate during rock coring was approximately 1 ft/min. for the 7-13 foot run and approximately 4 in./min for the 13-17 foot run.

4. Bedrock descriptions based on rock core obtained from 7-17 feet, air hammer response and cuttings.

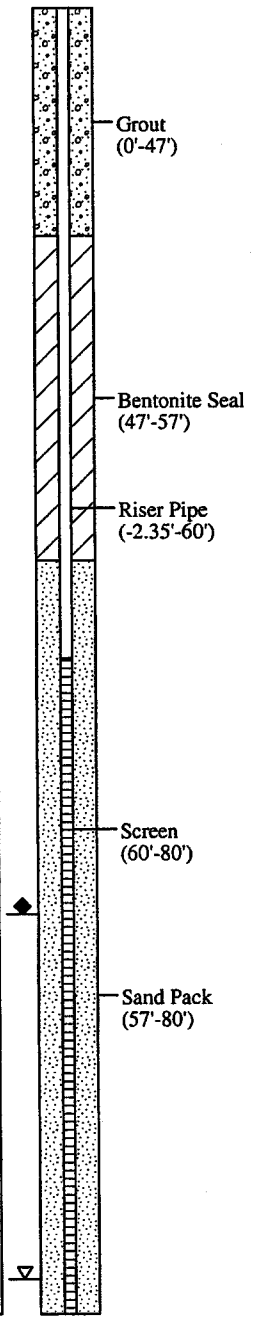
ENGINEERING, INC.

LOG OF BORING P-15D

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/19/02	Northing Coordinate	: 801847.0387
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1725576.6237
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings, rock core	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 731.88	Blow Count	% Rec.	USCS	DESCRIPTION
40	691				
45	686				
50	681				
55	676				
60	671			BR	
65	666				
70	661				
75	656				
80					Drilling terminated at approximately 80 feet



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/19/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.35-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 : No. 1 Portand grout

ANNULUS SEAL

Type : 3/8" Bentonite chips

PROTECTIVE CASING

Type : 4" X 4" Alum., locked

WELL PAD

Type : 3' X 3' X 6" concrete

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 7 feet. Ten feet of rock core were obtained using an NQ wire-line rock coring device. Borehole was overdrilled with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and advanced to approximately 80 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 81.28 feet below TOC. Solid diamond represents 8-day water level at 70.16 feet below TOC and still rising.

3. Pentration rate during rock coring was approximately 1 ft/min. for the 7-13 foot run and approximately 4 in./min for the 13-17 foot run.

4. Bedrock descriptions based on rock core obtained from 7-17 feet, air hammer response and cuttings.

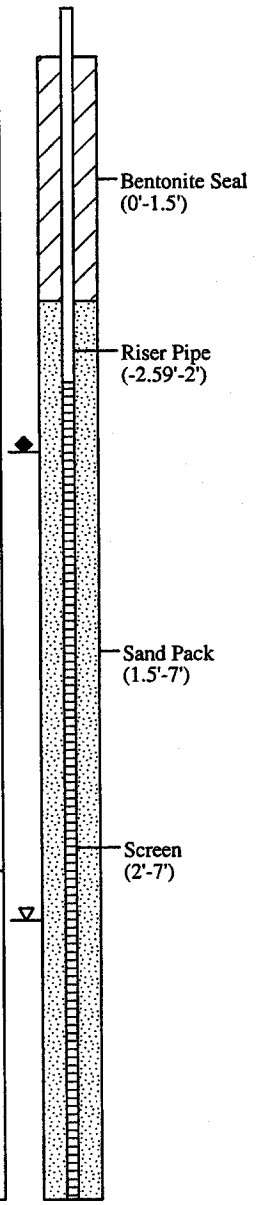
JOYCE ENGINEERING, INC.

LOG OF BORING B-~~17~~P-16

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/13/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/18/02	Northing Coordinate	: 801704.6334
Hole Diameter	: 8.25-inch	Easting Coordinate	: 1726813.5115
Drilling Method	: HSA	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 773.20	Blow Count	% Rec.	USCS	DESCRIPTION
0	773	1			TOPSOIL - dark brown with organic matter
1	772	1	100		SANDY SILT - tan to brown, moist, soft
2	771	2			
3	770			SM	
4	769				
5	768				PARTIALLY WEATHERED ROCK sandy silt, brown to tan, moist, hard
6	767	50/2	5	PWR	
7	766	50/3	<1		*Auger refusal at 7 feet*
8					



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/18/02
Hole Diameter	: 8.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.59-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 7 feet.

2. Borehole was dry at time of drilling on 02/13/02. Open triangle represents 24-hour water level at 7.89 feet (adjusted to be from TOC). Well was installed on 02/18/02. Solid diamond represents 8-day water level at 5.02 feet below TOC on 02/21/02.

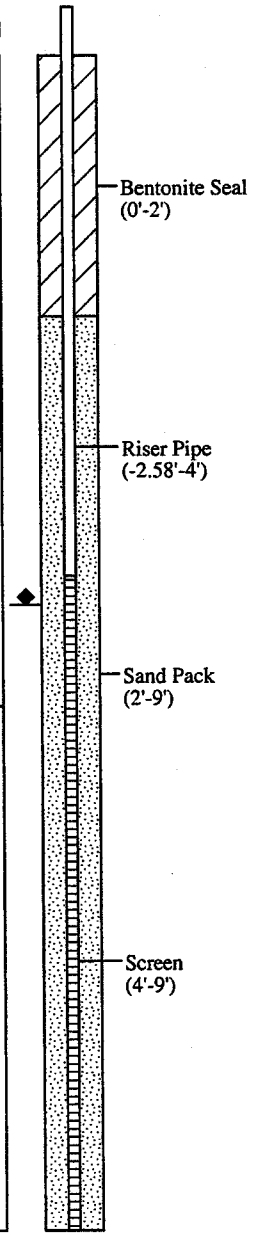
JOYCE ENGINEERING, INC.

LOG OF BORING B-47P-17

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/18/02	Northing Coordinate	: 802230.4668
Hole Diameter	: 8.25-inch	Easting Coordinate	: 1726287.1231
Drilling Method	: HSA	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 780.96	Blow Count	% Rec.	USCS	DESCRIPTION
0		1			FILL
1	780	1	35	SM	SILTY SAND - brown, soft, moist
2	779	3			
3	778				
4	777				
5	776	33		PWR	PARTIALLY WEATHERED ROCK silty sand, tan to white, medium-grained, moist, large biotite grains, quartz, faint granitic fabric
6	775		75		
7	774	50/3			
8	773				soil was dry
9	772	50/3	10		*Auger refusal at 9 feet*
10	771				



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/18/02
Hole Diameter	: 8.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.58-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 a Acker Soil Max utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 9 feet.

2. Borehole was dry at time of drilling on 02/14/02 and after 24 hours. The well was constructed on 02/18/02. Solid diamond represents 7-day water level at 6.80 feet below TOC.

JOYCE ENGINEERING, INC.

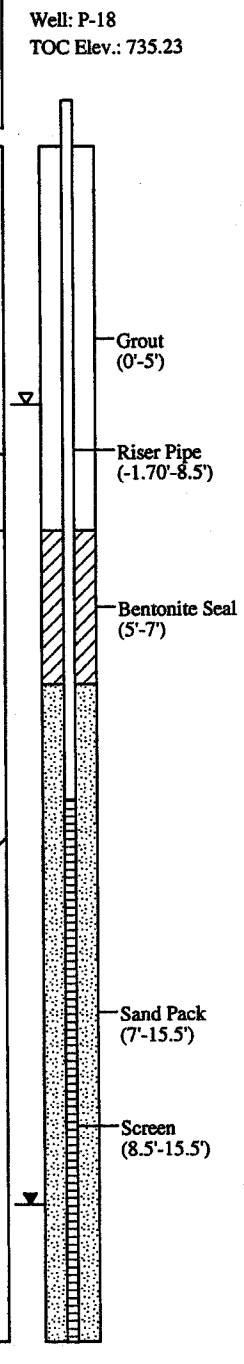
LOG OF BORING P-18

MRR of High Point
C&D Permit Application Response to Comments
High Point, NC

JEI Project No. 600.00, Task 06

Date Started	: 12/04/02	Drilling Company	: J&L Drilling, Inc.
Date Completed	: 12/17/02	Northing Coord.	: 801625.0677
Hole Diameter	: 8.25-inch, 6.25-inch	Easting Coord.	: 1725754.7189
Drilling Method	: HSA/Downhole Hammer	Survey By	: Fleming Engineering, Inc.
Sampling Method	: Split Spoons, Cuttings	Logged By	: David Y. Reedy

Depth in Feet	Surf. Elev. 733.53	Blow Count	% Rec.	USCS	DESCRIPTION
0	733	2	80%	SM	SILTY SAND - yellow fine to medium grained silty sand, quartz grains, moist
1		2			
		4			
2	732	5			
3	731				
4	730			CL	LEAN CLAY - orange sandy clay, moist
5	729	14	50%	PWR	PWR - white coarse grained silty sand with abundant iron staining, granitic texture, moist
6	728	21			
7	727	27			
8	726	25			
9	725				Granitic rock fragments at end of split-spoon with quartz, feldspar, and biotite
10	724				*Auger refusal at 9 ft*
11	723	50/5	5%	BR	BEDROCK - granitic rock with quartz, feldspar, and biotite, gray damp cuttings, no dust
12	722				Wet cuttings at 10 ft
13	721				
14	720				Green cuttings at 13.5 ft that may represent metavolcanics, damp
15	719				White and gray granitic cuttings at 14.5 ft
16	718				Drilling terminated at approximately 15.5 ft



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12/17/02
Hole Diameter(s)	: 8.25-inch/6.25-inch
Drilling Method	: Hollow Stem Augers
Drilling Method	: Downhole Hammer
Company Rep.	: Lee Charbonneau

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 1.70

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 CME 75 rig utilizing 6.25-inch ID hollow stem augers, and 6-inch downhole hammer. An external air compressor was used for downhole hammer drilling.

2. The drilling method consisted of advancing 6.25-inch ID hollow stem augers to auger refusal and then rock drilling with a 6-inch downhole hammer to the desired depth.

3. Solid triangle represent water level at time of drilling (15.43 feet below TOC). Open triangle represents water level 8 days after well construction (5.05 feet below TOC). Dry cuttings were observed with air rotary drilling from 9-10 feet.

JOYCE ENGINEERING, INC.

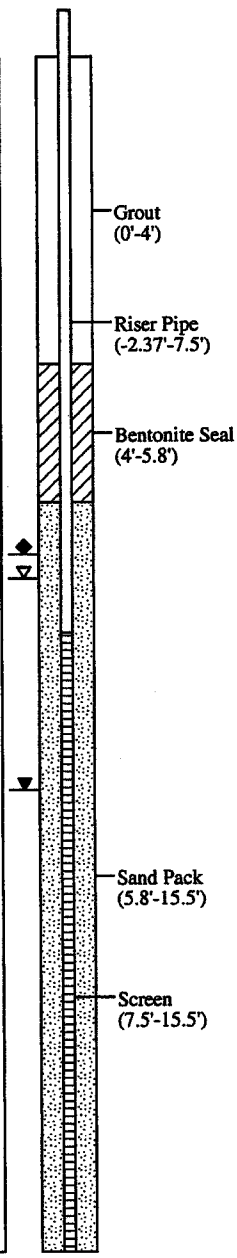
LOG OF BORING P-19

MRR of High Point
C&D Permit Application Response to Comments
High Point, NC

JEI Project No. 600.00, Task 06

Date Started	: 12/04/02	Drilling Company	: J&L Drilling, Inc.
Date Completed	: 12/17/02	Northing Coord.	: 801782.1494
Hole Diameter	: 8.25-inch, 6.25-inch	Easting Coord.	: 1725826.3022
Drilling Method	: HSA/Core/Downhole Hammer	Survey By	: Fleming Engineering, Inc.
Sampling Method	: Split Spoons, Core, Cuttings	Logged By	: David Y. Reedy

Depth in Feet	Surf. Elev. 749.41	Blow Count	% Rec.	USCS	DESCRIPTION
0	749	4	80%	SM	SILTY SAND - tan sitly sand, moist
1		3			
	748	2			
2		6		CH	FAT CLAY - yellow and gray mottled fat clay, moist
	747				
3					Yellow and gray mottled fat clay with some sand, moist at 3 ft
	746				
4					Rock fragments in cuttings at 4 ft
	745				
5		31		PWR	PWR - white, coarse grained silty sand with quartz and feldspar grains with abundant iron staining, dry, prominent granitic texture
	744	50/4	40%		*Auger refusal at 6 ft*
6					
	743	100/6			BEDROCK - light gray granitic rock with quartz, orthoclase, and biotite, still weathered with gravel size cuttings, dry
7					Core run 7-15 feet: RQD = 100%, Recovery = 100%; weathered surface at top of core, granite with biotite, feldspar and quartz, , granite/diabase contact at 7.4 ft, diabase is dark green in color and fine grained, diabase/granite contact at 8 ft, granite/diabase contact at 15 ft, all granite/diabase contacts are steeply dipping, no natural breaks were observed in core
	742				
8					
	741				
9					
	740				
10					
	739			BR	
11					
	738				Approximate core rate: 1 ft/10 min.
12					
	737				
13					Apparent water producing fracture at 13.5 ft identified during downhole hammer drilling
	736				
14					Apparent fracture at 15 ft based on downhole hammer drilling response
	735				
15					**Drilling terminated at approximately 15.5 ft**
	734				
16					



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12/17/02
Hole Diameter(s)	: 8.25-inch/6.25-inch
Drilling Method	: Hollow Stem Augers
Drilling Method	: NQ Core Barrell
Drilling Method	: Tricone Bit
Drilling Method	: Downhole Hammer
Company Rep.	: Lee Charbonneau

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.37

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 CME 75 rig utilizing 3.25-inch ID surface casing, 3-inch tricone bit, 3-inch NQ core barrell, 6.25-inch ID hollow stem augers, and 6-inch downhole hammer. An external air compressor was used for tricone and downhole hammer drilling.

2. The drilling method consisted of driving temporary 3.25-inch ID surface casing down to top of rock by drilling ahead using a 3-inch tricone bit. Coring took place at the top of rock using a 3-inch NQ core barrell. The drilling rig was then moved 3.3 feet due west. 6.25-inch ID hollow stem augers were advanced to auger refusal and then a 6-inch downhole hammer was used for rock drilling to the desired depth. A piezometer was constructed in the second boring. The first boring was abandoned with Portland Type I grout.

3. Solid triangle represent water level at time of drilling (11.91 feet below TOC). Open triangle represents water level 24 hours after well construction (9.16 feet below TOC). Solid diamond represent water level 6 days after well construction (8.85 feet below TOC).

4. Bedrock descriptions based on rock core obtained from 7-15 feet.

JOYCE ENGINEERING, INC.

LOG OF BORING P-20

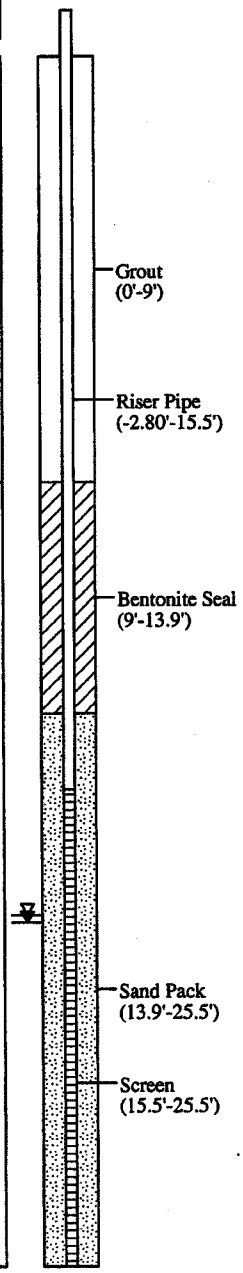
MRR of High Point
C&D Permit Application Response to Comments
High Point, NC

JEI Project No. 600.00, Task 06

Date Started	: 12/12/02	Drilling Company	: J&L Drilling, Inc.
Date Completed	: 12/17/02	Northing Coord.	: 802235.9472
Hole Diameter	: 8.25-inch, 6.25-inch	Easting Coord.	: 1726398.6587
Drilling Method	: HSA/Core/Downhole Hammer	Survey By	: Fleming Engineering, Inc.
Sampling Method	: Split Spoons, Core, Cuttings	Logged By	: David Y. Reedy

Depth in Feet	Surf. Elev. 792.79	Blow Count	% Rec.	USCS	DESCRIPTION
0	792	3 4 4	100%		TOPSOIL - dark brown organic rich soil
2	790	13		CL	LEAN CLAY - tan sandy clay, saturated
4	788			SM	SILTY SAND - orange and tan mottled silty sand, slightly moist Changes in color to tan at 4.5 ft, still slightly moist
6	786	50/1	10%	PWR	PWR - light tan, fine grained silty sand with small pebbles, primarily made up of quartz ***Auger refusal at 9 ft***
8	784				
10	782			BR	BEDROCK - iron stained, light gray granitic rock, still weathered with pebble size cuttings, dry Core run 10-15 feet: RQD = 69%, Recovery = 75%; weathered granite with abundant iron staining throughout core, natural break at 10.5 ft with heavy iron staining, natural break at 12.10 ft with heavy iron staining, and missing core from 12.10 to 13.75 ft is interpreted as a large fracture
12	780				Approximate core rate: 10'-11'/250 sec., 11'-12'/410 sec., 12'-13'/200 sec., 13'-14'/130 sec., 14'-15'/210 sec.
14	778				Core run 15-19 ft: RQD = 96%, Recovery = 98%; weathered granite with abundant iron staining throughout core, natural breaks at 17 ft and 18 ft with heavy iron staining
16	776				Core rate: 15'-16'/210 sec., 16'-17'/280 sec., 17'-18'/280 sec., 18'-19'/360 sec.
18	774				Apparent fracture at 19.5 ft identified by downhole hammer drilling response
20	772				Apparent fracture at 21 ft based on downhole hammer drilling response
22	770				Apparent fracture at 23.5 ft based on downhole hammer drilling response
24	768				**Drilling terminated at approximately 25.5 ft**
26					

Well: P-20
TOC Elev.: 795.59



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12/17/02
Hole Diameters	: 8.25-inch/6.25-inch
Drilling Method	: Hollow Stem Augers
Drilling Method	: NQ Core Barrell
Drilling Method	: Tricone Bit
Drilling Method	: Downhole Hammer
Company Rep.	: Lee Charbonneau

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.80

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 CME 75 rig utilizing 3.25-inch ID surface casing, 3-inch tricone bit, 3-inch NQ core barrell, 6.25-inch ID hollow stem augers, and 6-inch downhole hammer. An external air compressor was used for tricone and downhole hammer drilling.

2. The drilling method consisted of advancing 6.25-inch ID hollow stem augers to auger refusal and then rock drilling with a 6-inch downhole hammer to the desired depth. The drilling rig was then moved 10.8 feet due west. Then, 3.25-inch ID surface casing was driven down to top of rock by drilling ahead using a 3-inch tricone bit. Coring took place at the top of rock using 3-inch NQ core barrell. A piezometer was constructed in the first boring. The second boring was abandoned with Portland Type I grout.

3. Boring was dry at time of drilling. Solid triangle represent water level 24 hours after well construction (21.10 feet below TOC). Open triangle represents water level 6 days after well construction (20.94 feet below TOC).

4. Bedrock descriptions based on rock core obtained from 10-19 feet.

JOYCE ENGINEERING, INC.

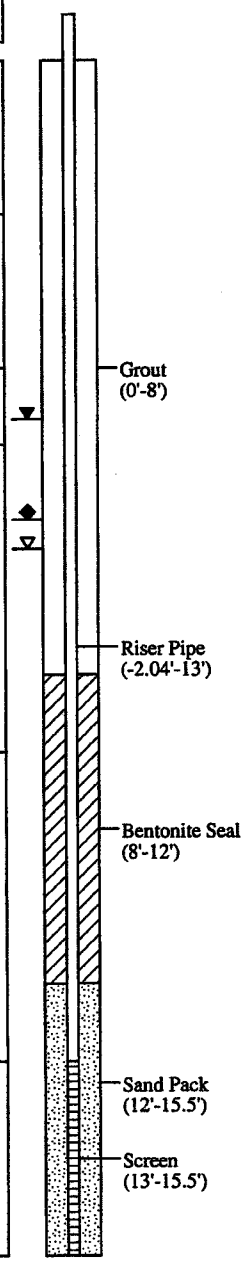
LOG OF BORING P-21

MRR of High Point
C&D Permit Application Response to Comments
High Point, NC

JEI Project No. 600.00, Task 06

Date Started	: 12/16/02	Drilling Company	: J&L Drilling, Inc.
Date Completed	: 12/17/02	Northing Coord.	: 801737.6955
Hole Diameter	: 8.25-inch, 6.25-inch	Easting Coord.	: 1726398.4269
Drilling Method	: HSA/Downhole Hammer	Survey By	: Fleming Engineering, Inc.
Sampling Method	: Split Spoons, Cuttings	Logged By	: David Y. Reedy

Depth in Feet	Surf. Elev. 764.47	Blow Count	% Rec.	USCS	DESCRIPTION
0	764	1 1 1 1	100%		TOPSOIL - thick organic debris and dark brown organic soil, moist
2	762			CL	LEAN CLAY - tan sandy clay, saturated
4	760			SC	CLAYEY SAND - tan clayey sand, dry
6	758	29 50/4	50%	SM	SILTY SAND - tan and orange mottled silty sand, coarse grained quartz sand, transitioning into partially weathered rock Augers become tight at 9 ft, may be due to expansion of unconsolidated material against the augers, auger drilling terminated, probably not true auger refusal
10	754	50/3.5	40%	PWR	PWR - white coarse grained silty sand with abundant iron staining, granitic texture with quartz and weathered biotite, moist Dry orange cuttings at 10 ft, very soft material Changes to tannish gray cuttings, still very soft, hammer fired once, possibly hit a boulder
14	750			BR	**BEDROCK** - weathered granitic rock, tannish gray cuttings, downhole hammer began to fire at 13 ft, material is still rather soft **Drilling terminated at approximately 15.5 ft**
16	748				



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12/17/02
Hole Diameter(s)	: 8.25-inch/6.25-inch
Drilling Method	: Hollow Stem Augers
Drilling Method	: Downhole Hammer
Company Rep.	: Lee Charbonneau

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.04

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 CME 75 utilizing 6.25-inch ID hollow stem augers, and 6-inch downhole hammer. An external air compressor was used for downhole hammer drilling.

2. The drilling method consisted of advancing 6.25-inch ID hollow stem augers and then rock drilling with a 6-inch downhole hammer to the desired depth.

3. Solid triangle represent water level at time of drilling (6.71 feet below TOC). Open triangle represents water level 24 hours after well construction (8.40 feet below TOC). Solid diamond represent water level 6 days after well construction (8.02 feet below TOC).

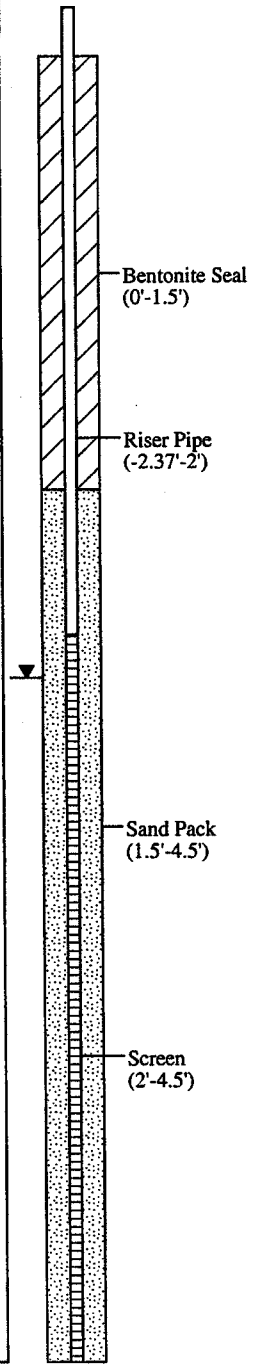
JOYCE ENGINEERING, INC.

LOG OF BORING HA-1

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/22/02	Drilling Company	: Joyce Engineering
Date Completed	: 02/22/02	Northing Coordinate	: 802093.3263
Hole Diameter	: 2.5-inch	Easting Coordinate	: 1727173.5397
Drilling Method	: Hand auger	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 770.71	USCS	DESCRIPTION
0			TOPSOIL - dark brown with organic matter, moist
1	770		SILTY SAND - orange, moist, medium-grained
2	769		
3	768	SM	gray, saturated, clay mixed in
4	767		Boring terminated at approximately 4.5 feet (flowing sands encountered)



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/22/02
Hole Diameter	: 2.5-inch
Drilling Method	: Hand auger
Company Rep.	: Jason Deem

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.37-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 pellets

ANNULUS SEAL

Type	: 3/8" Bentonite pellets

1. Drilling performed with a 2.5-inch ID hand auger to (hand auger refusal) at aproximately 4.5 feet.

2. Solid triangle represents water level of 4.52 feet below TOC at time of drilling, after approximately 72 hours, and after 6 days.

3. Flowing sands prevented augering deeper than 4.5 feet below ground surface.

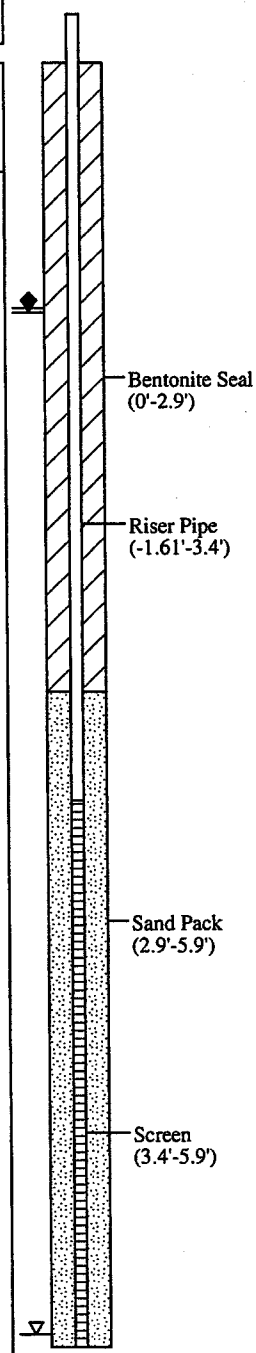
JOYCE ENGINEERING, INC.

LOG OF BORING HA-2

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/22/02	Drilling Company	: Joyce Engineering
Date Completed	: 02/22/02	Northing Coordinate	: 801511.8082
Hole Diameter	: 2.5-inch	Easting Coordinate	: 1727790.7709
Drilling Method	: Hand auger	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 783.06	USCS	DESCRIPTION
0	783		TOPSOIL - dark brown with organic matter
.5	782.5		SILTY SAND - tan, medium grained, very moist
1	782		
1.5	781.5		Color change to gray at 1.5 feet
2	781		
2.5	780.5		
3	780	SM	Water encountered at 3 feet
3.5	779.5		
4	779		
4.5	778.5		
5	778		
5.5	777.5		
6			Boring terminated at approximately 5.9 feet (flowing sands encountered)



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/22/02
Hole Diameter	: 2.5-inch
Drilling Method	: Hand auger
Company Rep.	: Jason Deem

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 1.61-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 pellets

ANNULUS SEAL

Type	: 3/8" Bentonite pellets

1. Drilling performed with a 2.5-inch ID hand auger to 5.8 feet until flowing sands prevented further augering.

2. Open triangle represents water level at time of drilling of 7.45 feet below TOC. Solid triangle represents 72-hour water level of 2.76 feet below TOC. Solid triangle represents 6-day water level at 2.75 feet below TOC.

3. Flowing sands prevented augering deeper than 5.9 feet below ground surface.

BORING LOGS FOR BORINGS AND TEST PITS

JOYCE ENGINEERING, INC.

LOG OF BORING P-4

(Page 1 of 1)

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/12/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/18/02	Company Rep.	: Kevin Kendrick
Hole Diameter	: 8.25-inch	Logged By	: Rachel P. Kirkman, P.G.
Drilling Method	: HSA		
Sampling Method	: Split Spoons		

Depth in Feet	Approx. Surf. Elev 793	Blow Count	% Rec.	USCS	GRAPHIC	DESCRIPTION
0	793	3				TOPSOIL- dark brown with organics
1	792	3	75	SM		SANDY SILT - brown to gray, moist
2	791	5				color change to light gray clay, moist
3	790					
4	789					
5	788			PWR		PARTIALLY WEATHERED ROCK silty sand, tan to white, coarse-grained, slightly moist, prominent granitic fabric, drilling progress slowed significantly
6	787	45 50/3	40			*Auger refusal at approximately 6 feet*
7						

REMARKS

1. Drilling performed iwth an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 6 feet.

2. Boring was dry at time of drilling.

3. Cuttings fell into hole to a depth of approximately 2 feet below ground surface. Water was observed just above these cuttings approximately on 2/18/02. The remainder of the borehole was abandoned on 2/18/02 by backfilling with No. 1 Portland grout.

4. Abandoned borehole located approximately 6.5 feet and 318 degrees from P-4A.

5. Approximate ground surface elevation based on data from P-4A.

JOYCE ENGINEERING, INC.

LOG OF BORING B-2

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/15/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/18/02	Company Rep.	: Kevin Kendrick
Hole Diameter	: 8.25-inch	Logged By	: Rachel P. Kirkman, P.G.
Drilling Method	: Hollow Stem Augers		
Sampling Method	: Split Spoons		

Depth in Feet	Approx. Surf. Elev 802	Blow Count	% Rec.	USCS	GRAPHIC	DESCRIPTION
0	802	4				TOPSOIL- dark brown to black with organic matter
		5	75			CLAYEY SAND - tan, medium grained, moist, soft
2	800	5		SC		
4	798					
		37				PARTIALLY WEATHERED ROCK - silty sand, tan/white/orange, dry, hard, with quartz, feldspar, and biotite, prominent granitic fabric
6	796	49	100			
		50/3				
8	794			PWR		
10	792					dry, coarse-grained as above
		50/3	5			most split spoon sample at 12 feet
12						*Auger refusal at 12 feet*
		50/2	5			

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at 12 feet.

2. No water was encountered at the time of drilling. Moist cuttings were observed in the last split spoon sample.

3. Borehole was abandoned with bentonite from 3-12 feet and with cuttings from 3 feet to ground surface on 02/18/02. Borehole was dry at the time of abandonment.

4. Approximate ground surface elevation taken from topographic map.

5. Drilling rate from 10-12 feet was approximately 4 in./min.

JOYCE ENGINEERING, INC.

LOG OF BORING B-3

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/18/02	Company Rep.	: Kevin Kendrick
Hole Diameter	: 8.25-inch	Logged By	: Rachel P. Kirkman, P.G.
Drilling Method	: Hollow Stem Augers		
Sampling Method	: Split Spoons		

Depth in Feet	Approx. Surf. Elev 752	Blow Count	% Rec.	USCS	GRAPHIC	DESCRIPTION
0	752	2				TOPSOIL- dark brown to black with organic matter
1	751	2	75			SILTY SAND - tan, medium-grained, slightly moist
		1				
2	750					
3	749			SM		
4	748					
5	747	50/5	5	PWR		PARTIALLY WEATHERED ROCK - silty sand, tan, medium to coarse-grained, slightly moist, prominent granitic fabric
6	746					*Auger refusal at 6 feet*
7						

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at 6 feet.

2. No water was encountered at the time of drilling.

3. Borehole was abandoned with bentonite from 2.3-6 feet and with cuttings from 2.3 feet to ground surface on 02/18/02. Borehole was dry at the time of abandonment.

4. Approximate ground surface elevation taken from topographic map.

JOYCE ENGINEERING, INC.

LOG OF BORING B-5

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/13/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/18/02	Company Rep.	: Kevin Kendrick
Hole Diameter	: 8.25-inch	Logged By	: Rachel P. Kirkman, P.G.
Drilling Method	: Hollow Stem Augers		
Sampling Method	: Split Spoons		

Depth in Feet	Approx. Surf. Elev 802	Blow Count	% Rec.	USCS	GRAPHIC	DESCRIPTION
0	802	1				TOPSOIL- tan to brown to black with organic matter
		2	75	SM		SILTY SAND - tan, moist, soft
		3				
2	800					
4	798					color change to tan/white/orange, slightly moist, stiff, very faint granitic texture
		14				
6	796	26	50			
		39				
8	794			PWR		Drilling rate slowed significantly to ~ 4in/min Fine dry orange powder with small rock fragments
10		50/4	10			*Auger refusal at 10 feet*

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at 10 feet.

2. No water was encountered at the time of drillling.

3. Borehole was abandoned with bentonite from 3-10 feet and with cuttings from 3 feet to ground surface on 02/18/02. Borehole was dry at the time of abandonment.

4. Approximate ground surface elevation taken from topographic map.

JOYCE ENGINEERING, INC.

LOG OF BORING T-1A

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/27/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/27/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 797	USCS	GRAPHIC	Water Level	DESCRIPTION
0	797				TOPSOIL - dark brown with organic matter
					SANDY CLAY/SANDY SILT - orange, moist
2	795	SM/SC			
					Faint granitic texture noted
4	793				Hard layer encountered, prominent granitic texture
6	791				Large weathered rock fragments (up to 1 ft.), prominent granitic texture, slightly moist
8	789	PWR			
					Some light gray clay mixed in w/ PWR, moist
10	787				Very hard layer with large PWR fragments (2-3 ft.) Biotite granite with quartz, feldspar, and iron staining
					Very hard layer with PWR fragments (3 ft.+), slighlty moist
12					Excavator could not procede past 12 feet

REMARKS

1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
2. Test pit was terminated at 12 ft.
3. No water was encountered during excavation, after 72-hours, or after 7 days.
4. Test pit was abandoned on 04/03/02 by backfilling with soil. Test pit was dry at time of abandonment.
5. Approximate ground surface elevation based on topographic map and data from P-4A.

JOYCE ENGINEERING, INC.

LOG OF BORING T-1B

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/28/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/28/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 792	USCS	GRAPHIC	Water Level	DESCRIPTION
0	792				TOPSOIL - dark brown with organic matter
		SM			SILTY SAND - tan/orange, moist, medium-grained
2	790				Weathered metavolcanic dikes: dark green, silty, oriented sub-vertical and ~2 ft. thick; quartz vein ~ 6 in.-1 ft. thick
4	788				
6	786				PARTIALLY WEATHERED ROCK - moist, granitic fabric, PWR fragments
8	784	PWR		◆	Larger rock fragments, course-grained, quartz, biotite, and feldspar noted
10	782				Much harder rock encountered
				▽	Water coming into pit at ~11.5 feet during excavation along weathered dike
12				▼	Excavation terminated at 12.5 feet

REMARKS

1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.

2. Test pit was terminated at 12.5 ft.

3. Solid triangle represents depth to water of 12.42 feet below ground surface at time of excavation. Open triangle represents 24-hour depth to water of 10.96 feet below ground surface. Solid diamond represents 6-day depth to water of 8.65 feet below ground surface. Test pit was abandoned on 04/03/02.

4. Test pit was abandoned on 04/03/02 by backfilling with soil.

5. Approximate ground surface elevation based on topographic map and data from P-4A.

6. Water entered test pit from approximately 3-4 feet below ground surface soon after excavation.

JOYCE ENGINEERING, INC.

LOG OF BORING T-1C

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/28/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/28/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx Surf. Elev 795.4	USCS	GRAPHIC	Water Level	DESCRIPTION
0	795				TOPSOIL - dark brown with organics
1	794	SM/SC			SILTY SAND/CLAYEY SAND - orange and gray layers Wet layers encountered
2	793				
3	792				SILTY SAND - orange/tan, moist, medium-grained
4	791				
5	790	PWR			PARTIALLY WEATHERED ROCK - faint granitic texture
6	789				
7	788				Two metavolcanic dikes near vertical and appoximately 2 feet wide
8					Excavation terminated at 8 feet

REMARKS

1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
2. Test pit was terminated at 8 ft.
3. No water was encountered during excavation, after 72-hours, or after 6 days.
4. Test pit was abandoned on 04/03/02 by backfilling with soil. Test pit was dry at time of abandonment.
5. Approximate ground surface elevatation based on topographic map and data from P-4A.

JOYCE ENGINEERING, INC.

LOG OF BORING T-2

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/27/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/27/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 804	USCS	GRAPHIC	Water Level	DESCRIPTION
0	804				TOPSOIL - dark brown with organic matter
1	803	SM			SILTY SAND - tan, slightly moist
2	802				
3	801				
4	800	CL			SANDY CLAY - light gray, moist
5	799	SC			CLAYEY SAND - light gray to light orange, slightly moist
6	798				
7	797	PWR		◆	PARTIALLY WEATHERED ROCK - tan/light gray/light orange, very hard, small fragments of weathered granite with iron stains, in silty sand
8	796			▽	Strong granitic fabric
9	795				Excavator could not procede past 9.5 feet
10					

REMARKS

1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
2. Test pit was terminated at 9.5 ft.
3. Test pit was dry at time of excavation. Open triagle represents 24-hour depth to water of 8.55 feet below ground surface. Solid diamond represents 8-day depth to water of 7.33 feet below ground surface.
4. Approximate ground surface elevation taken from topographic map.
5. Water entered test pit from approximately 4-5 feet below ground surface after excavation.
6. Test pit to be abandoned.

JOYCE ENGINEERING, INC.

LOG OF BORING T-3

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/28/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/28/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 804	USCS	GRAPHIC	Water Level	DESCRIPTION
0	804				TOPSOIL - dark brown with organic matter
2	802	SC			CLAYEY SAND - light gray/orange, moist, weathered feldspars noted, faint granitic fabric
4	800				
6	798	SM/SC			SILTY SAND/CLAYEY SAND - tan/orange, slightly moist, faint granitic fabric, with some clayey sand Material became slightly harder
8	796	PWR		◆	PARTIALLY WEATHERED ROCK - stronger granitic fabric, harder, weathered biotite noted Much harder large PWR fragments (up to 1 ft. across), slightly moist Hard, feldspar noted, thin light gray clay/silt layer (<1 ft. across) then back into hard weathered granite, larger rock fragments (>1 ft. across)
10				▽	Excavator could not procede past 10.5 feet

REMARKS

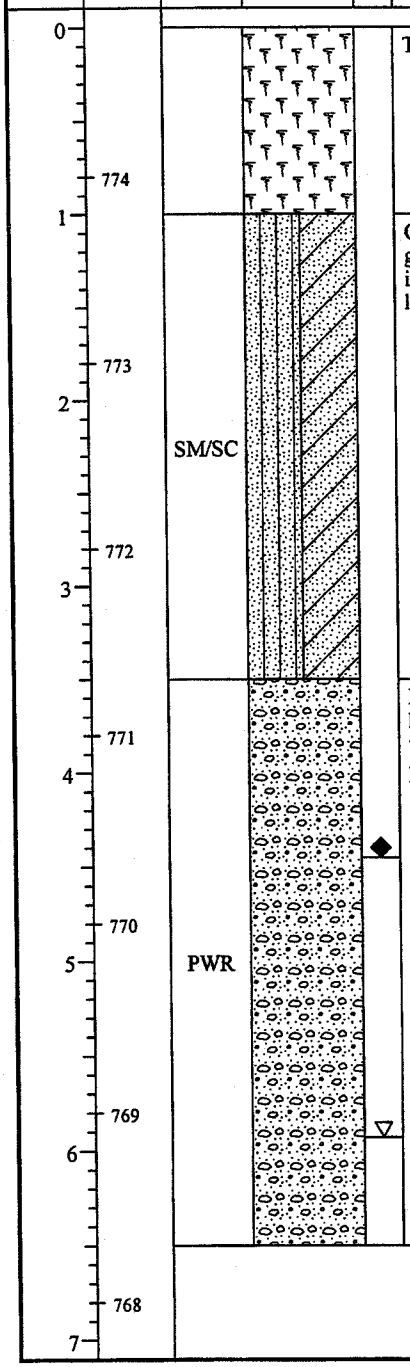
1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
2. Test pit was terminated at 10.5 feet.
3. Test pit was dry at time of excavation. Open triagle represents 24-hour water level of 10.30 feet below ground surface. Solid diamond represents 8-day water level of 9.12 feet below ground surface.
4. Approximate ground surface elevation taken from topographic map.
5. Water entered test pit from approximately 5-6 feet below ground surface soon after excavation.
6. Test pit to be abandoned.

JOYCE ENGINEERING, INC.

LOG OF BORING T-4

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/28/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/28/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		



TOPSOIL - dark brown with organic matter

CLAYEY SAND/SILTY SAND - tan/orange/light gray, moist, small (~1cm) layers of weathered biotite, iron-rich orange layers, feldspar-rich gray clayey layers

PARTIALLY WEATHERED ROCK - slightly moist, harder, up to 6-inch fragments of weathered granite with iron stains, biotite, quartz, and feldspar noted

Much harder

Softer layer with iron-rich and clay-rich layers

Harder PWR encountered

Excavator could not proceed past 6.5 feet

REMARKS

1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.

2. Test pit was terminated at 6.5 feet.

3. Test pit was dry at time of excavation. Open triangle represents 24-hour water level of 5.93 feet below ground surface. Solid diamond represents 8-day water level of 4.45 feet below ground surface.

4. Approximate ground surface elevation based on data from topographic map and P-16.

5. Water entered test pit from approximately 3-4 feet below ground surface soon after excavation.

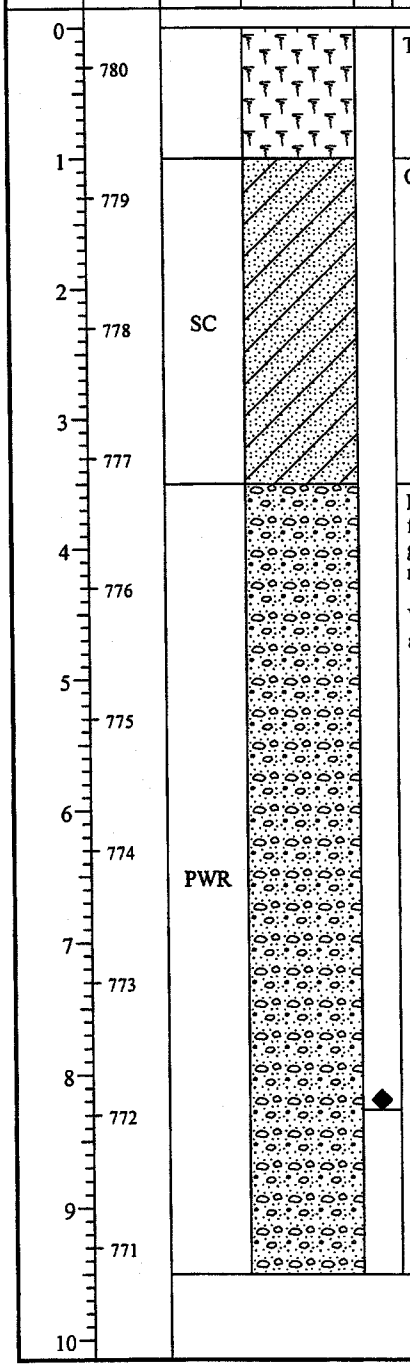
6. Test pit to be abandoned.

JOYCE ENGINEERING, INC.

LOG OF BORING T-5

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/28/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/28/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		



DESCRIPTION	REMARKS
TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
CLAYEY SAND - gray/tan/light orange, moist	2. Test pit was terminated at 9.5 feet.
PARTIALLY WEATHERED ROCK - light green fine-grained metavolcanic rock, large weathered granitic PWR fragments (up to 1 ft. across), slightly moist	3. Test pit was dry at time of excavation and at 24-hours. Solid diamond represents 8-day depth to water of 8.26 feet below ground surface.
Very hard, metavolcanic dike (~ 7 - 9 ft. thick) across one side and bottom within weathered granite	4. Approximate ground surface elevation based on data from topographic map and P-11.
	5. Water entered test pit along weathered dike and from approximately 3-4 feet below ground surface.
	6. Test pit to be abandoned.
Excavator could not procede past 9.5 feet	

JOYCE ENGINEERING, INC

LOG OF BORING T-6

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/27/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/27/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 798	USCS	GRAPHIC	Water Level	DESCRIPTION	REMARKS
0	798				TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
1	797	SC			CLAYEY SAND/SANDY CLAY - tan, very moist	2. Test pit was terminated at 7.0 feet.
2	796					3. Test pit was dry at time of excavation, at 24-hours and at 9-days.
3	795					4. Approximate ground surface elevation taken from topographic map.
4	794	PWR			PARTIALLY WEATHERED ROCK - tan, harder with granitic fabric, PWR fragments (up to 1 ft. across), some light gray clay-rich zones, slightly moist	5. Test pit to be abandoned.
5	793					
6	792				Stronger granitic fabric, PWR fragments very weathered, iron staining noted, slightly moist Light gray clay-rich layers	
7					Excavator could not procede past 7 feet	

JOYCE ENGINEERING, INC.

LOG OF BORING T-7

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/29/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/29/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 782	USCS	GRAPHIC	Water Level	DESCRIPTION	REMARKS
0	782				TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
1	781				SILTY SAND - tan, moist	2. Test pit was terminated at 7.0 feet.
2	780	SM			Mottled gray clayey sand/sandy clay mixed with tan/orange silty sand, moist	3. Test pit was dry at time of excavation. Open triangle represents 72-hour depth to water of 6.93 feet below ground surface. Solid diamond represents 7-day depth to water of 6.85 feet below ground surface.
3	779					4. Approximate ground surface elevation taken from topographic map.
4	778				PARTIALLY WEATHERED ROCK - much harder, granitic texture, slightly moist, PWR fragments (up to 1 ft.), course-grained biotite granite	5. Water entered test pit from approximately 3 feet below ground surface.
5	777	PWR			Very hard	6. Test pit to be abandoned.
6	776					
7					Excavator could not procede past 7 feet	

JOYCE ENGINEERING, INC.

LOG OF BORING T-8A

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/28/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/28/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 745	USCS	GRAPHIC	Water Level	DESCRIPTION	REMARKS
0	745				TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
					SILTY SAND - tan, medium-grained, very moist	2. Test pit was terminated at 10.5 feet.
2	743	SM				3. Test pit was dry at time of excavation, at 24-hours, and at 8-days.
						4. Approximate ground surface elevation based on data from topographic map and P-12.
4	741					5. Test pit to be abandoned.
6	739				PARTIALLY WEATHERED ROCK - tan, slightly moist, small (<1 ft. across) PWR fragments of weathered granite, coarse-grained, biotite, quartz, feldspar noted	
					Harder material encountered	
8	737	PWR				
10					Excavator could not procede past 10.5 feet	

JOYCE ENGINEERING, INC.

LOG OF BORING T-8B

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/29/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/29/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 739	USCS	GRAPHIC	Water Level	DESCRIPTION	REMARKS
0	739				TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
					Water coming into hole at approximately 1 foot	2. Test pit was terminated at 6 feet.
1	738	SM			SANDY SILT - light brown, saturated	3. Test pit was saturated at time of excavation and resulted in cave-in.
2	737	SC/SM			SANDY SILT/CLAYEY SAND - light gray, interlayered with sandy silt	4. Test pit was abandoned on 03/29/02 immediately after initial excavation.
					Water at approximately the same elevation as nearby stream	5. Approximate ground surface elevation based on data from topographic map and P-12.
3	736					
4	735	SC			CLAYEY SAND - tan/orange/light gray	
					Water coming quickly into hole	
5	734					
					Excavation terminated at 6 feet due to cave in near P-12	
6						

JOYCE ENGINEERING, INC.

LOG OF BORING T-9

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/29/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/29/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 740	USCS	GRAPHIC	Water Level	DESCRIPTION
0	740				TOPSOIL - dark brown with organic matter
					SILTY SAND/CLAYEY SAND - tan/orange, moist
2	738				
4	736				Layered silty sand and clayey sand, tan and light gray, moist
		SM/SC			Silty sand with clayey sand, mottled appearance, faint granitic fabric, moist
6	734			◆	
8	732			▽	Harder material, silty sand and sandy clay, a lot of light gray material, faint granitic fabric, moist
					SILTY SAND - slightly moist, very hard
		PWR			PARTIALLY WEATHERED ROCK - tan, very hard weathered granite fragments, slightly moist
10					Excavator could not procede past 10 feet

REMARKS

1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
2. Test pit was terminated at 10 feet.
3. Test pit was dry at time of excavation. Open triangle represents 72-hour depth to water at 8.65 feet below ground surface. Solid diamond represents 7-day depth to water of 6.77 feet below ground surface.
4. Approximate ground surface elevation based on data from topographic map and P-12.
5. Water entered test pit from approximately 4-5 feet below ground surface.
6. Test pit to be abandoned.

JOYCE ENGINEERING, INC.

LOG OF BORING T-10

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/27/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/27/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 775	USCS	GRAPHIC	Water Level	DESCRIPTION	REMARKS
0	775				TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator. 2. Test pit was terminated at 5 feet. 3. Test pit was dry at time of excavation. Open triangle represents 24-hour depth to water at 4.8 feet below ground surface. Solid diamond represents 9-day depth to water of 4.14 feet below ground surface. 4. Approximate ground surface elevation based on data from topographic map and P-13S. 5. Water entered test pit from approximately 2 feet below ground surface. 6. Test pit to be abandoned.
1	774				SANDY SILT - tan, moist	
2	773	SM				
3	772				PARTIALLY WEATHERED ROCK - weathered granite, coarse-grained, strong granitic fabric, moist	
4	771	PWR		◆	Very hard, slightly moist	
				▽		
5					Excavator could not procede past 5 feet	

JOYCE ENGINEERING, INC.

LOG OF BORING T-11

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/27/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/27/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

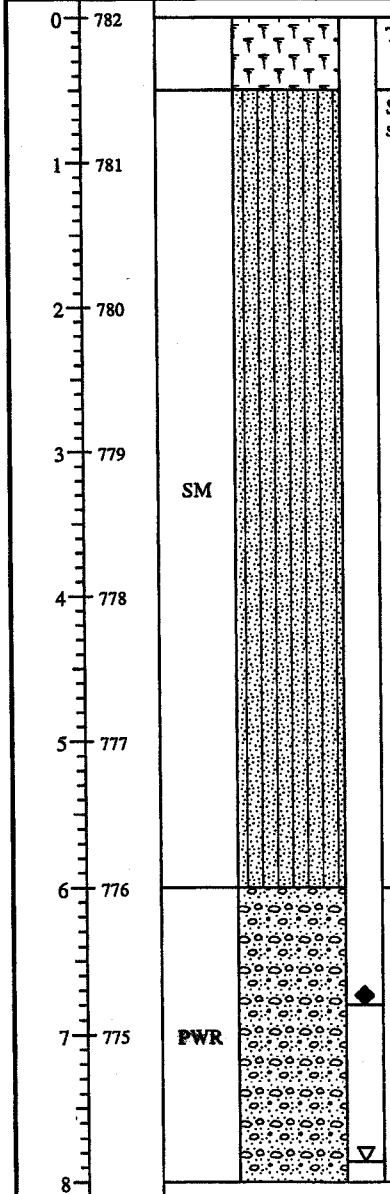
Depth in Feet	Approx. Surf. Elev 752	USCS	GRAPHIC	Water Level	DESCRIPTION	REMARKS
0	752	SM			pale brown, SILTY SAND - tan, moist, very large weathered granite boulders (~3.5 ft. across)	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator. 2. Test pit was terminated at 6.5 feet. 3. Test pit was dry at time of excavation. Open triangle represents 24-hour depth to water at 6.33 feet below ground surface. Solid diamond represents 9-day depth to water of 4.43 feet below ground surface. 4. Approximate ground surface elevation taken from topographic map. 5. Water entered test pit from approximately 3 feet below ground surface. 6. Test pit to be abandoned.
1	751					
2	750	PWR			PARTIALLY WEATHERED ROCK - tan, moist, very hard, competent granite boulders, coarse-grained, biotite, quartz, feldspar, iron stains noted	
3	749					
4	748			◆		
5	747					
6	746			▽	Excavator could not procede past 6.5 feet	
7						

JOYCE ENGINEERING, INC.

LOG OF BORING T-12

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/27/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/27/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		



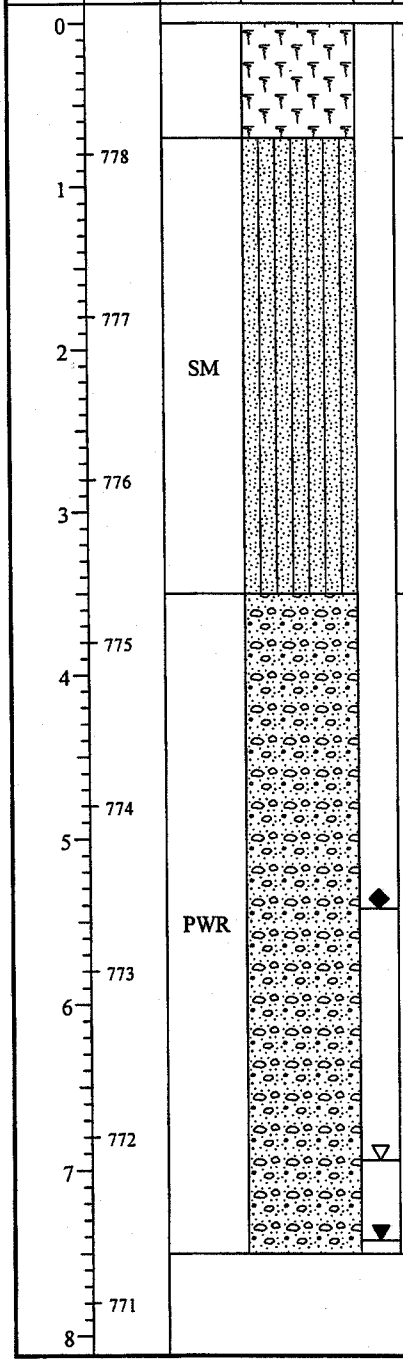
DESCRIPTION	REMARKS
TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
SILTY SAND - tan, moist, with lenses of clayey sand	2. Test pit was terminated at 8 feet.
	3. Test pit was dry at time of excavation and at 24-hours. Open tiangle represents 48-hour depth to water of 7.86 feet below ground surface. Solid diamond represents 9-day depth to water of 6.80 feet below ground surface.
	4. Approximate ground surface elevation based on topographic map and data from P-14.
	5. Water entered test pit from approximately 6 feet below ground surface.
	6. Test pit to be abandoned.
PARTIALLY WEATHERED ROCK - Much harder, coarse-grained weathered granite, slightly moist, iron stains, biotite, quartz, feldspar noted	
Excavator could not procede past 8 feet	

JOYCE ENGINEERING, INC.

LOG OF BORING T-13

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/27/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/27/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		



DESCRIPTION	REMARKS
TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
SILTY SAND - orange/tan, very moist, weathered mica and quartz noted	2. Test pit was terminated at 7.5 feet.
PARTIALLY WEATHERED ROCK - highly-weathered granite w/ large biotite, quartz, feldspar noted, moist	3. Solid triangle represents depth to water at time of excavation at 7.42 feet below ground surface. Open triangle represents 24-hour depth to water of 6.94 feet below ground surface. Solid diamond represents 9-day depth to water of 5.42 feet below ground surface.
4.5-5 ft. - weathered metavolcanic dike, light green/gray silt, slightly moist, linear feature ~ 1' X 3' in weathered granitic rock	4. Approximate ground surface elevation based on data from topographic map and P-17.
Very hard, very coarse-grained weathered granite, slightly moist	5. Water entered test pit from approximately 2-3 feet below ground surface.
Excavator could not procede past 7.5 feet	6. Test pit to be abandoned.

JOYCE ENGINEERING, INC.

LOG OF BORING T-14

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/27/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/27/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 760	USCS	GRAPHIC	Water Level	DESCRIPTION	REMARKS
0	760				TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
					SILTY SAND - brown, very moist	2. Test pit was terminated at 13.5 feet.
2	758					3. Test pit was dry at time of excavation. Open triangle represents 24-hour depth to water of 12.64 feet below ground surface. Solid diamond represents 9-day depth to water of 9.85 feet below ground surface.
					SANDY SILT - orange, very moist	4. Approximate ground surface elevation taken from topographic map.
					Mafic material noted during excavation	5. Water entered test pit along dike and from approximately 4-5 feet below ground surface.
4	756	SM				6. Test pit to be abandoned.
					Weathered dike noted at ~5 ft., wet cuttings	
6	754					
8	752				PARTIALLY WEATHERED ROCK - larger dike across bottom of test pit, very hard mafic rock fragments	
10	750	PWR			Wet mafic material and very moist silty sand in granitic PWR	
12	748					
					Excavator could not procede past 13.5 feet	
14						

JOYCE ENGINEERING, INC.

LOG OF BORING T-15

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/27/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/27/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 746	USCS	GRAPHIC	Water Level	DESCRIPTION	REMARKS
0	746				TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator. 2. Test pit was terminated at 12.5 feet. 3. Test pit was dry at time of excavation, at 24-hours and at 9-days. 4. Approximate ground surface elevation taken from topographic map. 5. Test pit to be abandoned.
2	744	SM			SANDY SILT - orange, moist	
4	742					
6	740	PWR			PARTIALLY WEATHERED ROCK - weathered granitic rock fragments, iron staining, slightly moist, granitic texture, coarse-grained, quartz, feldspar, biotite noted	
8	738					
					Larger PWR fragments	
10	736					
12					Excavation terminated at 12.5 feet	

ENGINEERING, INC.

LOG OF BORING T-16

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/29/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/29/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 225	USCS	GRAPHIC	Water Level	DESCRIPTION
0	225				TOPSOIL - dark brown with organic matter
1	224				SILTY SAND - tan/brown, medium-grained, moist
2	223				
3	222	SM/SC			Sandy clay/clayey sand, mottled, mixed with tan/orange sandy silt, moist
4	221				
5	220				
6	219				PARTIALLY WEATHERED ROCK - much harder, tan, moist, coarse-grained, weathered granite fragments (up to 6 in.across), biotite, feldspar, quartz noted
7	218	PWR		◆	Very hard
8	217				
9					Excavator could not procede past 9 feet

REMARKS

1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
2. Test pit was terminated at 9 feet.
3. Test pit was dry at time of excavation and at 48-hours. Solid diamond represents 7-day depth to water of 7.50 feet below ground surface.
4. Approximate ground surface elevation taken from topographic map and data from P-8.
5. Water entered test pit from approximately 3-4 feet below ground surface.
6. Test pit to be abandoned.

JOYCE ENGINEERING, INC.

LOG OF BORING T-17

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.04

Date Started	: 03/29/02	Excavation Company	: Joyce Engineering, Inc.
Date Completed	: 03/29/02	Company Rep.	: Ken Sizemore
Hole Width	: 3.5 feet	Logged By	: Rachel Kirkman, P.G.
Digging Method	: Excavator		
Sampling Method	: Visual Inspection		

Depth in Feet	Approx. Surf. Elev 791	USCS	GRAPHIC	Water Level	DESCRIPTION	REMARKS
0	791				TOPSOIL - dark brown with organic matter	1. Digging performed with a Kobelco Mark IV SK 103LC Track Excavator.
					SILTY SAND - tan, moist, biotite, quartz, feldspar noted	2. Test pit was terminated at 5 feet.
1	790					3. Test pit was dry at time of excavation and at 24-hours. Solid diamond represents 7-day depth to water of 4.55 feet below ground surface.
		SM				4. Approximate ground surface elevation taken from topographic map and data from P-10.
2	789					5. Test pit to be abandoned.
3	788				PARTIALLY WEATHERED ROCK - tan, moist, course-grained, iron stains, weathered granite fragments (up to 6 in.), biotite, quartz, feldspar noted	
					Very hard	
4	787	PWR		◆		
5					Excavator could not procede past 5 feet	

WELL DEVELOPMENT FORMS

JOYCE ENGINEERING, INC

MONITORING WELL DEVELOPMENT DATA SHEET

Project: **600.04** Date: **3/14-15/02**
Casing Type: **Sch. 40 PVC**
Well/Boring Number: **P-2**
Casing Diameter (Dr): **2 inches**
Screened Interval: **5 – 10 feet**
Riser Elevation: **796.78**
Total Well Depth (Lw): **12.49 feet**
Depth to Water (Lf): **3.26 feet**
Time of Measurement: **10:18**
Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = **1.5 gallons**

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	**10.5**	**6.08**	**218**	**clear**	**0**	**3.26**	**10:23**
After Purging 1 Well Vol	**11.3**	**5.83**	**216**	**slightly cloudy**	**1.5**	**---**	**10:27**
2 Well Vol	**11.0**	**5.74**	**216**	**slightly cloudy**	**3.0**	**---**	**10:30**
3 Well Vol	**11.5**	**5.73**	**209**	**brown**	**4.5**	**dry**	**10:34**
4 Well Vol (3/15/02)	**12.1**	**6.32**	**207**	**clear**	**4.5**	**3.65**	**10:25**
5 Well Vol	**11.4**	**6.06**	**204**	**clear**	**6.0**	**---**	**10:30**
6 Well Vol	**11.8**	**6.05**	**197.1**	**clear**	**7.5**	**---**	**10:33**
7 Well Vol	**12.8**	**5.95**	**206**	**slightly cloudy**	**9.0**	**dry**	**10:40**

(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: **Yes, on 3/14/02 & 3/15/02** Continuous Recharge: **No**
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Jason A. R

JOYCE ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

Project: **600.04** Date: **3/14-15/02**
Casing Type: **Sch. 40 PVC**
Well/Boring Number: **P-3**
Casing Diameter (Dr): **2 inches**
Screened Interval: **5 – 10 feet**
Riser Elevation: **790.06**
Total Well Depth (Lw): **27.35 feet**
Depth to Water (Lf): **4.60 feet**
Time of Measurement: **8:30**
Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = **3.70 gallons**

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	**12.7**	**7.03**	**1.1**	**clear**	**0**	**4.60**	**8:49**
After Purging							
1 Well Vol	**13.4**	**6.34**	**111.7**	**brown**	**3.7**	**---**	**8:55**
2 Well Vol	**14.1**	**6.11**	**105.5**	**brown**	**7.4**	**---**	**9:07**
3 Well Vol	**14.1**	**5.74**	**104.4**	**brown**	**11.1**	**13.20**	**9:17**
4 Well Vol	**14.3**	**5.98**	**99.4**	**brown**	**15.1**	**13.35**	**9:25**
5 Well Vol	**14.1**	**5.86**	**99.9**	**brown**	**15.0**	**---**	**9:34**
6 Well Vol	**14.1**	**5.84**	**97.4**	**brown**	**22.4**	**---**	**9:42**
7 Well Vol	**14.5**	**6.00**	**96.1**	**brown**	**26.1**	**12.0**	**9:50**
8 Well Vol (3/15/02)	**11.2**	**6.74**	**120.4**	**slightly cloudy**	**26.1**	**4.50**	**8:30**
9 Well Vol	**13.5**	**6.44**	**99.2**	**lt.brown**	**30.0**	**---**	**8:39**
10 Well Vol	**13.7**	**6.15**	**96.5**	**brown**	**34.0**	**---**	**8:48**
11 Well Vol	**14.1**	**6.07**	**94.5**	**brown**	**39.0**	**13.80**	**8:57**
12 Well Vol	**15.3**	**6.55**	**98.6**	**cloudy/brown**	**44.0**	**12.61**	**13:10**

(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: **Yes**
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Jason A. Re

JOYCE ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

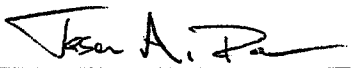
Project: **600.04** Date: **3/14-15/02**
Casing Type: **Sch. 40 PVC**
Well/Boring Number: **P-4A**
Casing Diameter (Dr): **2 inches**
Screened Interval: **6 - 16 feet**
Riser Elevation: **795.43**
Total Well Depth (Lw): **18.35 feet**
Depth to Water (Lf): **4.54 feet**
Time of Measurement: **12:03**
Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = **2.3 gallons**

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	13.3	6.42	98.7	clear	0	4.54	12:10
After Purging							
1 Well Vol	12.9	5.99	112.7	slightly cloudy	2.5	---	12:13
2 Well Vol	13.2	6.01	146.9	slightly cloudy	5.0	---	12.16
3 Well Vol	---	---	---	brown	7.5	---	---
4 Well Vol	14.2	6.08	142.7	brown	8.5	dry	12:28
5 Well Vol (3/15/02)	11.9	5.91	103.6	clear	8.5	4.75	9:06
6 Well Vol	11.8	5.89	104.7	clear	10.8	---	9:13
7 Well Vol	12.3	5.86	105.2	clear	13.1	12.0	9:16

(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: **Yes, on 3/14/02** Continuous Recharge: **No**
Notes concerning condition of well, odors, color, etc.:

Developer's Signature 

JOYCE ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

Project: **600.04** Date: **3/14-15/02**
Casing Type: **Sch. 40 PVC**
Well/Boring Number: **P-6**
Casing Diameter (Dr): **2 inches**
Screened Interval: **10.5 – 35.5 feet**
Riser Elevation: **799.72**
Total Well Depth (Lw): **38.30 feet**
Depth to Water (Lf): **20.47 feet**
Time of Measurement: **10:43**
Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = **2.9 gallons**

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	**16.0**	**5.79**	**166.9**	**clear**	**0**	**20.47**	**10:43**
After Purging							
1 Well Vol	**16.2**	**5.75**	**169.7**	**brown**	**3**	**---**	**10:55**
2 Well Vol	**16.1**	**5.77**	**167.3**	**brown**	**6**	**---**	**11:06**
3 Well Vol	**16.0**	**5.71**	**154.7**	**brown**	**9**	**---**	**11:18**
4 Well Vol	**16.3**	**5.84**	**156.3**	**brown**	**12**	**31.95**	**11:18**
5 Well Vol	**16.2**	**6.07**	**155.9**	**brown**	**15**	**dry**	**11:46**
6 Well Vol (3/15/02)	**16.2**	**5.81**	**146.0**	**clear**	**15**	**20.46**	**9:29**
7 Well Vol	**16.0**	**5.97**	**152.3**	**tan/cloudy**	**18**	**---**	**9:40**
8 Well Vol	**16.2**	**5.95**	**149.9**	**slightly cloudy**	**21**	**31.02**	**9:50**

(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: **Yes, on 3/14/02** Continuous Recharge: **No**
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Jason A. Pa

JOYCE ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

Project: **600.04** Date: **3/14-15/02**
Casing Type: **Sch. 40 PVC**
Well/Boring Number: **P-7**
Casing Diameter (Dr): **2 inches**
Screened Interval: **7 - 17 feet**
Riser Elevation: **796.78**
Total Well Depth (Lw): **19.05 feet**
Depth to Water (Lf): **10:36 feet**
Time of Measurement: **12:41**
Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = **1.4 gallons**

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	**14.9**	**6.42**	**317**	**slightly cloudy**	**0**	**10.36**	**12:45**
After Purging							
1 Well Vol	**14.0**	**6.52**	**299**	**brown**	**1.5**	**---**	**12:54**
2 Well Vol	**14.1**	**6.57**	**294**	**brown**	**3.0**	**---**	**12:59**
3 Well Vol	**14.7**	**6.62**	**296**	**very muddy**	**4.5**	**---**	**13:03**
4 Well Vol	**15.0**	**6.70**	**300**	**very muddy**	**6.0**	**17.90**	**13:08**
5 Well Vol	**15.3**	**6.85**	**308**	**very muddy**	**6.5**	**dry**	**13:13**
6 Well Vol (3/15/02)	**14.2**	**6.15**	**310**	**slightly cloudy**	**6.5**	**10.47**	**10:01**
7 Well Vol	**14.3**	**6.36**	**316**	**brown**	**8.0**	**---**	**10:05**
8 Well Vol	**14.4**	**6.49**	**308**	**very muddy**	**9.5**	**---**	**10:10**
9 Well Vol	**15.0**	**6.58**	**266**	**very muddy**	**11.0**	**dry**	**10:17**
10 Well Vol	**15.9**	**6.52**	**275**	**very muddy**	**12.5**	**---**	**12:53**
11 Well Vol	**15.2**	**6.57**	**269**	**muddy**	**14.0**	**dry**	**12:56**

(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: **Yes, on 3/14/02 & twice on 3/15/02** Continuous Recharge: **No**
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Jason A. P

ENGINEERING, INC

MONITORING WELL DEVELOPMENT DATA SHEET

Project: **600.04** Date: **3/14-15/02**
Casing Type: **Sch. 40 PVC**
Well/Boring Number: **P-9**
Casing Diameter (Dr): **2 inches**
Screened Interval: **20 - 40 feet**
Riser Elevation: **810.92**
Total Well Depth (Lw): **43.63 feet**
Depth to Water (Lf): **26.23 feet**
Time of Measurement: **15:15**
Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = **2.7 gallons**

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conductivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	**15.8**	**6.12**	**252**	**clear**	**0**	**26.23**	**15:23**
After Purging							
1 Well Vol	**15.2**	**5.92**	**252**	**tan/cloudy**	**3.0**	**---**	**15:29**
2 Well Vol	**15.5**	**5.50**	**223**	**tan/cloudy**	**5.4**	**---**	**15:40**
3 Well Vol	**15.5**	**5.77**	**240**	**tan/cloudy**	**7.1**	**36.35**	**15:45**
4 Well Vol	**15.2**	**5.81**	**231**	**brown**	**10.0**	**---**	**15:56**
5 Well Vol	**14.9**	**5.88**	**227**	**brown**	**12.7**	**40.08**	**16:00**
6 Well Vol	**15.0**	**5.98**	**211**	**very muddy**	**15.4**	**dry**	**16:30**
7 Well Vol (3/15/02)	**16.0**	**5.83**	**191.7**	**clear**	**15.4**	**26.45**	**10:53**
8 Well Vol	**16.2**	**5.79**	**190.1**	**tan/cloudy**	**18.4**	**---**	**11:03**
9 Well Vol	**15.6**	**5.76**	**196.9**	**tan/gray**	**21.4**	**35.11**	**11:11**

(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: **Yes, on 3/14/02** Continuous Recharge: **No**
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Jason A. D

ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

Project: **600.04** Date: **3/14-15/02**
Casing Type: **Sch. 40 PVC**
Well/Boring Number: **P-12**
Casing Diameter (Dr): **2 inches**
Screened Interval: **5 - 20 feet**
Riser Elevation: **743.44**
Total Well Depth (Lw): **22.45 feet**
Depth to Water (Lf): **10.04 feet**
Time of Measurement: **14:28**
Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = **1.9 gallons**

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	**13.0**	**6.12**	**139.2**	**clear**	**0**	**10.04**	**14.34**
After Purging							
1 Well Vol	**12.6**	**6.10**	**99.8**	**cloudy/tan**	**2.0**	**---**	**14:34**
2 Well Vol	**13.2**	**6.12**	**118.8**	**cloudy/tan**	**4.0**	**---**	**14:36**
3 Well Vol	**13.3**	**6.09**	**150.0**	**cloudy/tan**	**6.0**	**---**	**14:45**
4 Well Vol	**13.6**	**5.93**	**176.4**	**cloudy/tan**	**8.0**	**19.20**	**14:50**
5 Well Vol	**14.5**	**6.16**	**185.8**	**cloudy/tan**	**10.0**	**dry**	**14:56**
6 Well Vol (3/15/02)	**13.5**	**6.52**	**173.9**	**clear**	**10.0**	**10.25**	**11:50**
7 Well Vol	**12.9**	**6.47**	**155.3**	**slightly cloudy**	**12.0**	**---**	**11:56**
8 Well Vol	**14.1**	**6.03**	**175.0**	**slightly cloudy**	**17.0**	**dry**	**12:09**

(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: **Yes, on 3/14/02 & 3/15/02** Continuous Recharge: **No**
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Jason A. Ru

JOYCE ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

Project: **600.04** Date: **3/14/02**
Casing Type: **Sch. 40 PVC**
Well/Boring Number: **P-15S**
Casing Diameter (Dr): **2 inches**
Screened Interval: **5 - 20 feet**
Riser Elevation: **733.76**
Total Well Depth (Lw): **22.20 feet**
Depth to Water (Lf): **6.00 feet**
Time of Measurement: **13:34**
Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw-Lf)$ = **2.6 gallons**

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	**12.8**	**6.90**	**142.1**	**clear**	**0**	**6.00**	**13:34**
After Purging							
1 Well Vol	**11.4**	**6.67**	**139.9**	**tan/cloudy**	**2.6**	**---**	**13:38**
2 Well Vol	**11.8**	**6.36**	**140.4**	**tan/cloudy**	**5.2**	**---**	**13:43**
3 Well Vol	**12.0**	**6.14**	**141.3**	**tan/cloudy**	**7.8**	**---**	**13:46**
4 Well Vol	**12.7**	**5.96**	**143.2**	**tan/cloudy**	**10.4**	**13.75**	**13:50**
5 Well Vol	**13.0**	**5.76**	**151.5**	**tan/cloudy**	**13.0**	**---**	**13:55**
6 Well Vol	**13.6**	**5.50**	**147.0**	**tan/cloudy**	**15.6**	**---**	**14:00**
7 Well Vol	**13.0**	**5.53**	**155.3**	**tan/cloudy**	**18.2**	**dry**	**14:07**
8 Well Vol	**11.8**	**5.96**	**130.2**	**slightly cloudy**	**20.7**	**---**	**16:50**
9 Well Vol	**12.1**	**5.84**	**130.9**	**slightly cloudy**	**23.2**	**---**	**16:55**

(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: **Yes, on 3/14/02** Continuous Recharge: **No**
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Jason A. B

ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

Project: MRR of High Point
Date: 12/19/02
Casing Type: Schedule 40 PVC
Well/Boring Number P-18
Casing Diameter in inches (Dr): 2-inch
Screened Interval: 10.2 ft - 17.2 ft
Riser Elevation: 1.70 feet
Total Well Depth (Lw) in feet: 17.00 feet
Depth to Water (Lf) in feet: 2.50 feet
Time of Measurement: 11:12

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw - Lf)$ = 2.4 Gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	11.2	6.30	137	97.2	0	2.50	11:12
After Purging							
1 Well Vol	12.0	6.18	193	509	2.4	10.61	11:17
2 Well Vol	12.5	6.06	148	673	4.8	13.43	11:23
3 Well Vol	13.2	6.17	199	>1000	7.2	15.42	11:30
4 Well Vol	13.3	6.42	181	>1000	8.0	---	11:33
				Dry @ 8.0 gallons			
4 Well Vol	11.3	7.00	73.3	164	8.0	3.00	13:45
5 Well Vol	11.7	6.72	80.7	449	10.4	11.82	13:49
6 Well Vol	13.0	6.10	128.8	>1000	12.8	15.23	14:00
				Terminated purging @ 12.8 gallons			

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

Method of purging (bailer or pump) bailer
If pumped, pumping rate: n/a
Well Purged Dry 8.0 gallons
Continuous Recharge no
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Ken Dyemore

JOYCE ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

Project: MRR of High Point
Date: 12/19/02
Casing Type: Schedule 40 PVC
Well/Boring Number P-19
Casing Diameter in inches (Dr): 2-inch
Screened Interval: 9.87 ft - 17.87 ft
Riser Elevation: 2.37 feet
Total Well Depth (Lw) in feet: 17.50 feet
Depth to Water (Lf) in feet: 9.00 feet
Time of Measurement: 10:09

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw - Lf)$ = 1.4 Gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	11.7	7.26	149.4	72.4	0	9.00	10:09
After Purging							
1 Well Vol	11.7	7.20	149.0	>1000	1.4	10.83	10:14
2 Well Vol	12.8	6.73	148.8	>1000	2.8	11.13	10:18
3 Well Vol	13.2	6.37	149.1	>1000	4.2	11.71	10:22
4 Well Vol	13.3	6.06	154.6	>1000	5.6	12.21	10:26
5 Well Vol	13.2	6.05	148.9	>1000	7.0	12.65	10:30
6 Well Vol	13.0	5.94	151.4	>1000	8.4	12.90	10:36
7 Well Vol	13.3	5.80	155.9	>1000	9.8	13.20	10:40
8 Well Vol	13.4	5.76	146.8	>1000	11.2	13.55	10:44
9 Well Vol	13.6	5.74	144.9	>1000	12.6	13.94	10:48
10 Well Vol	13.7	5.75	143.7	>1000	14.0	14.10	10:52
11 Well Vol	13.7	5.77	141.7	>1000	15.4	14.51	10:56

Terminated purging @ 15.4 gallons

11 Well Vol	12.4	7.34	155.2	209	15.4	10.70	12:53
12 Well Vol	12.8	7.22	148.9	573	16.8	12.11	12:57
13 Well Vol	13.2	7.12	144.0	>1000	18.2	13.45	13:04
14 Well Vol	13.6	6.75	144.9	>1000	19.6	13.98	13:10
17 Well Vol	12.9	6.85	146.4	>1000	24.6	15.49	13:21
21 Well Vol	13.2	6.21	139.8	>1000	29.6	16.00	13:35

Terminated purging @ 29.6 gallons

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

Method of purging (bailer or pump) bailer If pumped, pumping rate: n/a

Well Purged Dry no Continuous Recharge yes

Notes concerning condition of well, odors, color, etc.:

Developer's Signature Ken Dyemore

JOYCE ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

Project: MRR of High Point
Date: 12/19/02
Casing Type: Schedule 40 PVC
Well/Boring Number P-20
Casing Diameter in inches (Dr): 2-inch
Screened Interval: 18.3 ft - 28.3 ft
Riser Elevation: 2.80 feet
Total Well Depth (Lw) in feet: 29.30 feet
Depth to Water (Lf) in feet: 20.55 feet
Time of Measurement: 9:32

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw - Lf) =$ 1.4 Gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conductivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	11.4	7.49	230	>1000	0	20.55	9.32
After Purging							
1 Well Vol	13.6	7.56	174	>1000	1.4	21.60	9:36
2 Well Vol	13.8	7.42	157	>1000	2.8	23.74	9:41
3 Well Vol	13.2	7.34	193.8	>1000	4.2	28.40	9:48
				Dry @ 4.2 gallons			
4 Well Vol	12.8	7.69	180.7	875	4.7	26.68	12:30
				Dry @ 4.7 gallons			

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

Method of purging (bailer or pump) bailer
If pumped, pumping rate: n/a
Well Purged Dry 4.2 gallons
Continuous Recharge no
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Ken Dejemore

JOYCE ENGINEERING, INC.

MONITORING WELL DEVELOPMENT DATA SHEET

Project: MRR of High Point
Date: 12/19/02
Casing Type: Schedule 40 PVC
Well/Boring Number P-21
Casing Diameter in inches (Dr): 2-inch
Screened Interval: 15.04 ft - 17.54 ft
Riser Elevation: 2.04 feet
Total Well Depth (Lw) in feet: 17.50 feet
Depth to Water (Lf) in feet: 8.10 feet
Time of Measurement: 11:52

Volume of water in well, using $V=0.041\ (Dr)^2\ (Lw - Lf)$ = 1.5 Gallons

FIELD MEASUREMENT OF PHYSICAL PARAMETERS

	Temp (C)	pH	Conduc-tivity (µS/cm)	Clarity/ Color	Volume (gallons)	Water Level (ft)	Time
Before Development	11.6	7.95	631	20.5	0	8.10	11:52
After Purging							
1 Well Vol	13.6	8.05	1729	>1000	1.5	15.37	11:57
2 Well Vol	14.1	7.96	789	>1000	3.0	---	12:03
				Dry @ 3.0 gallons			
2 Well Vol	13.0	7.11	664	638	3.0	9.35	14:15
3 Well Vol	13.9	7.16	661	>1000	4.5	15.77	14:21
4 Well Vol	14.0	7.10	390	>1000	6.0	---	14:38
				Dry @ 6.0 gallons			

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

Method of purging (bailer or pump) bailer
If pumped, pumping rate: n/a
Well Purged Dry 3 & 6 gal.
Continuous Recharge no
Notes concerning condition of well, odors, color, etc.:

Developer's Signature Ken Lyimore

JOYCE ENGINEERING, INC.

Waste Industry Experts

Job _____

Job No. _____ Sheet No. ____ of ____

Calculated by _____ Date _____

Checked by _____ Date _____

Subject _____ Scale _____

P-18

	Day	Time	WL
well const.	12-4	1457	15.43
~~24 hr~~/8 day	12-12	1034	5.05
1½ day	12-18		2.40

P-19

	Day	Time	WL
well const.	12-12	1300	11.91
24 hr	12-13	8:13	9.16
6 day	12-18		8.85

P-20

	Day	Time	WL
well const.	12-12-02		dry
24 hr	12-13-02	820	21.10
6 day	12-18-02		20.94

P-21

	Day	Time	WL
well const.	12-17-02	808	6.71
24 hr	12-18-02		8.40
6 day	12-23-02		8.02

Additional WLs can be seen on Field well Construction Logs.

FIELD LOGS

MRR, High Point C&D Landfill

BORING LOCATION P-1
GROUND ELEVATION (NGVD) ~8190
GROUNDWATER EL. BL 8105 DATE
DATE START/FINISH 02-15-02 / 2-21-02
DRILLED BY Bedford / Kevin Kendrick
LOGGED BY R Kirkman TOTAL DEPTH (FT) 80.5 M Monoghan

PG. 1 OF 2

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 1 2		100%	0-2	SM	0-1' Topsoil silty sand, tan, soft, wet, fine grained
5			50/3		0%	5-7	PWR	(no recovery) silty sand w/ rock fragments in cuttings AR @ 6' Dry @ 14:19 2/15 + @ 8:33 2/18 + @ 8:33 2/19 came back w/ air 2/20 orange flour soft
10								
15								Hard Rock @ 17' light gray rock flour
20								Hit several small fractures (< 1 inch) light brown rock flour ~2.5' thick
25								

25-35

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
GROUNDWATER

NOTES:
Acker Soil Max HSA Rig w/ 4 1/4" ID augers
Ingersoll Rand T3w w/ 6" hammer

JOYCE ENGINEERING, INC

MRR High Point C+D Landfill

BORING LOCATION P-1
GROUND ELEVATION (NGVD) ~819
GROUNDWATER EL. _____ DATE _____

DATE START/FINISH 2-15-02 / 2-21-02
DRILLED BY Bedford / Kendrick Monaghan
LOGGED BY R Kirkman TOTAL DEPTH (FT) 50.5

PG. 2 OF 2

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
35								
40								Dry @ 18:13 2/20 + @ 7:15+9:06 2/21 mud @ bottom @ 14:49 2/21
45								Continued dry rockflow
50								
								Boring advanced to 50.5' + terminated

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max H 12 Avis
w/ 4 1/4 ID augers
Ingersoll Rand T3W w/ 6" hammer

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR High Point C&D Landfill

Monitoring Well Number: P-1

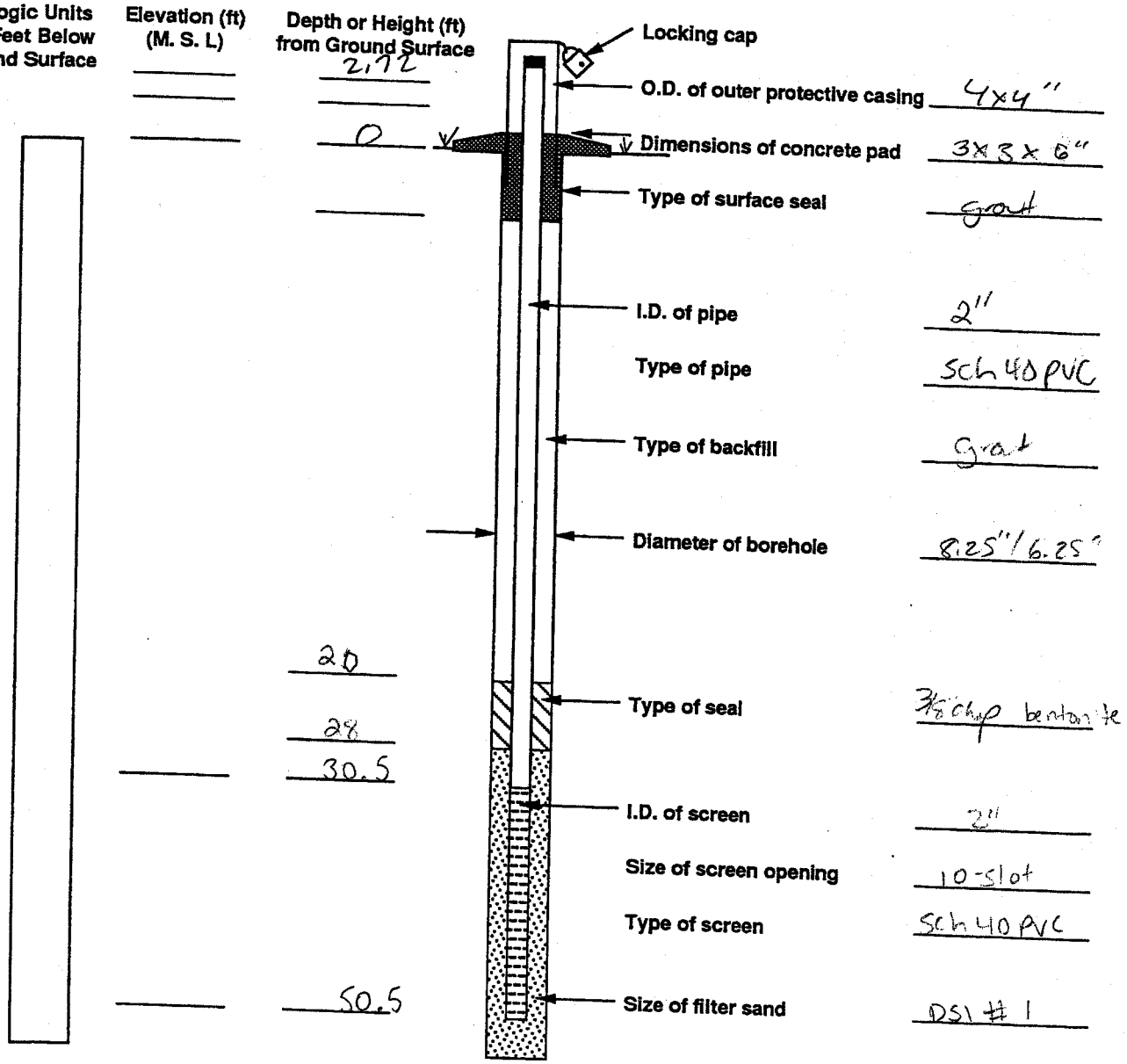
Drilling Subcontractor: Bedford

Date of Well Installation: 2-21-02

Driller: Kevin Kendrick **Logged by:** R Kirkman
Mike Monaghan

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 53.01



2/21 15:32 24 hrs

WATER LEVEL MEASUREMENTS

Diagram not to Scale

Date	TOP	2/22								
Depth from top of monitoring well pipe	dry	52.46								
Elevation										

MRR - High Point C&D Landfill

BORING LOCATION P-2
GROUND ELEVATION (NGVD) ~797'
GROUNDWATER EL. ~795 DATE
BR EL ~787

DATE START/FINISH 02/13/02 / 2/13/02
DRILLED BY Bedford/Kevin Kendrick
LOGGED BY R. Kirkman TOTAL DEPTH (FT) 10

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 1 3		65%	0-2'	SM	0-1" Topsoil Brown to Black w/ organics, wet, loose, sandy silt
5			3 5 6		75%	4.5-6.5'	SC	Sandy clay gray to tan very wet (near or in water)
						7-9' Pushed a Shelby tube w/good recovery		Boring Terminated at 10'
10								
15								
20								
25								

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" ID augers

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point - C&D Landfill

Monitoring Well Number: P-2

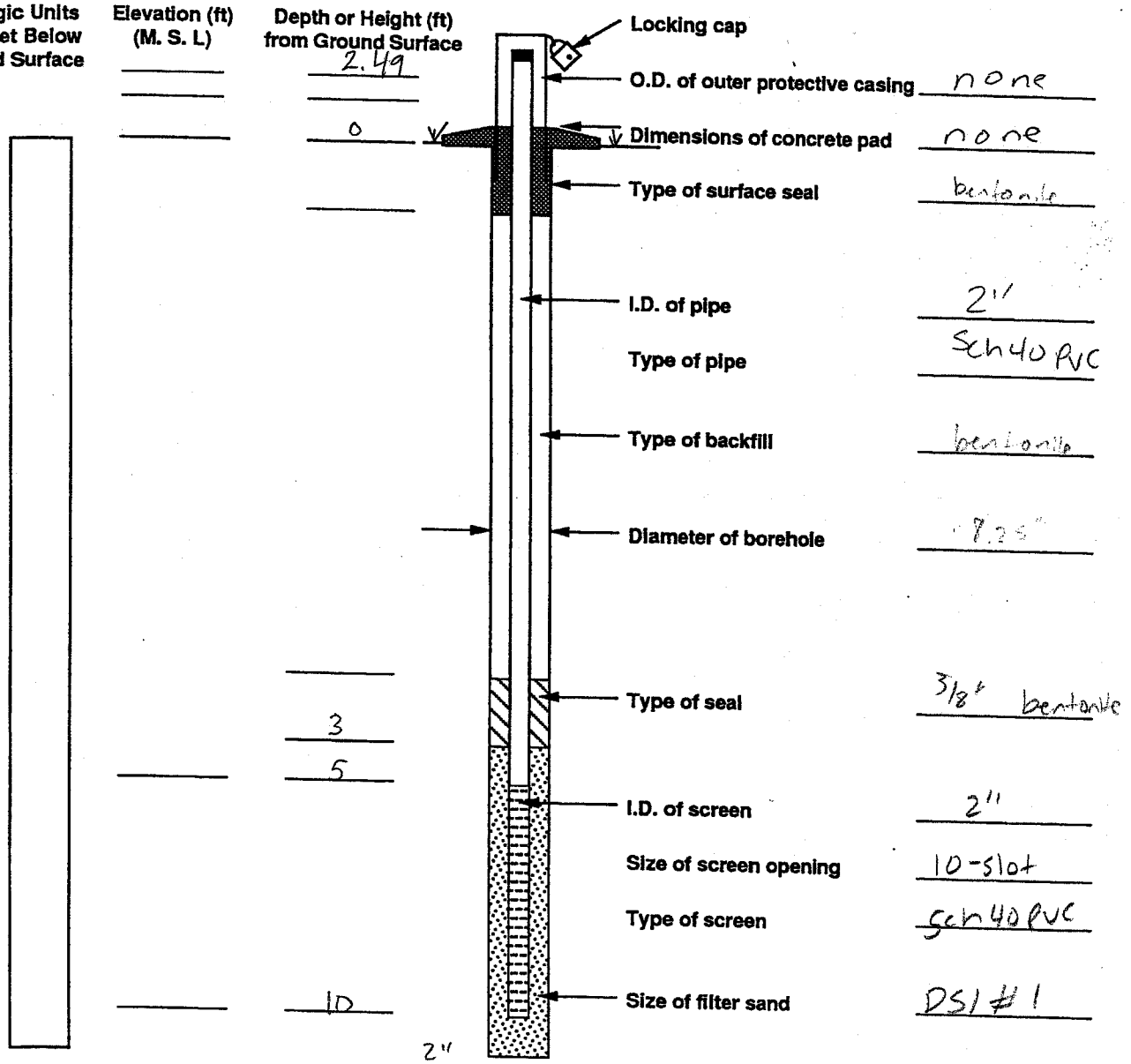
Drilling Subcontractor: Bedford

Date of Well Installation: 2-13-02

Driller: Kevin Kendrick **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 12.37



WATER LEVEL MEASUREMENTS

Diagram not to Scale

Date	ToD 800	1800	24hrs	2/14 5:30	2/15 13:36	2/18 8:35	2/19 4:30	7days 2/20 7:13	2/21 10:00	2/22 12:28
Depth from top of monitoring well pipe	Dry	884	5.88	4.48	3.55	3.96	4.00	3.92	3.71	3.68
Elevation										

MRR of High Point Co D Landfill

BORING LOCATION P-3 | DATE START/FINISH 02-12-02 / 2-12-02
GROUND ELEVATION (NGVD) ~789' | DRILLED BY Bedford / Kevin Kendrick
GROUNDWATER EL BR ~787 EI ~760 DATE | LOGGED BY R Kirkman TOTAL DEPTH (FT) 25 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			2 3 4		75%	0-2		0-3" Topsoil
							SC	3"-6" clayey sand, brown, moist
							SM	6"-1' Silty sand, brown, very moist
								4.5-6.5 Sandy silt light brown, stiff
			8				SM	w/ qtz, fspar, faint granitic texture, moist
5			11 13		100%	4.5-6.5		more clay-rich towards bottom
							SC/SM	9.5-11.5 Silty Sand
			2 6 9		75%	9.5-11.5		as above but coarser grained, very moist
10						~10' bulk sample taken of clayey silt		
							(SM) PWR	14.5-16.5 Silty sand very prominent granitic fabric coarse grained, slightly moist stiffer light brown/white
			15 22 25		100%	14.5-16.5		
15								~16' drilling progress slowed (stiffer)
								Water ~19'-20'
			11 23 22		75%	19.5-21.5	(SM) PWR	Silty sand, moist, strong granitic fabric light brown/white/orange, stiff
20								
								water coming out of hole
			38 50/5		30%	24.5-26.5	(SM) PWR	Silty sand, slightly moist, strong granitic fabric, white layers to light brown to orange, coarse, very stiff
25								Boring Terminated at 25'

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4¼" ID augers

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point C&D Landfill

Monitoring Well Number: P-3

Drilling Subcontractor: Bedford

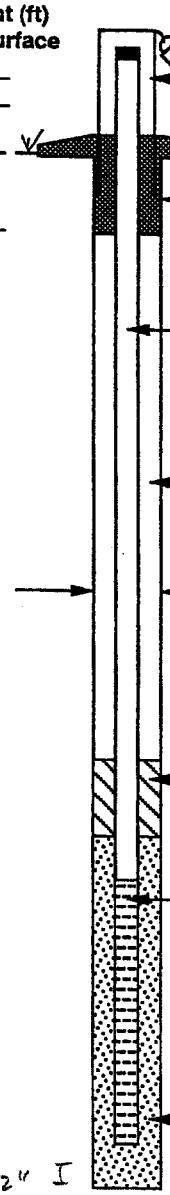
Date of Well Installation: 2-12-02

Driller: Kevin Kendrick **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 27.73

Geologic Units and Feet Below Ground Surface	Elevation (ft) (M. S. L)	Depth or Height (ft) from Ground Surface
		2.55
		0
		5.5
		8
		10
		25



Locking cap	
O.D. of outer protective casing	none
Dimensions of concrete pad	none
Type of surface seal	grout
I.D. of pipe	2"
Type of pipe	Sch40 PVC
Type of backfill	grout (quickcrete)
Diameter of borehole	8.25"
Type of seal	3/8" chip bentonite
I.D. of screen	2"
Size of screen opening	10 slot
Type of screen	Sch40 PVC
Size of filter sand	DSI #2 (out of #1)

WATER LEVEL MEASUREMENTS

Date	(Pre-well) TOD	(w/well) TOD (GS)	2 mins (GS)	2/13 18:00 (GS)	2/14 7:00 (GS)	2/14 5:30 pm (GS)	2/15 14:43 GS	2/18 8:07 GS	(TOC) 7 day 2/19 8:13	2/21 9:52
Depth from top of monitoring well pipe	~19-20' BGS	8.35 ~~6.03~~	4.39 ~~2.04~~	4.55 ~~2.20~~	4.60 ~~2.25~~	4.65 ~~2.30~~	4.50 ~~2.15~~	4.78 ~~2.43~~	5.20	5.06
Elevation										

2/22
1/12/13
5.14

Diagram not to Scale

MRR of High Point C&D Landfill

BORING LOCATION P-4 | DATE START/FINISH 22-12-02/

GROUND ELEVATION (NGVD) ~800' | DRILLED BY Bedford/Kevin Kendrick

GROUNDWATER EL. _____ DATE _____ | LOGGED BY R Kirkman TOTAL DEPTH (FT) _____

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
			WOH/3		7/8	0-2'	SM	0-6" Topsoil sandy silt brown to orange moist last 1' lighter gray clay moist
			45 50/3		4/12	4.5-6.5'	PWR	~4' Drilling progress slowed significantly very hard very coarse grained silty sand w/ strong granitic texture coarse grained tan to white, slightly moist AR@6'
						2/15/02 hole collapsed to 2', 1' water		
						2/18/02 water ~ 1.5' bgs		Cuttings fell into hole to 2', 2' grout put in hole to abandon 2/18 ? Check dates

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" ID augers

JOYCE ENGINEERING, INC.

Material Recovery LLC of High Point

BORING LOCATION P-4A (next to P-4 ~5') DATE START/FINISH 2/15/02 / 2/15/02

GROUND ELEVATION (NGVD) 800 DRILLED BY K. Kendrick / Bedford

GROUNDWATER EL. 788 DATE _____ LOGGED BY R Kirkman TOTAL DEPTH (FT) _____ PG. 1 OF 1

BL 784

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							(same as P-4)
	5					2in/min		~5-10 feet very hard
	10		5 12 20		60%	10-12'	PWR	Coarse grained silty sand w/ prominent granitic fabric, very moist, moderate Biot, qtz, feldspar, weathered garnet?
						3in/min		
							CL	~12-13.5 feet - very soft Water ~12' clay layer w/ silt brown wet/saturated
	15		50/4		57%	15-17'	PWR	as above slightly moist w/ rock fragments, much harder
						4in/min		
			50/3		55%	16-18	PWR	Auger refusal at 16' very hard as above, slightly moist
	20							
	25							

used a new cutter head

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES: Acker Soil Max HSA Rig w/ 4 1/4" ID augers NQ wireline coring

JOYCE ENGINEERING, INC.

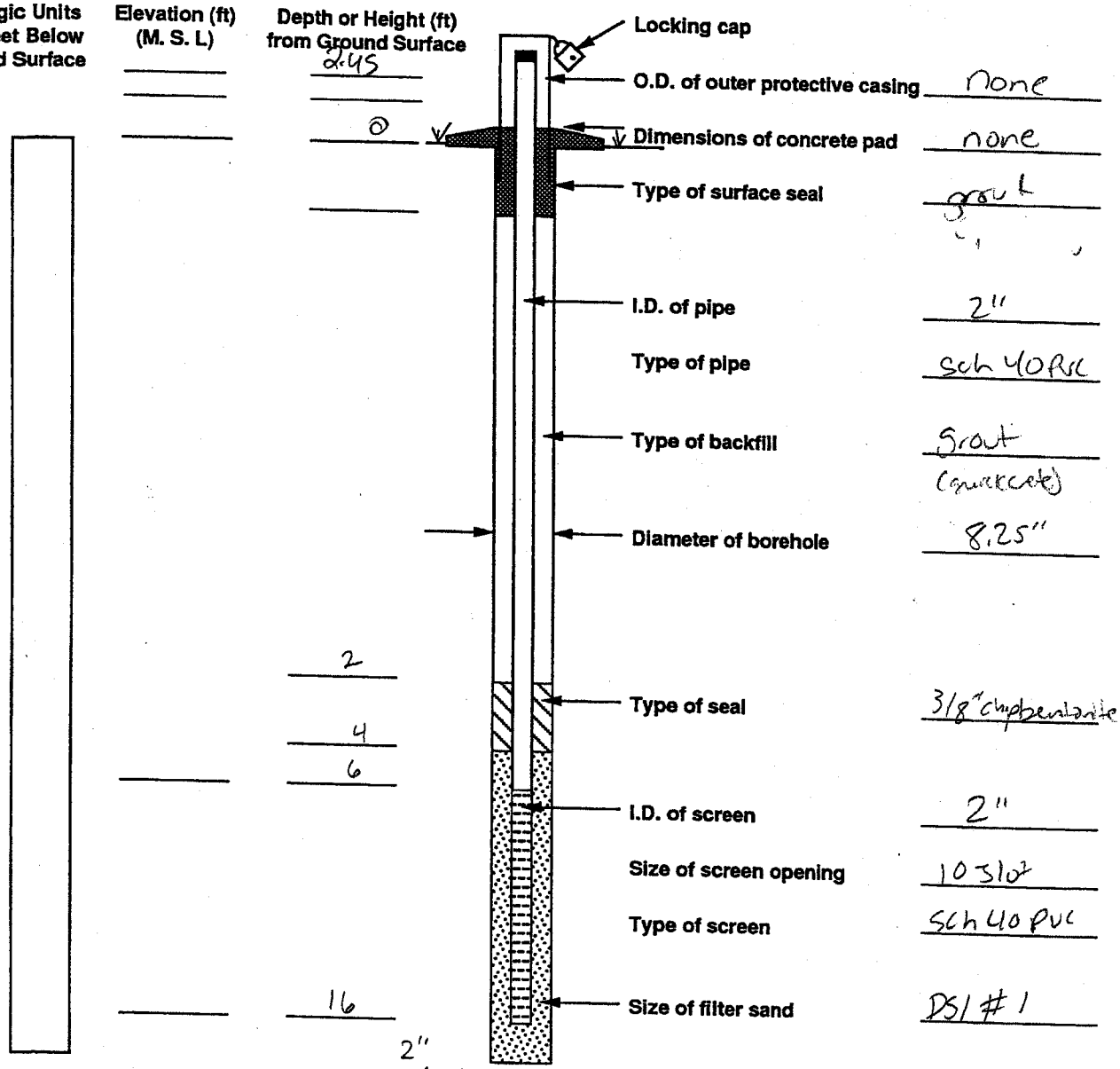
MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point - C&D Landfill **Monitoring Well Number:** P-4A

Drilling Subcontractor: Bedford **Date of Well Installation:** 2/15/02

Driller: K. Hendrick **Logged by:** R Kirkman **Date of Well Development:**

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 18.23



WATER LEVEL MEASUREMENTS Diagram not to Scale

Date	TOD 2/15	14:30	8:11 2/18	8:15 2/19	9:49 2/21	11:29 7day 2/22				
Depth from top of monitoring well pipe	17.83	11.02	5.05	5.03	4.96	5.04				
Elevation										

MRR of High Point Gt D Land Fill

BORING LOCATION P-5	DATE START/FINISH 02/15/02 / 2/15/02
GROUND ELEVATION (NGVD) ~759'	DRILLED BY Bedford / Kevin Kendrick
GROUNDWATER EL. BR = 752 DATE	LOGGED BY R Kirkman TOTAL DEPTH (FT)
	PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0					75%	0-2		0-6 Fill 6-1.5 Topsoil Dark brown w/ organics
								Drilled to 5' and attempted a Shelby tube only recoverd 6" before tube began to bend
							PWR	very strong granitic texture, coarse-grained, moist, qtz fspar, biotite
5						5-7' Failed Shelby tube		
						3in/min		~7' getting very hard, rock fragments coming up hole
			50/1		5%	7-9		Auger Refusal @ 7'
10							PWR	very hard silty sand w/ rock fragments tan/brown

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" ID augers

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point

Monitoring Well Number: P-5

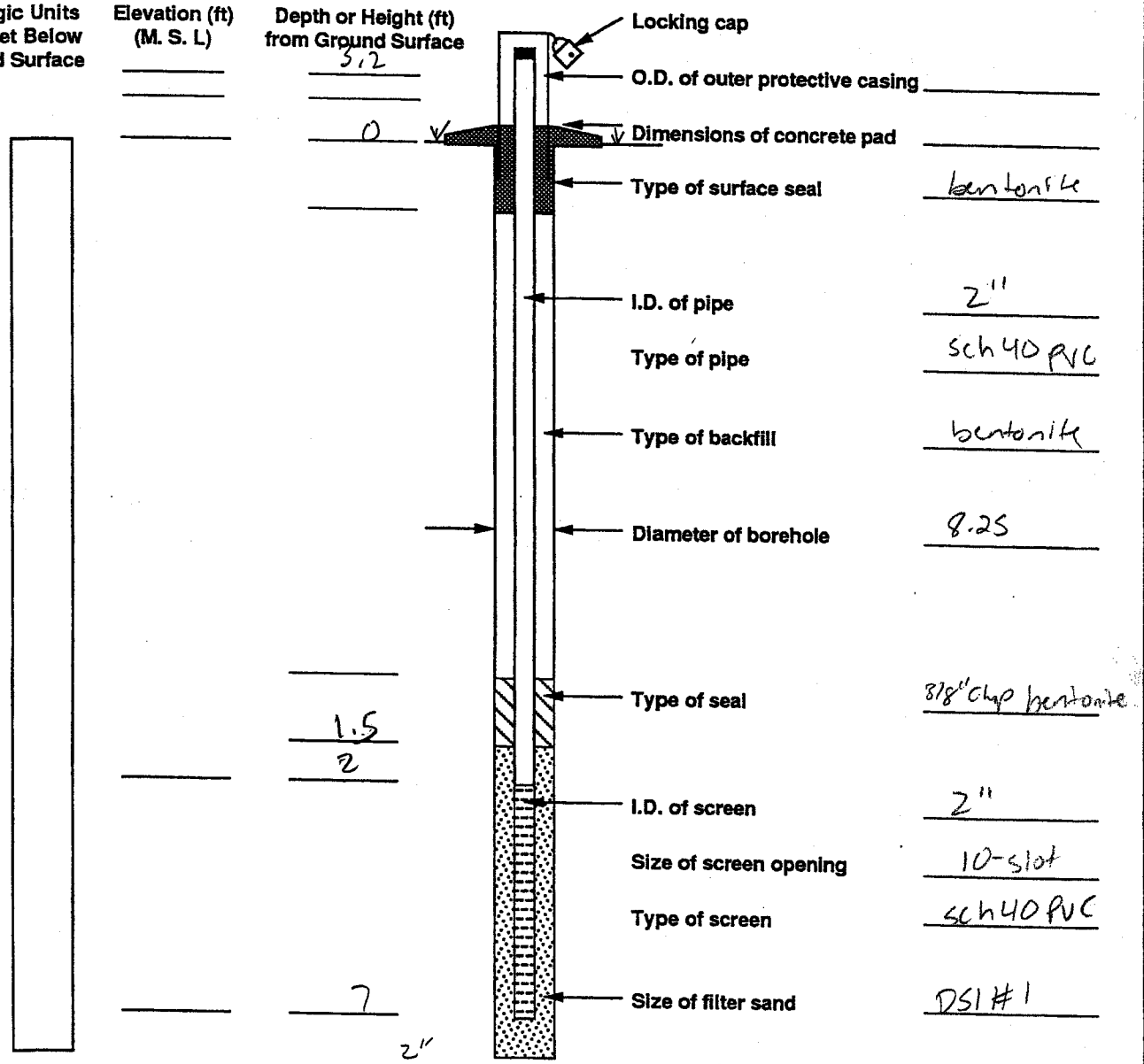
Drilling Subcontractor: Bedford

Date of Well Installation: 2-15-02

Driller: K. Kendrick **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 9.75



(24) 7 day

WATER LEVEL MEASUREMENTS

Diagram not to Scale

Date	TOD	2/15 14:27	2/18 8:23	2/19 8:22	2/21 9:45	2/22 17:13				
Depth from top of monitoring well pipe	dry	9.60	9.12	9.02	8.77	8.69				
Elevation										

MRR of High Point C&D Landfill

* changed to a newer bit right before drilling

BORING LOCATION P-6
GROUND ELEVATION (NGVD) ~797'
GROUNDWATER EL. BRKL 789 DATE
DATE START/FINISH 02-12-02 / 12-20-02
DRILLED BY Bedford / Kevin Kendrick / [illegible]
LOGGED BY R Kirkman TOTAL DEPTH (FT) 35.5
PG. 1 OF 2

35-40

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 1 3		75%	0-2	SC PWR	0-4" Topsoil Sandy clay brown moist ~3.5' very stiff
5			21 35 50/5.5		100%	4.5-6.5	PWR	4.5-6.5 tan to white silty sand very coarse grained moist coarse grained w/ granitic texture-strong 5-8 - gray powder w/ rock fragments AR@ 8.5' Dry @ 2/18 8:19 & @ 2/19 8:19 Continued w/ air rig orange rock flour
10								
15								
20								
25								
30								30'

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" ID augers
Ingersoll Rand T3W w/ 6" hammer

JOYCE ENGINEERING, INC.

MRR High Point LLC

BORING LOCATION P-6		DATE START/FINISH 2/12/02 - 2/20-02	
GROUND ELEVATION (NGVD) 797		DRILLED BY Bedford / Kendrick + Monaghan	
GROUNDWATER EL. _____	DATE _____	LOGGED BY R Kirkman TOTAL DEPTH (FT) _____	PG. 2 OF 2

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
								weathered to bottom (soft) (30-35)
35								Stopped @ 35 ft
								water @ 31.95 18:13 2/20

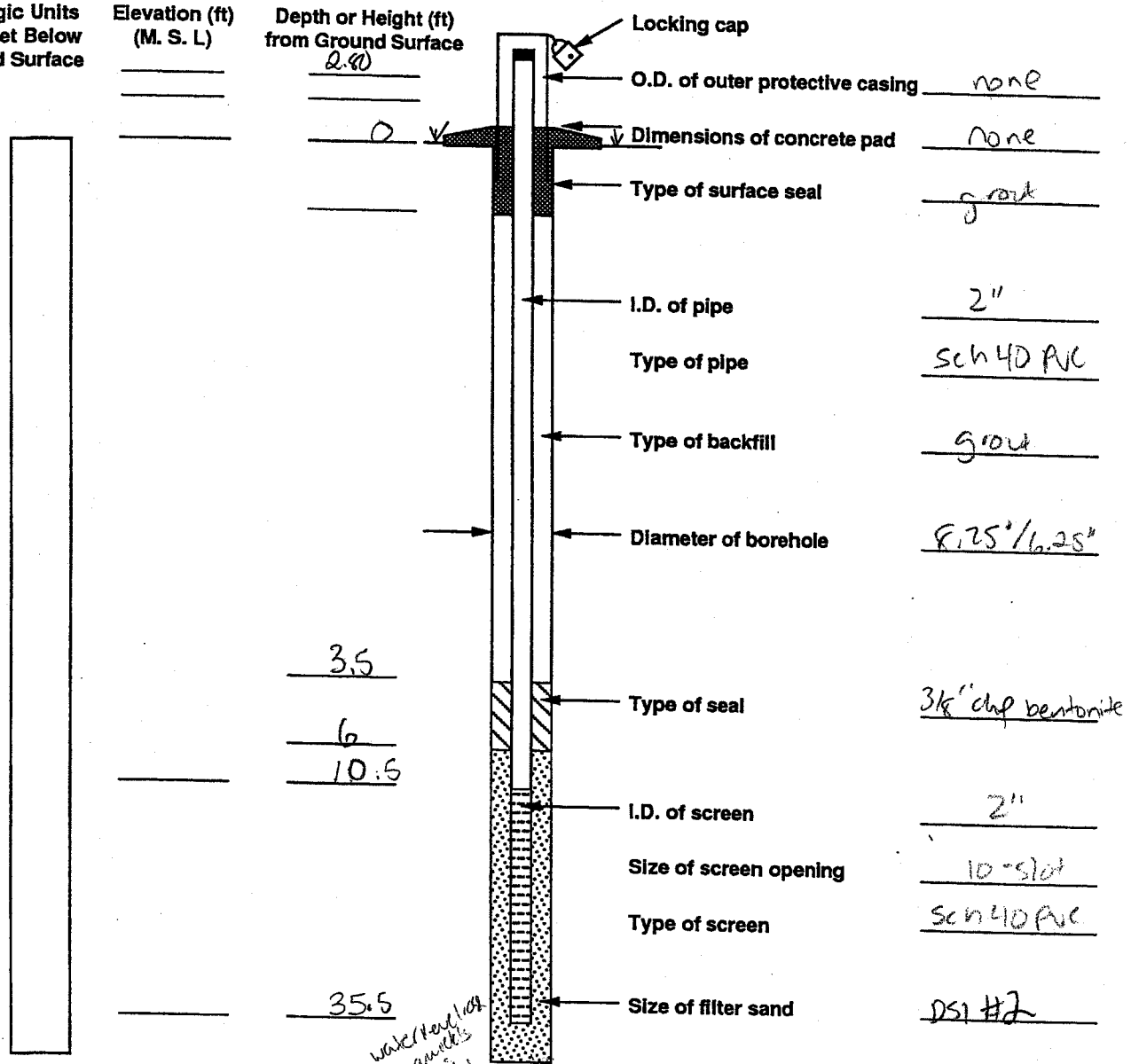
BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA w/ 4 1/4" 1 Days
Ingersoll Rand 73W w/ 6" hammer

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point Ct D Landfill
Monitoring Well Number: P-6
Drilling Subcontractor: Bedford
Date of Well Installation: 2-21-02
Driller: K. Kendrick **Logged by:** R Kirkman
Date of Well Development:
Depth to Bottom of Well from the Top of Monitoring Well Pipe:



WATER LEVEL MEASUREMENTS 2/20

Date	TOD	2/21 9:17	8/8/1	2/21	2/20					
Depth from top of monitoring well pipe	dry	17.5 (BGS)	7.8 (TOC)	20.26	20.72					
Elevation		20.3								

Diagram not to Scale

2/20 18:13
31.95

MRR of High Point - C&D Landfill

BORING LOCATION P-7 | DATE START/FINISH 02-12-02 / 2-13-02

GROUND ELEVATION (NGVD) ~783' | DRILLED BY Bedford / Kevin

GROUNDWATER EL. 774 (RR FL 2763) | DATE | LOGGED BY RKirkman | TOTAL DEPTH (FT) | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							0-4" topsoil
			3 6 6		75%	0-2'	SM	brown to orange moist sand, silt / silty sand
	5		50/4		10%	4.5-6.5'	PWR	weathered rock or fragment? granite tan silty sand consolidated very hard
	10					no spoon sample too hard	PWR	Brown silty sand w/ rock fragments very hard; dry
	15							AR@17' no water after 14 hrs water @ 11.35 ft BGS
			50/1		5% (Cuein?)	17-19'		
	20							
	25							
	30							

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil max HSA rigw/ 4¼" ID augers

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point C&D Landfill

Monitoring Well Number: P-7

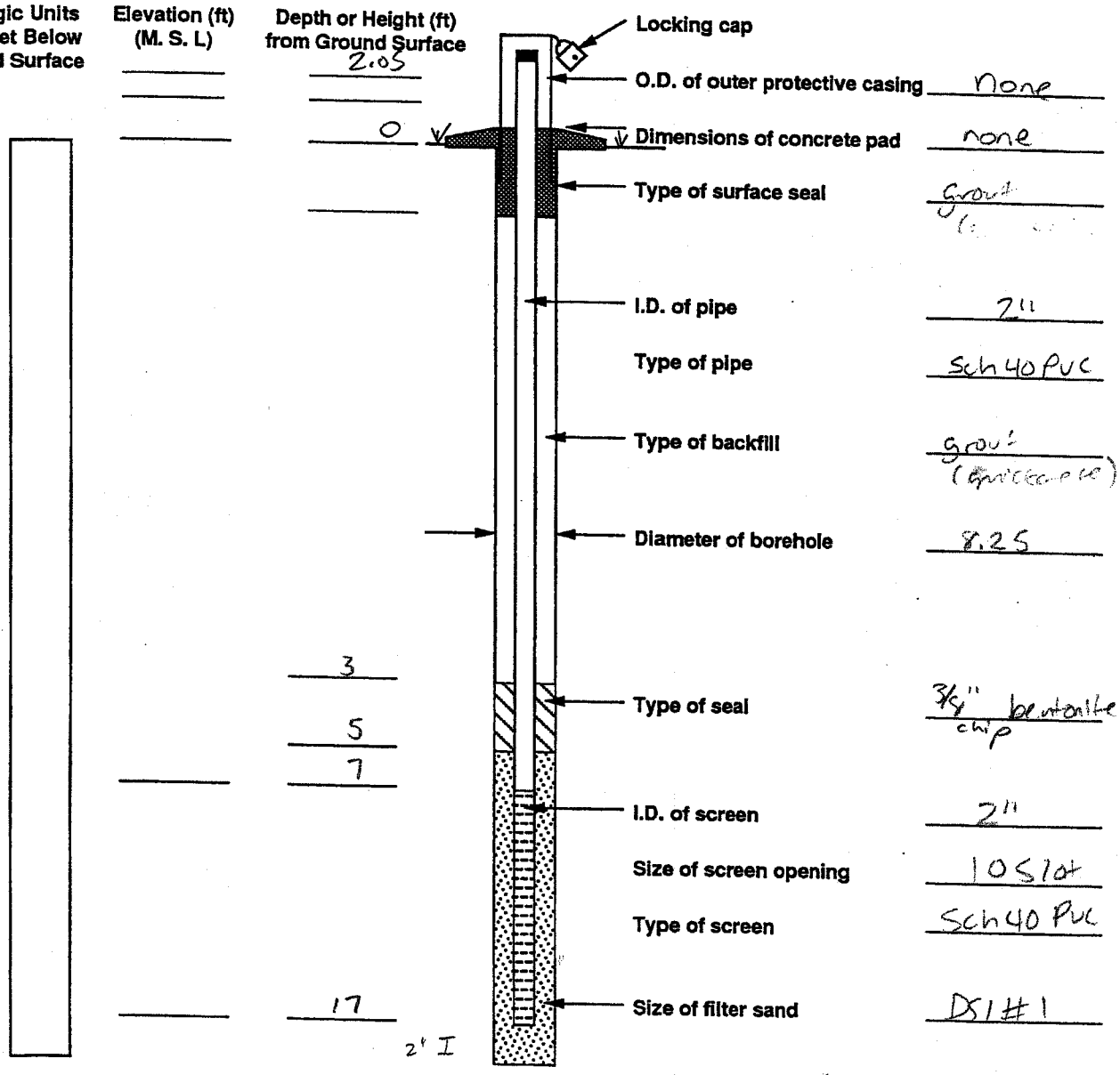
Drilling Subcontractor: Bedford

Date of Well Installation: 2-13-02

Driller: Kirkendrick **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 19.95



WATER LEVEL MEASUREMENTS after 10 hrs (TOC) 2/14 2/14 2/15 2/18 2/19 7day 2/20 2/21

Diagram not to Scale

Date	TOD	from GS	24 hrs	7:00	5:30	13:34	8:27	8:26	7:09	9:57
Depth from top of monitoring well pipe	dry	11.35	11.21	11.07	10.98	10.85	10.91	10.87	10.78	10.57
Elevation										

2/22 12:02 10.67

map well 20-35

MRR of High Point C&D Landfill

AR-9'

BORING LOCATION P-8 | DATE START/FINISH 02-13-02/20

GROUND ELEVATION (NGVD) ~797' | DRILLED BY Bedford/K. Kendrick

GROUNDWATER EL. BR ~780 DATE | LOGGED BY R Kirkman | TOTAL DEPTH (FT) 25 | PG. | OF |

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 2 2		80%	0-2	SM	0-6" Topsoil moist silty sand brown
								S-7
			21 35 50/5		35%	5-7'	PWR	silty sand coarse-grained, micaceous Strong granitic texture musc, qtz, fspar very weathered
5								
			50/4		5%	8-10		Auger Refusal @ 8' dry @ 14:11 2/15 @ 9:20 2/18 @ 9:00 2/19
10								Gray rock flour to 22' (PWR)
						Some mast cuttings came out of hole initially		
15								
20								Harder rock gray flour @ 22'
25								Boring Terminated at 25' ~11:48 dry @ 12:48 2:33 wet @ bottom
30								

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rigwd
4¼" ID augers
Ingersoll Rand T3W
w/ 6" dr. hammer

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point - GTO Landfill

Monitoring Well Number: P-8

Drilling Subcontractor: Bedford

Date of Well Installation: 2/20/02

Driller: K. Kendrick, M Monaghen **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 27.48

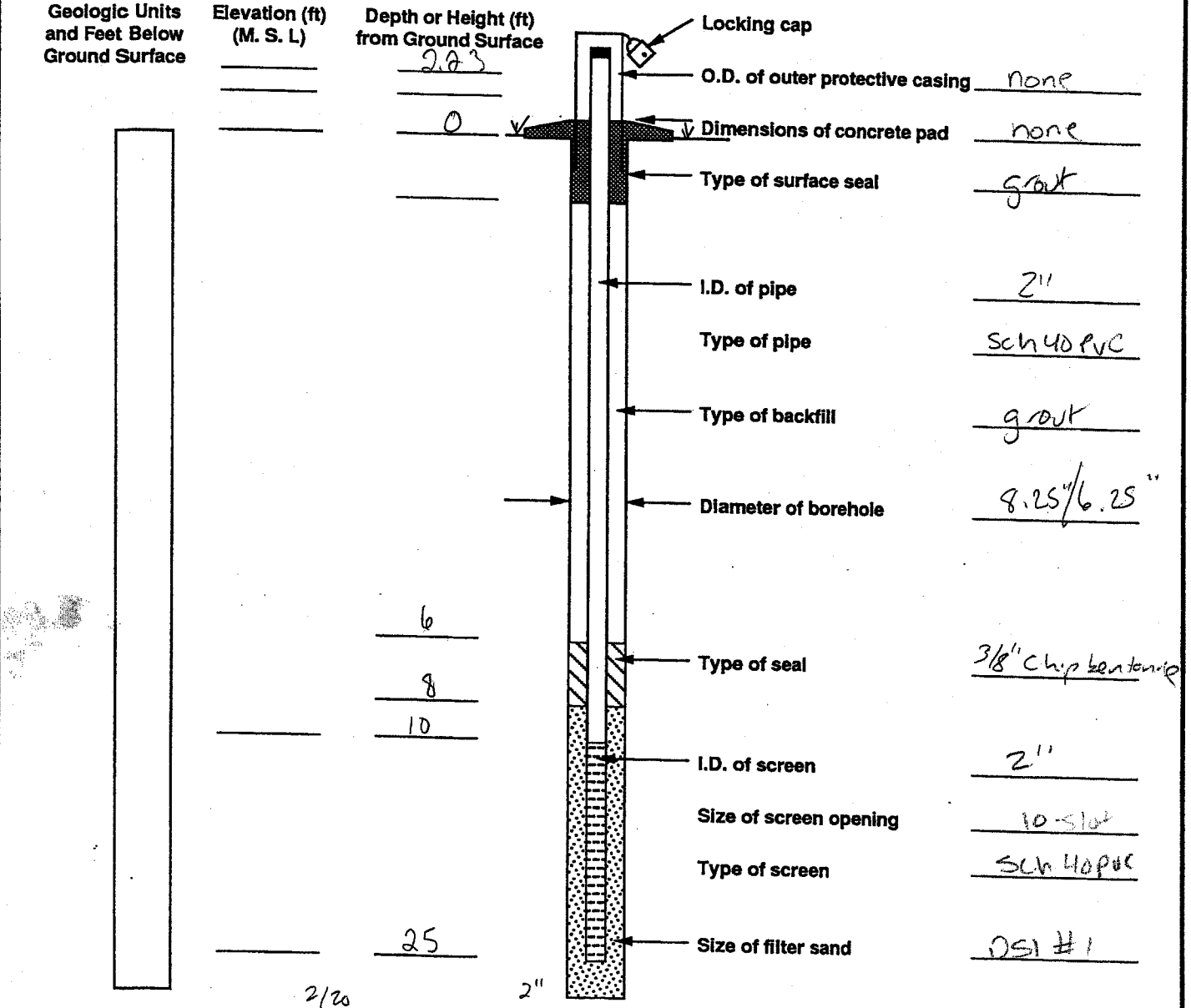


Diagram not to Scale

WATER LEVEL MEASUREMENTS

		2/20	2/21	2/21	2/22					
Date	TOD	18:02	8:12	24hrs	13:12					
Depth from top of monitoring well pipe	dry	27.29	26.65	26.48	25.58					
Elevation										

AR-9

BORING LOCATION P-9		DATE START/FINISH 02-13 02 / 2-20-02	
GROUND ELEVATION (NGVD) ~808'		DRILLED BY Bedford / K. Kendrick / M Managh	
GROUNDWATER EL. BR 788	DATE	LOGGED BY R Kirkman TOTAL DEPTH (FT) 40	PG. 1 OF 2

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 2 3		25%	0-2' * fell out of spoon	SM	0-2 brown very moist silty sand
								~4'-6' dark green/brown sandy silt (dry) drastic color change! hard; weathered mafic material?
5			3 44 50/3		75%	5-7'	SM PWR ~6'	6-7' silty sand tan, white, orange slightly moist faint granitic texture
			59/5		25%	10-12'	PWR	10-12' mafic rock fragments in dark green/gray sandy silt (dry)
10						wet @ bottom? 2/18 8:37 2/19 8:35 dry		Auger refusal @ 11' continued w/ air rotary Back into granitic weathered flour
15								
20								
25								
								Hard rock @ 30' (gray flour)
30								

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4¼" ID augers
Ingersoll Rand Air Rig w/ 6" hamer

JOYCE ENGINEERING, INC.

MRR of High Point, LLC

BORING LOCATION P-9		DATE START/FINISH 2-13-02 / 2-20-02	
GROUND ELEVATION (NGVD) ~408		DRILLED BY Bedford / Kentick & Mangaran	
GROUNDWATER EL. _____	DATE _____	LOGGED BY R Kirkman TOTAL DEPTH (FT) 46	PG. 2 OF 2

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
								water @32'? (dust dried down + cool flow) orange/brown in color
35								
								rods were wet coming out of hole
40								Boring Terminated @40' ~1' water in hole

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" I Dangers
Ingersoll Rand T3W air rig w/ 6" hammer

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRL of High Point C&D Landfill

Monitoring Well Number: P-9

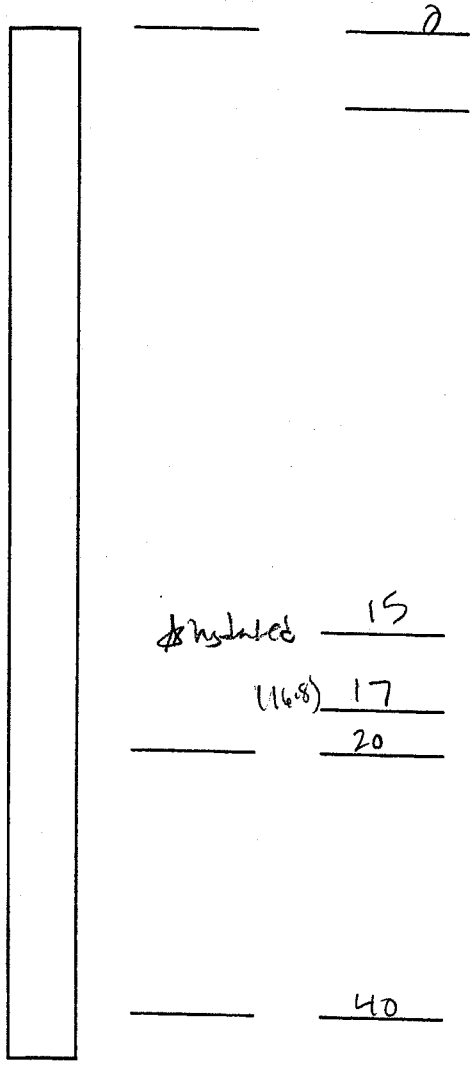
Drilling Subcontractor: Bedford

Date of Well Installation: 2-20-02

Driller: K. Kendrick / M Monaghan **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 43.05



Geologic Units and Feet Below Ground Surface	Elevation (ft) (M. S. L)	Depth or Height (ft) from Ground Surface
		2.6
		0
		15
		17
		20
		40

Locking cap	
O.D. of outer protective casing	None
Dimensions of concrete pad	none
Type of surface seal	grout
I.D. of pipe	2"
Type of pipe	Sch 40 PVC
Type of backfill	grout
Diameter of borehole	8.25/6.25
Type of seal	3/8" Cp bentonite
I.D. of screen	2"
Size of screen opening	10-slot
Type of screen	Sch 40 PVC
Size of filter sand	DSI #1

WATER LEVEL MEASUREMENTS 2/20 1:00 2/21 7:30 2/21

Diagram not to Scale

Date	TOD		24hrs	2 days 2:30						
Depth from top of monitoring well pipe	(TOC) 37.26	26.20	26.17	26.32						
Elevation										

MRR of High Point Ct D Landfill

BORING LOCATION P-10	DATE START/FINISH 02-13-02 / 2-20-02
GROUND ELEVATION (NGVD) ~792'	DRILLED BY Bedford/K. Kendrick
GROUNDWATER EL. BR 777 DATE	LOGGED BY R Kirkman TOTAL DEPTH (FT) 30.5
	PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 5 7		75%	0-2	SM	0-1' Topsoil 1-2 Silty sand very moist, tan, white, orange, coarse-grained
5			50/5		10%	5-7	PWR	Silty sand coarse gravel slightly moist biotite, qtz, fspar; faint granitic texture Auger Refusal @ 5' Began coring Cored 5-15' (hard at bottom of 15' run) .2/10 = .02% Recovery → all washed out RQD=0%
						6in/30s 6in/15s " " 6in/25s } very soft!		
10						6in/30s		
15						6in/30s 6in/1min 6in/45s 6in/min "		Cored 15-20' a little harder %Rec 5.3/5.5 = 97% %RQD 5.1/5.5 = 93% Coarse-grained granite w/ biotite, feldspar, quartz
20					2/18 8:40	water@1.56 core water? wet mud@1.5 some water in hole when started drilling from coring or real?		Some Fe-mn stains on fractures 30°, 45°, 70° *Reamed out core hole to 20' + proceeded to 25' Hard rock @ 17' dry gray rock flour
25						water@25.4' 1203		Stopped @ 25.5 13:35 2/19 2/20 dry @ 25' (morning) came back + went to 30' ~26' (~1' wet, rest dry) brown/dark gray cuttings Boring Terminated at 30.5
30								

→30 set 20' screen

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4¼" ID augers NQ wireline coring
Ingersoll Rand T3W air rotary rig w/ 6" hammer

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point C&D Landfill

Monitoring Well Number: P-16

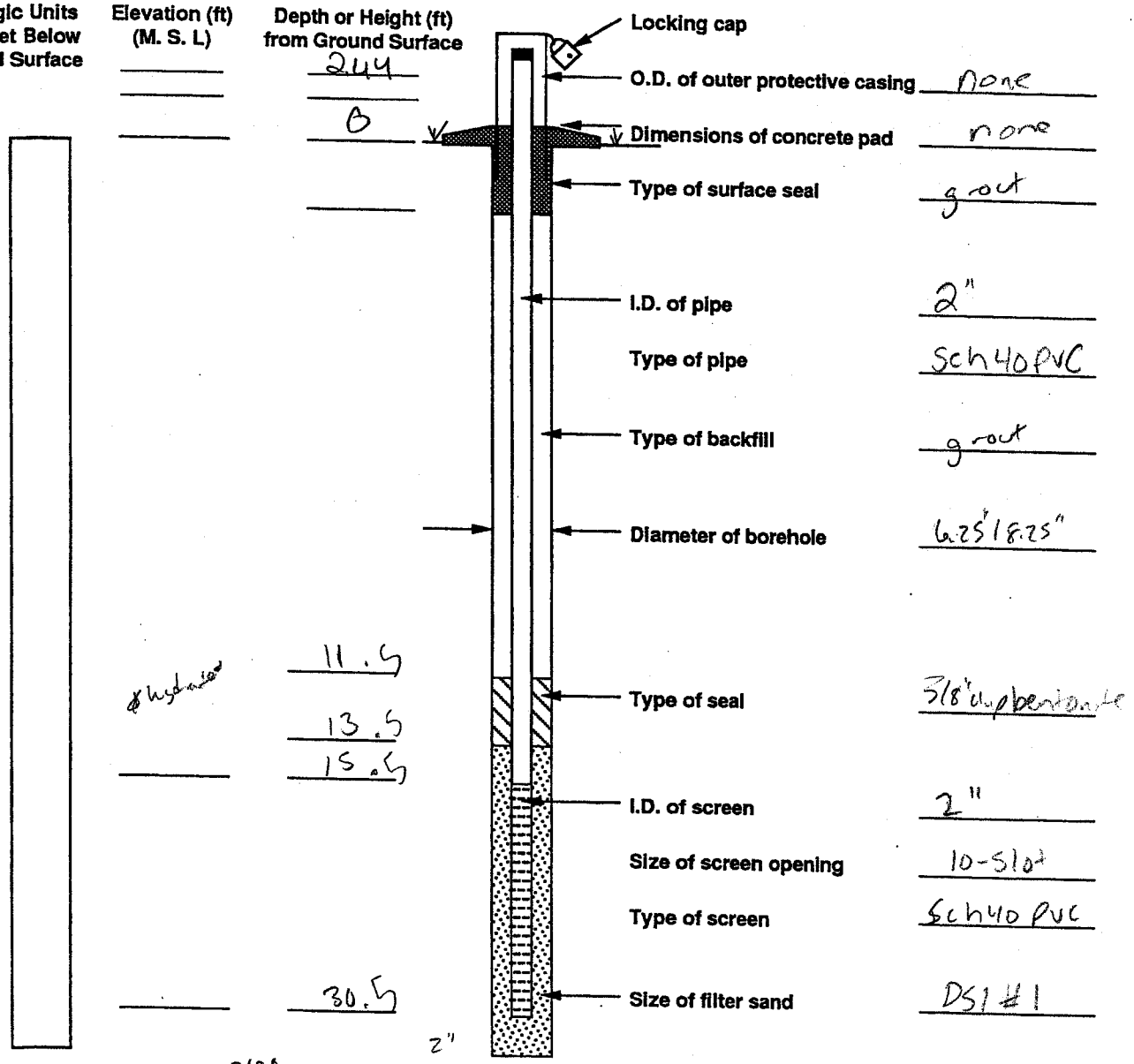
Drilling Subcontractor: Bedford

Date of Well Installation: 2-20-02

Driller: K. Hendrick / M Monaghan **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 33.05



2/20 2116 2/20 2/21 24hrs

WATER LEVEL MEASUREMENTS

Diagram not to Scale

Date	TOD	17:37	7:33	2/21	2/22					
Depth from top of monitoring well pipe	dry	dry	dry	dry	12:39 32.99					
Elevation										

MRR of High Point C&D Landfill

BORING LOCATION P-11	DATE START/FINISH 02-14-02 / 2-20-02
GROUND ELEVATION (NGVD) ~777'	DRILLED BY Bedford/K. Kendrick / M Monaghan
GROUNDWATER EL. BR 758 DATE	LOGGED BY R Kirkman TOTAL DEPTH (FT) 40

PG. 1 OF 2

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			2 1 2		80%	0-2'	SM	0-1 Topsoil/fill Tan/Brown silty sand, moist, soft
			50/4		<5%	5-7'	PWR	Tan to white silty sand, dry, hard
5								
10			50/3		5%	10-12	PWR	As above w/ larger rock fragments Auger Refusal at 10' came back w/ air Dry @ 13:45 2/15/02 @ 8:52 2/18/02 + 8:43 2/19
15								Slightly moist cuttings @ 15'
20								
								~25' moist orange flour - water?
25								dark green/gray rock flour (like P-10) ~2' ~26-28 Hard rock @ 28'
							BR	then light gray rock flour → 30'
								2/19 Stopped @ 30' @ 13:00 dry @ 7:21 2/20
30								

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA Auger Rig w/ 4 1/4" ID augers
Ingersoll Rand T3W air Rotary rig w/ 6" air hammer

2/13/08

JOYCE ENGINEERING, INC.

BORING LOCATION P-11
GROUND ELEVATION (NGVD) ~777'
GROUNDWATER EL. _____ DATE _____

DATE START/FINISH 2/14/02 / 2/20/02
DRILLED BY Bedford / M Monaghan
LOGGED BY R Kirkman TOTAL DEPTH (FT) 40

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
								Came back & drilled another 10' 2/20
								light gray rock flour (dry)
35								~37' weathered looking rock flour (~1') back into mafic rock flour (38-40)
40								Boring Terminated @ 40'

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Ingersoll Rand T-3W w/ 6" hammer air rig

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point Ct Landfill

Monitoring Well Number: P-11

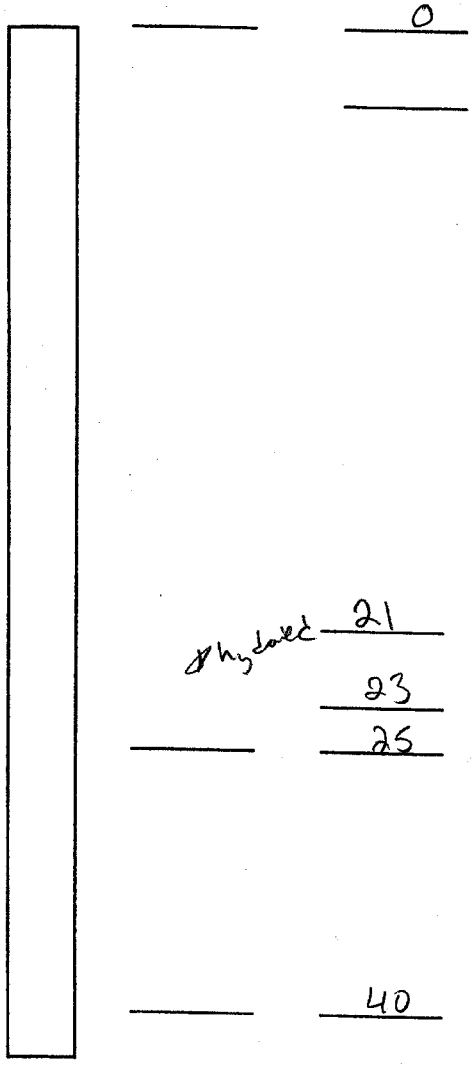
Drilling Subcontractor: Bedford

Date of Well Installation: 2-28-02

Driller: K. Kendrick, M Monaghan **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 42.38



Geologic Units and Feet Below Ground Surface	Elevation (ft) (M. S. L)	Depth or Height (ft) from Ground Surface
		2.3
		0
		21
		23
		25
		40

2"

Locking cap	
O.D. of outer protective casing	4x4
Dimensions of concrete pad	3x3x6
Type of surface seal	grout
I.D. of pipe	2"
Type of pipe	Sch 40 PVC
Type of backfill	grout
Diameter of borehole	6.25" / 6.25"
Type of seal	3/8" chip bentonite
I.D. of screen	2"
Size of screen opening	10-slot
Type of screen	Sch 40 PVC
Size of filter sand	DSI #1

WATER LEVEL MEASUREMENTS 2/20 1:39 2/20 2/21 24hr

Diagram not to Scale

Date	TOD	17:49	7:46	2/21	2/22					
Depth from top of monitoring well pipe	dry	42.18	42.00	41.85	41.82					
Elevation										

MRR of High Point C&D Landfill

AR-8

BORING LOCATION P-12 DATE START/FINISH 02-14-02 / 2-19-02

GROUND ELEVATION (NGVD) ~738' DRILLED BY Bedford/K. Kendrick

GROUNDWATER EL. BR 720 DATE LOGGED BY R Kirkman TOTAL DEPTH (FT) 20

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 2		75%	0-2	SM	0-1 Topsoil Sandy silt/silty sand, dark brown soft
5			12 19 26		50%	5-7'	SM	silty sand coarse grained tan/brown/white 6-7 PWR sump granitic texture
10			50/1		0%	10-12 water @ 6.98 13:48 2/15 Cave into 7' water @ 2.50 8:55 2/18 water @ 2.45 8:46 2/19		Dry Auger Refusal @ 10' cave in to 7'? came back w/air rig 2/19/02 hard rock @ 10' light gray rock flour slightly moist
15								very dry rock flour
20								Boring Terminated at 20'
25								

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" ID augers
Ingersoll Rand T3W air rotary rig w/ 6.25" hammer

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point Cd Landfill

Monitoring Well Number: P-12

Drilling Subcontractor: Bedford

Date of Well Installation: 2-19-02

Driller: R. Kendrick, M Monaghan

Logged by: R Kirkman

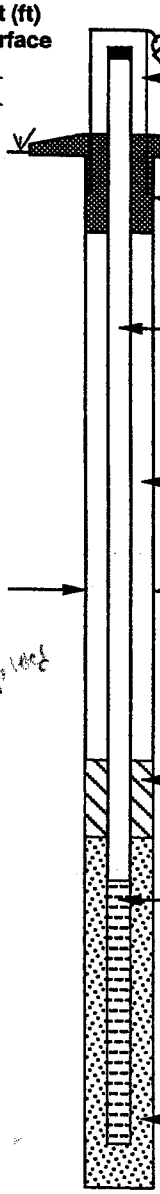
Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 22.74

Geologic Units and Feet Below Ground Surface	Elevation (ft) (M. S. L)	Depth or Height (ft) from Ground Surface
		2.45
		0
		3
		5
		20

need to add more bentonite when well is completed

& hydrated



Locking cap	
O.D. of outer protective casing	4x4"
Dimensions of concrete pad	3x3x6"
Type of surface seal	bentonite
I.D. of pipe	2"
Type of pipe	Sch 40 PVC
Type of backfill	bentonite
Diameter of borehole	8.25"/6.25"
Type of seal	3/8" chips bentonite
I.D. of screen	2"
Size of screen opening	10-slot
Type of screen	Sch 40 PVC
Size of filter sand	DSI #1

WATER LEVEL MEASUREMENTS

Diagram not to Scale

	2/14	24hrs			24 after well	12:51	12:43			
Date	TOD	2/15	2/18	2/19	2/20	2/21	2/22			
Depth from top of monitoring well pipe	dry	(GS) 6.98	(GS) 2.50	(GS) 2.45	(TOC) 9.70	9.78	10.25			
Elevation										

9.43 4.95 4.90

MRL of High Point C&D Landfill

BORING LOCATION P-13 | DATE START/FINISH 12-14-01 2-19-02

GROUND ELEVATION (NGVD) ~772' | DRILLED BY Bedford/K. Kendrick/M Monaghan

GROUNDWATER EL. BR 754 DATE — | LOGGED BY R Kirkman | TOTAL DEPTH (FT) 23 | PG. 1 OF

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 3 4		100%	0-2	SM	0-1' Topsoil very moist silty sand fine grained w/ muscovite & quartz grains present, loose
5			33 50/5		25%	5-7'	PWR	very hard coarse grained silty sand, slightly moist w/ feldspar, quartz, iron stains (weathered biotite?), granitic texture
10			31 50/5		5%	10-12' Core Rate 6"/20s	PWR	silty sand very coarse-grained, very prominent fabric slightly moist; biot, qtz, feldspar Auger Refusal @ 10' Began Coring @ 10'-13' 10-13' .1/3 = .03% Rec RQD = 0%
15						Core Rate 6 in/45s 6 in/min 6 in/1 min Water @ 1.62 2/18 9:00 @ 2.17 after bailing		coarse-grained granite, weathered w/ fe stains, very brittle, biot, qtz, fspar, epidote 13-18 %Rec = 66% RQD% 2.77/5 = 55% 3.3/5 18-23 4.71/5 = 94% Rec 4.34/5 = 87% RQD fractures: 2 horizontal & 2 ~ 35° Fe-Mn stains on fractures throughout upper 2' (18-20) Biotite granite, very hard competent
20								overreamed w/ 10" hammer to 23' ~10' hard weathered rock ~15' light gray rock flour drilled to 23 & set 15'
25						Boring terminated @ 23'		

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" ID augers NQ wireline coring
Ingersoll Rand T3W air rotary rig w/ 10" hammer

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

(same borehole as 13B)

Project: MRR of High Point C&D Landfill

Monitoring Well Number: P-13.5 (shallow)

Drilling Subcontractor: Bedford

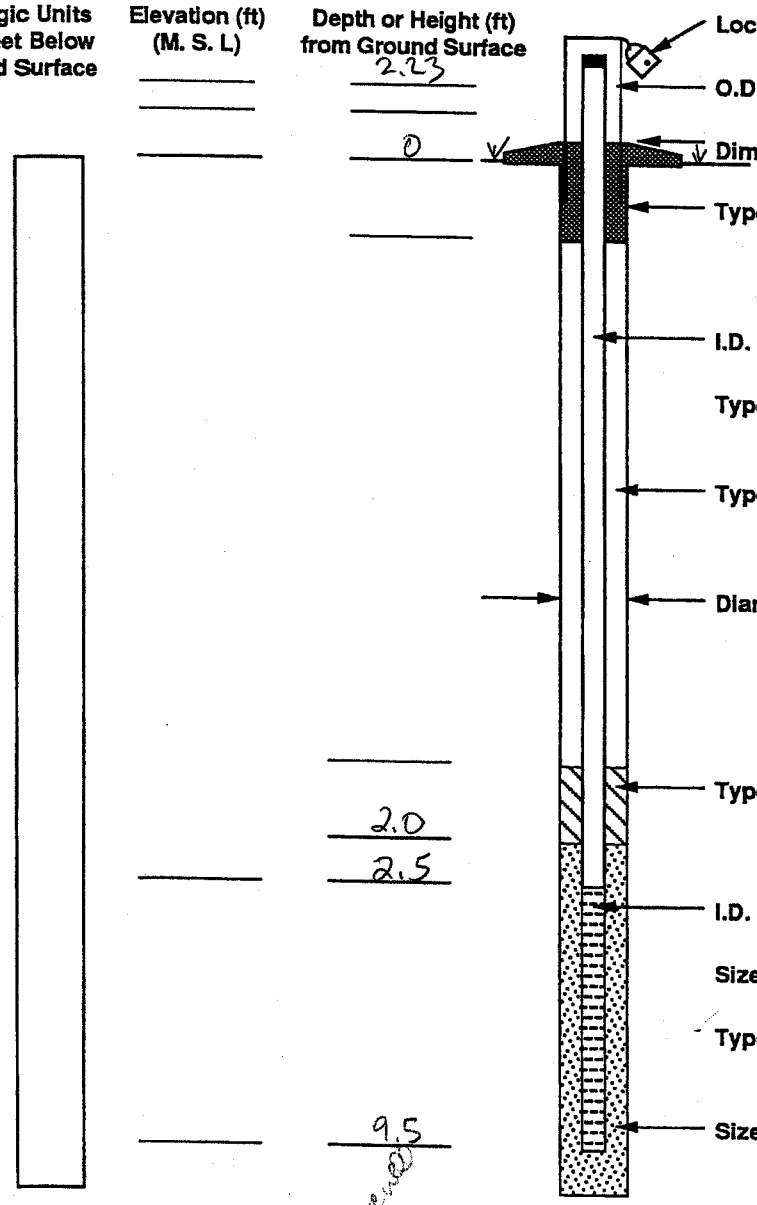
Date of Well Installation: 2-19-02

Driller: M Monaghan **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 12.05

Geologic Units and Feet Below Ground Surface	Elevation (ft) (M. S. L)	Depth or Height (ft) from Ground Surface
		2.23
		0
		2.0
		2.5
		9.5



Locking cap	
O.D. of outer protective casing	none
Dimensions of concrete pad	none
Type of surface seal	bentonite
I.D. of pipe	2"
Type of pipe	Sch 40 PVC
Type of backfill	bentonite
Diameter of borehole	10.25"
Type of seal	3/8" chip bentonite
I.D. of screen	2"
Size of screen opening	10-slot
Type of screen	Sch 40 PVC
Size of filter sand	DSI #1

WATER LEVEL MEASUREMENTS *Diagram not to Scale*

Date	2/19 (before well)	2/20	2/20 (24)	2/21	2/22					
Depth from top of monitoring well pipe	TOD core water 12.5	11.41	2:30 10.12	10:42 9.69	12:56 8.19					
Elevation										

MONITORING WELL INSTALLATION SKETCH

Same borehole as 13A

Project: MRR of High Point C&D Landfill

Monitoring Well Number: P-13D (deep)

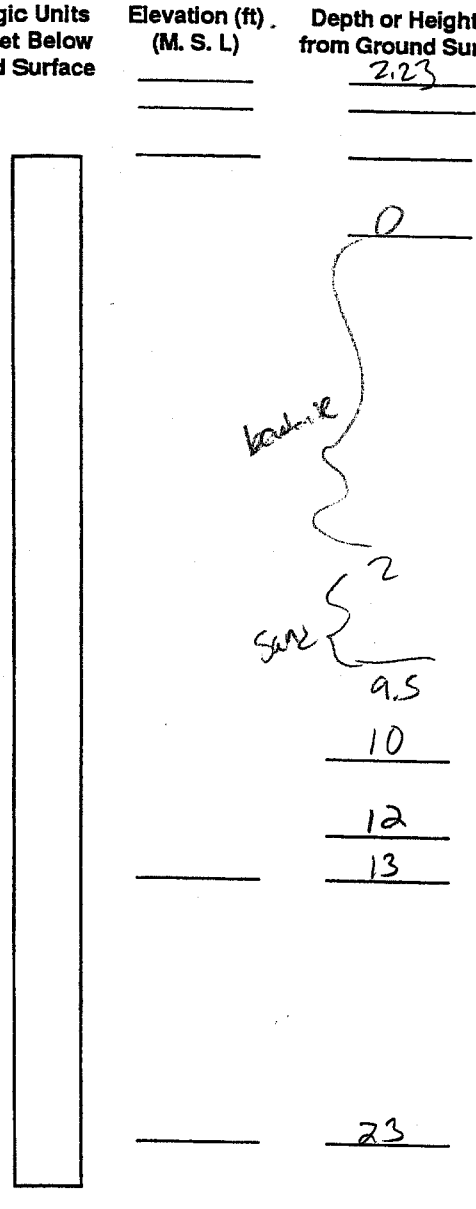
Drilling Subcontractor: Bedford

Date of Well Installation: 2-19-02

Driller: M Monaghan **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 25.42



Locking cap

O.D. of outer protective casing: none

Dimensions of concrete pad: none

Type of surface seal: bentonite

I.D. of pipe: 2"

Type of pipe: sch 40 PVC

Type of backfill: bentonite

Diameter of borehole: 10.25"

#1 sand

Type of seal: 3/8" chip bentonite

I.D. of screen: 2"

Size of screen opening: 10-slot

Type of screen: sch 40 PVC

Size of filter sand: DS 1 # 1

WATER LEVEL MEASUREMENTS 24 10:42 12:57

Diagram not to Scale

Date	TOD	2/20	2/20	2/21	2/22					
Depth from top of monitoring well pipe	22.78	10.46	2:50 10.01	10.13	10.19					
Elevation										

AR-9

BORING LOCATION P-14	DATE START/FINISH 02-14-02/ 2-19-02
GROUND ELEVATION (NGVD) ~782'	DRILLED BY Bedford / K Kendrick M Monaghan
GROUNDWATER EL. BR 761 DATE	LOGGED BY R Kirkman TOTAL DEPTH (FT) 58

PG. 1 OF 2

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			2 2 3		80%	0-2'	SM	0-8" Topsoil Silty sand, fine grained, tan, moist, loose
5			50/5		10%	5-7'	PWR	silty sand, med-coarse grained, tan/white, dry, very dense
10			18 50/4		75%	10-12	MH PWR	lense? 10-11 silt, brown dry w/ PWR chunks inside whose 11-12 silty sand w/ large quartz grains as above dry
			49 50/5		100%	12-14	PWR	Auger Refusal @ 12' as above but coarse grained slightly moist
15								Dry @ 14:07 2/15 Dry @ 9:15 2/18 dry @ 8:58 2/19
20								Hardrock (light gray rock flour @ 20')
25								
30								

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max + BA Rig w 4 1/4" ID Augers
Inger soil Rand T3W air rig w/ 6" hammer

JOYCE ENGINEERING, INC.

BORING LOCATION B-14 | DATE START/FINISH 2-14-02 / 2-19-02

GROUND ELEVATION (NGVD) ~782' | DRILLED BY Bedford / Kendrick & Monaghan

GROUNDWATER EL. RR 761 DATE | LOGGED BY R Kirkman | TOTAL DEPTH (FT) 50

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	40							light gray rock flour dry
	50							Boring Terminated @ 50'

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

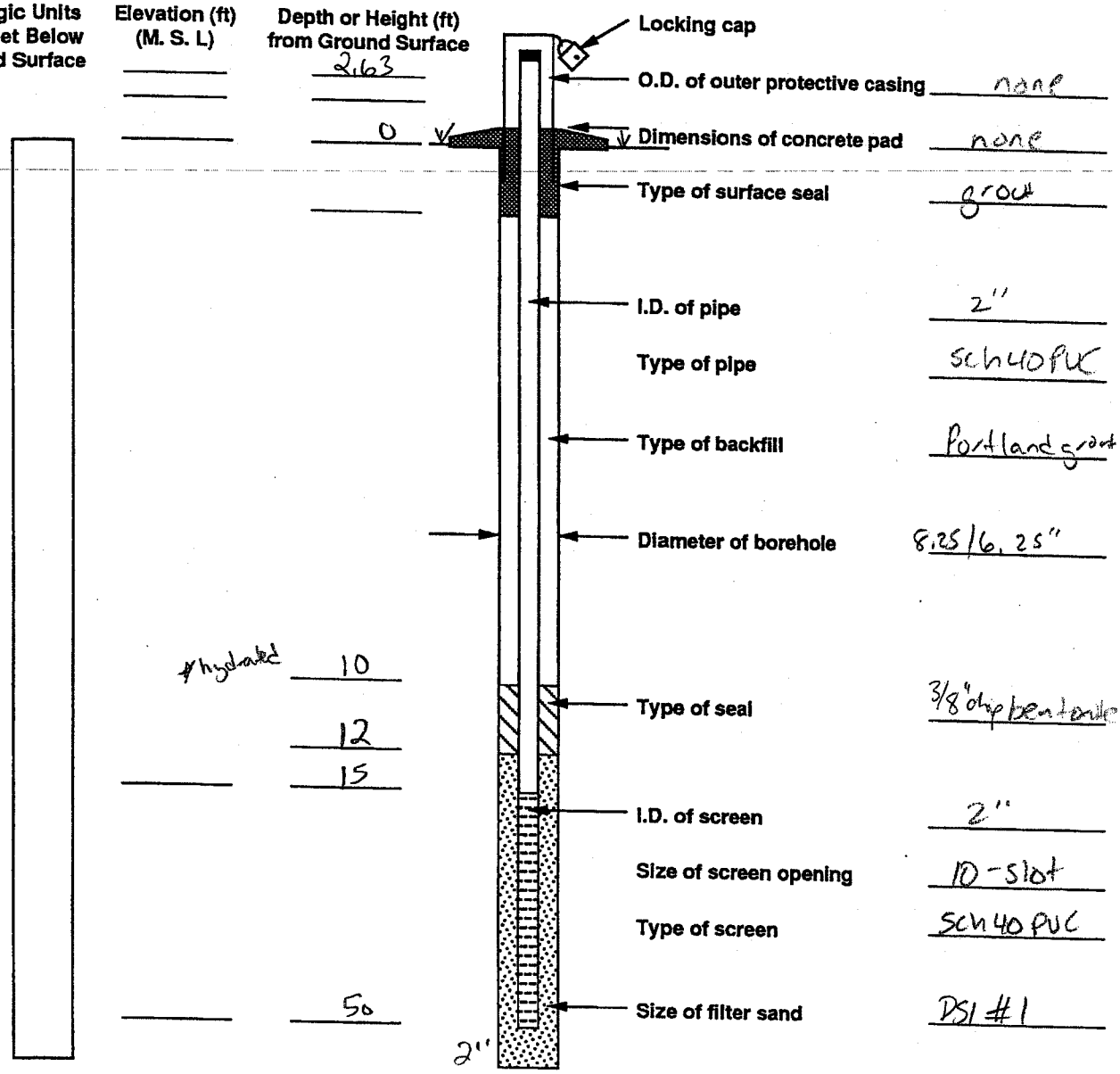
NOTES: Acker Soil max HSA Rig w/ 4 1/4" ID Augers Ingersoll-Rand T3W Carries w/ 6" hammer

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRRot High Point C&D Landfill
Monitoring Well Number: P-14
Drilling Subcontractor: Bedford
Date of Well Installation: 2/19/02
Driller: K. Kendrick / M Managhan **Logged by:** R Kirkman
Date of Well Development:
Depth to Bottom of Well from the Top of Monitoring Well Pipe: 53.03

Geologic Units and Feet Below Ground Surface	Elevation (ft) (M. S. L)	Depth or Height (ft) from Ground Surface
		2.63
		0
		10 (hydrated)
		12
		15
		50



WATER LEVEL MEASUREMENTS 2/19 17:21 24

Diagram not to Scale

Date	TOD	2/20	2/20	2/21	2/22 13:04					
Depth from top of monitoring well pipe	dry	35.67	32.83	28.55	26.28					
Elevation										

MRR at High Point C&D Landfill

BORING LOCATION P-155 | DATE START/FINISH 02-20-02
GROUND ELEVATION (NGVD) ~732' | DRILLED BY Belford/M Monaghan
GROUNDWATER EL. BR~718 DATE | LOGGED BY RKirkman TOTAL DEPTH (FT) 20 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							0-5 silty Sand / Sand, moist
	5					(5) PWR		5-7 pushed Shelby tube w/ ~50% recovery, (tube began to bend)
	10							(AR@7' based on P-15D) Dry, rock flour light brown/grey
	15							
	20							Boring Terminated @ 20'

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▼ GROUNDWATER

NOTES:

Ingersol Rand T3W Air Rotary Rig w/ 6" " hammers

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point - C+D Landfill

Monitoring Well Number: P-155

Drilling Subcontractor: Boland

Date of Well Installation: 2-20-02

Driller: M Monaghan **Logged by:** R Workman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 22.35

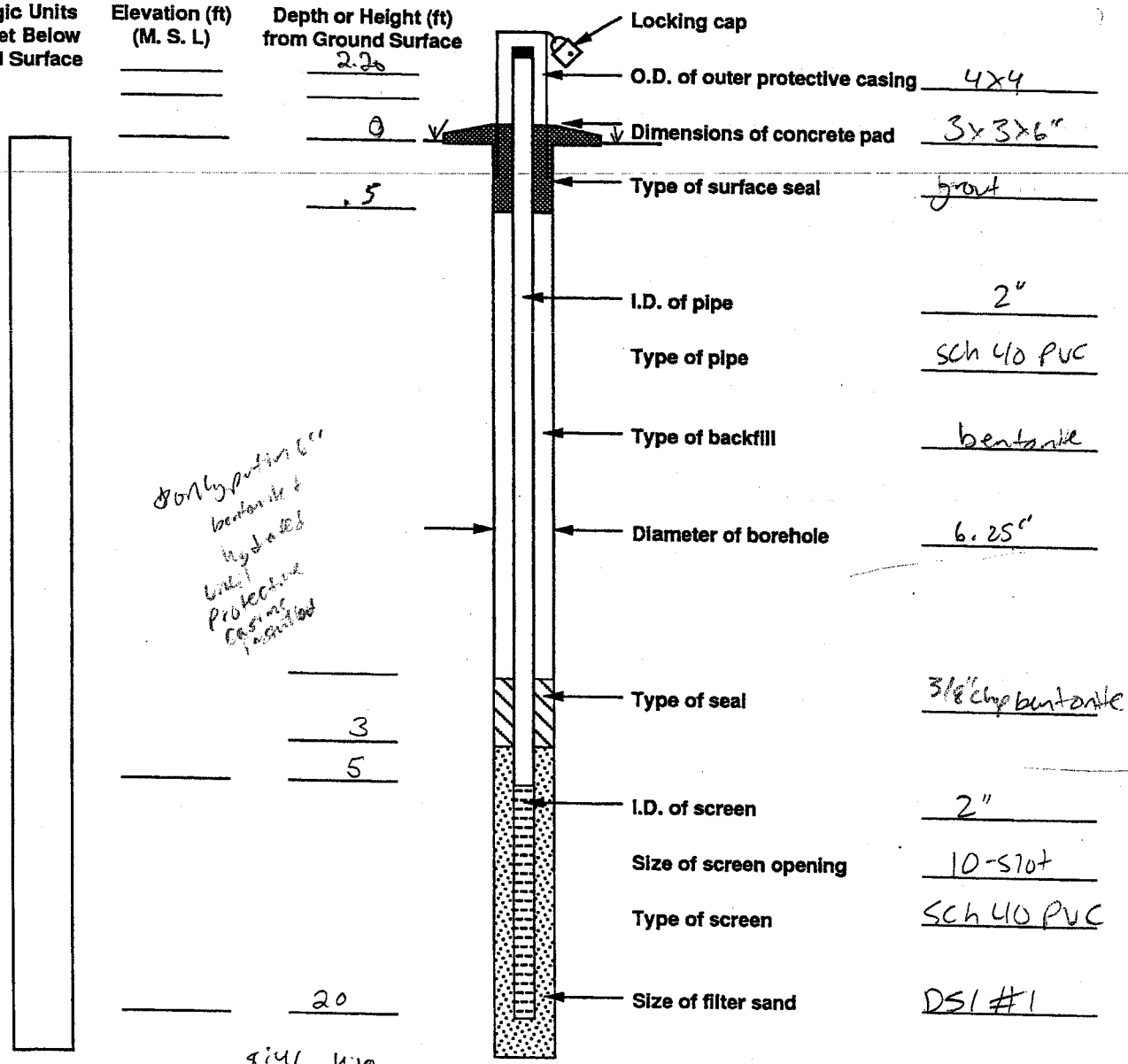


Diagram not to Scale

WATER LEVEL MEASUREMENTS

Date	TOD		4:19	2/21	10:54	2/22				
Depth from top of monitoring well pipe	18.65	6.24	6.25	6.24	6.15					
Elevation										

9:41 2/20 4:19 2/20 24 hrs 2/21

MRR of High Point C&D Landfill

AR-7

BORING LOCATION P-15 D	DATE START/FINISH 02-14-02 / 2/14/02
GROUND ELEVATION (NGVD) ~732'	DRILLED BY Bedford / K. Kendrick
GROUNDWATER EL. 728 DATE 2/15	LOGGED BY R Kirkman TOTAL DEPTH (FT)
BR 718	PG. 1 OF

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0					75%	0-2	SP	0-8" Topsoil well sorted sand tan, slightly moist, soft alluvial?
5			16 15 50/4		90%	5-7 Coring Rates: 6in/1.25 min 1ft/min 6in/45 sec 1ft/min	PWR (SP)	silty sand (PWR), tan & white, soft, moist, slight granitic texture, Auger Refusal @ 7' Began coring @10' Soft spot 1 foot otherwise fairly competent 7-13' % Rec = 2.75/6 2.28/6 = % RQD = 38 % = 46% granite-biot, fspar, qtz med-grained Some quartz-rich veins, kspar? Fractures 25°, 2@30°, Fe stains, some brittle zones 13-17' 1 horizontal Rec = 3.91/4' = 98% RQD = 2.65/4 = 66% WL @ 3.53 14:01 2/15 2/18 9:10 dry (mud collapsed in core hole) proceeded w/ air hammer (6") @ 7' 2/19
10						Core rate: 6in/1.5 min 6in/1.25 min 6in/1.5 min		
15						mud cave in to 3' no water		
20								hard rock @ 20'
25								
30								

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
GROUNDWATER

NOTES:
Acker Soil Max HSA Rig w/ 4 1/4" ID augers
Ingersoll Rand T3W w/ 6" air hammer

JOYCE ENGINEERING, INC.

MRL of High Point C&D Landfill

AL-7

BORING LOCATION P-15D
GROUND ELEVATION (NGVD) ~738'
GROUNDWATER EL. 728 DATE 2/15
DATE START/FINISH 02/14-02/15/2-11/02
DRILLED BY Bedford/K. Hendrick
LOGGED BY R Kirkman TOTAL DEPTH (FT)
PG. | OF

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0		1 1 1		85%	0-2	SP	0-8" Topsoil well sorted sand tan, slightly moist, soft alluvial?
	5		16 15 50/4		90%	5-7 Coring Rates: 6in/1.25 min 1ft/min 6in/45sec 1ft/min	PWR (SP)	silty sand (PWR), tan & white, soft, moist, slight granitic texture, Auger Refusal @ 7' Begin coring @10' Soft spot 1 foot otherwise fairly competent
	10					Core rate: 6in/1.5min 6in/1.25 min 6in/1.5 min mud cavein to 3' no water		7-13' %Rec = 2.75/6 2.28/6 = %RQD = 38% = 46% granite-biot, fspr, qtz some quartz-rich veins, Kspar? med grained Fractures 25°, 2@30°, Fe stains, some brittle zones 13-17' Horizontal Rec = 3.91/4' = 98% RQD = 2.65/4 = 66%
	15							WL@ 3.53 14:01 2/15 2/18 9:10 dry (mud collapsed in core hole) proceeded w/ air hammer (6") @ 7' 2/19
	20							hard rock @ 20'
	25							
	30							

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HS A Rig w/ 4¼" ID augers
Ingersoll-Rand T3W w/ 6" air hammer

JOYCE ENGINEERING, INC.

MRR of High Point, LLC

BORING LOCATION P-15D		DATE START/FINISH 2/14/02	
GROUND ELEVATION (NGVD) ~732'		DRILLED BY Bedford / Kendrick + Monaghan	
GROUNDWATER EL.	DATE	LOGGED BY R Kirkman TOTAL DEPTH (FT)	PG. 2 OF 2

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
40								all dry rock flour 20'-80'
50								
60								
70								
80								

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker soil Max 45+ rig w/ 4¼" ID augers + Ingersoll Rand T3W air rig w/ 10" + 6" hammer

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point C&D Landfill

Monitoring Well Number: P-15 D

Drilling Subcontractor: Bedford

Date of Well Installation: 2-19-02

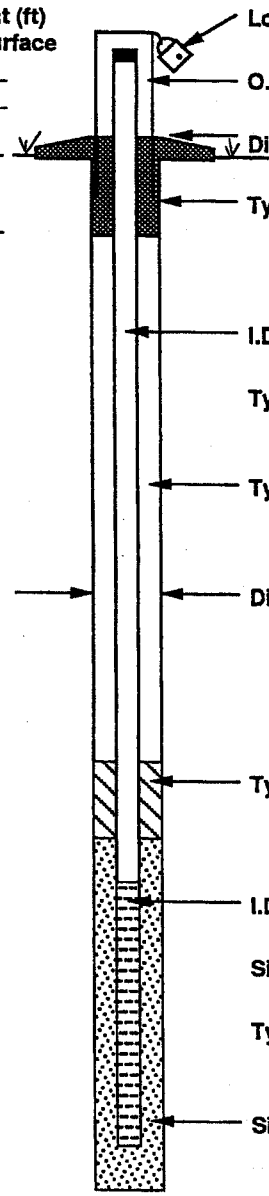
Driller: Kendrick, M Monaghan

Logged by: R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 84.13

Geologic Units and Feet Below Ground Surface	Elevation (ft) (M. S. L)	Depth or Height (ft) from Ground Surface
		2.47
		0
		47
		57
		60
		80



Locking cap	
O.D. of outer protective casing	4x4"
Dimensions of concrete pad	3x3x6"
Type of surface seal	grout
I.D. of pipe	2"
Type of pipe	Sch 40 PVC
Type of backfill	grout
Diameter of borehole	8.25" / 6.25"
Type of seal	3/8" chip bentonite
I.D. of screen	2"
Size of screen opening	10-slot
Type of screen	Sch 40 PVC
Size of filter sand	DSI #1

WATER LEVEL MEASUREMENTS *Diagram not to Scale*

		12hrs	2/20 8:30	2/20 9:26	24	7:29	10:54	13:06		
Date	T&D	2/20	Bailed to		2/20	2/21	2/21	2/22		
Depth from top of monitoring well pipe	dry	(SS) surface water 77.55	TOC 82.28	82.00	81.28	80.07	79.81	78.05		
Elevation		during construction water came in?		10.44 81.82						

MRRDI High Point C&D Landfill

BORING LOCATION B-1 / P-16 | DATE START/FINISH 02-13-01

GROUND ELEVATION (NGVD) ~768 | DRILLED BY Bedford / K. Kendrick

GROUNDWATER EL GW 765 RP ~ 754 DATE | LOGGED BY R Kirkman TOTAL DEPTH (FT) 7 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1/2		100%	0-2'		0-1' Topsoil Tan to Brown Sandy Silt, moist, soft
5			50/2		5/8	5-7'	Fill	Sandy silt brown to tan, moist, hard AR@ 7'
			50/3		1 1/8	7-9'		water @ 5.30' BGS 13:45 =15 water@4.05 8:44 2/18
10								
15								
20								
25								

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA w/ 4¼" ID augers

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR of High Point, LLC

Drilling Subcontractor: Bedford

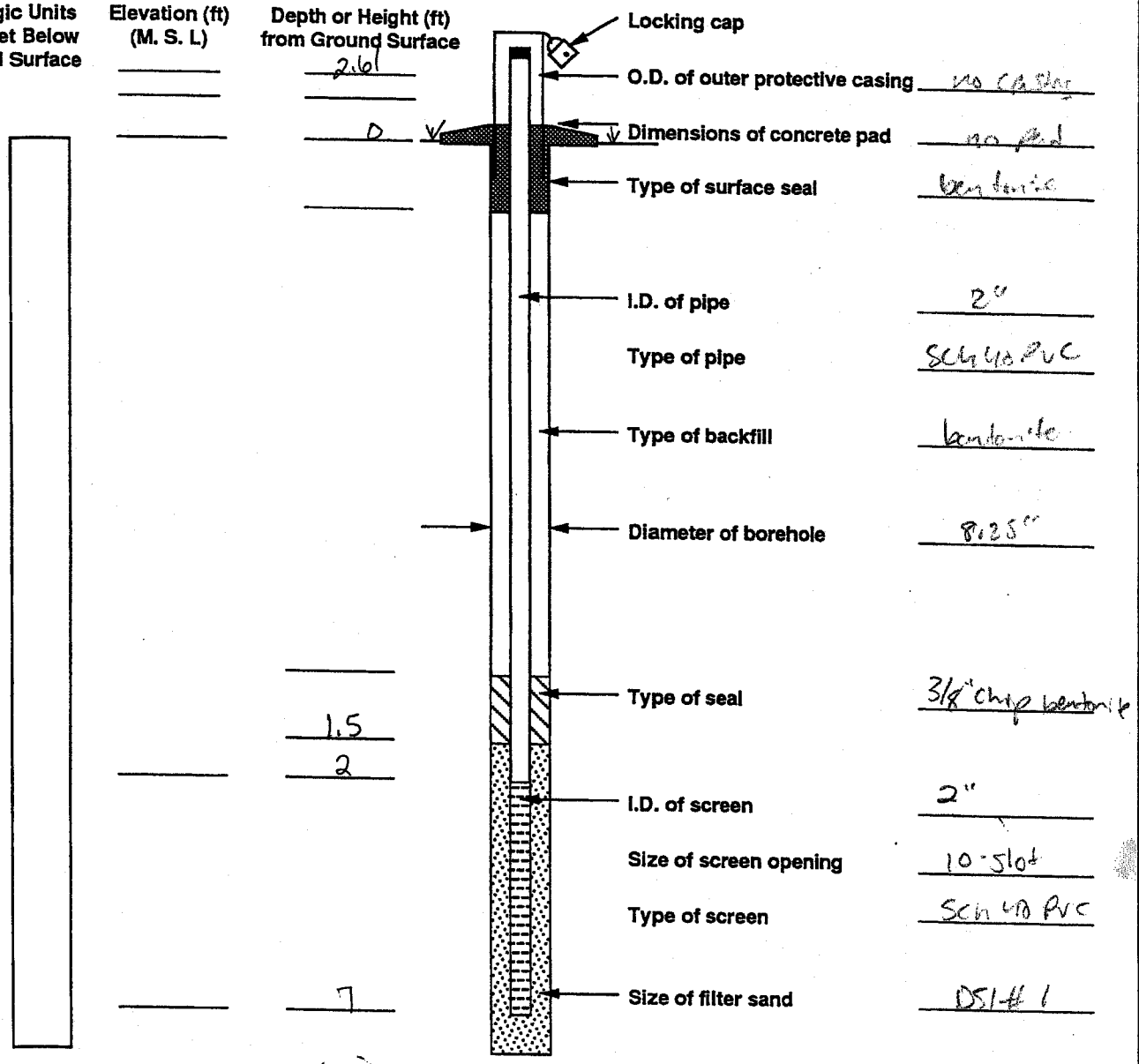
Driller: K. Kendrick **Logged by:** R Kirkman

Monitoring Well Number: P-16 IB-1

Date of Well Installation: 2-18-02

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 9.45



WATER LEVEL MEASUREMENTS 2/13 (24) 2/15 2/18 2/19 2/21 2/22

Diagram not to Scale

Date	TOD	13:45	10:16	8:41	8:50	12:38				
Depth from top of monitoring well pipe	dry	BGS 5.30	TOC 5.20	4.94	5.02	5.07				
Elevation										

MRR of High Point C&D Landfill

BORING LOCATION B-4 / P-17 DATE START/FINISH 02-14-021

GROUND ELEVATION (NGVD) ~784' DRILLED BY Bedford / K. Kendrick

GROUNDWATER EL. BR 766 DATE LOGGED BY R Kirkman TOTAL DEPTH (FT) 9

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 1 3		35%	0-2'	SM	0-6" Fill Silty Sand; brown; soft; moist.
5			33 50/3		75%	5-7'	PWR (SM)	(PWR) Silty Sand, Medium grained, tan & white; moist large biotite, quartz grains w/ faint granitic texture
10			50/3		10%	9-11'	PWR (SM)	Auger Refusal @ 9 ft Silty Sand, Medium grained; tan & white; dry; quartz & biotite crystals w/ faint granitic texture. Dry @ 13:52 2/15 water @ 6.77 2/18
15								
20								
25								

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA now 4¼" ID augers

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR High Point, LCC

Monitoring Well Number: B-4/P-17

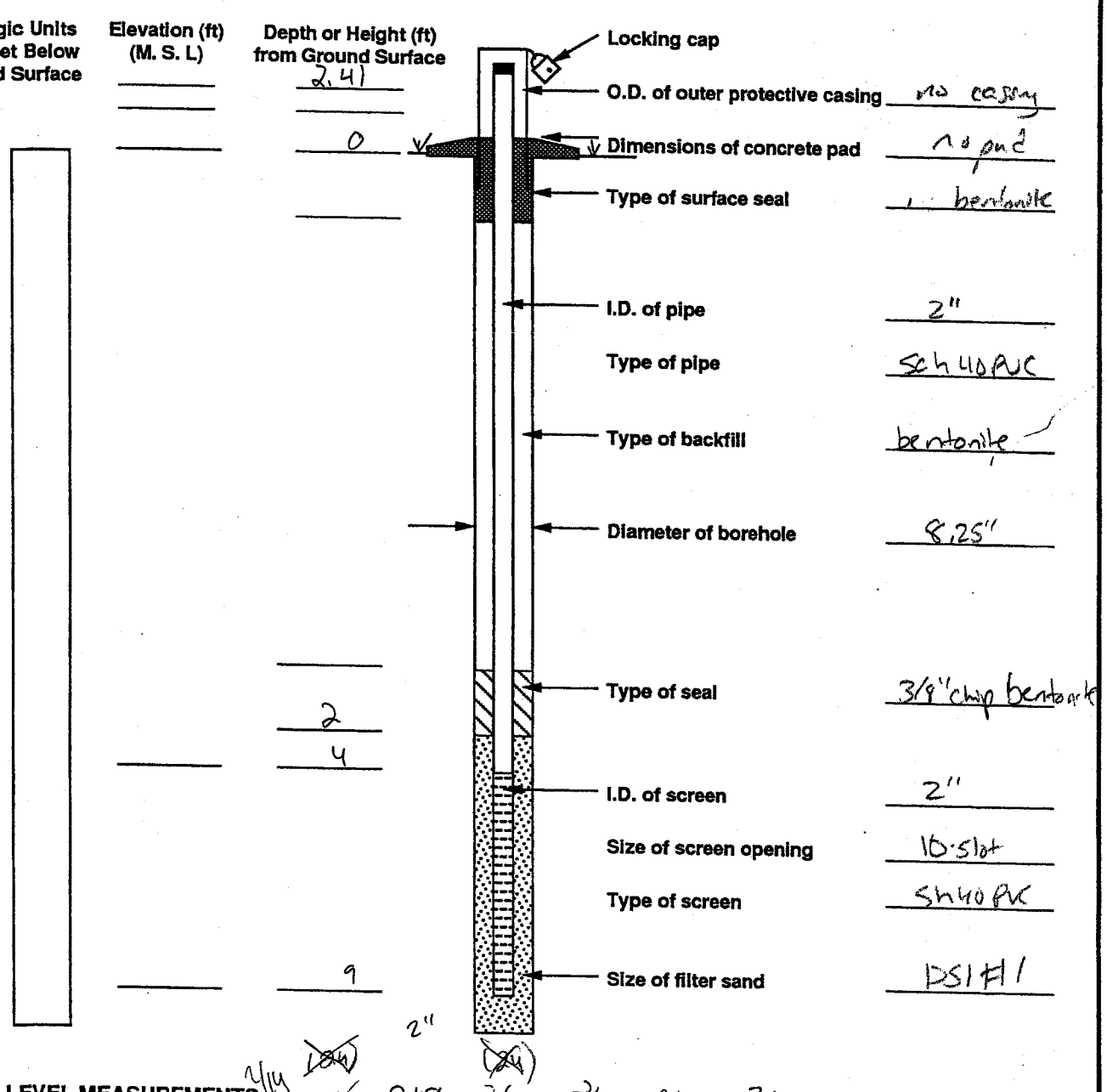
Drilling Subcontractor: Bedford

Date of Well Installation: 2-18-22

Driller: K. Kendrick **Logged by:** R Kirkman

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 12.04



WATER LEVEL MEASUREMENTS 2/14 ~~2/16~~ ✓ 2/18 2/19 2/20 2/21 2/22

Diagram not to Scale

Date	TOD	2/15	10:31	8:56	7:31	10:12	12:15			
Depth from top of monitoring well pipe	Dry	dry	TOD 8.75	7.67	7.29	6.90	6.43			
Elevation										

BORING LOCATION P-18 | DATE START/FINISH 12-04-02/12-17-02

GROUND ELEVATION (NGVD) | DRILLED BY Jt L, Inc.

GROUNDWATER EL. ____ DATE ____ | LOGGED BY D. Reedy | TOTAL DEPTH (FT) 15.5

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
			2 2 4 5		80%	0-2		yellow silty sand, fine to medium grained sand, quartz grains, moist.
								Changes to an orange sandy clay at 4'
	5		14 21 27 25		50%	5-7		Partially weathered rock, white silty sand with abundant iron staining, moist
			50/5		5%	9-11		Rock fragments at end of spoon, granitic rock.
	10							Auger Refusal at 9 ft Advanced with air hammer Gray cuttings, damp, no dust wet cuttings at 10 ft
								Green cuttings at 13.5', damp. possibly diabase.
	15							Granitic, white and gray cuttings at 14.5 ft
								Drilling terminated at 15.5 ft.
	20							

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES: CME 75
2' split spoon
6.25" ID Hollow stem Augers
6" air hammer
external air compressor

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR - High Point

Monitoring Well Number: P-18

Drilling Subcontractor: J + L, Inc.

Date of Well Installation: 12-04-02/12-17-02

Driller: L. Chesbrough Logged by: D. Ready

Date of Well Development: 12-19-02

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 17.00

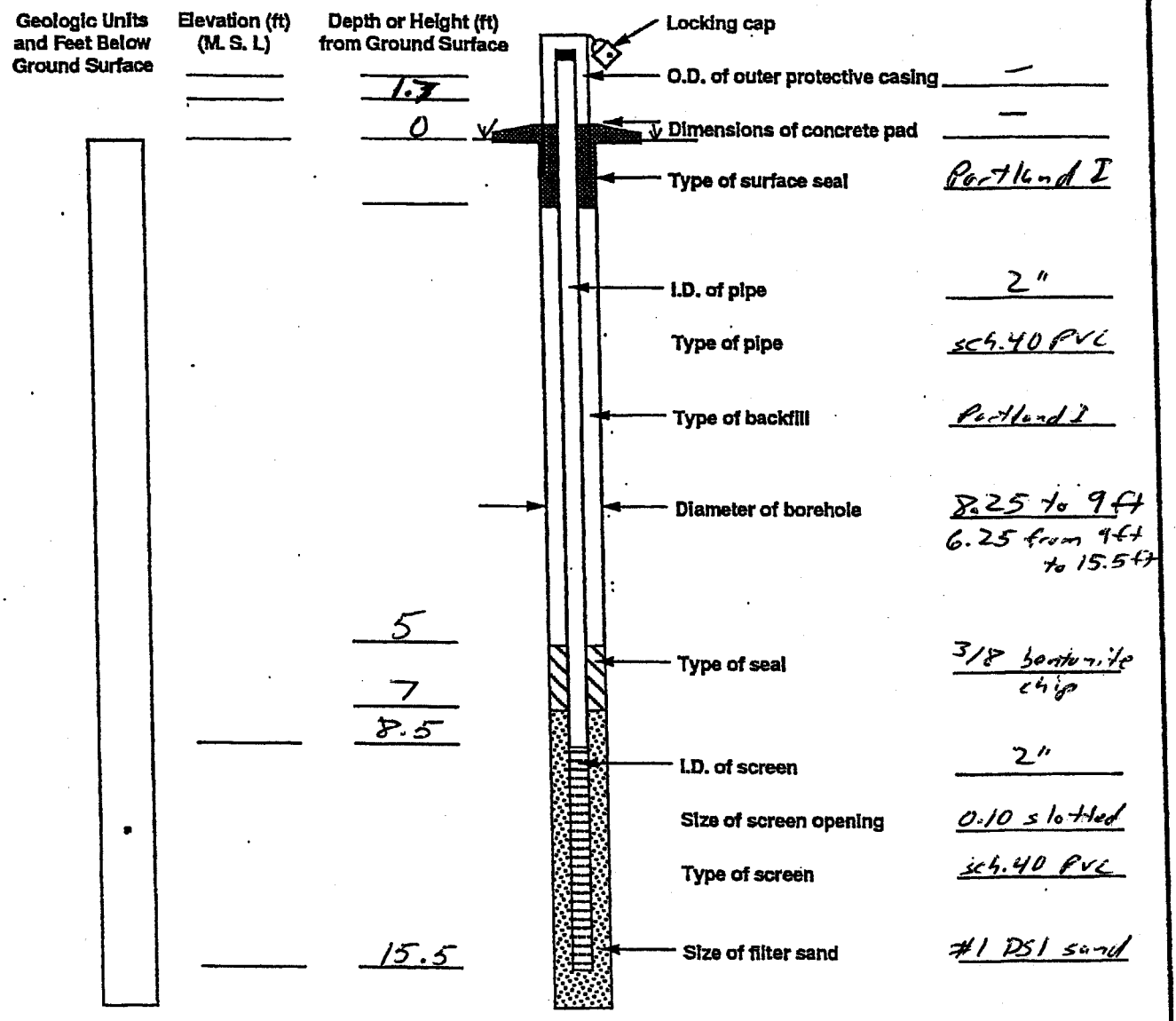


Diagram not to Scale

WATER LEVEL MEASUREMENTS

Date	12-4-02 1457	12-12-02 1034	12-13-02 810	12-16-02 1138	12-17-02 1243	12-18-02				
Depth from top of monitoring well pipe	15.43	5.05	2.65	2.62	2.47	2.40				
Elevation										

BORING LOCATION P-19 | DATE START/FINISH 12-04-02 / 12-17-02

GROUND ELEVATION (NGVD) | DRILLED BY J+L, Inc.

GROUNDWATER EL. ____ DATE ____ | LOGGED BY D. Reedy | TOTAL DEPTH (FT) 15 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
			4 3 2 6		80%	0-2		Tan silty sand changing to a yellow and gray mottled fat clay at 1.5 ft, moist
								Gray and yellow mottled fat clay with some sand at 3ft, moist.
	5		31 50/4 or 100/6		40%	5-7		White partially weathered rock, course grained sand with quartz and feldspar grains with abundant iron staining, dry.
								Terminated tricone drilling at 7ft Drove surface casing down to 7ft to start Coring. Very Hard at 7ft
	10					10'-11'/10 min		Core run from 7ft to 15 ft. Core Length = 8 ft Core Recovery = 8 ft REC% = 100% RQD% = 100% Weathered surface on top of core. Granite/Diabase contact from top of core to 7.4 ft Mechanical break at 7.5' Diabase/Granite contact at 8' to 11.5' Granite/Diabase Contact at 15' Mechanical breaks near end of run. Coring Terminated at 15'
	15							* The drilling procedure consisted of driving surface casing and drilling inside surface casing with tricone bit. Once surface casing was in competent rock, coring took place inside surface casing.
	20							Abandoned on 12-17-02 with Portland grout.

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES: CME 75
2' split spoons
4" Surface casing
3" tricone bit
NQ 3" Core Barrell
External air compressor

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Abandoned

Project: MRR-High Point

Monitoring Well Number: P-19

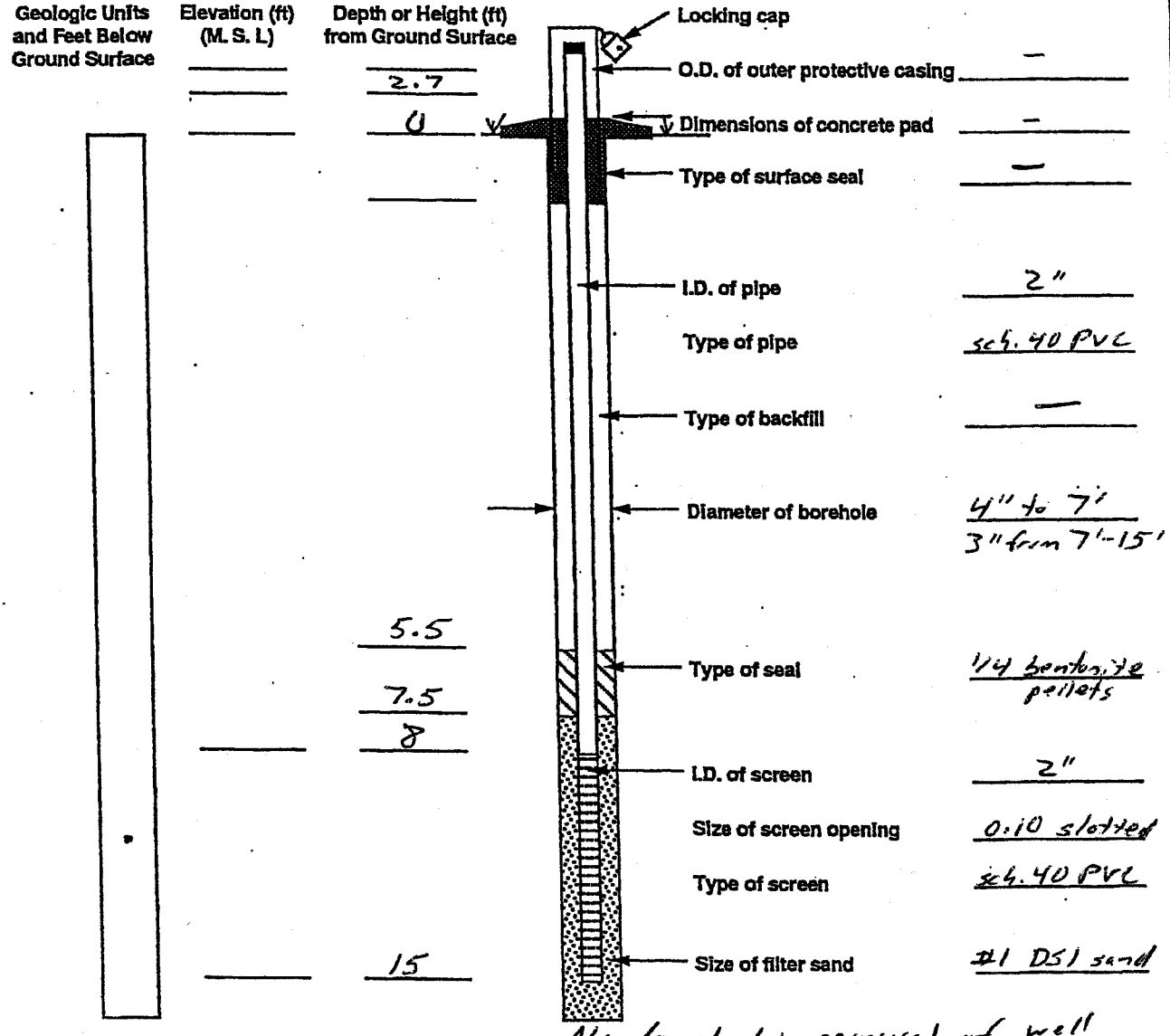
Drilling Subcontractor: J+L, Inc.

Date of Well Installation: 12-04-02

Driller: L. Charbonneau Logged by: D. Roedy

Date of Well Development:

Depth to Bottom of Well from the Top of Monitoring Well Pipe:



Abandoned by removal of well materials and grouted to surface with Portland I.

Diagram not to Scale

WATER LEVEL MEASUREMENTS

Date	12-4-02 1258	12-12-02 1042								
Depth from top of monitoring well pipe	6.07	9.43								
Elevation										

BORING LOCATION P-19B
GROUND ELEVATION (NGVD) _____
GROUNDWATER EL. _____ DATE _____

DATE START/FINISH 12-12-02/12-17-02
DRILLED BY J+L
LOGGED BY D. Reedy TOTAL DEPTH (FT) 15.5

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
								Orange sandy clay, moist
								Rock fragments at 4'
								~~Terminated auger~~ Refusal auger drilling at 6'
	5							changes to light tan partially weathered rock at 5', dry. silty sand
								Becomes lighter at 6ft.
								Rock at 6.5', light gray granitic cuttings, dry quartz, orthoclase, and biotite mica in cuttings, dust to gravel size pieces indicating still soft.
	10							~~Large~~ water bearing fracture at 13.5'
	15							Possible fracture at 15'
								Terminated drilling at 15.5'
	20							

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES: CME 75
6.25" ID Hollow Stem Augers
6" air hammer

ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MKR High Point

Monitoring Well Number: P-19B

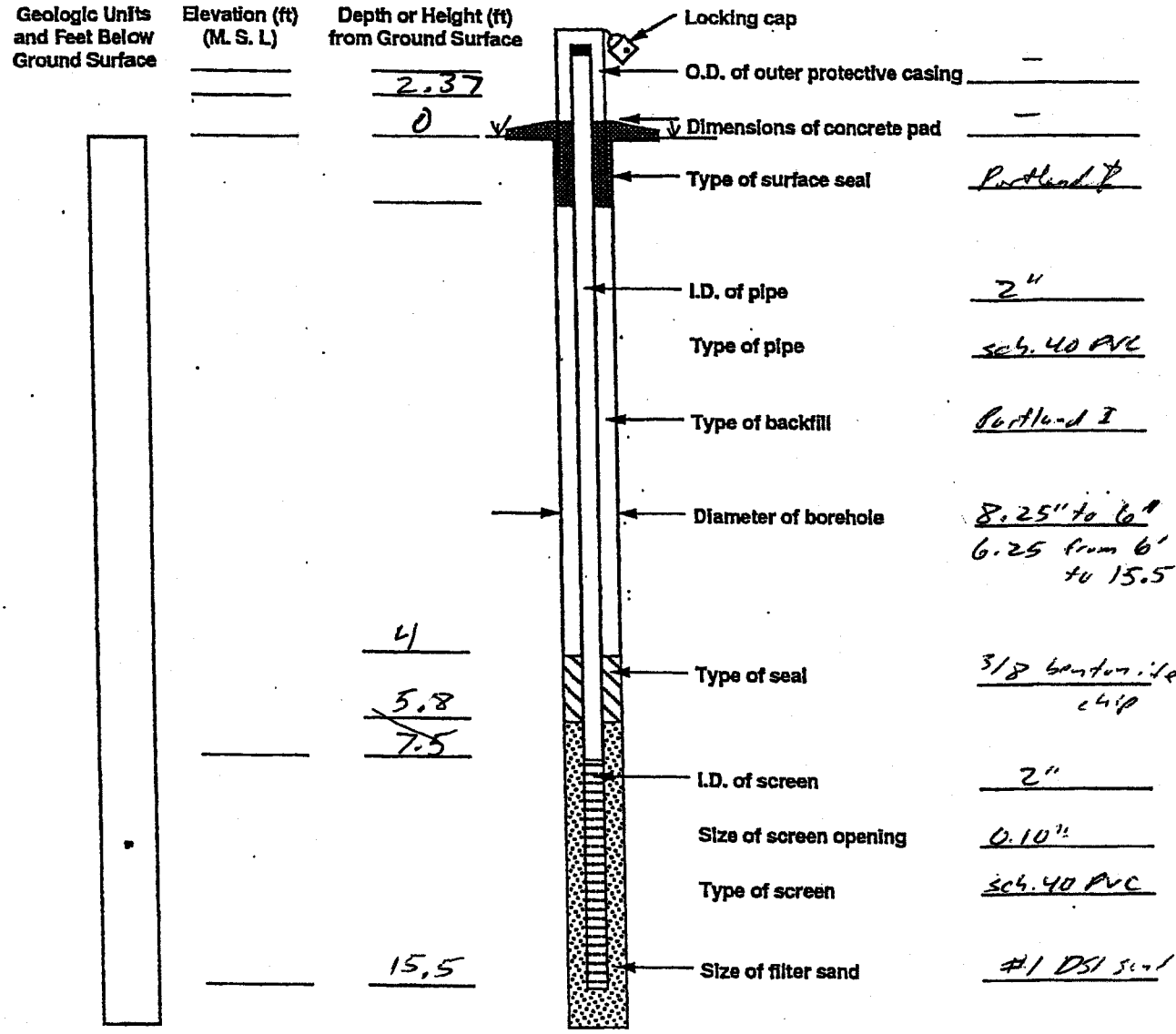
Drilling Subcontractor: J+L

Date of Well Installation: 12-12-02/12-17-02

Driller: C. Cheatham Logged by: D. Reedy

Date of Well Development: 12-19-02

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 17.5



WATER LEVEL MEASUREMENTS

Diagram not to Scale

Date	12-12-02 1300	12-13-02 813	12-16-02 1134	12-17-02 1248	12-18-02					
Depth from top of monitoring well pipe	11.91	9.16	8.54 ~~11.34~~	8.62	8.85					
Elevation										

BORING LOCATION P-20M | DATE START/FINISH 12-12-02/12-17-02

GROUND ELEVATION (NGVD) _____ | DRILLED BY J+L

GROUNDWATER EL. _____ DATE _____ | LOGGED BY D. Reedy | TOTAL DEPTH (FT) 25.5 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
			3 4 4 13		1000	0-2		Topsoil ~ 6" changes to a saturated sandy clay ~~silty sand~~ tan in color.
	5		50/1		10	5-7	10	orange/tan silty sand at 3.5' slightly moist. changes to tan color at 4.5' tan silty sand, slightly moist @ 6 feet, becomes light tan fine grained sand with some silt PWR material, slightly moist, small pebbles mixed in.
	10							Auger refusal at 9' Hammer fires at 9.5' Iron stained granitic cuttings, pebble sized, dry.
	15							
	20							Fracture at 19.5 ft., dry continues with iron stained granitic cuttings. Possible fracture at 21 ft. Possible Fracture at 23.5 ft.
	25							Terminated drilling at 25.5'
	30							

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES: GME 75
6.25 ID HSA
6" downhole hammer

JOYCE ENGINEERING, INC.

1217-02

BORING LOCATION P-20 Core
GROUND ELEVATION (NGVD)
GROUNDWATER EL. DATE
DATE START/FINISH 12-16-02 ~~12-17-02~~
DRILLED BY J+L, Inc.
LOGGED BY D. Reedy TOTAL DEPTH (FT) 19

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
			77/2.5'			0-2.5 ft		Hammered surface casing in 2.5 ft By 2.5 feet, pwr appearance. Advanced with tricone bit, to 9 ft. Continued hammering in surface casing to 8'
	5		46/2'			2.5-4.5 ft.		Cleaned out surface casing with tricone bit. to 10 ft. Drove surface casing to 9'
			42/3.5'			4.5-8 ft		Started coring at 10' @ 12:35
	10		108/1			8-9 ft		
						4min 10sec/1ft.		10-11 feet.
						6min 50sec/1ft		11-12 feet
						3min 20sec/1ft.		12-13 feet. 500 lbs of downfeed, upped RPMs.
						2min 10sec/1ft.		13-14 feet.
	15					3min 30sec/1ft		14-15ft.
				15-16'		3min 30sec/1ft		Core Run = 5'
				16-17'		4min 140sec/1ft		Core length = 45.25"
				17-18'		4min 140sec/1ft		Rec % = 75.4%
				18-19		6min 1ft.		RQD % = 69.2% 41.50
	20							weathered granite abundant iron staining natural break at 10.5' natural break at 12.1 ft. part of fracture to 13.75'
						3		Core run = 48" Core length = 47"
	25							Rec % = 97.9% RQD % = 95.8% weathered granite with iron staining Natural breaks at 12 ft and 16' Terminated coring at 19'. Abandoned with Portland 1 grout on 12-17-02

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES: CME 75
4" surface casing hammered down with cathead + hammer.
NQ 3" Core Barrel 3" tricone bit.

JOYCE ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR High Point

Monitoring Well Number: P-20

Drilling Subcontractor: J+L, Inc.

Date of Well Installation: 12-12-02/12-16-02

Driller: D. Reedy Logged by: C. Charbonneau

Date of Well Development: 12-19-02

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 29.3

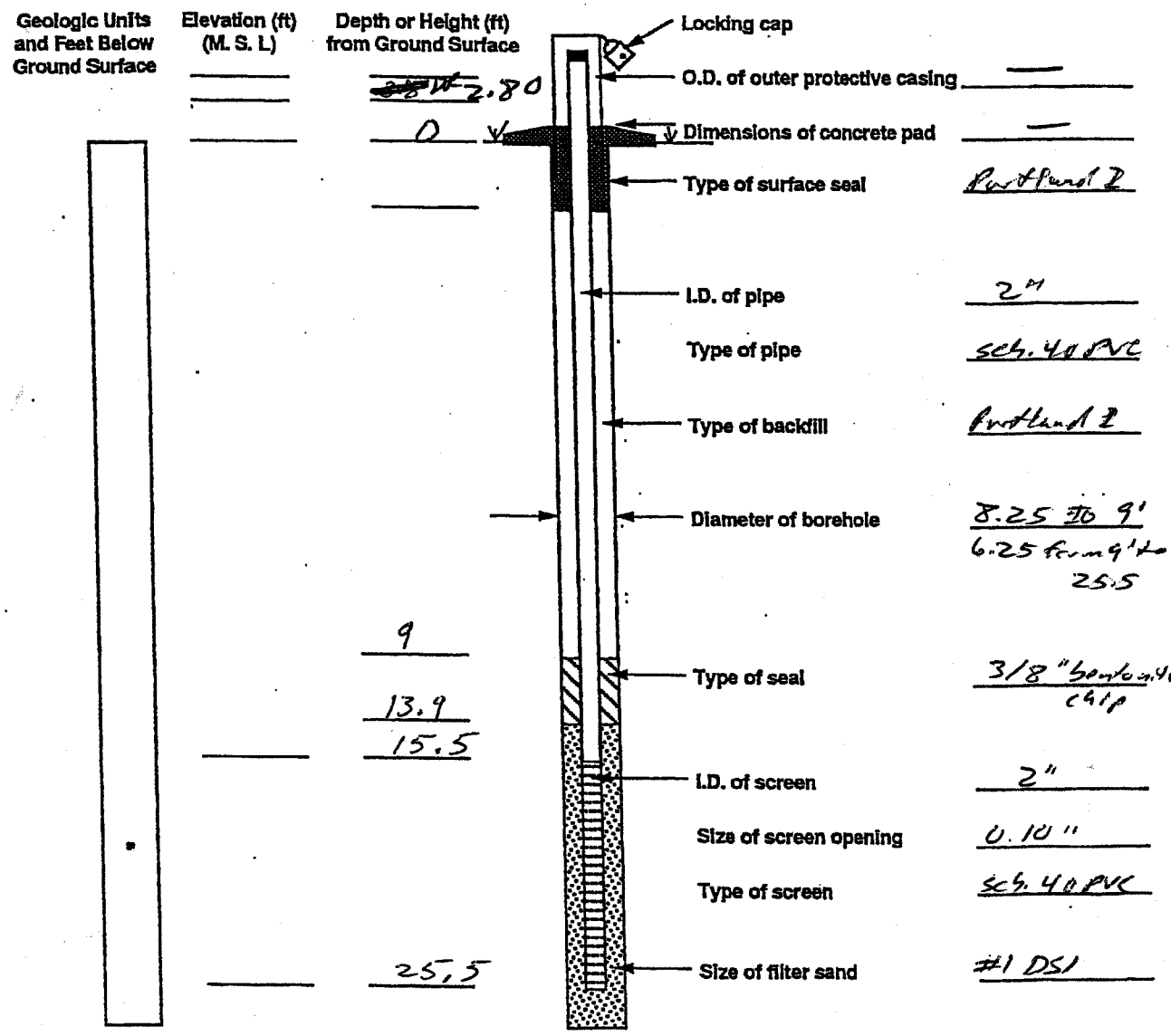


Diagram not to Scale

WATER LEVEL MEASUREMENTS

Date	12-12-02	12-13-02 820	12-16-02 1005	12-17-02 1301	12-18-02					
Depth from top of monitoring well pipe	dry	18.3 (66) 21.1 (TOC)	24.57	21.40	20.94					
Elevation										

BORING LOCATION P-21 | DATE START/FINISH 12-16-02/12-17-02

GROUND ELEVATION (NGVD) | DRILLED BY J+L

GROUNDWATER EL. | DATE | LOGGED BY D. Reedy | TOTAL DEPTH (FT) 15.5

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
			1			0-2		thick organic debris and topsoil
			1				100	sandy clay;
			1					tan saturated ~~clayey~~ at 2'
			1					clayey silt dry ~~sandy clay~~ at 4'
	5		29			5-7	50%	slightly moist mottled silty sandy with iron stains; pwr appearance (transition.
			50/4					
								Augers tight at 9'; Auger drilling terminated, ~~Auger Refusal at 9'~~ previously not Auger refusal.
	10		50/3.5				90%	orange tan white mottled silty sand moist, changes to coarse grained pwr with quartz and weathered mica.
						continue with air hammer		DF orange cuttings at 10 ft,
								Hammer fires and 11 ft, tannish/gray cuttings; dry.
	15							Hammer fires against 13', still rather soft,
								Drilling Terminated at 15.5 ft.
	20							

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES: CME 75
6.25 ID HSA
6" downhole hammer

ENGINEERING, INC.

MONITORING WELL INSTALLATION SKETCH

Project: MRR High Point

Monitoring Well Number: P-21

Drilling Subcontractor: J+L

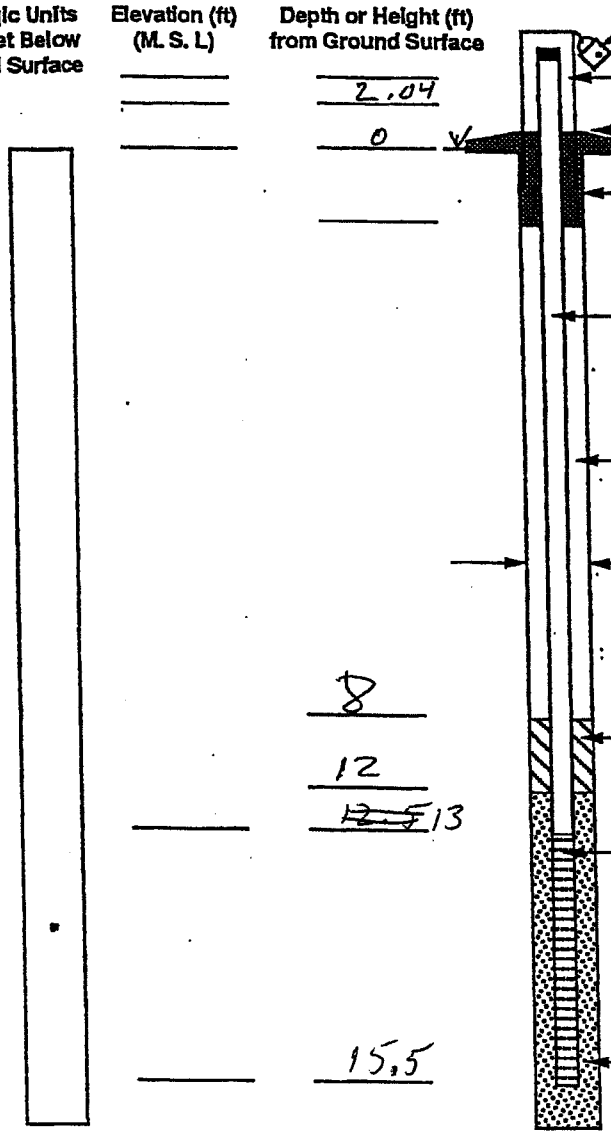
Date of Well Installation: 12-16/17+02

Driller: L. Charbonneau Logged by: D. Reedy

Date of Well Development: 12-19-02

Depth to Bottom of Well from the Top of Monitoring Well Pipe: 17.5

Geologic Units and Feet Below Ground Surface	Elevation (ft) (M. S. L)	Depth or Height (ft) from Ground Surface
		2.04
		0
		8
		12
		~~12.5~~ 13
		15.5



Locking cap	
O.D. of outer protective casing	—
Dimensions of concrete pad	—
Type of surface seal	Portland I
I.D. of pipe	2"
Type of pipe	sch. 40 PVC
Type of backfill	Portland I
Diameter of borehole	8.25" to 9 ft 6.25" from 9 ft to 15.5
Type of seal	3/8" bentonite chips
I.D. of screen	2"
Size of screen opening	0.10 inch
Type of screen	sch. 40 PVC
Size of filter sand	#1 DS1

WATER LEVEL MEASUREMENTS

Diagram not to Scale

Date	12-17-02 808	12-17-02 850	6-18-02							
Depth from top of monitoring well pipe	4.90 (GS) 6.94 (TOC)	6.71	8.40							
Elevation										

MRR of High Point C&D Landfill

BORING LOCATION B-2 | DATE START/FINISH 02-15-02 / 2-15-02
GROUND ELEVATION (NGVD) ~ 790' | DRILLED BY Bedford / E. Kendrick
GROUNDWATER EL. Est. 769 DATE | LOGGED BY R Kirkman TOTAL DEPTH (FT) 12
PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			4 5 5		7.5"	0-2'	SC	0-1' Topsoil Clayey sand tan moist med-grained, soft
5			37 49 50/3		10"	5-7'	Pwr	Strong granitic texture, qtz, f spar, blot silty sand, tan, white, orange, dry, hard
10			50/5		5"	10-12 Drilling rate min/min	Pwr	Dry coarse-grained saprolite
			50/2		5"			Auger Refusal @ 12' moist spoon sample near water? Dry @ 14:17 2/15 @ 8:32 2/18
15								Abandoned 2/18 w/ 9'' bentonite + 3' cuttings
20								
25								

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" ID augers

JOYCE ENGINEERING, INC.

MRR of High Point - Cd D Landfill

BORING LOCATION B-3 DATE START/FINISH 02-14-02/

GROUND ELEVATION (NGVD) ~752 DRILLED BY Bedford/K Kendrick

GROUNDWATER EL. BR 738 DATE LOGGED BY R Kirkman TOTAL DEPTH (FT)

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0		2 2 1		7	0-2		0-2 Topsoil/Fill
							SM	
	5		50/5		5	S-7	PWR	Silty sand w/ strong granitic fabric red-coarse grained slightly moist
								Auger Refusal @ 6'
								Dry @ 13:57 2/15 & @ 9:07 2/18
	10							Abandoned w/ 3.7' bentonite cuttings 2/18 10:46 2.3' cuttings
	15							
	20							
	25							

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" ID augers

JOYCE ENGINEERING, INC.

MRR of High Point C&D Landfill

BORING LOCATION B-5 | DATE START/FINISH 02-13-02 / 2-13-02
GROUND ELEVATION (NGVD) ~808' | DRILLED BY Bedford/K. Kendrick
GROUNDWATER EL. ~789 DATE | LOGGED BY R. Kirkman | TOTAL DEPTH (FT) 10 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0			1 2 3		75%	0-2'	SM	0-6" Topsoil & silty sand moist tan w/ some organics
			14 26 39		50%	5-7'	SM	silty sand tan to white to orange, slightly moist hard/stiff, faint granitic texture
5						drilling rate ~4"/min	PWR	~7' PWR? fine dry orange powder w/ small rock fragments
			5/4		10%	10-12'		
10								Auger refusal at 10'
								Dry @ 14:13 2/15
								& @ 9:22 2/18 some cave in.
15								Abandoned w/ 7' bentonite & 3' cuttings on 2/18/02 10:54
20								
25								

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Acker Soil Max HSA rig w/ 4 1/4" ID augers

JOYCE ENGINEERING, INC.

MRR - High Point LLC

BORING LOCATION HA-1 DATE START/FINISH 9-22-02

GROUND ELEVATION (NGVD) _____ DRILLED BY Kirkman & Deem

GROUNDWATER EL. _____ DATE _____ LOGGED BY R Kirkman TOTAL DEPTH (FT) 4.5

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							topsoil - moist
	1							
	2							silty sand orange moist
								2.5' water - gray silty sand
	3							
	4							
								Hand auger refusal @ 4.5'
	5							
	6							Well constructed w/ 2" Sch 40 PVC 2.5' screen, sand to 3.5' + Bentonite to surface (pellets)
	7							Stickup = 2.35'
	8							DTW = 4.52

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Hand Auger w/ 2.5" ID auger

JOYCE ENGINEERING, INC.

MRL of High Point, LLC

BORING LOCATION HA-2 | DATE START/FINISH 2/22/02
GROUND ELEVATION (NGVD) — | DRILLED BY Deem
GROUNDWATER EL. — DATE — | LOGGED BY R Workmen | TOTAL DEPTH (FT) 5.8 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							Silty sand very moist tan med grained
	0.5							
	1							color change to gray ~1.5
								Sandy silt
	2							
								water ~3'
	3							
	4							Flowing sands prevented further augering
	5							well constructed w/ 2" PVC sch 40
								TD @ 5.8' 2.5' screen sand to 3' Bentonite pellets to surface
								Stickup = 1.7'
								DTW = 7.45'

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Hand Aug. w/ 2.5" ID auger

JOYCE ENGINEERING, INC

BORING LOCATION T-1A | DATE START/FINISH 3/27/02
GROUND ELEVATION (NGVD) | DRILLED BY K Sizemore
GROUNDWATER EL. ____ DATE ____ | LOGGED BY R Kirkman | TOTAL DEPTH (FT) 12 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0					Topsoil		0-8" Topsoil
						SM		→3.5' Orange, moist sandy clay / sandy silt
								3.0' Faint granitic texture noted
						PWR@4'		4' Hard layer encountered
	5							6' Large weathered rock fragments (up to 1' long) strong granitic texture / slightly moist
								9' Some light gray clay, moist mixed now PWR
	10							10' very hard large (2-3' PWR fragments) brittle granite w/ qtz & fe stains
								11' very hard large (3' PWR fragments) slightly moist
	15							12' could not proceed further 9:30 dry

Location from A-4A 45' N 38° E

7:28 3/28 - no water
dry @ 3/29 7:31
dry @ 3/29 14:22

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLER
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

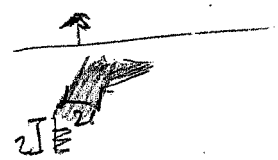
NOTES:
Kobelco Trak Excavator
Mark IV SK 130 LC

JOYCE ENGINEERING, INC.

BORING LOCATION T-1B		DATE START/FINISH 3/28/02	
GROUND ELEVATION (NGVD)		DRILLED BY K Simmons	
GROUNDWATER EL.	DATE	LOGGED BY R Kirkman	TOTAL DEPTH (FT) 12.5

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							0-1 Topsoil
	1					SM		silty sand tan/orange moist, med grained
	2							~2' metavolcanic dike (weathered) dark green silty subhorizontal ~1' thick + 1 near vertical ~2' thick intersecting it twice
	3							
	4							~5' Granitic fabric, Pure fragments in silty sand, moist
	5					water seeping in from 3-4' BGS		
	6							
	7							
	8							8.5 - larger rock fragments, coarse grained w/ qtz, biot, fspar
	9							
	10							~10' much harder
	11							
	12							



1.38' of water 7:32 3/29
1.54' of water 14:23 3/29
TD = 12.5
water @ 11.5' coming into hole during excavation
1" water at 15:50

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:

Same as 1A

JOYCE ENGINEERING, INC.

BORING LOCATION T-1C		DATE START/FINISH 3/28/02	
GROUND ELEVATION (NGVD)		DRILLED BY K Sizemore	
GROUNDWATER EL.	DATE	LOGGED BY P Kirkman TOTAL DEPTH (FT) 8	PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							0-1 Topsoil
								silty sand/clayey sand — orange, grey, orange layers ~1cm
								wet ~1.5-2'
	2							
								silty sand moist, orange/tan, med grained
	4							
	6							
	8							
	10							2 metavolcanic dikes near vertical ~2' wide
								dry @ 16:26 TD = 8'
								+ @ 7:32 3/29
								+ 14:22 3/29

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:

Same as T-1

JOYCE ENGINEERING, INC.

Lufs
9/19
733
4996
ex

BORING LOCATION T-2 DATE START/FINISH 3/27/02
GROUND ELEVATION (NGVD) DRILLED BY K Sizemore
GROUNDWATER EL. DATE LOGGED BY R Kirkman TOTAL DEPTH (FT) 9.5 PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							0-1' Topsoil
						SM		silty sand, tan, slightly moist
						CL		4-5 light gray sandy clay moist
	5					SC		5' clayey sand light gray to light orange slightly moist
						PWR		7' very hard PWR encountered small fragments of weathered granite w/ Fe staining no biot - very weathered clayey sand tan/light gray/lt orange Strong granitic fabric
	16							could not proceed past 9.5' 10:20 dry
	15							N46°W +45' from B-5
								7:37 0.3' of wate
								0.95' water 13:47 3/29

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
(same equipment as T-1)

JOYCE ENGINEERING, INC.

BORING LOCATION T-5 | DATE START/FINISH 3/28/02

GROUND ELEVATION (NGVD) _____ | DRILLED BY IC Sizemore

GROUNDWATER EL. _____ DATE _____ | LOGGED BY R Ickman | TOTAL DEPTH (FT) 10.5 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0	0							0-1' Topsoil
						SC		Light gray/orange clayey sand, moist weathered feldspars? slight texture (granitic)
						SM		~5' silty sand w/ clayey sand tan/orange faint granitic texture, slightly moist
	5							7.5' a little harder
						PWR		8' stronger fabric (rest as above) & harder weathered biotite noted
								9' much harder large (up to 1') fragments of PWR in silty sand, slightly moist
	10							9.5 Hard fspar light gray clay/silt (thin <1') then back into hard weathered granite (larger rock frags >1')
								Could not proceed past 10.5'
	15							
								up road from P-10 215' near intersection dry @ time of excavation 8:50
	20							
								0.15' of water 7:41 3/29
								water seepins in from ~5.5'
	25							0.2' of water 13:25 3/29
								water seeping from ~2.5'

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:

Same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-4 | DATE START/FINISH 3/28/02
GROUND ELEVATION (NGVD) | DRILLED BY KS-remore
GROUNDWATER EL. | DATE | LOGGED BY RK/Kenan | TOTAL DEPTH (FT) 6.5

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							0-8" Topsoil
						SC/SM		Tan/orange/light gray clayey sand to silty sand w/ small (~1cm layers of weathered brittle Fe-rich/orange & feldspar-rich clay/gray layers moist
	1							
						PWR @3.5'		3.5' PWR harder silty sand w/ up to 6" fragments of weathered granite w/ Fe stains, biot, qtz & fspar, slightly moist
	2							
	3							~4' much harder
	4							~5' softer layer w/ Fe/clay layers 5.5' back into harder PWR
	5							
	6							could not proceed past 6.5' 9:44 dry
	7							
	8							near P-16
	9							
	10							
								~1cm Fe layer Clay layer 0.57' of water 7:44 3/29
								0.56' of water 13:24 3/29

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
GROUNDWATER

NOTES:

Same as T-1

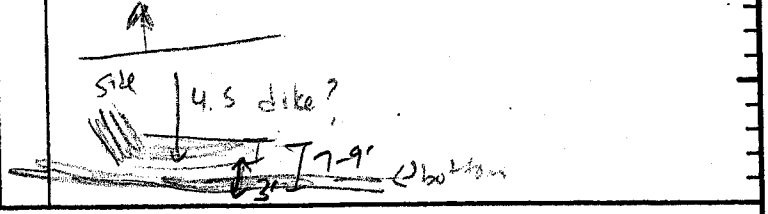
JOYCE ENGINEERING, INC.

BORING LOCATION T-5 | DATE START/FINISH 3/28/02

GROUND ELEVATION (NGVD) | DRILLED BY K. Sizemore

GROUNDWATER EL. ____ DATE ____ | LOGGED BY RLC/Karen | TOTAL DEPTH (FT) 9.5 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0	0							
	1					SC		0-1 Topsoil Clayey sand gray/tan/light orange, moist
	2							
	3					PWR@3.5		3.5' light green fine grained rock (metavolcanic) Large weathered PWR fragments (up to 1') in silty sand slightly moist
	4							4.5' very hard, metavolcanic dike? across 1 sided bottom
	5							7-9' thick (at least dike)
	6							9.5 feet - could not proceed further dry 10:52
	7							
	8							near R11 dry @ 7:48 3/29 dry @ 13:31 3/29
	9							
	10							



BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-6 DATE START/FINISH 3/27/02

GROUND ELEVATION (NGVD) _____ DRILLED BY K Stremore

GROUNDWATER EL. _____ DATE _____ LOGGED BY R Ickes TOTAL DEPTH (FT) 7

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0					CL/SC		Topsoil 0-1' 2-4' Clayey sand, tan, very moist mixed w/ sandy clay
	5					PWR		4' PWR Harder w/ granitic texture tan silty sand w/ PWR fragments (plot sandy silt some clay-rich zones light gray in color slightly moist
	10							6' stronger fabric still very weathered lots of Fe stains silty sand w/ PWR frags slightly moist
								6.5' more light gray clay-rich lens mixed in
	15							7' - could not proceed further 11:05 dry 225' up road from P-17 N side of road (20' off road)

dry @ 8:02 3/28

dry @ 13:02 3/29

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Same equipment as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-7 DATE START/FINISH 3/29/02

GROUND ELEVATION (NGVD) DRILLED BY K Sizemore

GROUNDWATER EL. DATE LOGGED BY R Kirkman TOTAL DEPTH (FT) ~~5.5~~ 7.0

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0								0-1 Topsoil
						SM		silty sand tan, moist
	2					SMW/ SC-CL		@2' mottled gray clayey sand/sandy clay mixed w/tan/orange silty sand, moist
						PWR		@3.5 much harder granitic texture slightly moist w/ up to 1' frags of PWR coarse-grained biot granite
	4							@5 very hard 7.0 could not proceed past ~~5.5~~ 10:31 dry
								dry @ 13:41 3/29
	6							
	8							
	10							

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
GROUNDWATER

NOTES:

Same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-8A
GROUND ELEVATION (NGVD)
GROUNDWATER EL. DATE
DATE START/FINISH 3/28/02
DRILLED BY K Sizemore
LOGGED BY R Kirkman TOTAL DEPTH (FT) 10.5

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							0-1 Topsoil
	1					SM		Silty sand, very moist, med-grained tan
	2							
	3							
	4							
	5							
	6					PWR		6' PWR silty tan sand, slightly moist w/ small (<1') PWR frags - weathered granite, coarse-grained w/ biot, qtz, fspar 7' harder material encountered
	7							
	8							
	9							
	10							could not proceed further 10.5' dry @ 12:12
	11							dry @ 13:38 3/29

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
▽ GROUNDWATER

NOTES:
Same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-8B
GROUND ELEVATION (NGVD)
GROUNDWATER EL. DATE

DATE START/FINISH 3/29/02
DRILLED BY K Sizemore
LOGGED BY R Kirkman TOTAL DEPTH (FT)

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							0-1' Topsoil
								water coming into hole @ 1'
						SM		lt brown Sandy silt saturated
								clayey sand light gray interlayered w/ sandy silt
	2					SC/SM		water @ ~same elevation as stream nearby
						SC		4-6' lots more clayey sand throughout tan/orange/light gray
	4							water pouring in hole
								Stopped @ 6' (cave in close to well!)
								had to fill back 8:45 am
	6							8' due w of P-12
	8							
	10							

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
GROUNDWATER

NOTES:

Same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-9 | DATE START/FINISH 3/29/02

GROUND ELEVATION (NGVD) _____ | DRILLED BY ICS/Remote

GROUNDWATER EL. _____ DATE _____ | LOGGED BY R Kirkham | TOTAL DEPTH (FT) 10 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0					SM W/SC		0-6" Topsoil silty sand w/ clayey sand tan/orange, moist
	2							
	4					SM w/SC		~4' light gray clayey sand, moist mixed w/ silty sand (tan) layered 5' mottled appearance w/ slight granitic texture most silty sand w/ clayey sand
	6							
	8							8' getting harder still moist w/ faint granitic fabric silty sand still lots of light gray sandy clay/mottled
	10					SM PWR		9' silty sand, slightly moist, very hard 10' granitic fabric, very hard weathered granite fragments in silty sand, slightly moist tan could not proceed past 10' 9:37 dry 0.2' of water 13:38 3/29
	12							

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:

Same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-10 DATE START/FINISH 3-27-02

GROUND ELEVATION (NGVD) DRILLED BY K Sizemore

GROUNDWATER EL. DATE — LOGGED BY R Kirkman TOTAL DEPTH (FT) 5

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0							0- 1 Topsoil
						SM		tan silty sand, moist
						PWR		3' weathered granite, coarse grained, moist
								Strong fabric in silty sand
	5							4' very hard, slightly moist
								5' could not proceed further
								13:54 dry
	10							40' + S10E from P-13S
								0.2' of water 8:00 3/28
								0.24' of water 3/29 13:07
								coming in near top ~ 2' down

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:

Same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-11 DATE START/FINISH 3/27/02

GROUND ELEVATION (NGVD) DRILLED BY K Sizemore

GROUNDWATER EL. DATE LOGGED BY R Kirkman TOTAL DEPTH (FT) 6.5

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	6					SM		silty sand, moist, tan ~7.5' Very large (~3.5' long granite boulders-weathered) Coarse-grained biot/qtz/fspar w/ Fe stains in silty sand, tan, moist boulders - very hard, competent granite, very coarse grained up to 2cm
						PWR@1.5		
	5							
								Could not proceed past 6.5' very hard
	10							Stopped @ 16:50 dry
								13:20 0.42' 3/29.
								coming in from ~3' down
	15							
	20							
								0.17' of water 7:52 3/28
								~10' NE of B-3

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES: Same

JOYCE ENGINEERING, INC.

BORING LOCATION T-12 DATE START/FINISH 3/27/02

GROUND ELEVATION (NGVD) DRILLED BY K Sizemore

GROUNDWATER EL. DATE LOGGED BY R Kirkman TOTAL DEPTH (FT) 8

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0								0-6" Topsoil
						SC/SM		Clayey sand light gray - lenses in, moist " silty sand (mostly silty sand) tan moist
	5					PWR		~6' weathered granite mixed in (PWR frags) much harder coarse-grained w/ Fe stains biot/cpt 2/fspar slightly moist
	10							could not proceed past 8' 17:19 dry
	15							
								S67E + 45' from P-14 dry @ 7:42 3/28 0.14' water 3/29 13:55 Coming in @ bottom?

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
GROUNDWATER

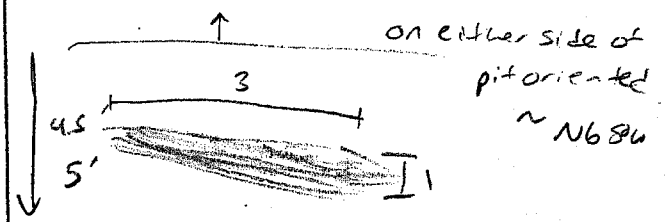
NOTES: Same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-13 | DATE START/FINISH 3/27/02

GROUND ELEVATION (NGVD) _____ | DRILLED BY K Sizemore

GROUNDWATER EL. _____ DATE _____ | LOGGED BY R Kirkman | TOTAL DEPTH (FT) 7.5 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0					SM		0-8" Topsoil 8"-3.5' very moist silty sand orange/tan w/ weathered mica & qtz
						PWR		3.5' Very weathered granite w/ large biot, qtz, fspar coarse-grained silty sand moist
	5							4.5-5' metavolcanic rock - weathered light green/gray silt slightly moist linear feature ~ 1" deep & 3" long then back into granitic pwr 7' very hard very coarse-grained granite (weathered) slightly moist silty sand
								7.5' - could not proceed further 11:36 45° & N20°W from P-4.7 ~1 in of water @ 17:49 after 10 min 0.56' of water @ 7:57 3/28
	10							Water moving along & through mafic layer ~10 min after completion of excavation
								
								water @ 0.66 3/29/02 13:08 Comming near top

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES: Same equipment as T-1

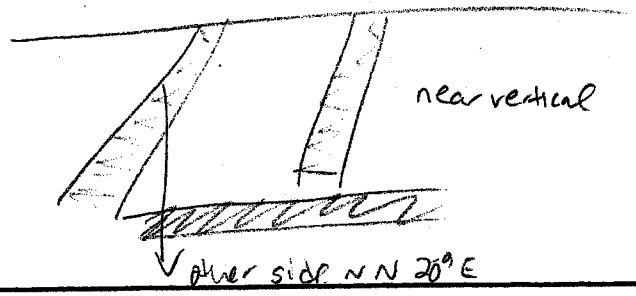
JOYCE ENGINEERING, INC.

BORING LOCATION T-14 | DATE START/FINISH 3-27-02

GROUND ELEVATION (NGVD) _____ | DRILLED BY K Sizemore

GROUNDWATER EL. _____ DATE _____ | LOGGED BY R Kirkman | TOTAL DEPTH (FT) 13.5 | PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	SAMPLE BLOWS PER 6 IN.	SAMPLE PEN IN.	SAMPLE REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0					SM		0-8" Topsoil Brown very moist silty sand @3' orange very moist sandy silt mafic material in dirt pile saw dike (weathered) at 5' - wet cuttings 8' larger dike in bottom of hole (across bottom) very hard mafic rock fragments
	5					PWR		
	10							wet mafic material & very moist silty sand / granitic PWR (water?)
	15							13.5' - could not proceed further 15:22 dry
	20							0.86' water @ 7:46 3/28 1.65' water @ 13:15 3/29 (coming in bottom) 20' off road down other "road" see map



BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
▽ GROUNDWATER

NOTES:
Same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-15 DATE START/FINISH 3-27-02

GROUND ELEVATION (NGVD) DRILLED BY K Sizemore

GROUNDWATER EL. DATE LOGGED BY R Kirkman TOTAL DEPTH (FT) 12.5

PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0								0-1.5 Topsoil
						SM		orange, moist, sandy silt
						PWR		75.5' (PWR) silty sand w/ granitic rock fragments (weathered w/ Fe stains) slightly moist granitic texture coarse-grained w/ qtz, fspar, biot - very weathered
	5							
								9' larger PWR frags
	10							
								(never got really hard)
								Stopped at 12.5' 16:09 dry
	15							
	20							
								75' from P-15D to road & 225' up road on E side of road
								dry @ 7:48 3/28
								dry @ 13:16 3/29

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
GROUNDWATER

NOTES:

Same as T-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-16		DATE START/FINISH 3-29-02	
GROUND ELEVATION (NGVD)		DRILLED BY K Sizemore	
GROUNDWATER EL.	DATE	LOGGED BY RKirkman TOTAL DEPTH (FT) 9	PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
	0					SM		0-8" Topsoil silty sand tan-brown, moist med grained
	2					SM w/ SC/CL		@ 3' gray sandy clay/clayey sand mottled, mixed w/ tan/orange sandy silt, moist
	4					PWR		much harder 5.5' weathered granite frags (up to 6") in silty sand, tan, moist, coarse grained w/ biot, fspar, qtz
	6							very hard
	8							Could not proceed beyond 9' dry @ 11:31 dry but water coming into hole @ 2' BGS 13:50 3/29 moist @ bottom 14:59 3/29
	10							

BLOWS PER 6 IN.–140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN–PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC–RECOVERY LENGTH OF SAMPLE
RQD–LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S–SPLIT SPOON SAMPLE
U–UNDISTURBED SAMPLES, UF–FIXED PISTON UO–OSTERBERG
GROUNDWATER

NOTES:

Same as 7-1

JOYCE ENGINEERING, INC.

BORING LOCATION T-17
GROUND ELEVATION (NGVD)
GROUNDWATER EL. DATE
DATE START/FINISH 3-29-02
DRILLED BY K S Zermo
LOGGED BY R K [illegible] TOTAL DEPTH (FT) ~~4.5~~ 5
PG. 1 OF 1

EL. FT.	DEPTH FT.	SAMPLE TYPE and NO.	BLOWS PER 6 IN.	PEN IN.	REC IN.	REMARKS	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
0								0-6" Topsoil
						SM		silty sand moist, tan w/ biot, qtz, fspar
	2							
						PWR		@ 3' up to 6" pieces of weathered granite (biot, qtz, fspar) coarse grained with stains in moist tan silty sand
								@ 3.5 very hard
	4							could not proceed past ~~4.5~~ 5 10:56 dry
								dry @ 13:42 3/29
	6							

BLOWS PER 6 IN.—140 LB. HAMMER FALLING 30 IN. TO DRIVE A 2.0 IN. OD SPLIT SPOON SAMPLER
PEN—PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC—RECOVERY LENGTH OF SAMPLE
RQD—LENGTH OF SOUND CORES >4 IN./LENGTH CORED, %
S—SPLIT SPOON SAMPLE
U—UNDISTURBED SAMPLES, UF—FIXED PISTON UO—OSTERBERG
GROUNDWATER

NOTES:
Same as T-1.

JOYCE ENGINEERING, INC.

JOYCE ENGINEERING, INC.

Waste Industry Experts

Job _____

Job No. _____ Sheet No. ____ of ____

Calculated by _____ Date _____

Checked by _____ Date _____

Subject _____ Scale _____

P-18

	Day	Time	WL
well const.	12-4	1457	15.43
~~24 hr~~ / 8 day	12-12	1034	5.05
1½ day	12-18		2.40

P-19

	Day	Time	WL
well const.	12-12	1300	11.91
24 hr	12-13	8:13	9.16
6 day	12-18		8.85

P-20

	Day	Time	WL
well const.	12-12-02		dry
24 hr	12-13-02	820	21.10
6 day	12-18-02		20.94

P-21

	Day	Time	WL
well const.	12-17-02	808	6.71
24 hr	12-18-02		8.40
6 day	12-23-02		8.02

Additional WLs can be seen on Field well Construction Logs.

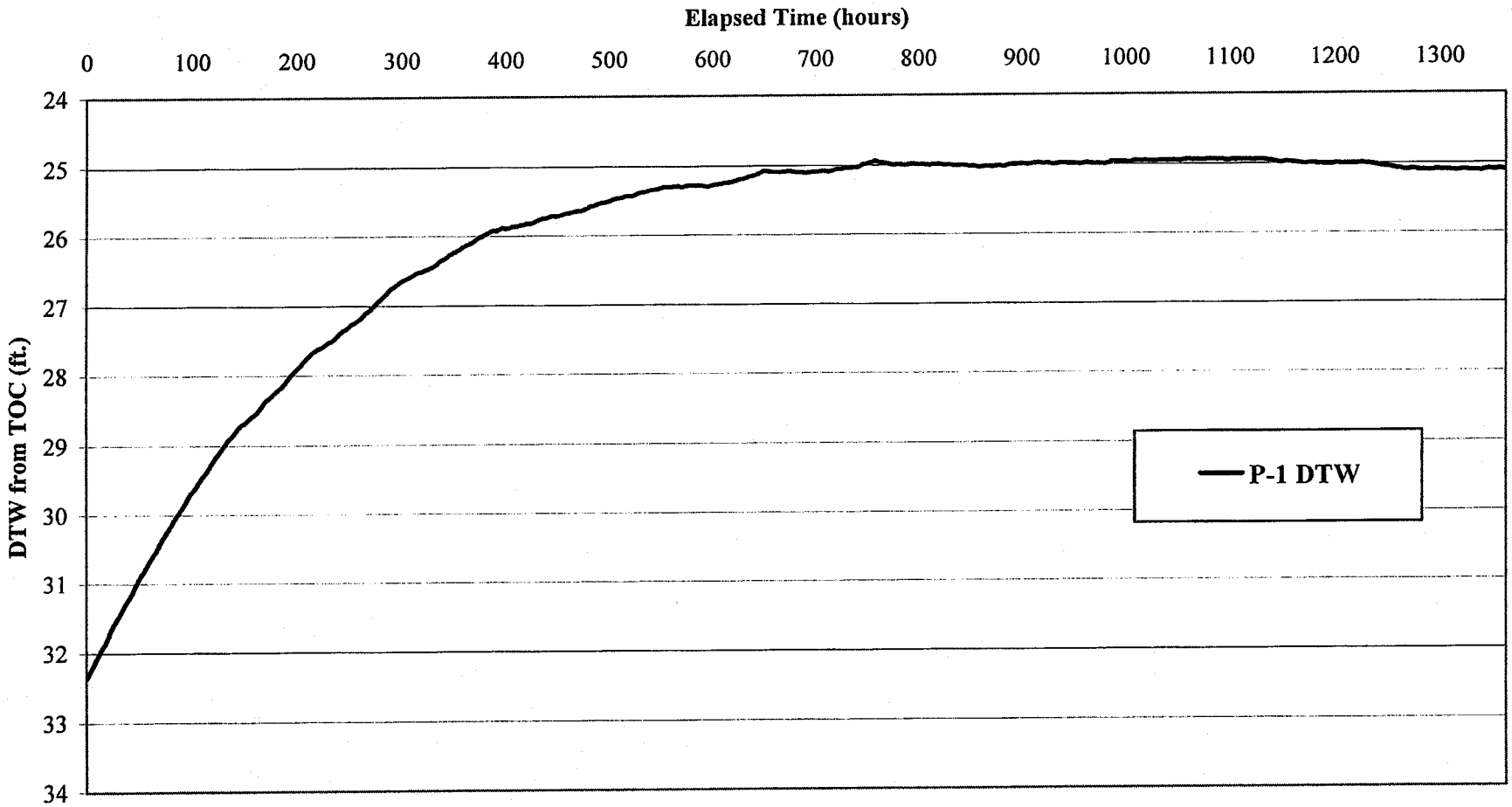
APPENDIX 2

Survey of Piezometer Locations

APPENDIX 3

Pressure Transducer/Data Logger Water Levels for P-1

P-1 MiniTROLL Data



Note:
Data was collected from 04/16/02 - 06/12/02 utilizing an In-Situ, Inc., miniTROLL™ Pro pressure transducer/data logger.

APPENDIX 4

Magnetometer Survey Report

Prepared for:

Material Recovery, LLC
421 Raleigh View Road
Raleigh, North Carolina 27610

JEI PROJECT NO. 600.00, TASK 04

VOLUME ONE - SECTION II

APPENDIX 4
MAGNETOMETER SURVEY REPORT

MATERIAL RECOVERY AND RECLAIMATION OF HIGH POINT, LLC

CONSTUCTION AND DEMOLITION LANDFILL

HIGH POINT, NORTH CAROLINA

JUNE 2002

Prepared by:

ENGINEERING, INC.

2301 West Meadowview Road, Suite 203
Greensboro, North Carolina 27407
(336) 323-0092

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Drawing

Drawing No. 1 Magnetometer Survey Map

1.0 INTRODUCTION AND OVERVIEW

A magnetometer survey was performed at the proposed MRR of High Point, LLC C & D Landfill on May 28-31, 2002 by Joyce Engineering, Inc. The purpose of this geophysical investigation was to locate and delineate diabase dikes at the proposed site, due to their potential impact upon the groundwater flow regime. Small-scale diabase dikes were identified in surface exposures, drill cuttings and test pits prior to the survey.

A portable Geometrics G-856AX Proton Precession Magnetometer was used to locate magnetic anomalies by measuring total magnetic field strength. The results of this survey are presented below along with interpretations of the extent of diabase in this area.

2.0 DATA COLLECTION

Magnetometer data were collected throughout the property of the proposed landfill site north of the existing east-northeast trending overhead power lines that transect the property. A base station was chosen before the magnetometer survey was performed. This point, which was located near the drainage south of HA-1, was checked periodically in order to make certain the magnetometer readings were consistent throughout the survey. The base station location is shown on Drawing No. 1. No significant deviations in gamma readings were observed throughout the geophysical investigation. Minor shifts were noted, but their effect on the survey was determined to be negligible.

Background data were also collected along the stream that trends to the southeast along the southwest border of the site boundary. This portion of the site was not included in the magnetometer survey; however diabase dike outcrops in this area were helpful in the interpretation of the magnetic anomalies found within the survey area.

2.1 Method of Data Collection

Information from reconnaissance of the site as well as regional-scale geologic mapping indicate that dikes on the property and in the area characteristically strike approximately north-south. Therefore, several lines were run in an east-west direction on the assumption that anomalies, if present, could be intercepted in these lines. A total of ten data collection transects of varying length were established on the property. The transects were oriented in an approximately east-west direction, with a concentration in and around the Phase I disposal area. These lines labeled as Line-A through Line-J can be seen in *Drawing No. 1*. Roads, and surveyed markers such as piezometers, and test pits were used when possible as points of reference. The area of overhead power lines to the south and west of the characterized area was avoided due to their associated electromagnetic field interference.

Magnetometer readings were taken on each transect line at approximate 25-foot intervals. This interval was small enough to intersect significant anomalies such as those associated with diabase dikes could potentially alter groundwater flow. Data collection points were flagged and recorded in a field logbook as the magnetometer survey was performed. The points were subsequently located

using a topographic map. No attempt to delineate magnetic anomalies was made during the initial transects.

2.2 Delineation of Anomalies

After magnetic field strength data from several of the survey lines were collected, it was entered in a spreadsheet and graphed (Figure 1). These graphs and data were used in the interpretation of the total magnetic field strength of anomalies throughout the property. Magnetic highs and averages were studied throughout each line and on a site-wide basis. These data were also compared to data obtained from known diabase outcrops on the property. Based on interpretation of the data a baseline determination of relative magnetic anomalies was made. A magnetic field strength cutoff of 51,950 gammas was chosen to be the border between a magnetic high and the background magnetic field for the area. Once this baseline was defined, several other survey lines were walked in the same manner as mentioned above. Data from these survey lines was found to be similar to those previously collected (Table 1).

Magnetic highs, which had been previously flagged, were revisited after initial data from survey lines were obtained. These areas of high magnetic readings were further delineated using the 51,950 gammas as the cut off between anomalous features and the background magnetic field. Surveyed markers such as piezometers and roads were used to find the exact location of anomalous readings when possible. The mapped anomalies are shown on *Drawing No. 1.* When discontinuous linear features of anomalously high readings were identified, random data points were taken between the anomalously high areas in an attempt to locate additional areas of high magnetic readings.

3.0 ANALYSIS OF MAGNETIC ANOMALIES

The predominant trend of the mapped magnetic anomalies is southwest-northeast. This orientation is similar to diabase dikes that have been observed in outcrops along the stream on the southwest border of the property *(Photograph 2 and Figures 12-14).* The most dominant feature delineated lies in the center of the property and extends for approximately 1300 feet. High magnetic readings associated with this area faded out near HA-1. Strong readings were encountered again near piezometer P-2 on the same trend as the previous anomaly. This is interpreted to be a continuation of the larger anomaly to the southwest. The anomaly varies in width from approximately 40 feet, to as much as 240 feet wide. Suspect readings were obtained near the southern flank of this anomaly, likely due to the overhead power lines located approximately 250 feet to the south.

Another large anomaly trending to the northeast that was identified in the magnetometer survey lies near the eastern border of the property. This anomaly varies in width from approximately 240-300 feet. The eastern and southern borders of this anomaly are considered to be suspect due to the close proximity of the overhead power lines. A smaller linear anomaly trending northeast, which ranges from 20-50 feet wide, was observed between the two larger anomalies and southwest of piezometer P-6. Suspect readings were obtained near the southern flank of this feature due to power line interference. This anomaly pinches out to the northeast after approximately 600 feet. Several other

small isolated anomalies were noted throughout the survey area. These anomalies can be seen in *Drawing No.1.*

4.0 CONCLUSIONS

Several areas of high total magnetic field strength occurred throughout the site during the magnetometer investigation. These southwest-northeast anomalous areas follow the trend of diabase outcrops that have been seen in the stream on the southwest border of the property, and are consistent with the regionally mapped diabase dikes(Ragland, 1991). Although the high magnetic readings comprise a large area it is inferred that these anomalies do not represent single homogeneous diabase dikes. The anomalies are inferred to represent swarms of very small, discontinuous diabase dikes with granite as the major rock type. The section near the chosen base station shows anomalously high readings, but is characterized by granite outcrops with discolored soils due to small dikes crosscutting the area. This is similar to outcrops seen throughout the site. *Photograph 3* represents a typical diabase outcrop. The accompanying overlay outlines the dike configuration. This photograph shows irregular and discontinuous diabase intermingled with lenses of granite. *Photgraphs 5 and 6* show very narrow dike sets with granite in between the diabase, which is also characteristic of the area. The typical width of these dikes is less than 2 feet.

Although diabase outcrop exposures were not present in the area characterized in the magnetometer survey, similar swarms of discontinuous dikes can be inferred from the magnetic readings obtained. The areas noted as anomalous high readings in *Drawing No. 1* were characterized by mixed high readings between the 51,950 gamma mark and approximately 52,150. No distinct pattern of high and low readings was recognized in the areas characterized by anomalously high readings. The lack of pattern in readings obtained in anomalously high areas helped confirm the anticipated characteristics of diabase dikes in the area. A large continuous dike is expected to give off magnetic readings that are more uniform and predictable in nature. These readings, along with observations made in drill cuttings, test pits, and during reconnaissance surveys of outcrops, supports the theory of the very small and discontinuous dikes that exist throughout the proposed landfill site.

5.0 References

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.

TABLE

Table 1
Magnetometer Gamma Readings From Survey Lines

Data Point	Gamma Reading									
	A-Line	B-Line	C-Line	D-Line	E-Line	F-Line	G-Line	H-Line	I-Line	J-Line
1	51820.0	51807.0	51890.5	51802.0	51929.3	51862.0	51869.9	51914.8	51742.3	51810.3
2	51923.0	51851.8	51853.7	51844.1	51867.5	51892.1	51860.2	51854.0	51858.0	51831.8
3	51623.6	51909.1	51854.2	51843.9	51828.6	51888.5	51843.6	51988.0	51896.2	51855.8
4	51673.0	51888.0	51830.0	51813.6	51929.3	51852.2	51891.2	51938.5	51914.7	51857.9
5	51759.0	51870.6	51850.5	51788.7	52028.4	51867.9	51904.9	52062.2	51934.3	51850.8
6	51819.0	51858.7	51844.3	51787.4	51971.4	51888.6	51896.3	52035.7	51954.3	51843.3
7	51850.5	51826.8	51859.0	51792.7	51927.4	51857.8	51875.2	51939.8	51960.4	51851.2
8	51875.1	51772.0	51813.0	51766.4	51911.7	51793.0	51878.2	51854.0	51952.6	51864.0
9	51869.9	51783.6	51816.1	51761.4	52016.0	51775.7	51911.3	51824.6	51959.8	51855.9
10	51874.0	51827.7	51798.3	51772.1	51870.2	51778.2	51925.3	51830.0	51938.3	51845.3
11	51912.4	51868.7	51850.0	51780.7	51918.5	51827.0	51917.9	51871.1	51920.5	51840.1
12	51925.0	51877.6	51863.5	51777.8	51885.9	51838.0	51918.5	51859.8	51922.2	51844.8
13	51917.0	51894.4	51894.6	51778.7	51825.3	51877.8	51936.0	51860.0	51907.1	51862.9
14	51953.6	51924.1	51884.0	51797.4	51800.5	51881.6	51941.3	51870.8	51905.8	51881.7
15	52145.6	51932.4	51879.6	51820.0	51760.0	51882.0	51947.5	51864.9	51892.0	51898.1
16	52040.5	51976.1	51908.2	51857.7	51768.4	51945.6	51948.4	51852.2	51895.4	51855.5
17	52036.7	51946.8	51923.4	51840.4	51759.0	51861.3	51956.6	51843.8	51917.2	51828.4
18	51993.3	51884.3	51921.0	51838.4	51748.1	51884.3	51955.3	51838.9	51957.1	51808.9
19	51962.5	51855.8	51915.0	51830.9	51804.4	51852.3	51948.8	51843.6	51932.0	51877.8
20	51954.7	51890.5	51899.6	51826.8	51816.7	51814.2	51955.6	51864.2		51841.2
21	51962.0	51864.8	51889.9	51841.7	51806.3	51810.4	51968.2	51828.9		
22	51952.2	51874.0	51903.9	51865.2	51802.0	51809.5	51963.2	51837.4		
23	51952.6	51861.5	51908.5	51856.8	51826.7	51814.7	51963.3	51832.1		
24	51922.3	51854.3	51863.0	51862.8	51816.1	51819.8	51948.8	51829.2		
25	51877.6	51881.8	51884.4	51893.2	51805.9	51782.3	51943.4	51796.9		
26	51858.1	51903.9	51866.2	51925.7	51804.5	51948.7	51941.9	51794.3		
27	51887.8	51904.2	51901.1	51932.7	51814.1	51864.2	51951.6	51816.2		
28	51918.8	51900.3	51905.3	51927.0	51814.9	51812.2		51826.5		
29	51958.0	51915.7	51913.7	52020.5		51850.1		51806.4		
30	51978.7	51915.2	51901.5	52033.2		51824.5		51803.3		
31	51975.5	51908.6		51978.7		51804.6		51803.8		
32		51893.0		51917.4		51781.5		51825.9		
33		51898.5		51878.4		51762.4		51828.1		
34		51916.0		51874.7		51786.1		51855.0		
35		51917.6		51907.1		51797.8		51866.0		
36		51930.9		51923.0		51798.9		51847.3		
37		51939.1		51908.8		51866.1		51836.0		
38		51927.8		51904.3		51914.8		51826.6		
39		51912.5		51867.2		51908.3		51820.6		
40		51904.9		51818.3		51923.9		51817.8		
41		51901.8		51795.8		51966.6		51809.5		
42		51928.1		51786.1		51999.7		51803.3		
43		51899.9		51798.1		52011.4		51796.6		
44		51880.9		51797.1		52024.0		51793.0		
45		51932.8		51794.1		52011.0		51798.8		
46		51918.8		51813.8		52043.5		51799.0		
47		51932.9		51840.9		52072.8		51796.0		
48				51851.0		52073.2				
49				51934.6		52034.5				
50				51897.0		51988.5				
51				51880.1		51950.6				
52				51890.7		51910.7				
53				51868.8		51895.4				
54				51880.1		51893.7				
55				51956.8		51897.2				
56						51891.5				
Line Average	51908.8	51890.8	51876.2	51855.3	51852.0	51883.3	51924.5	51849.1	51913.7	51850.3

Note: Lines are shown in descending order West to East.

Site Average **51880.4**

FIGURES

Figure 1
All Lines Graph

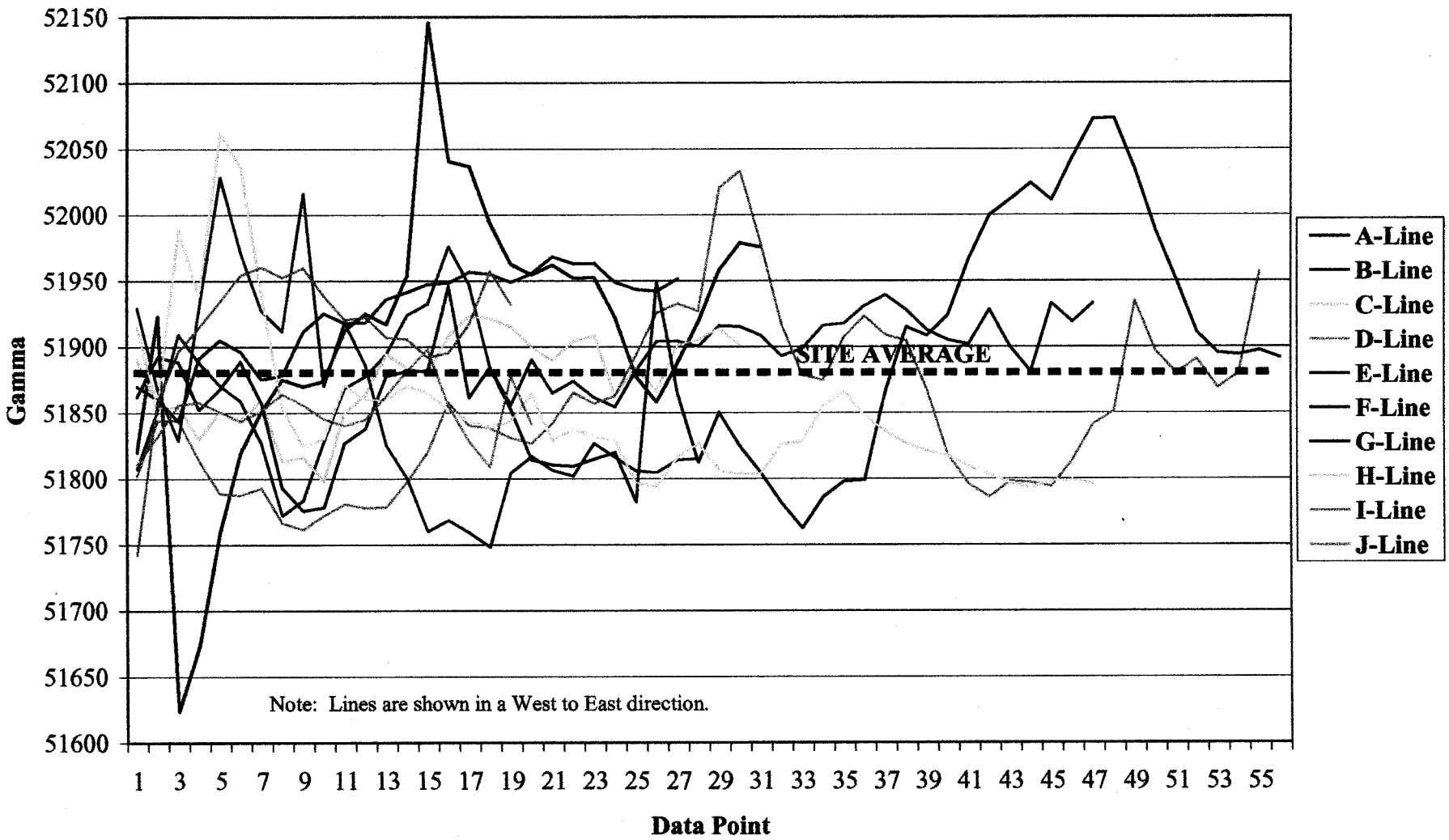


Figure 2
A-Line Graph

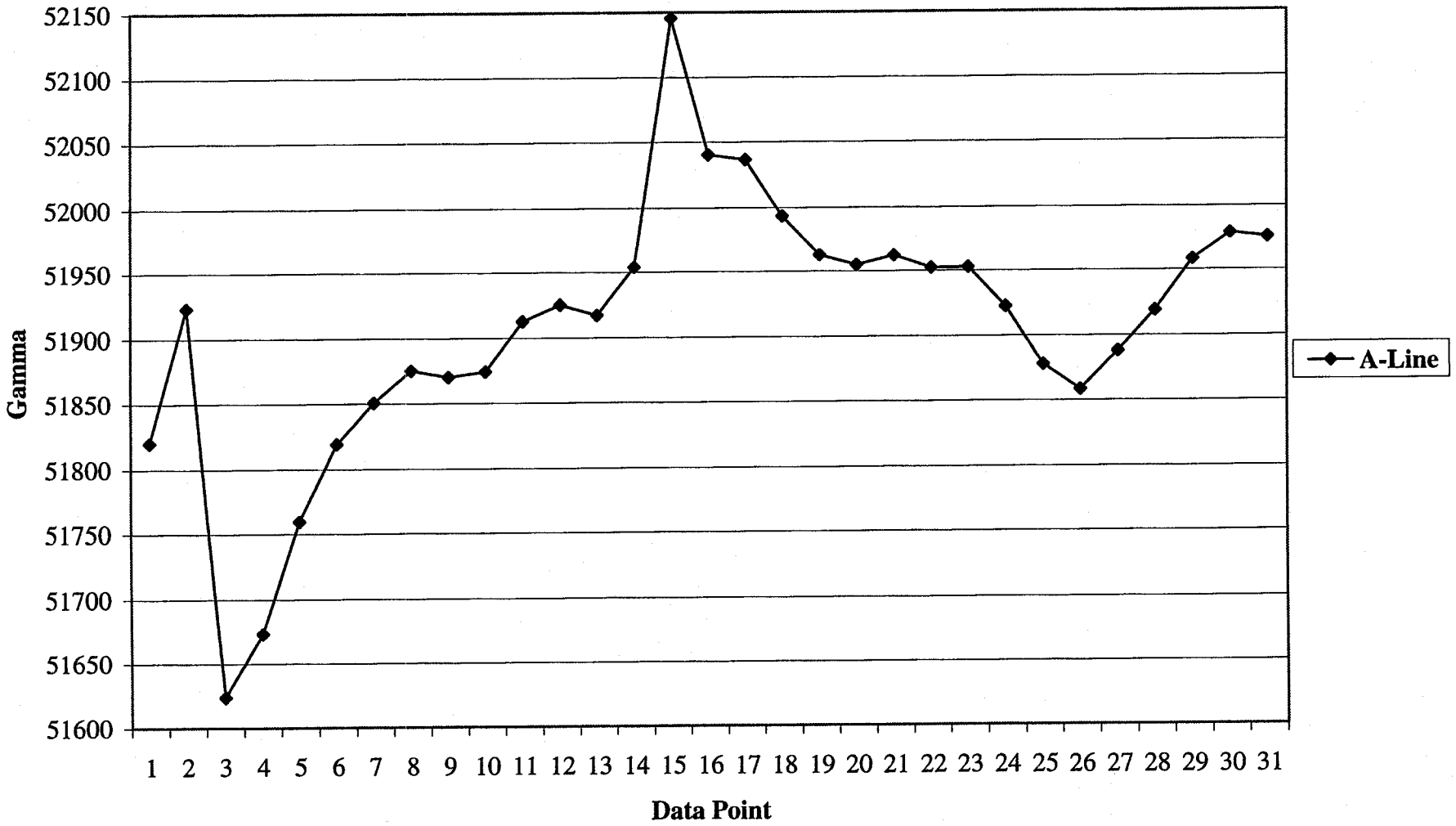


Figure 3
B-Line Graph

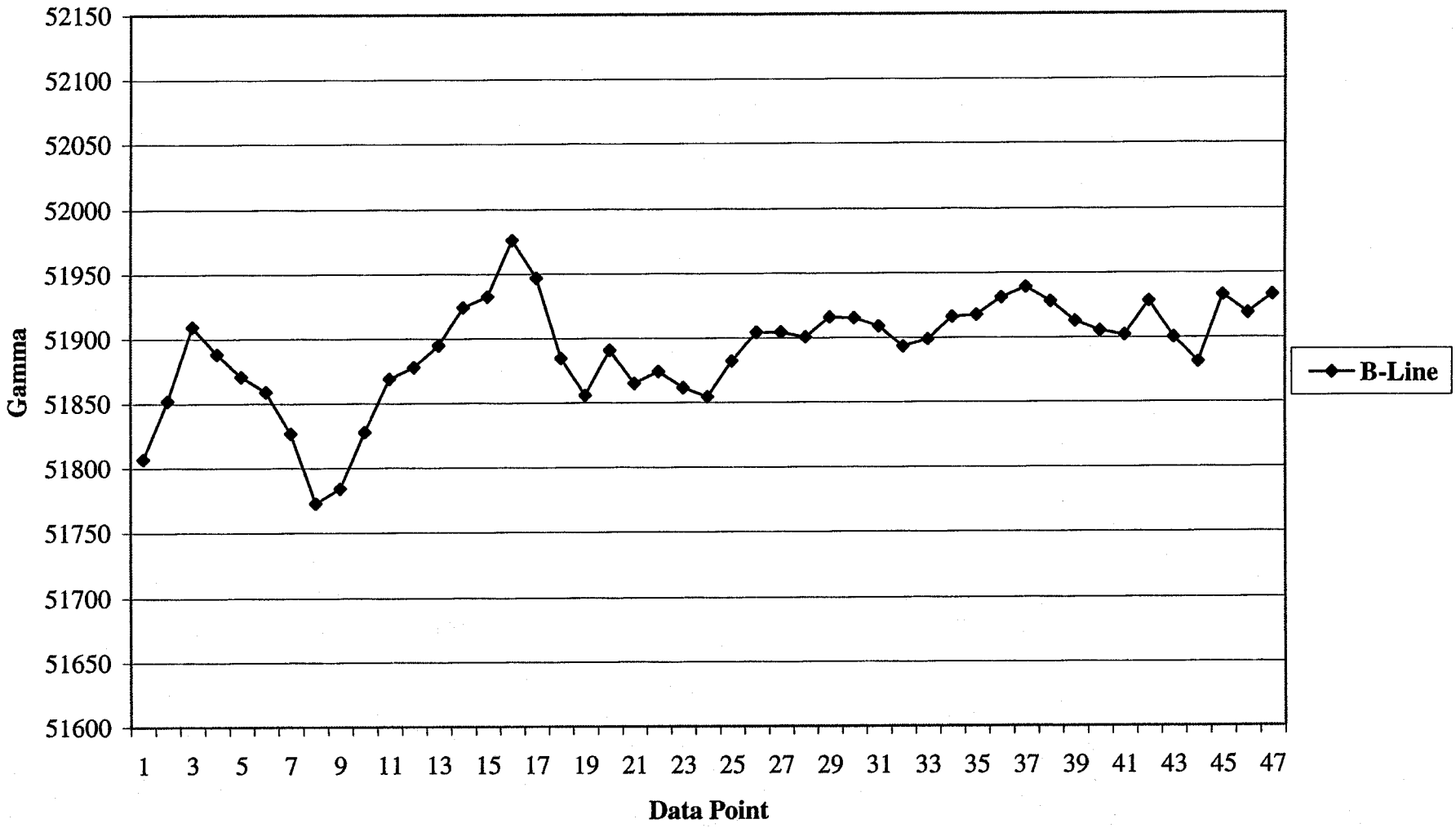


Figure 4
C-Line Graph

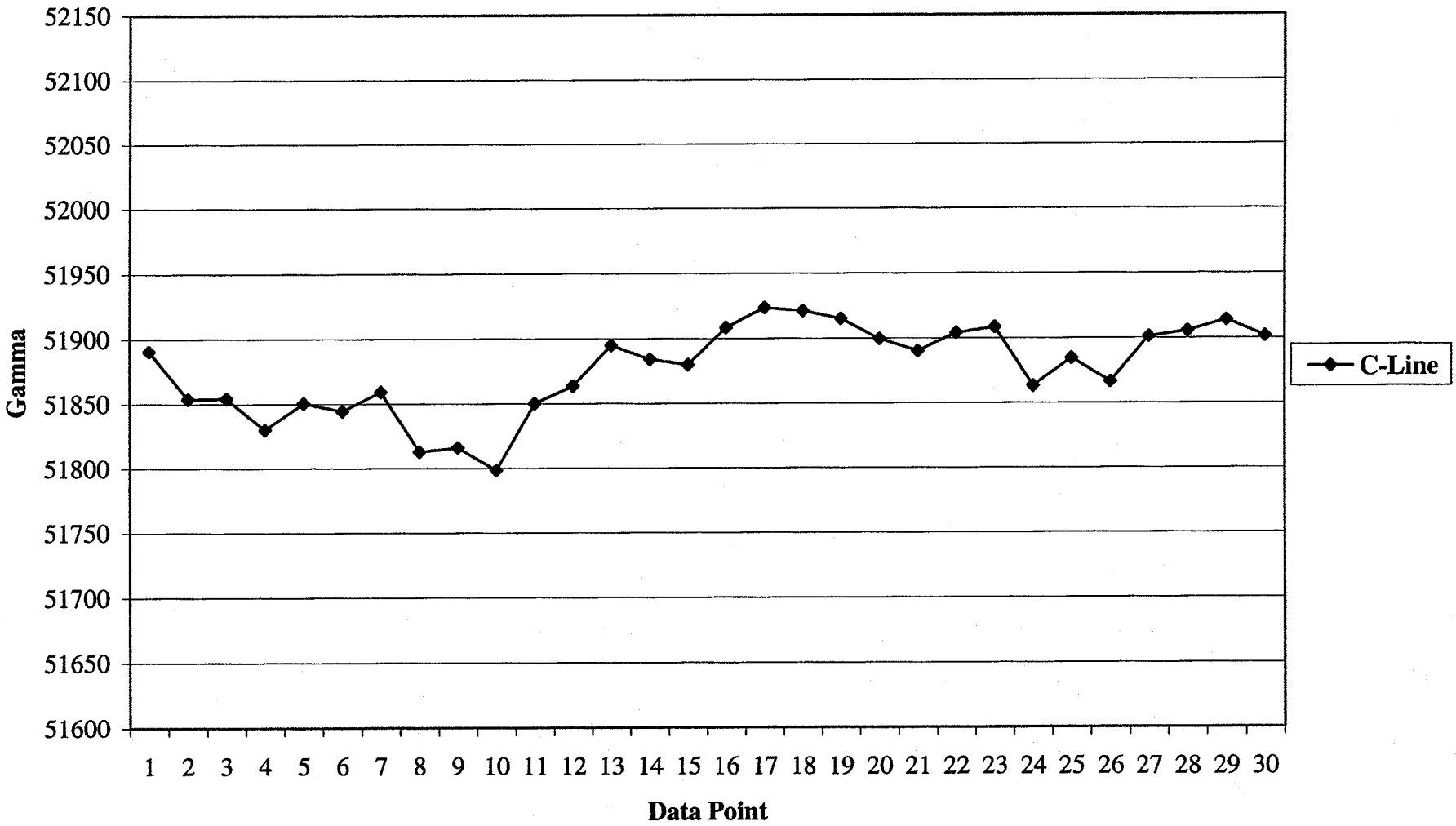


Figure 5
D-Line Graph

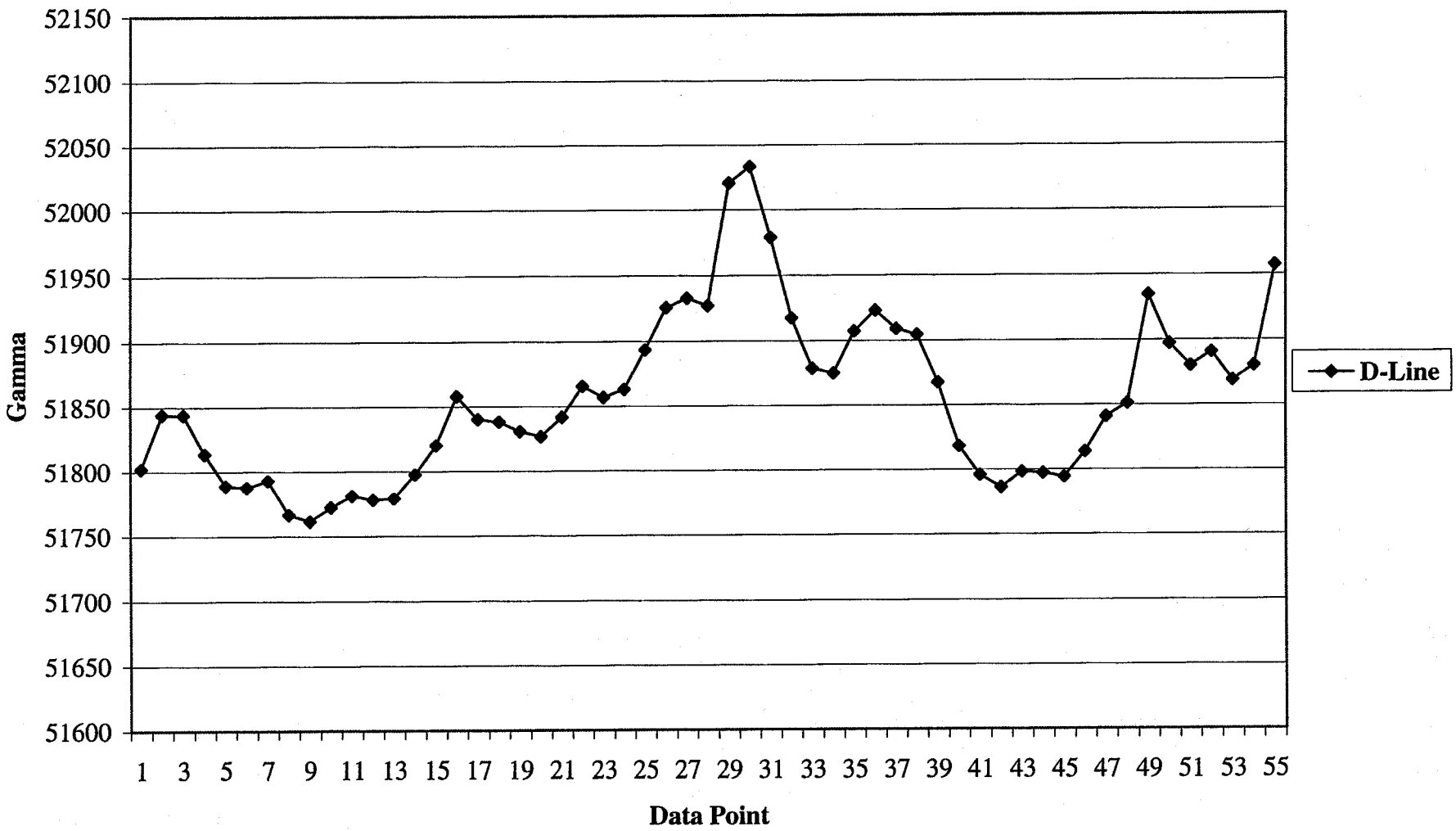


Figure 6
E-Line Chart

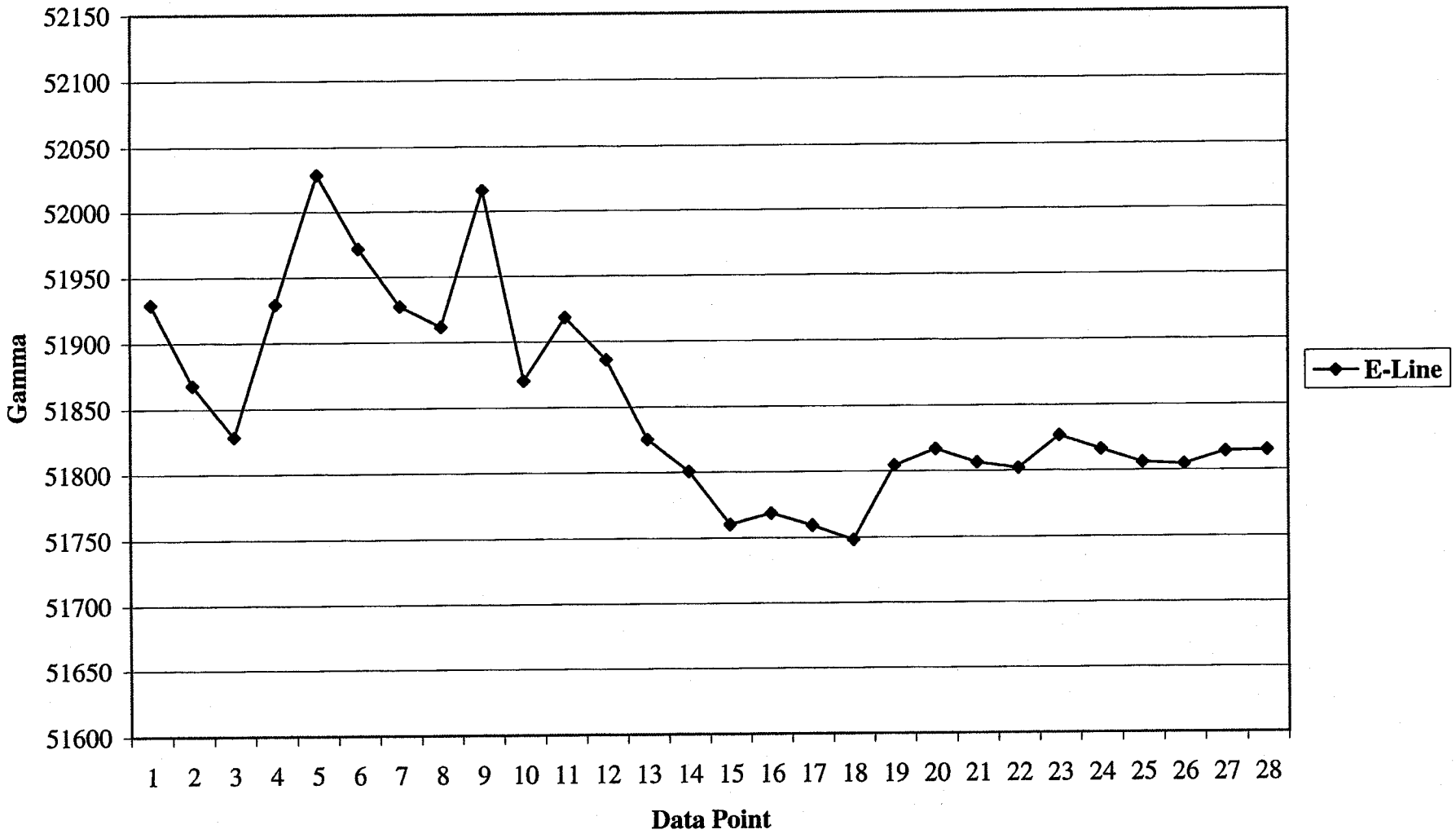


Figure 7
F-Line Graph

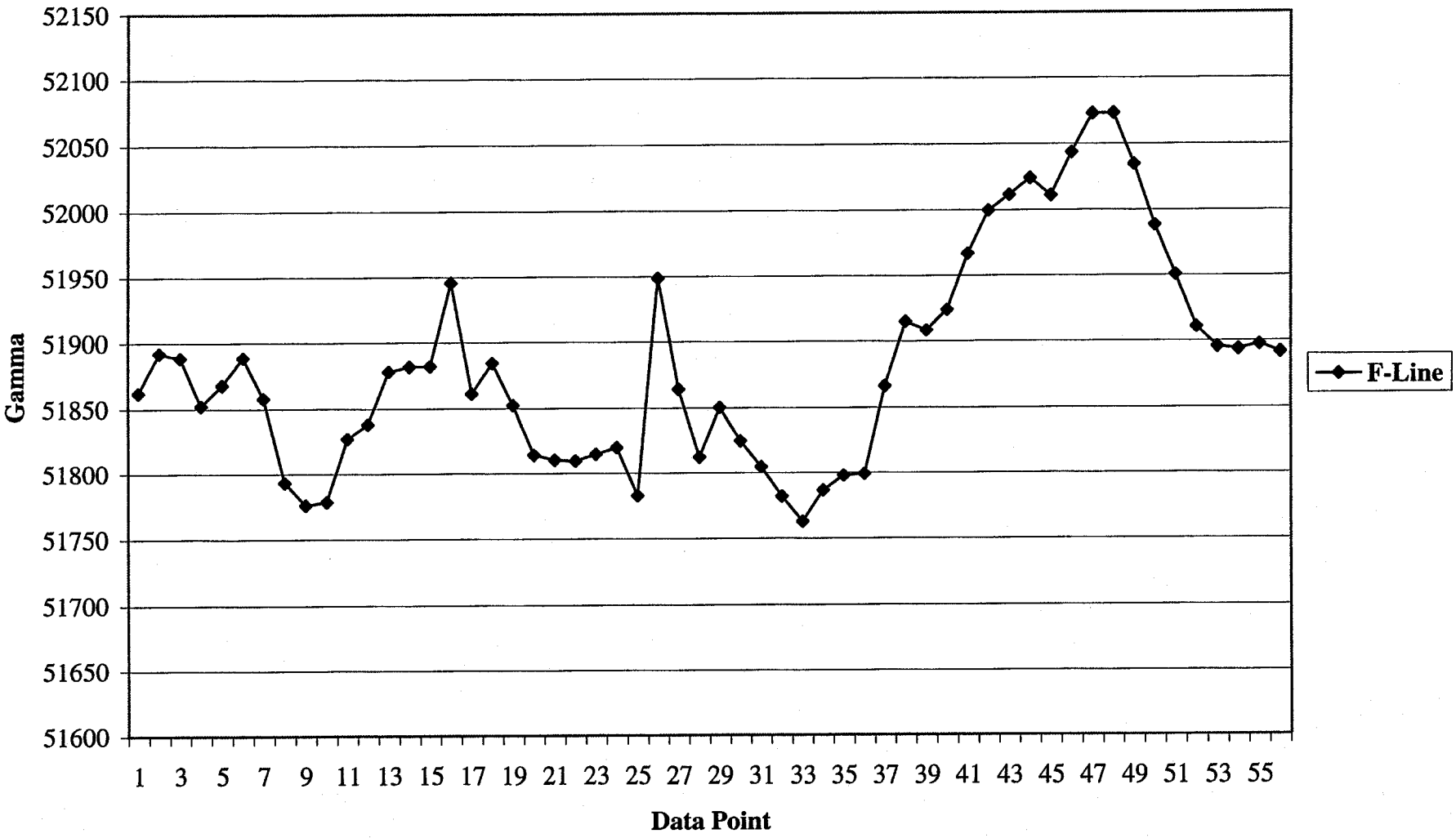


Figure 8
G-Line Graph

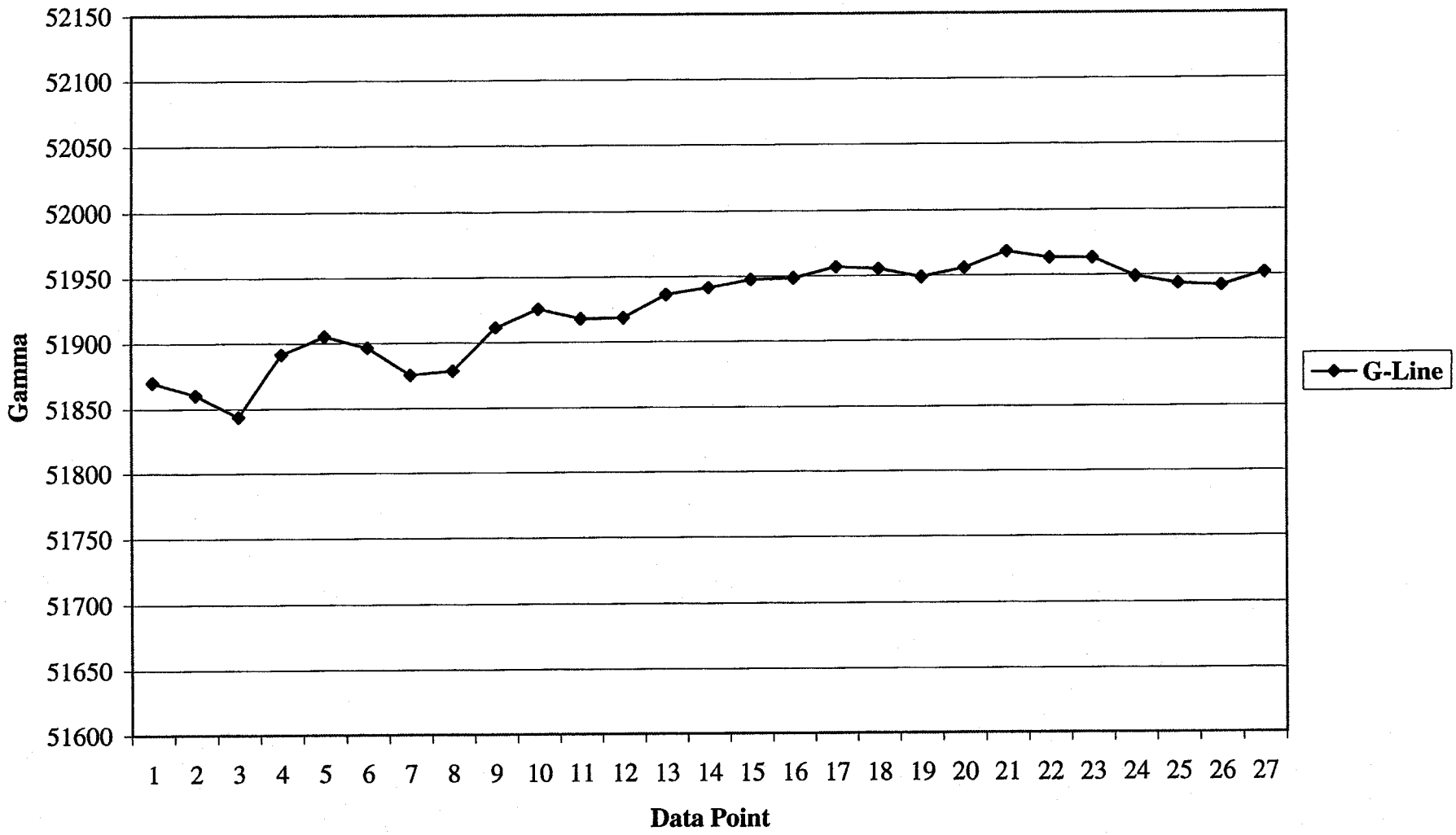


Figure 9
H-Line Graph

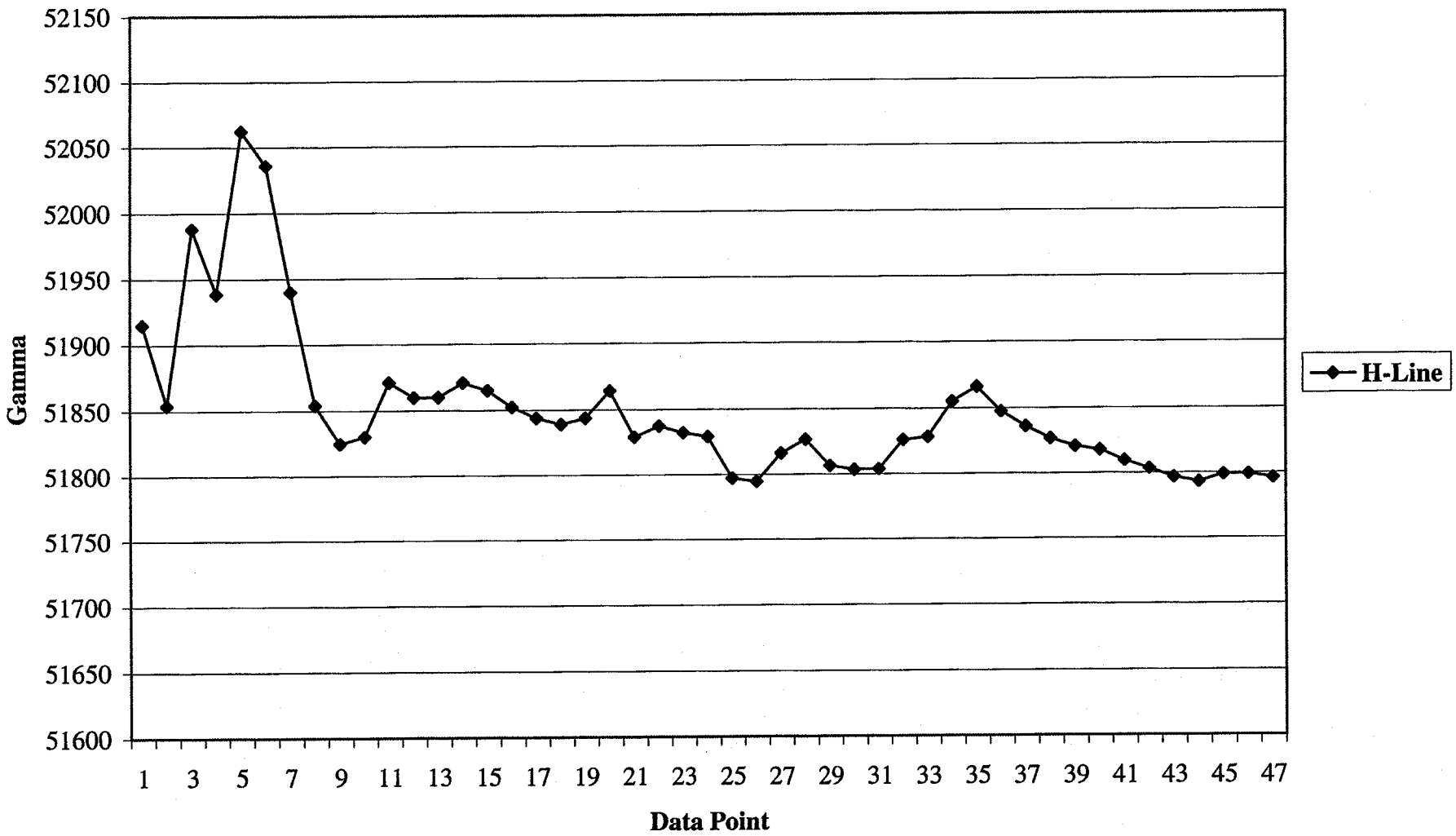


Figure 10
I-Line Graph

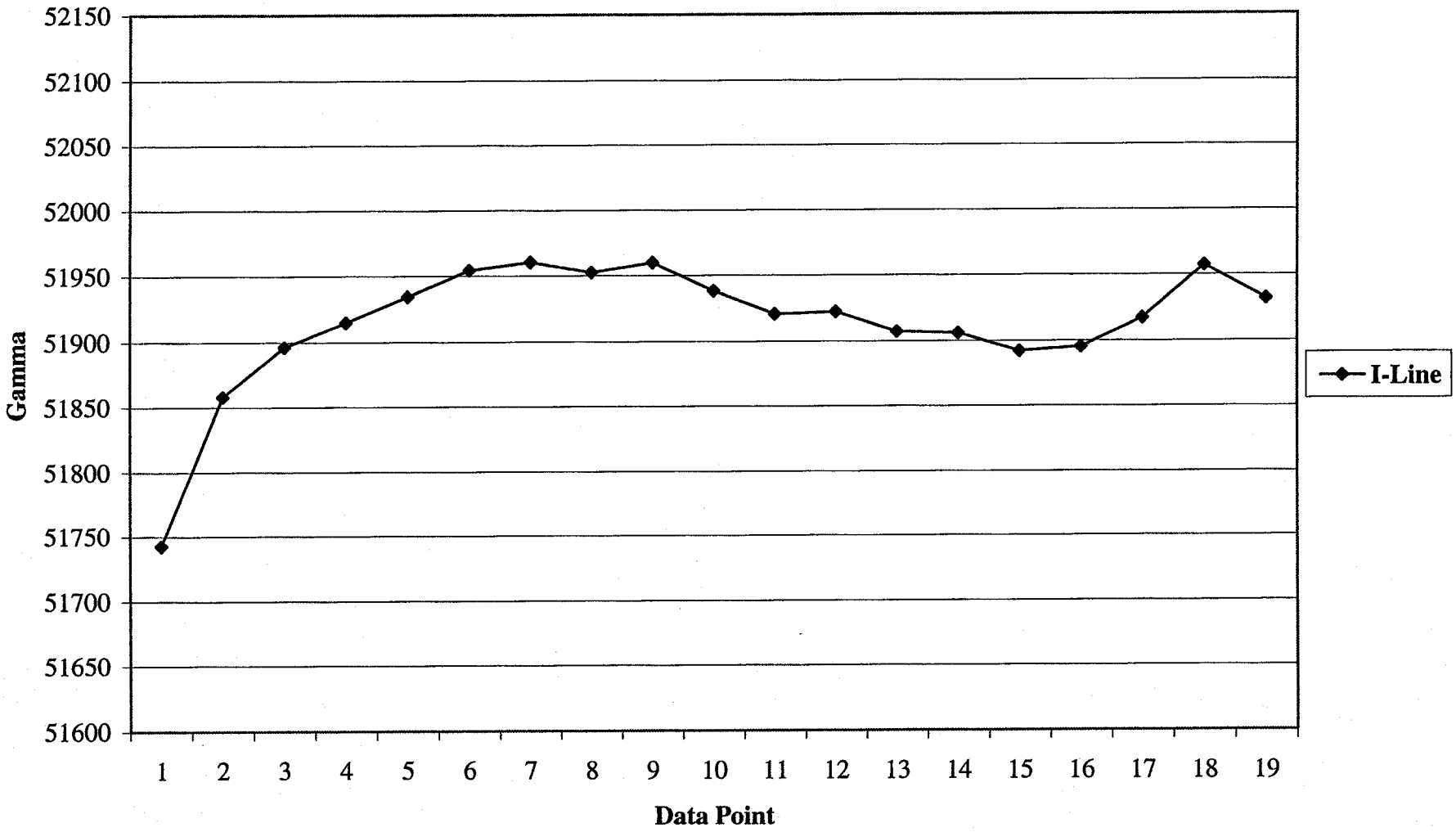
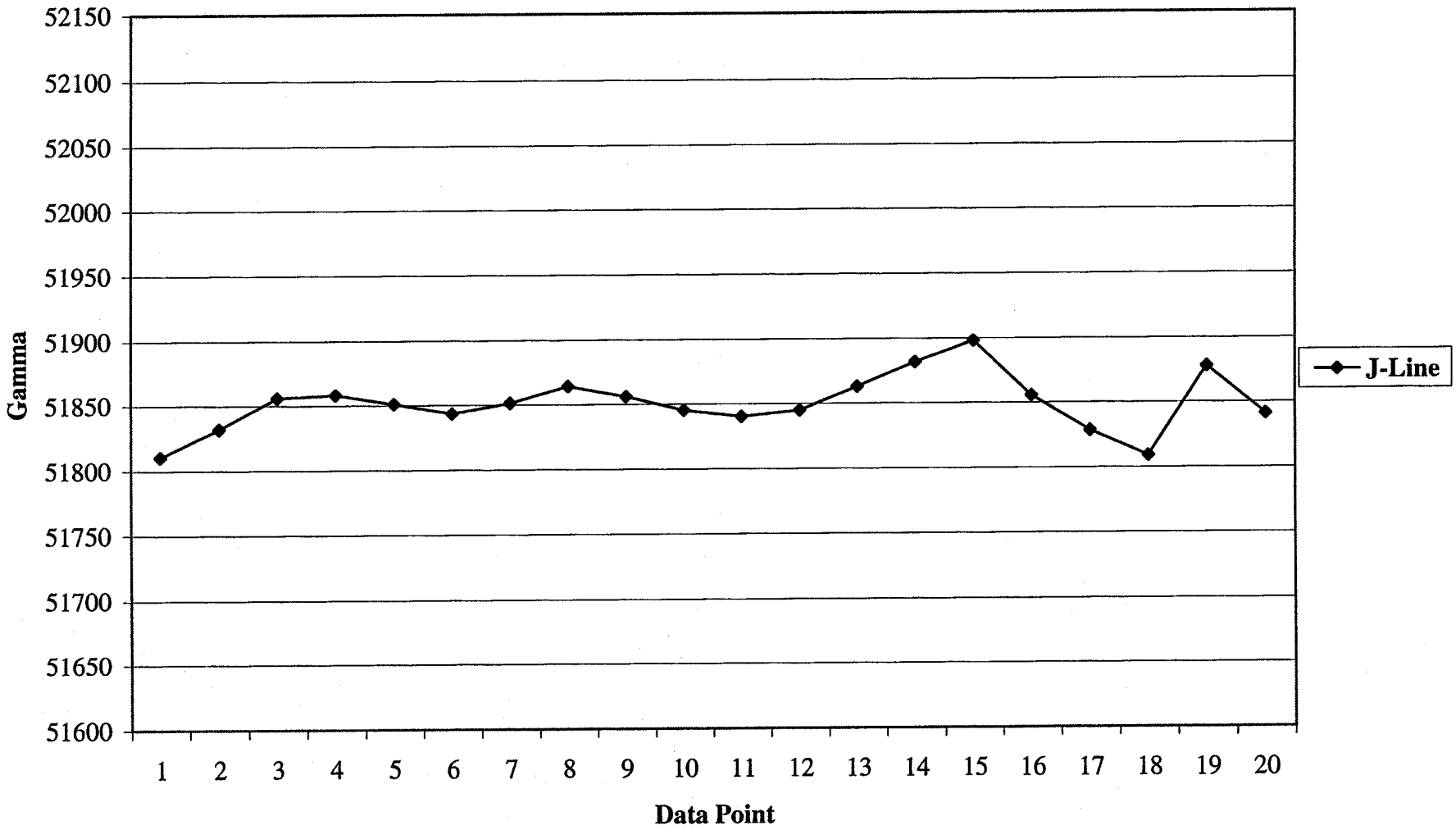


Figure 11
J-Line Graph



PHOTOGRAPHS

MRR of High Point, LLC
Outcrop Photographs

Photograph 1 – Operation of the portable G-856AX Proton Precession Magnetometer.

Photograph 2 – Diabase dike was taken in the stream bed near the southwest border of the property, near the fenced in area which can be seen on topographic map. Trend of dike is ~N5°E. Photograph is viewed to the north.

Photograph 3 – Diabase dike in granite in creek at southwest border of property. Photograph is viewed to the northeast.

Photograph 4 – Mafic dike in granite on hillside approximately 150 feet North of stream and the southwest border of property. This dike, which is approximately 200 feet downstream of **Photograph 3**, was traced for approximately 200 feet. Photograph is viewed to the north.

DRAWING

Photograph 5 – Diabase dike sets in streambed at southwest border of property. Photograph is viewed to the north.

Photograph 6 – Diabase dike set at the southwest border of the property. Photograph is viewed to the south.

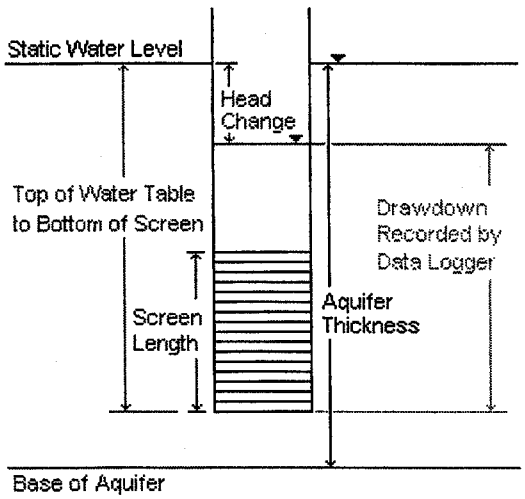
APPENDIX 5

Single Well Aquifer (Slug) Test Results

Bouwer and Rice Graphical Method
(Full or Partial Penetration)

See Also:
Excluding Points from Analysis
Text Boxes

The Bouwer and Rice method applies to the aquifer scenario shown in the figure.



The aquifer can be either fully penetrated or partially penetrated by the screened portion of the well. The Bouwer and Rice method is designed for unconfined aquifer scenario's, however use in confined or leaky aquifer scenario's can give reasonable estimates of hydraulic conductivity.

Value Substitutions:

In some aquifer scenario's, the Bouwer and Rice formula will result in taking the logarithm of a negative number. The following value substitutions will be made to prevent this occurrence.

1. If the distance from the top of the water table to the bottom of the well screen is greater that the aquifer saturated thickness (screen penetrates below the base of the aquifer), the aquifer saturated thickness is used for the distance from the top of the water table to the bottom of the well screen.

2. If the screen length is greater that the distance from the top of the water table to the bottom of the well screen (screen sticks above the water table), then the top of the water table to the bottom of the well screen is used for the screen length.

3. If the screen length is greater than the aquifer saturated thickness, the aquifer saturated thickness is used for the value of screen length.

Hydraulic conductivity is determined with the equation:

Equation 1

$$k = \frac{r_c^2 \ln(R_e/r_w)}{2L_{scr}} \cdot \frac{1}{t} \cdot \ln\left(\frac{H_o}{H_t}\right)$$

Where:

k = aquifer hydraulic conductivity

r_c = radius of the well casing

t = time since slug removal or injection

H_t = head in the well at time t

H_o = initial head change from static water level

R_e = radius of influence of the test

r_w = effective radius of the well (radius of well and gravel pack

L_{scr} = length of the well screen or open hole

ln(Re/rw) is determined with one of the equations below:

Equation 2

For partially penetrating wells:

$$\ln\left(\frac{R_e}{r_w}\right) = \left[\frac{1.1}{\ln(Z/r_w)} + \frac{A + B \cdot \ln[(D-Z)/r_w]}{(L_{scr}/r_w)}\right]^{-1}$$

Equation 3

For fully penetrating wells:

$$\ln\left(\frac{R_e}{r_w}\right) = \left[\frac{1.1}{\ln(Z/r_w)} + \frac{C}{L_{scr}/r_w}\right]^{-1}$$

Where:

Z = the distance from the water table to the bottom of the well screen or open hole

D = the aquifer thickness

A, B, and C are determined from a graph determined by Bouwer and Rice.

Determining Partial or Full Penetration

Equation 2 is used for partially penetrating wells, and Equation 3 is used for wells that fully penetrate the aquifer.

Super Slug automatically determines if the well is fully or partially penetrating and selects the proper parameters. If the well is greater than 95% fully penetrating, Super Slug will assume full penetration and use Equation 3.

The Graphical Method

Super Slug plots a graph of the log of head ratio (Ht/Ho) on the vertical axis, and the time on the horizontal axis. A straight line is fit through the data points. The slope and the intercept of the line are used to calculate the time for a head ratio of 0.01. The calculated time, the head ratio 0.01, and the other variables described above are used in Equation 1 to determine hydraulic conductivity.

Note that equation 1 uses a head ratio calculated as Ho/Ht. All other methods and graphs (including the Bouwer and Rice graph) use a head ratio calculated as Ht/Ho.

When the graphical method is selected, two pairs of arrow buttons will appear at the bottom of the screen. These buttons are used to control which data points are included in the best fit analysis.

Excluding Data Points

For the end of the test:

- Data adjustments for the end of the test are controlled by the arrow buttons in the lower right corner of the screen.
- The up arrow key and right arrow button increase the number of points to which the line is fit.
- The down arrow key and left arrow button decrease the number of points to which the line is fit.

For the beginning of the test

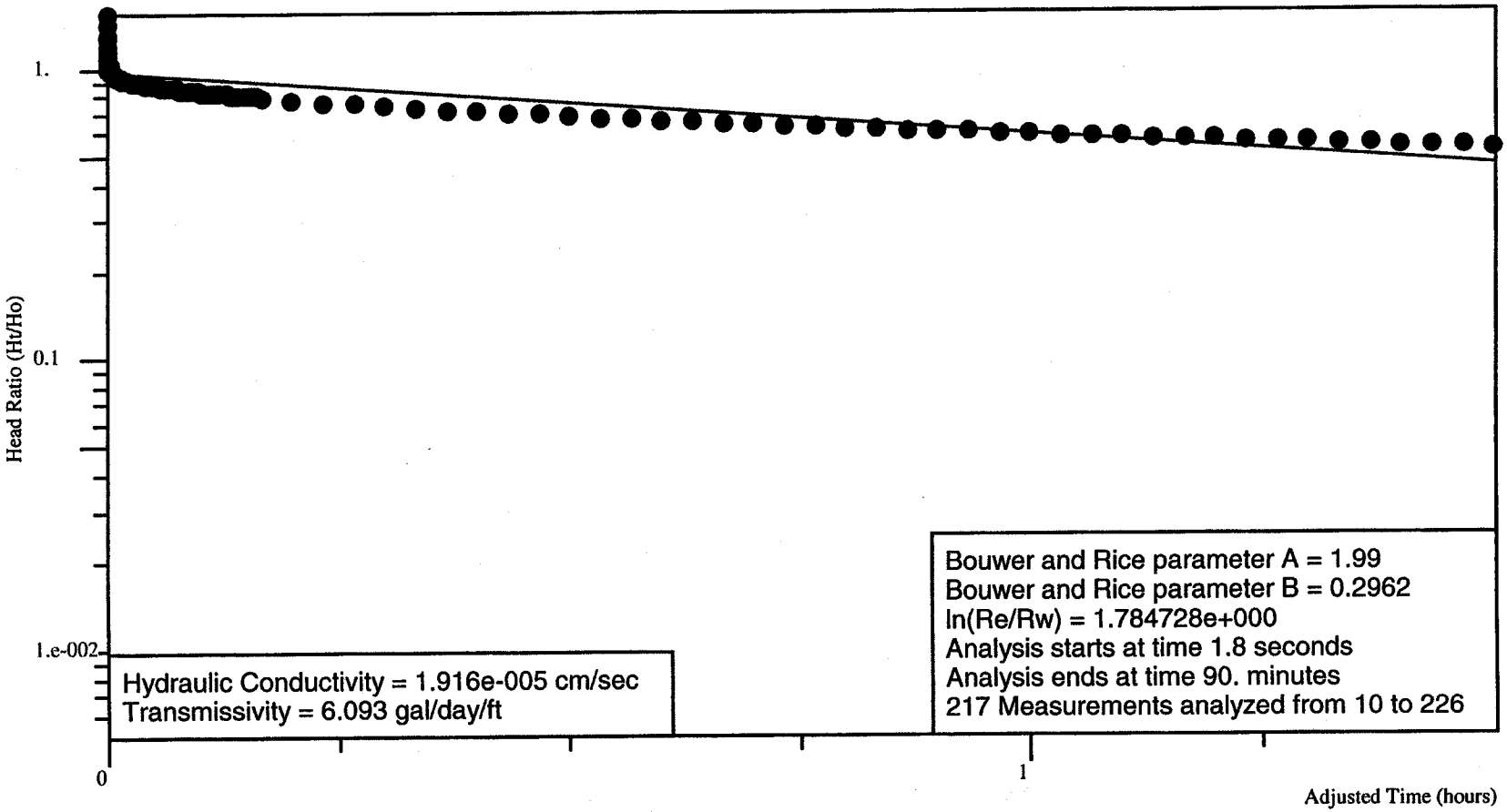
- Data adjustments for the beginning of the test are controlled by the arrow buttons in the lower left corner of the screen.
- Use shift-up arrow key or the left arrow to increase the number of points to which the line is fit.
- Use shift-down arrow key or the right arrow to decrease the number of points to which the line is fit.

Aquifer Analysis March 21, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-2 (Rising)



Ho is 1.536 feet at 1.8 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: March 21, 2002
Project Number: 600.04
Import File: C:\Documents and Settings\jdeem\My Documents\P-2RH

Well Label: P-2 (Rising)
Aquifer Thickness: 15. feet
Screen Length: 5. feet
Casing Radius: 1.888 inches
Effective Radius: 4.125 inches
Static Water Level: 2.71 feet
Water Table to Screen Bottom: 7.29 feet
Anisotropy Ratio: 1.
Time Adjustment: 1.8 Seconds
Test starts with trial 2
There are 226 time and drawdown measurements
Maximum head is 3.838 feet
Minimum head is -2.4e-002 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-3.e-002	3.236	0.526	0.1371
2	3.3e-003	-2.67e-002	4.999	2.289	0.5964
3	6.6e-003	-2.34e-002	6.548	3.838	1.
4	1.e-002	-2.e-002	5.516	2.806	0.7311
5	1.33e-002	-1.67e-002	2.686	-2.4e-002	-6.253e-003
6	1.66e-002	-1.34e-002	4.118	1.408	0.3669
7	2.e-002	-1.e-002	5.909	3.199	0.8335
8	2.33e-002	-6.7e-003	5.17	2.46	0.641
9	2.66e-002	-3.4e-003	3.919	1.209	0.315
10	3.e-002	0.	4.246	1.536	0.4002
11	3.33e-002	3.3e-003	5.056	2.346	0.6113
12	3.66e-002	6.6e-003	4.876	2.166	0.5644
13	4.e-002	1.e-002	4.293	1.583	0.4125
14	4.33e-002	1.33e-002	4.35	1.64	0.4273
15	4.66e-002	1.66e-002	4.715	2.005	0.5224
16	5.e-002	2.e-002	4.682	1.972	0.5138
17	5.33e-002	2.33e-002	4.416	1.706	0.4445
18	5.66e-002	2.66e-002	4.407	1.697	0.4422
19	6.e-002	3.e-002	4.563	1.853	0.4828
20	6.33e-002	3.33e-002	4.563	1.853	0.4828
21	6.66e-002	3.66e-002	4.445	1.735	0.4521
22	7.e-002	4.e-002	4.421	1.711	0.4458
23	7.33e-002	4.33e-002	4.487	1.777	0.463
24	7.66e-002	4.66e-002	4.497	1.787	0.4656
25	8.e-002	5.e-002	4.435	1.725	0.4495
26	8.33e-002	5.33e-002	4.416	1.706	0.4445
27	8.66e-002	5.66e-002	4.445	1.735	0.4521
28	9.e-002	6.e-002	4.445	1.735	0.4521
29	9.33e-002	6.33e-002	4.416	1.706	0.4445
30	9.66e-002	6.66e-002	4.402	1.692	0.4409
31	0.1	7.e-002	4.412	1.702	0.4435

32	0.1033	7.33e-002	4.412	1.702	0.4435
33	0.1066	7.66e-002	4.397	1.687	0.4396
34	0.11	8.e-002	4.388	1.678	0.4372
35	0.1133	8.33e-002	4.388	1.678	0.4372
36	0.1166	8.66e-002	4.388	1.678	0.4372
37	0.12	9.e-002	4.378	1.668	0.4346
38	0.1233	9.33e-002	4.374	1.664	0.4336
39	0.1266	9.66e-002	4.369	1.659	0.4323
40	0.13	0.1	4.369	1.659	0.4323
41	0.1333	0.1033	4.359	1.649	0.4297
42	0.1366	0.1066	4.355	1.645	0.4286
43	0.14	0.11	4.355	1.645	0.4286
44	0.1433	0.1133	4.35	1.64	0.4273
45	0.1466	0.1166	4.345	1.635	0.426
46	0.15	0.12	4.34	1.63	0.4247
47	0.1533	0.1233	4.34	1.63	0.4247
48	0.1566	0.1266	4.336	1.626	0.4237
49	0.16	0.13	4.331	1.621	0.4224
50	0.1633	0.1333	4.326	1.616	0.4211
51	0.1666	0.1366	4.322	1.612	0.42
52	0.17	0.14	4.322	1.612	0.42
53	0.1733	0.1433	4.317	1.607	0.4187
54	0.1766	0.1466	4.312	1.602	0.4174
55	0.18	0.15	4.312	1.602	0.4174
56	0.1833	0.1533	4.307	1.597	0.4161
57	0.1866	0.1566	4.307	1.597	0.4161
58	0.19	0.16	4.303	1.593	0.4151
59	0.1933	0.1633	4.298	1.588	0.4138
60	0.1966	0.1666	4.298	1.588	0.4138
61	0.2	0.17	4.293	1.583	0.4125
62	0.2033	0.1733	4.293	1.583	0.4125
63	0.2066	0.1766	4.288	1.578	0.4112
64	0.21	0.18	4.288	1.578	0.4112
65	0.2133	0.1833	4.284	1.574	0.4101
66	0.2166	0.1866	4.284	1.574	0.4101
67	0.22	0.19	4.279	1.569	0.4088
68	0.2233	0.1933	4.279	1.569	0.4088
69	0.2266	0.1966	4.274	1.564	0.4075
70	0.23	0.2	4.274	1.564	0.4075
71	0.2333	0.2033	4.269	1.559	0.4062
72	0.2366	0.2066	4.269	1.559	0.4062
73	0.24	0.21	4.265	1.555	0.4052
74	0.2433	0.2133	4.265	1.555	0.4052
75	0.2466	0.2166	4.26	1.55	0.4039
76	0.25	0.22	4.26	1.55	0.4039
77	0.2533	0.2233	4.26	1.55	0.4039
78	0.2566	0.2266	4.26	1.55	0.4039
79	0.26	0.23	4.255	1.545	0.4026
80	0.2633	0.2333	4.255	1.545	0.4026
81	0.2666	0.2366	4.25	1.54	0.4013
82	0.27	0.24	4.25	1.54	0.4013
83	0.2733	0.2433	4.246	1.536	0.4002
84	0.2766	0.2466	4.246	1.536	0.4002

85	0.28	0.25	4.246	1.536	0.4002
86	0.2833	0.2533	4.241	1.531	0.3989
87	0.2866	0.2566	4.241	1.531	0.3989
88	0.29	0.26	4.241	1.531	0.3989
89	0.2933	0.2633	4.241	1.531	0.3989
90	0.2966	0.2666	4.236	1.526	0.3976
91	0.3	0.27	4.236	1.526	0.3976
92	0.3033	0.2733	4.236	1.526	0.3976
93	0.3066	0.2766	4.236	1.526	0.3976
94	0.31	0.28	4.231	1.521	0.3963
95	0.3133	0.2833	4.231	1.521	0.3963
96	0.3166	0.2866	4.231	1.521	0.3963
97	0.32	0.29	4.227	1.517	0.3953
98	0.3233	0.2933	4.227	1.517	0.3953
99	0.3266	0.2966	4.227	1.517	0.3953
100	0.33	0.3	4.222	1.512	0.394
101	0.3333	0.3033	4.222	1.512	0.394
102	0.35	0.32	4.217	1.507	0.3927
103	0.3666	0.3366	4.212	1.502	0.3913
104	0.3833	0.3533	4.208	1.498	0.3903
105	0.4	0.37	4.203	1.493	0.389
106	0.4166	0.3866	4.194	1.484	0.3867
107	0.4333	0.4033	4.194	1.484	0.3867
108	0.45	0.42	4.189	1.479	0.3854
109	0.4666	0.4366	4.184	1.474	0.3841
110	0.4833	0.4533	4.179	1.469	0.3828
111	0.5	0.47	4.179	1.469	0.3828
112	0.5166	0.4866	4.175	1.465	0.3817
113	0.5333	0.5033	4.17	1.46	0.3804
114	0.55	0.52	4.17	1.46	0.3804
115	0.5666	0.5366	4.165	1.455	0.3791
116	0.5833	0.5533	4.165	1.455	0.3791
117	0.6	0.57	4.16	1.45	0.3778
118	0.6166	0.5866	4.16	1.45	0.3778
119	0.6333	0.6033	4.16	1.45	0.3778
120	0.65	0.62	4.156	1.446	0.3768
121	0.6666	0.6366	4.156	1.446	0.3768
122	0.6833	0.6533	4.151	1.441	0.3755
123	0.7	0.67	4.151	1.441	0.3755
124	0.7166	0.6866	4.151	1.441	0.3755
125	0.7333	0.7033	4.146	1.436	0.3742
126	0.75	0.72	4.146	1.436	0.3742
127	0.7666	0.7366	4.141	1.431	0.3729
128	0.7833	0.7533	4.141	1.431	0.3729
129	0.8	0.77	4.141	1.431	0.3729
130	0.8166	0.7866	4.137	1.427	0.3718
131	0.8333	0.8033	4.137	1.427	0.3718
132	0.85	0.82	4.137	1.427	0.3718
133	0.8666	0.8366	4.137	1.427	0.3718
134	0.8833	0.8533	4.132	1.422	0.3705
135	0.9	0.87	4.132	1.422	0.3705
136	0.9166	0.8866	4.132	1.422	0.3705
137	0.9333	0.9033	4.132	1.422	0.3705

138	0.95	0.92	4.127	1.417	0.3692
139	0.9666	0.9366	4.127	1.417	0.3692
140	0.9833	0.9533	4.127	1.417	0.3692
141	1.	0.97	4.127	1.417	0.3692
142	1.2	1.17	4.113	1.403	0.3656
143	1.4	1.37	4.103	1.393	0.3629
144	1.6	1.57	4.099	1.389	0.3619
145	1.8	1.77	4.089	1.379	0.3593
146	2.	1.97	4.085	1.375	0.3583
147	2.2	2.17	4.08	1.37	0.357
148	2.4	2.37	4.075	1.365	0.3557
149	2.6	2.57	4.066	1.356	0.3533
150	2.8	2.77	4.061	1.351	0.352
151	3.	2.97	4.056	1.346	0.3507
152	3.2	3.17	4.051	1.341	0.3494
153	3.4	3.37	4.047	1.337	0.3484
154	3.6	3.57	4.042	1.332	0.3471
155	3.8	3.77	4.037	1.327	0.3458
156	4.	3.97	4.032	1.322	0.3445
157	4.2	4.17	4.028	1.318	0.3434
158	4.4	4.37	4.023	1.313	0.3421
159	4.6	4.57	4.018	1.308	0.3408
160	4.8	4.77	4.013	1.303	0.3395
161	5.	4.97	4.013	1.303	0.3395
162	5.2	5.17	4.009	1.299	0.3385
163	5.4	5.37	4.004	1.294	0.3372
164	5.6	5.57	3.999	1.289	0.3359
165	5.8	5.77	3.999	1.289	0.3359
166	6.	5.97	3.994	1.284	0.3345
167	6.2	6.17	3.99	1.28	0.3335
168	6.4	6.37	3.985	1.275	0.3322
169	6.6	6.57	3.985	1.275	0.3322
170	6.8	6.77	3.98	1.27	0.3309
171	7.	6.97	3.975	1.265	0.3296
172	7.2	7.17	3.975	1.265	0.3296
173	7.4	7.37	3.971	1.261	0.3286
174	7.6	7.57	3.971	1.261	0.3286
175	7.8	7.77	3.966	1.256	0.3273
176	8.	7.97	3.961	1.251	0.326
177	8.2	8.17	3.961	1.251	0.326
178	8.4	8.37	3.957	1.247	0.3249
179	8.6	8.57	3.952	1.242	0.3236
180	8.8	8.77	3.947	1.237	0.3223
181	9.	8.97	3.947	1.237	0.3223
182	9.2	9.17	3.942	1.232	0.321
183	9.4	9.37	3.942	1.232	0.321
184	9.6	9.57	3.938	1.228	0.32
185	9.8	9.77	3.938	1.228	0.32
186	10.	9.97	3.933	1.223	0.3187
187	12.	11.97	3.909	1.199	0.3124
188	14.	13.97	3.885	1.175	0.3061
189	16.	15.97	3.866	1.156	0.3012
190	18.	17.97	3.848	1.138	0.2965

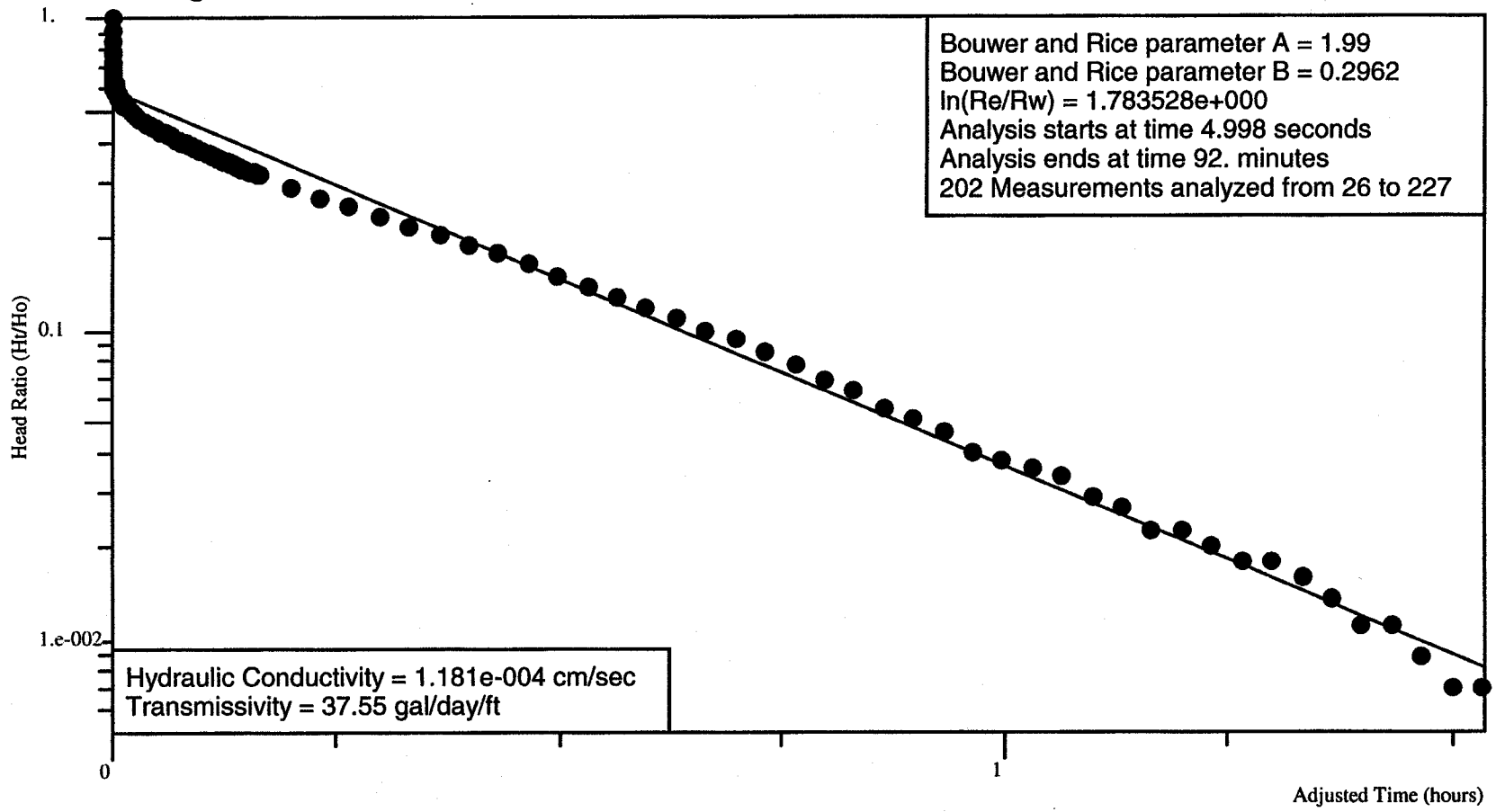
191	20.	19.97	3.829	1.119	0.2916
192	22.	21.97	3.814	1.104	0.2876
193	24.	23.97	3.8	1.09	0.284
194	26.	25.97	3.786	1.076	0.2804
195	28.	27.97	3.772	1.062	0.2767
196	30.	29.97	3.757	1.047	0.2728
197	32.	31.97	3.743	1.033	0.2692
198	34.	33.97	3.734	1.024	0.2668
199	36.	35.97	3.72	1.01	0.2632
200	38.	37.97	3.715	1.005	0.2619
201	40.	39.97	3.701	0.991	0.2582
202	42.	41.97	3.691	0.981	0.2556
203	44.	43.97	3.682	0.972	0.2533
204	46.	45.97	3.672	0.962	0.2507
205	48.	47.97	3.663	0.953	0.2483
206	50.	49.97	3.653	0.943	0.2457
207	52.	51.97	3.644	0.934	0.2434
208	54.	53.97	3.639	0.929	0.2421
209	56.	55.97	3.629	0.919	0.2394
210	58.	57.97	3.62	0.91	0.2371
211	60.	59.97	3.615	0.905	0.2358
212	62.	61.97	3.606	0.896	0.2335
213	64.	63.97	3.601	0.891	0.2322
214	66.	65.97	3.592	0.882	0.2298
215	68.	67.97	3.587	0.877	0.2285
216	70.	69.97	3.582	0.872	0.2272
217	72.	71.97	3.573	0.863	0.2249
218	74.	73.97	3.568	0.858	0.2236
219	76.	75.97	3.558	0.848	0.2209
220	78.	77.97	3.554	0.844	0.2199
221	80.	79.97	3.549	0.839	0.2186
222	82.	81.97	3.544	0.834	0.2173
223	84.	83.97	3.535	0.825	0.215
224	86.	85.97	3.53	0.82	0.2137
225	88.	87.97	3.525	0.815	0.2124
226	90.	89.97	3.516	0.806	0.21

Aquifer Analysis March 21, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-2 (Falling)



Ho is 2.15 feet at 4.998 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: March 21, 2002
Project Number: 600.04
Import File: C:\Documents and Settings\jdeem\My Documents\P-2FH

Well Label: P-2 (Falling)
Aquifer Thickness: 15. feet
Screen Length: 5. feet
Casing Radius: 1.888 inches
Effective Radius: 4.125 inches
Static Water Level: 2.73 feet
Water Table to Screen Bottom: 7.27 feet
Anisotropy Ratio: 1.
Time Adjustment: 4.998 Seconds
Test starts with trial 25
There are 227 time and drawdown measurements
Maximum head is 2.15 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-8.33e-002	2.668	6.2e-002	2.884e-002
2	3.3e-003	-8.e-002	2.16	0.57	0.2651
3	6.6e-003	-7.67e-002	1.23	1.5	0.6977
4	1.e-002	-7.33e-002	1.031	1.699	0.7902
5	1.33e-002	-7.e-002	0.931	1.799	0.8367
6	1.66e-002	-6.67e-002	1.937	0.793	0.3688
7	2.e-002	-6.33e-002	1.572	1.158	0.5386
8	2.33e-002	-6.e-002	1.695	1.035	0.4814
9	2.66e-002	-5.67e-002	1.553	1.177	0.5474
10	3.e-002	-5.33e-002	1.131	1.599	0.7437
11	3.33e-002	-5.e-002	1.377	1.353	0.6293
12	3.66e-002	-4.67e-002	0.95	1.78	0.8279
13	4.e-002	-4.33e-002	1.268	1.462	0.68
14	4.33e-002	-4.e-002	1.529	1.201	0.5586
15	4.66e-002	-3.67e-002	0.737	1.993	0.927
16	5.e-002	-3.33e-002	0.974	1.756	0.8167
17	5.33e-002	-3.e-002	1.031	1.699	0.7902
18	5.66e-002	-2.67e-002	0.76	1.97	0.9163
19	6.e-002	-2.33e-002	0.656	2.074	0.9647
20	6.33e-002	-2.e-002	1.558	1.172	0.5451
21	6.66e-002	-1.67e-002	1.615	1.115	0.5186
22	7.e-002	-1.33e-002	1.501	1.229	0.5716
23	7.33e-002	-1.e-002	1.14	1.59	0.7395
24	7.66e-002	-6.7e-003	0.879	1.851	0.8609
25	8.e-002	-3.3e-003	0.722	2.008	0.934
26	8.33e-002	0.	0.58	2.15	1.
27	8.66e-002	3.3e-003	0.741	1.989	0.9251
28	9.e-002	6.7e-003	0.898	1.832	0.8521
29	9.33e-002	1.e-002	1.083	1.647	0.766
30	9.66e-002	1.33e-002	1.301	1.429	0.6647
31	0.1	1.67e-002	1.392	1.338	0.6223

32	0.1033	2.e-002	1.401	1.329	0.6181
33	0.1066	2.33e-002	1.306	1.424	0.6623
34	0.11	2.67e-002	1.392	1.338	0.6223
35	0.1133	3.e-002	1.169	1.561	0.726
36	0.1166	3.33e-002	1.045	1.685	0.7837
37	0.12	3.67e-002	1.083	1.647	0.766
38	0.1233	4.e-002	1.192	1.538	0.7153
39	0.1266	4.33e-002	1.235	1.495	0.6953
40	0.13	4.67e-002	1.164	1.566	0.7284
41	0.1333	5.e-002	1.401	1.329	0.6181
42	0.1366	5.33e-002	1.453	1.277	0.594
43	0.14	5.67e-002	1.396	1.334	0.6205
44	0.1433	6.e-002	1.297	1.433	0.6665
45	0.1466	6.33e-002	1.197	1.533	0.713
46	0.15	6.67e-002	1.178	1.552	0.7219
47	0.1533	7.e-002	1.211	1.519	0.7065
48	0.1566	7.33e-002	1.273	1.457	0.6777
49	0.16	7.67e-002	1.339	1.391	0.647
50	0.1633	8.e-002	1.354	1.376	0.64
51	0.1666	8.33e-002	1.32	1.41	0.6558
52	0.17	8.67e-002	1.278	1.452	0.6753
53	0.1733	9.e-002	1.259	1.471	0.6842
54	0.1766	9.33e-002	1.273	1.457	0.6777
55	0.18	9.67e-002	1.306	1.424	0.6623
56	0.1833	0.1	1.33	1.4	0.6512
57	0.1866	0.1033	1.335	1.395	0.6488
58	0.19	0.1067	1.325	1.405	0.6535
59	0.1933	0.11	1.316	1.414	0.6577
60	0.1966	0.1133	1.316	1.414	0.6577
61	0.2	0.1167	1.32	1.41	0.6558
62	0.2033	0.12	1.335	1.395	0.6488
63	0.2066	0.1233	1.344	1.386	0.6447
64	0.21	0.1267	1.344	1.386	0.6447
65	0.2133	0.13	1.344	1.386	0.6447
66	0.2166	0.1333	1.344	1.386	0.6447
67	0.22	0.1367	1.344	1.386	0.6447
68	0.2233	0.14	1.349	1.381	0.6423
69	0.2266	0.1433	1.358	1.372	0.6381
70	0.23	0.1467	1.358	1.372	0.6381
71	0.2333	0.15	1.363	1.367	0.6358
72	0.2366	0.1533	1.363	1.367	0.6358
73	0.24	0.1567	1.368	1.362	0.6335
74	0.2433	0.16	1.368	1.362	0.6335
75	0.2466	0.1633	1.373	1.357	0.6312
76	0.25	0.1667	1.377	1.353	0.6293
77	0.2533	0.17	1.377	1.353	0.6293
78	0.2566	0.1733	1.382	1.348	0.627
79	0.26	0.1767	1.382	1.348	0.627
80	0.2633	0.18	1.387	1.343	0.6247
81	0.2666	0.1833	1.387	1.343	0.6247
82	0.27	0.1867	1.392	1.338	0.6223
83	0.2733	0.19	1.396	1.334	0.6205
84	0.2766	0.1933	1.396	1.334	0.6205

85	0.28	0.1967	1.396	1.334	0.6205
86	0.2833	0.2	1.401	1.329	0.6181
87	0.2866	0.2033	1.401	1.329	0.6181
88	0.29	0.2067	1.406	1.324	0.6158
89	0.2933	0.21	1.406	1.324	0.6158
90	0.2966	0.2133	1.411	1.319	0.6135
91	0.3	0.2167	1.411	1.319	0.6135
92	0.3033	0.22	1.415	1.315	0.6116
93	0.3066	0.2233	1.415	1.315	0.6116
94	0.31	0.2267	1.42	1.31	0.6093
95	0.3133	0.23	1.42	1.31	0.6093
96	0.3166	0.2333	1.42	1.31	0.6093
97	0.32	0.2367	1.425	1.305	0.607
98	0.3233	0.24	1.425	1.305	0.607
99	0.3266	0.2433	1.43	1.3	0.6047
100	0.33	0.2467	1.43	1.3	0.6047
101	0.3333	0.25	1.43	1.3	0.6047
102	0.35	0.2667	1.444	1.286	0.5981
103	0.3666	0.2833	1.453	1.277	0.594
104	0.3833	0.3	1.458	1.272	0.5916
105	0.4	0.3167	1.468	1.262	0.587
106	0.4166	0.3333	1.477	1.253	0.5828
107	0.4333	0.35	1.482	1.248	0.5805
108	0.45	0.3667	1.482	1.248	0.5805
109	0.4666	0.3833	1.491	1.239	0.5763
110	0.4833	0.4	1.501	1.229	0.5716
111	0.5	0.4167	1.506	1.224	0.5693
112	0.5166	0.4333	1.52	1.21	0.5628
113	0.5333	0.45	1.515	1.215	0.5651
114	0.55	0.4667	1.515	1.215	0.5651
115	0.5666	0.4833	1.525	1.205	0.5605
116	0.5833	0.5	1.529	1.201	0.5586
117	0.6	0.5167	1.534	1.196	0.5563
118	0.6166	0.5333	1.539	1.191	0.554
119	0.6333	0.55	1.544	1.186	0.5516
120	0.65	0.5667	1.544	1.186	0.5516
121	0.6666	0.5833	1.548	1.182	0.5498
122	0.6833	0.6	1.553	1.177	0.5474
123	0.7	0.6167	1.553	1.177	0.5474
124	0.7166	0.6333	1.558	1.172	0.5451
125	0.7333	0.65	1.562	1.168	0.5433
126	0.75	0.6667	1.562	1.168	0.5433
127	0.7666	0.6833	1.567	1.163	0.5409
128	0.7833	0.7	1.572	1.158	0.5386
129	0.8	0.7167	1.572	1.158	0.5386
130	0.8166	0.7333	1.577	1.153	0.5363
131	0.8333	0.75	1.577	1.153	0.5363
132	0.85	0.7667	1.581	1.149	0.5344
133	0.8666	0.7833	1.581	1.149	0.5344
134	0.8833	0.8	1.586	1.144	0.5321
135	0.9	0.8167	1.586	1.144	0.5321
136	0.9166	0.8333	1.591	1.139	0.5298
137	0.9333	0.85	1.596	1.134	0.5274

138	0.95	0.8667	1.596	1.134	0.5274
139	0.9666	0.8833	1.596	1.134	0.5274
140	0.9833	0.9	1.6	1.13	0.5256
141	1.	0.9167	1.6	1.13	0.5256
142	1.2	1.117	1.634	1.096	0.5098
143	1.4	1.317	1.653	1.077	0.5009
144	1.6	1.517	1.672	1.058	0.4921
145	1.8	1.717	1.691	1.039	0.4833
146	2.	1.917	1.71	1.02	0.4744
147	2.2	2.117	1.724	1.006	0.4679
148	2.4	2.317	1.738	0.992	0.4614
149	2.6	2.517	1.748	0.982	0.4567
150	2.8	2.717	1.762	0.968	0.4502
151	3.	2.917	1.771	0.959	0.446
152	3.2	3.117	1.785	0.945	0.4395
153	3.4	3.317	1.795	0.935	0.4349
154	3.6	3.517	1.809	0.921	0.4284
155	3.8	3.717	1.819	0.911	0.4237
156	4.	3.917	1.828	0.902	0.4195
157	4.2	4.117	1.838	0.892	0.4149
158	4.4	4.317	1.847	0.883	0.4107
159	4.6	4.517	1.857	0.873	0.406
160	4.8	4.717	1.866	0.864	0.4019
161	5.	4.917	1.876	0.854	0.3972
162	5.2	5.117	1.885	0.845	0.393
163	5.4	5.317	1.895	0.835	0.3884
164	5.6	5.517	1.904	0.826	0.3842
165	5.8	5.717	1.909	0.821	0.3819
166	6.	5.917	1.918	0.812	0.3777
167	6.2	6.117	1.928	0.802	0.373
168	6.4	6.317	1.933	0.797	0.3707
169	6.6	6.517	1.942	0.788	0.3665
170	6.8	6.717	1.952	0.778	0.3619
171	7.	6.917	1.956	0.774	0.36
172	7.2	7.117	1.966	0.764	0.3553
173	7.4	7.317	1.971	0.759	0.353
174	7.6	7.517	1.98	0.75	0.3488
175	7.8	7.717	1.985	0.745	0.3465
176	8.	7.917	1.994	0.736	0.3423
177	8.2	8.117	1.999	0.731	0.34
178	8.4	8.317	2.004	0.726	0.3377
179	8.6	8.517	2.013	0.717	0.3335
180	8.8	8.717	2.018	0.712	0.3312
181	9.	8.917	2.023	0.707	0.3288
182	9.2	9.117	2.032	0.698	0.3247
183	9.4	9.317	2.037	0.693	0.3223
184	9.6	9.517	2.042	0.688	0.32
185	9.8	9.717	2.046	0.684	0.3181
186	10.	9.917	2.056	0.674	0.3135
187	12.	11.92	2.108	0.622	0.2893
188	14.	13.92	2.156	0.574	0.267
189	16.	15.92	2.194	0.536	0.2493
190	18.	17.92	2.231	0.499	0.2321

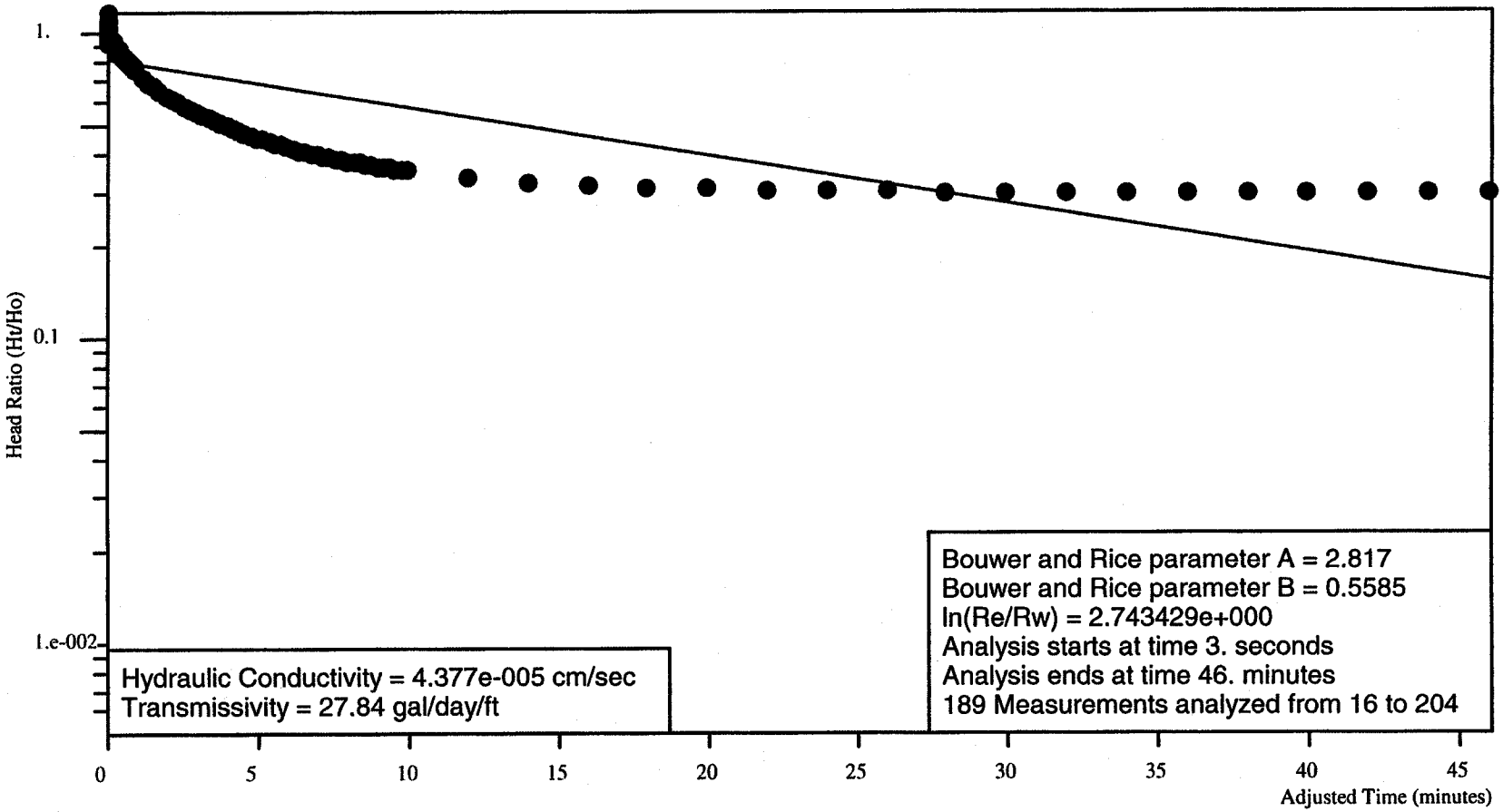
191	20.	19.92	2.265	0.465	0.2163
192	22.	21.92	2.298	0.432	0.2009
193	24.	23.92	2.326	0.404	0.1879
194	26.	25.92	2.35	0.38	0.1767
195	28.	27.92	2.378	0.352	0.1637
196	30.	29.92	2.407	0.323	0.1502
197	32.	31.92	2.431	0.299	0.1391
198	34.	33.92	2.454	0.276	0.1284
199	36.	35.92	2.478	0.252	0.1172
200	38.	37.92	2.497	0.233	0.1084
201	40.	39.92	2.516	0.214	9.953e-002
202	42.	41.92	2.53	0.2	9.302e-002
203	44.	43.92	2.549	0.181	8.419e-002
204	46.	45.92	2.564	0.166	7.721e-002
205	48.	47.92	2.582	0.148	6.884e-002
206	50.	49.92	2.592	0.138	6.419e-002
207	52.	51.92	2.611	0.119	5.535e-002
208	54.	53.92	2.62	0.11	5.116e-002
209	56.	55.92	2.63	0.1	4.651e-002
210	58.	57.92	2.644	8.6e-002	4.e-002
211	60.	59.92	2.649	8.1e-002	3.767e-002
212	62.	61.92	2.654	7.6e-002	3.535e-002
213	64.	63.92	2.658	7.2e-002	3.349e-002
214	66.	65.92	2.668	6.2e-002	2.884e-002
215	68.	67.92	2.673	5.7e-002	2.651e-002
216	70.	69.92	2.682	4.8e-002	2.233e-002
217	72.	71.92	2.682	4.8e-002	2.233e-002
218	74.	73.92	2.687	4.3e-002	2.e-002
219	76.	75.92	2.692	3.8e-002	1.767e-002
220	78.	77.92	2.692	3.8e-002	1.767e-002
221	80.	79.92	2.696	3.4e-002	1.581e-002
222	82.	81.92	2.701	2.9e-002	1.349e-002
223	84.	83.92	2.706	2.4e-002	1.116e-002
224	86.	85.92	2.706	2.4e-002	1.116e-002
225	88.	87.92	2.711	1.9e-002	8.837e-003
226	90.	89.92	2.715	1.5e-002	6.977e-003
227	92.	91.92	2.715	1.5e-002	6.977e-003

Aquifer Analysis March 19, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-3 (Rising)



Ho is 2.827 feet at 3. seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: March 19, 2002
Project Number: 600.04
Import File: P:\MRR of High Point\Task 04 Hydrogeologic Report and WQMP\Slug Data\P-3RH

Well Label: P-3 (Rising)
Aquifer Thickness: 30. feet
Screen Length: 15. feet
Casing Radius: 1.888 inches
Effective Radius: 4.125 inches
Static Water Level: 3.51 feet
Water Table to Screen Bottom: 23.07 feet
Anisotropy Ratio: 1.
Time Adjustment: 3. Seconds
Test starts with trial 2
There are 204 time and drawdown measurements
Maximum head is 6.275 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-5.e-002	4.988	1.478	0.2355
2	3.3e-003	-4.67e-002	9.328	5.818	0.9272
3	6.6e-003	-4.34e-002	9.785	6.275	1.
4	1.e-002	-4.e-002	5.327	1.817	0.2896
5	1.33e-002	-3.67e-002	3.51	0.	0.
6	1.66e-002	-3.34e-002	6.266	2.756	0.4392
7	2.e-002	-3.e-002	8.319	4.809	0.7664
8	2.33e-002	-2.67e-002	7.738	4.228	0.6738
9	2.66e-002	-2.34e-002	5.903	2.393	0.3814
10	3.e-002	-2.e-002	5.174	1.664	0.2652
11	3.33e-002	-1.67e-002	6.266	2.756	0.4392
12	3.66e-002	-1.34e-002	7.28	3.77	0.6008
13	4.e-002	-1.e-002	7.009	3.499	0.5576
14	4.33e-002	-6.7e-003	6.137	2.627	0.4186
15	4.66e-002	-3.4e-003	5.827	2.317	0.3692
16	5.e-002	0.	6.337	2.827	0.4505
17	5.33e-002	3.3e-003	6.795	3.285	0.5235
18	5.66e-002	6.6e-003	6.642	3.132	0.4991
19	6.e-002	1.e-002	6.223	2.713	0.4324
20	6.33e-002	1.33e-002	6.108	2.598	0.414
21	6.66e-002	1.66e-002	6.356	2.846	0.4535
22	7.e-002	2.e-002	6.552	3.042	0.4848
23	7.33e-002	2.33e-002	6.456	2.946	0.4695
24	7.66e-002	2.66e-002	6.261	2.751	0.4384
25	8.e-002	3.e-002	6.227	2.717	0.433
26	8.33e-002	3.33e-002	6.351	2.841	0.4527
27	8.66e-002	3.66e-002	6.423	2.913	0.4642
28	9.e-002	4.e-002	6.361	2.851	0.4543
29	9.33e-002	4.33e-002	6.27	2.76	0.4398
30	9.66e-002	4.66e-002	6.266	2.756	0.4392
31	0.1	5.e-002	6.323	2.813	0.4483

32	0.1033	5.33e-002	6.342	2.832	0.4513
33	0.1066	5.66e-002	6.309	2.799	0.4461
34	0.11	6.e-002	6.266	2.756	0.4392
35	0.1133	6.33e-002	6.27	2.76	0.4398
36	0.1166	6.66e-002	6.294	2.784	0.4437
37	0.12	7.e-002	6.299	2.789	0.4445
38	0.1233	7.33e-002	6.275	2.765	0.4406
39	0.1266	7.66e-002	6.256	2.746	0.4376
40	0.13	8.e-002	6.261	2.751	0.4384
41	0.1333	8.33e-002	6.266	2.756	0.4392
42	0.1366	8.66e-002	6.266	2.756	0.4392
43	0.14	9.e-002	6.251	2.741	0.4368
44	0.1433	9.33e-002	6.242	2.732	0.4354
45	0.1466	9.66e-002	6.242	2.732	0.4354
46	0.15	1.e-001	6.247	2.737	0.4362
47	0.1533	0.1033	6.237	2.727	0.4346
48	0.1566	0.1066	6.232	2.722	0.4338
49	0.16	0.11	6.227	2.717	0.433
50	0.1633	0.1133	6.227	2.717	0.433
51	0.1666	0.1166	6.223	2.713	0.4324
52	0.17	0.12	6.218	2.708	0.4316
53	0.1733	0.1233	6.213	2.703	0.4308
54	0.1766	0.1266	6.208	2.698	0.43
55	0.18	0.13	6.208	2.698	0.43
56	0.1833	0.1333	6.204	2.694	0.4293
57	0.1866	0.1366	6.199	2.689	0.4285
58	0.19	0.14	6.194	2.684	0.4277
59	0.1933	0.1433	6.194	2.684	0.4277
60	0.1966	0.1466	6.189	2.679	0.4269
61	0.2	0.15	6.185	2.675	0.4263
62	0.2033	0.1533	6.18	2.67	0.4255
63	0.2066	0.1566	6.18	2.67	0.4255
64	0.21	0.16	6.175	2.665	0.4247
65	0.2133	0.1633	6.17	2.66	0.4239
66	0.2166	0.1666	6.17	2.66	0.4239
67	0.22	0.17	6.166	2.656	0.4233
68	0.2233	0.1733	6.161	2.651	0.4225
69	0.2266	0.1766	6.161	2.651	0.4225
70	0.23	0.18	6.156	2.646	0.4217
71	0.2333	0.1833	6.151	2.641	0.4209
72	0.2366	0.1866	6.151	2.641	0.4209
73	0.24	0.19	6.147	2.637	0.4202
74	0.2433	0.1933	6.147	2.637	0.4202
75	0.2466	0.1966	6.142	2.632	0.4194
76	0.25	0.2	6.137	2.627	0.4186
77	0.2533	0.2033	6.137	2.627	0.4186
78	0.2566	0.2066	6.132	2.622	0.4178
79	0.26	0.21	6.127	2.617	0.4171
80	0.2633	0.2133	6.127	2.617	0.4171
81	0.2666	0.2166	6.123	2.613	0.4164
82	0.27	0.22	6.118	2.608	0.4156
83	0.2733	0.2233	6.118	2.608	0.4156
84	0.2766	0.2266	6.113	2.603	0.4148

85	0.28	0.23	6.113	2.603	0.4148
86	0.2833	0.2333	6.108	2.598	0.414
87	0.2866	0.2366	6.104	2.594	0.4134
88	0.29	0.24	6.104	2.594	0.4134
89	0.2933	0.2433	6.099	2.589	0.4126
90	0.2966	0.2466	6.099	2.589	0.4126
91	0.3	0.25	6.094	2.584	0.4118
92	0.3033	0.2533	6.089	2.579	0.411
93	0.3066	0.2566	6.089	2.579	0.411
94	0.31	0.26	6.085	2.575	0.4104
95	0.3133	0.2633	6.085	2.575	0.4104
96	0.3166	0.2666	6.08	2.57	0.4096
97	0.32	0.27	6.08	2.57	0.4096
98	0.3233	0.2733	6.075	2.565	0.4088
99	0.3266	0.2766	6.075	2.565	0.4088
100	0.33	0.28	6.07	2.56	0.408
101	0.3333	0.2833	6.066	2.556	0.4073
102	0.35	0.3	6.051	2.541	0.4049
103	0.3666	0.3166	6.037	2.527	0.4027
104	0.3833	0.3333	6.023	2.513	0.4005
105	0.4	0.35	6.008	2.498	0.3981
106	0.4166	0.3666	5.999	2.489	0.3967
107	0.4333	0.3833	5.984	2.474	0.3943
108	0.45	0.4	5.97	2.46	0.392
109	0.4666	0.4166	5.961	2.451	0.3906
110	0.4833	0.4333	5.946	2.436	0.3882
111	0.5	0.45	5.937	2.427	0.3868
112	0.5166	0.4666	5.923	2.413	0.3845
113	0.5333	0.4833	5.913	2.403	0.3829
114	0.55	0.5	5.899	2.389	0.3807
115	0.5666	0.5166	5.889	2.379	0.3791
116	0.5833	0.5333	5.88	2.37	0.3777
117	0.6	0.55	5.865	2.355	0.3753
118	0.6166	0.5666	5.856	2.346	0.3739
119	0.6333	0.5833	5.846	2.336	0.3723
120	0.65	0.6	5.837	2.327	0.3708
121	0.6666	0.6166	5.827	2.317	0.3692
122	0.6833	0.6333	5.818	2.308	0.3678
123	0.7	0.65	5.803	2.293	0.3654
124	0.7166	0.6666	5.799	2.289	0.3648
125	0.7333	0.6833	5.784	2.274	0.3624
126	0.75	0.7	5.775	2.265	0.361
127	0.7666	0.7166	5.77	2.26	0.3602
128	0.7833	0.7333	5.76	2.25	0.3586
129	0.8	0.75	5.751	2.241	0.3571
130	0.8166	0.7666	5.741	2.231	0.3555
131	0.8333	0.7833	5.732	2.222	0.3541
132	0.85	0.8	5.722	2.212	0.3525
133	0.8666	0.8166	5.713	2.203	0.3511
134	0.8833	0.8333	5.703	2.193	0.3495
135	0.9	0.85	5.699	2.189	0.3488
136	0.9166	0.8666	5.689	2.179	0.3473
137	0.9333	0.8833	5.679	2.169	0.3457

138	0.95	0.9	5.675	2.165	0.345
139	0.9666	0.9166	5.665	2.155	0.3434
140	0.9833	0.9333	5.656	2.146	0.342
141	1.	0.95	5.651	2.141	0.3412
142	1.2	1.15	5.536	2.026	0.3229
143	1.4	1.35	5.46	1.95	0.3108
144	1.6	1.55	5.393	1.883	0.3001
145	1.8	1.75	5.327	1.817	0.2896
146	2.	1.95	5.274	1.764	0.2811
147	2.2	2.15	5.227	1.717	0.2736
148	2.4	2.35	5.184	1.674	0.2668
149	2.6	2.55	5.141	1.631	0.2599
150	2.8	2.75	5.103	1.593	0.2539
151	3.	2.95	5.069	1.559	0.2484
152	3.2	3.15	5.031	1.521	0.2424
153	3.4	3.35	5.002	1.492	0.2378
154	3.6	3.55	4.969	1.459	0.2325
155	3.8	3.75	4.94	1.43	0.2279
156	4.	3.95	4.917	1.407	0.2242
157	4.2	4.15	4.888	1.378	0.2196
158	4.4	4.35	4.864	1.354	0.2158
159	4.6	4.55	4.84	1.33	0.212
160	4.8	4.75	4.821	1.311	0.2089
161	5.	4.95	4.797	1.287	0.2051
162	5.2	5.15	4.778	1.268	0.2021
163	5.4	5.35	4.764	1.254	0.1998
164	5.6	5.55	4.745	1.235	0.1968
165	5.8	5.75	4.726	1.216	0.1938
166	6.	5.95	4.712	1.202	0.1916
167	6.2	6.15	4.697	1.187	0.1892
168	6.4	6.35	4.678	1.168	0.1861
169	6.6	6.55	4.669	1.159	0.1847
170	6.8	6.75	4.654	1.144	0.1823
171	7.	6.95	4.64	1.13	0.1801
172	7.2	7.15	4.63	1.12	0.1785
173	7.4	7.35	4.616	1.106	0.1763
174	7.6	7.55	4.607	1.097	0.1748
175	7.8	7.75	4.597	1.087	0.1732
176	8.	7.95	4.588	1.078	0.1718
177	8.2	8.15	4.578	1.068	0.1702
178	8.4	8.35	4.569	1.059	0.1688
179	8.6	8.55	4.559	1.049	0.1672
180	8.8	8.75	4.549	1.039	0.1656
181	9.	8.95	4.545	1.035	0.1649
182	9.2	9.15	4.535	1.025	0.1633
183	9.4	9.35	4.53	1.02	0.1625
184	9.6	9.55	4.521	1.011	0.1611
185	9.8	9.75	4.516	1.006	0.1603
186	10.	9.95	4.511	1.001	0.1595
187	12.	11.95	4.459	0.949	0.1512
188	14.	13.95	4.425	0.915	0.1458
189	16.	15.95	4.406	0.896	0.1428
190	18.	17.95	4.392	0.882	0.1406

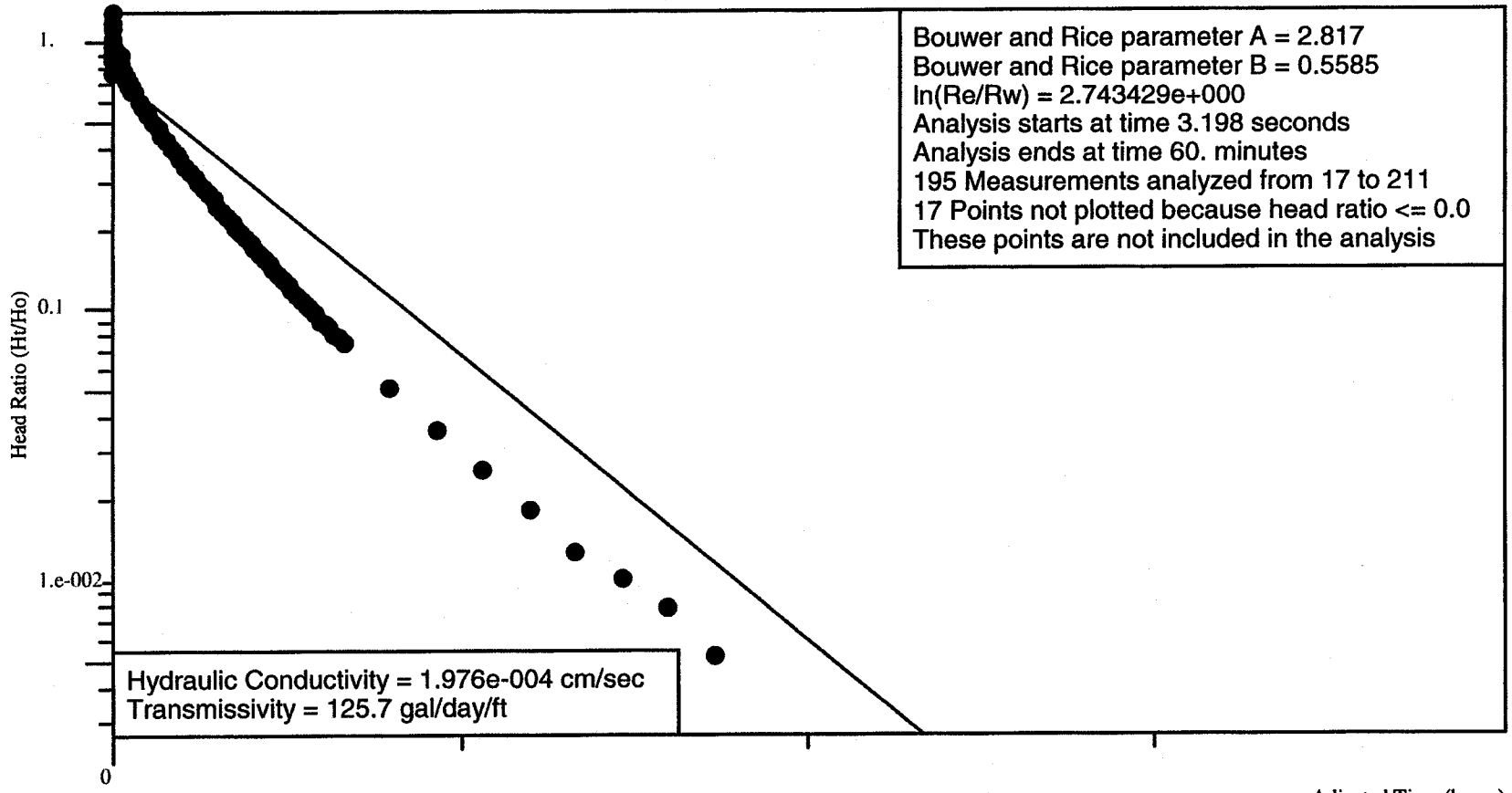
191	20.	19.95	4.382	0.872	0.139
192	22.	21.95	4.373	0.863	0.1375
193	24.	23.95	4.368	0.858	0.1367
194	26.	25.95	4.364	0.854	0.1361
195	28.	27.95	4.359	0.849	0.1353
196	30.	29.95	4.359	0.849	0.1353
197	32.	31.95	4.359	0.849	0.1353
198	34.	33.95	4.354	0.844	0.1345
199	36.	35.95	4.354	0.844	0.1345
200	38.	37.95	4.354	0.844	0.1345
201	40.	39.95	4.354	0.844	0.1345
202	42.	41.95	4.354	0.844	0.1345
203	44.	43.95	4.349	0.839	0.1337
204	46.	45.95	4.349	0.839	0.1337

Aquifer Analysis March 19, 2001

MRR of High Point, LLC

Bouwer and Rice Graph

P-3 (Falling)



Ho is 1.89 feet at 3.198 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: March 19, 2001
Project Number: 600.04
Import File: P:\MRR of High Point\Task 04 Hydrogeologic Report and WQMP\Slug Data\P-3FH

Well Label: P-3 (Falling)
Aquifer Thickness: 30. feet
Screen Length: 15. feet
Casing Radius: 1.888 inches
Effective Radius: 4.125 inches
Static Water Level: 4.346 feet
Water Table to Screen Bottom: 23.07 feet
Anisotropy Ratio: 1.
Time Adjustment: 3.198 Seconds
Test starts with trial 8
There are 211 time and drawdown measurements
Maximum head is 2.873 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-5.33e-002	3.797	0.549	0.1911
2	3.3e-003	-5.e-002	3.12	1.226	0.4267
3	6.6e-003	-4.67e-002	3.435	0.911	0.3171
4	1.e-002	-4.33e-002	3.225	1.121	0.3902
5	1.33e-002	-4.e-002	2.251	2.095	0.7292
6	1.66e-002	-3.67e-002	1.931	2.415	0.8406
7	2.e-002	-3.33e-002	1.75	2.596	0.9036
8	2.33e-002	-3.e-002	1.731	2.615	0.9102
9	2.66e-002	-2.67e-002	1.473	2.873	1.
10	3.e-002	-2.33e-002	2.113	2.233	0.7772
11	3.33e-002	-2.e-002	2.16	2.186	0.7609
12	3.66e-002	-1.67e-002	1.993	2.353	0.819
13	4.e-002	-1.33e-002	2.074	2.272	0.7908
14	4.33e-002	-1.e-002	2.805	1.541	0.5364
15	4.66e-002	-6.7e-003	3.191	1.155	0.402
16	5.e-002	-3.3e-003	2.929	1.417	0.4932
17	5.33e-002	0.	2.456	1.89	0.6578
18	5.66e-002	3.3e-003	1.936	2.41	0.8388
19	6.e-002	6.7e-003	2.113	2.233	0.7772
20	6.33e-002	1.e-002	2.227	2.119	0.7376
21	6.66e-002	1.33e-002	2.671	1.675	0.583
22	7.e-002	1.67e-002	2.881	1.465	0.5099
23	7.33e-002	2.e-002	2.709	1.637	0.5698
24	7.66e-002	2.33e-002	2.409	1.937	0.6742
25	8.e-002	2.67e-002	2.237	2.109	0.7341
26	8.33e-002	3.e-002	2.404	1.942	0.6759
27	8.66e-002	3.33e-002	2.432	1.914	0.6662
28	9.e-002	3.67e-002	2.428	1.918	0.6676
29	9.33e-002	4.e-002	2.614	1.732	0.6029
30	9.66e-002	4.33e-002	2.633	1.713	0.5962
31	0.1	4.67e-002	2.518	1.828	0.6363

32	0.1033	5.e-002	2.452	1.894	0.6592
33	0.1066	5.33e-002	2.418	1.928	0.6711
34	0.11	5.67e-002	2.48	1.866	0.6495
35	0.1133	6.e-002	2.547	1.799	0.6262
36	0.1166	6.33e-002	2.58	1.766	0.6147
37	0.12	6.67e-002	2.58	1.766	0.6147
38	0.1233	7.e-002	2.533	1.813	0.631
39	0.1266	7.33e-002	2.49	1.856	0.646
40	0.13	7.67e-002	2.494	1.852	0.6446
41	0.1333	8.e-002	2.537	1.809	0.6297
42	0.1366	8.33e-002	2.571	1.775	0.6178
43	0.14	8.67e-002	2.585	1.761	0.6129
44	0.1433	9.e-002	2.576	1.77	0.6161
45	0.1466	9.33e-002	2.557	1.789	0.6227
46	0.15	9.67e-002	2.533	1.813	0.631
47	0.1533	1.e-001	2.557	1.789	0.6227
48	0.1566	0.1033	2.585	1.761	0.6129
49	0.16	0.1067	2.604	1.742	0.6063
50	0.1633	0.11	2.595	1.751	0.6095
51	0.1666	0.1133	2.58	1.766	0.6147
52	0.17	0.1167	2.576	1.77	0.6161
53	0.1733	0.12	2.576	1.77	0.6161
54	0.1766	0.1233	2.595	1.751	0.6095
55	0.18	0.1267	2.604	1.742	0.6063
56	0.1833	0.13	2.609	1.737	0.6046
57	0.1866	0.1333	2.609	1.737	0.6046
58	0.19	0.1367	2.604	1.742	0.6063
59	0.1933	0.14	2.609	1.737	0.6046
60	0.1966	0.1433	2.614	1.732	0.6029
61	0.2	0.1467	2.619	1.727	0.6011
62	0.2033	0.15	2.623	1.723	0.5997
63	0.2066	0.1533	2.628	1.718	0.598
64	0.21	0.1567	2.628	1.718	0.598
65	0.2133	0.16	2.628	1.718	0.598
66	0.2166	0.1633	2.633	1.713	0.5962
67	0.22	0.1667	2.638	1.708	0.5945
68	0.2233	0.17	2.643	1.703	0.5928
69	0.2266	0.1733	2.643	1.703	0.5928
70	0.23	0.1767	2.647	1.699	0.5914
71	0.2333	0.18	2.647	1.699	0.5914
72	0.2366	0.1833	2.647	1.699	0.5914
73	0.24	0.1867	2.657	1.689	0.5879
74	0.2433	0.19	2.661	1.685	0.5865
75	0.2466	0.1933	2.661	1.685	0.5865
76	0.25	0.1967	2.666	1.68	0.5848
77	0.2533	0.2	2.666	1.68	0.5848
78	0.2566	0.2033	2.671	1.675	0.583
79	0.26	0.2067	2.671	1.675	0.583
80	0.2633	0.21	2.676	1.67	0.5813
81	0.2666	0.2133	2.681	1.665	0.5795
82	0.27	0.2167	2.681	1.665	0.5795
83	0.2733	0.22	2.685	1.661	0.5781
84	0.2766	0.2233	2.685	1.661	0.5781

85	0.28	0.2267	2.69	1.656	0.5764
86	0.2833	0.23	2.695	1.651	0.5747
87	0.2866	0.2333	2.695	1.651	0.5747
88	0.29	0.2367	2.7	1.646	0.5729
89	0.2933	0.24	2.7	1.646	0.5729
90	0.2966	0.2433	2.709	1.637	0.5698
91	0.3	0.2467	2.705	1.641	0.5712
92	0.3033	0.25	2.709	1.637	0.5698
93	0.3066	0.2533	2.714	1.632	0.568
94	0.31	0.2567	2.714	1.632	0.568
95	0.3133	0.26	2.724	1.622	0.5646
96	0.3166	0.2633	2.719	1.627	0.5663
97	0.32	0.2667	2.719	1.627	0.5663
98	0.3233	0.27	2.724	1.622	0.5646
99	0.3266	0.2733	2.728	1.618	0.5632
100	0.33	0.2767	2.733	1.613	0.5614
101	0.3333	0.28	2.733	1.613	0.5614
102	0.35	0.2967	2.743	1.603	0.558
103	0.3666	0.3133	2.776	1.57	0.5465
104	0.3833	0.33	2.771	1.575	0.5482
105	0.4	0.3467	2.786	1.56	0.543
106	0.4166	0.3633	2.638	1.708	0.5945
107	0.4333	0.38	2.771	1.575	0.5482
108	0.45	0.3967	2.819	1.527	0.5315
109	0.4666	0.4133	2.867	1.479	0.5148
110	0.4833	0.43	2.848	1.498	0.5214
111	0.5	0.4467	2.857	1.489	0.5183
112	0.5166	0.4633	2.871	1.475	0.5134
113	0.5333	0.48	2.886	1.46	0.5082
114	0.55	0.4967	2.895	1.451	0.505
115	0.5666	0.5133	2.905	1.441	0.5016
116	0.5833	0.53	2.915	1.431	0.4981
117	0.6	0.5467	2.924	1.422	0.495
118	0.6166	0.5633	2.934	1.412	0.4915
119	0.6333	0.58	2.943	1.403	0.4883
120	0.65	0.5967	2.953	1.393	0.4849
121	0.6666	0.6133	2.962	1.384	0.4817
122	0.6833	0.63	2.972	1.374	0.4782
123	0.7	0.6467	2.977	1.369	0.4765
124	0.7166	0.6633	2.986	1.36	0.4734
125	0.7333	0.68	2.996	1.35	0.4699
126	0.75	0.6967	3.005	1.341	0.4668
127	0.7666	0.7133	3.01	1.336	0.465
128	0.7833	0.73	3.019	1.327	0.4619
129	0.8	0.7467	3.024	1.322	0.4601
130	0.8166	0.7633	3.034	1.312	0.4567
131	0.8333	0.78	3.043	1.303	0.4535
132	0.85	0.7967	3.048	1.298	0.4518
133	0.8666	0.8133	3.058	1.288	0.4483
134	0.8833	0.83	3.062	1.284	0.4469
135	0.9	0.8467	3.072	1.274	0.4434
136	0.9166	0.8633	3.077	1.269	0.4417
137	0.9333	0.88	3.086	1.26	0.4386

138	0.95	0.8967	3.091	1.255	0.4368
139	0.9666	0.9133	3.1	1.246	0.4337
140	0.9833	0.93	3.105	1.241	0.432
141	1.	0.9467	3.115	1.231	0.4285
142	1.2	1.147	3.205	1.141	0.3971
143	1.4	1.347	3.272	1.074	0.3738
144	1.6	1.547	3.339	1.007	0.3505
145	1.8	1.747	3.396	0.95	0.3307
146	2.	1.947	3.449	0.897	0.3122
147	2.2	2.147	3.496	0.85	0.2959
148	2.4	2.347	3.54	0.806	0.2805
149	2.6	2.547	3.583	0.763	0.2656
150	2.8	2.747	3.621	0.725	0.2523
151	3.	2.947	3.659	0.687	0.2391
152	3.2	3.147	3.697	0.649	0.2259
153	3.4	3.347	3.726	0.62	0.2158
154	3.6	3.547	3.754	0.592	0.2061
155	3.8	3.747	3.783	0.563	0.196
156	4.	3.947	3.811	0.535	0.1862
157	4.2	4.147	3.835	0.511	0.1779
158	4.4	4.347	3.859	0.487	0.1695
159	4.6	4.547	3.883	0.463	0.1612
160	4.8	4.747	3.907	0.439	0.1528
161	5.	4.947	3.926	0.42	0.1462
162	5.2	5.147	3.945	0.401	0.1396
163	5.4	5.347	3.964	0.382	0.133
164	5.6	5.547	3.978	0.368	0.1281
165	5.8	5.747	3.997	0.349	0.1215
166	6.	5.947	4.012	0.334	0.1163
167	6.2	6.147	4.026	0.32	0.1114
168	6.4	6.347	4.04	0.306	0.1065
169	6.6	6.547	4.055	0.291	0.1013
170	6.8	6.747	4.069	0.277	9.641e-002
171	7.	6.947	4.079	0.267	9.293e-002
172	7.2	7.147	4.093	0.253	8.806e-002
173	7.4	7.347	4.102	0.244	8.493e-002
174	7.6	7.547	4.112	0.234	8.145e-002
175	7.8	7.747	4.122	0.224	7.797e-002
176	8.	7.947	4.131	0.215	7.483e-002
177	8.2	8.147	4.14	0.206	7.17e-002
178	8.4	8.347	4.15	0.196	6.822e-002
179	8.6	8.547	4.155	0.191	6.648e-002
180	8.8	8.747	4.164	0.182	6.335e-002
181	9.	8.947	4.174	0.172	5.987e-002
182	9.2	9.147	4.179	0.167	5.813e-002
183	9.4	9.347	4.184	0.162	5.639e-002
184	9.6	9.547	4.193	0.153	5.325e-002
185	9.8	9.747	4.198	0.148	5.151e-002
186	10.	9.947	4.203	0.143	4.977e-002
187	12.	11.95	4.25	9.6e-002	3.341e-002
188	14.	13.95	4.279	6.7e-002	2.332e-002
189	16.	15.95	4.298	4.8e-002	1.671e-002
190	18.	17.95	4.312	3.4e-002	1.183e-002

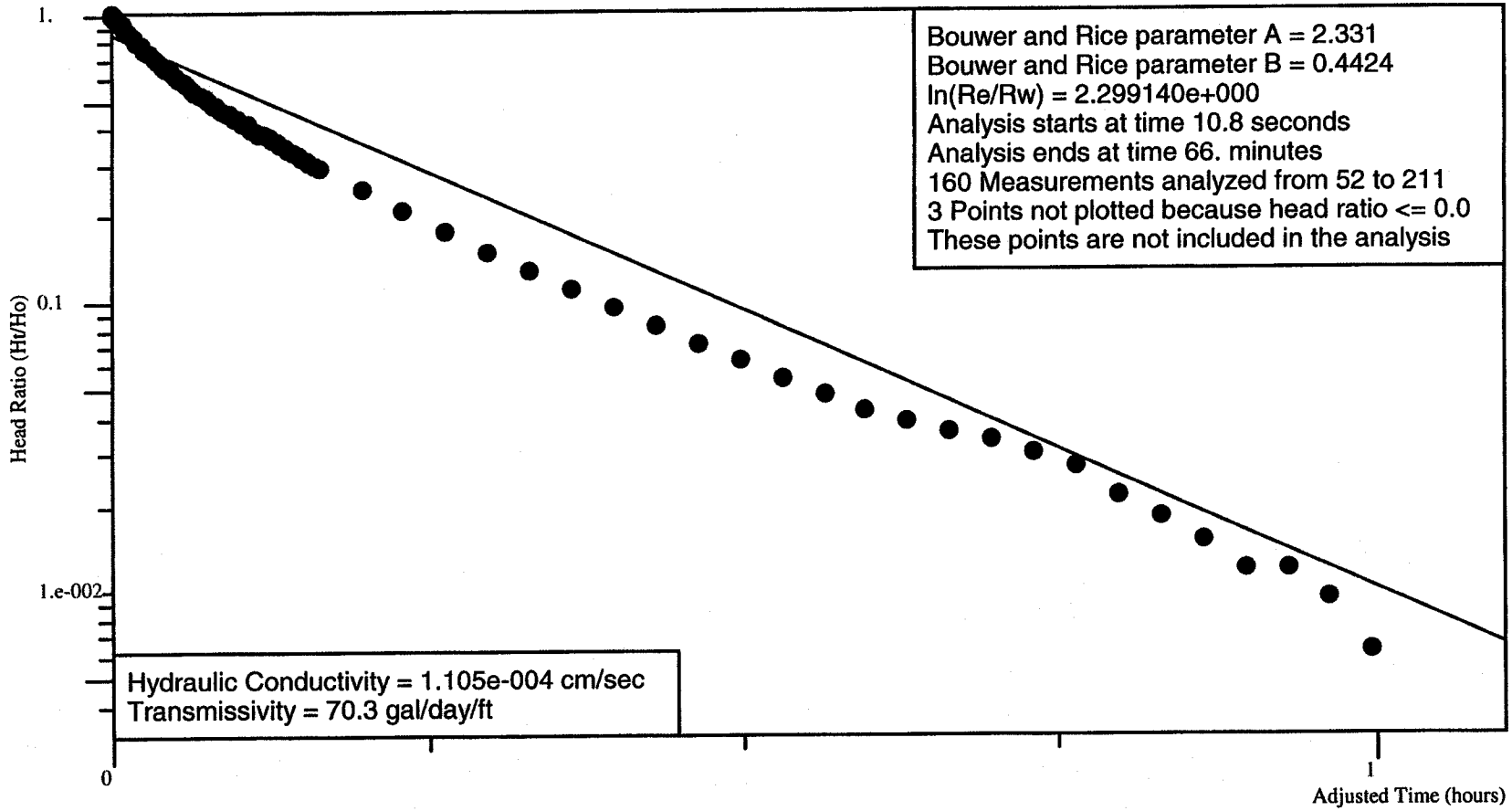
191	20.	19.95	4.322	2.4e-002	8.354e-003
192	22.	21.95	4.327	1.9e-002	6.613e-003
193	24.	23.95	4.331	1.5e-002	5.221e-003
194	26.	25.95	4.336	1.e-002	3.481e-003
195	28.	27.95	4.341	5.e-003	1.74e-003
196	30.	29.95	4.341	5.e-003	1.74e-003
197	32.	31.95	4.341	5.e-003	1.74e-003
198	34.	33.95	4.346	0.	0.
199	36.	35.95	4.346	0.	0.
200	38.	37.95	4.346	0.	0.
201	40.	39.95	4.346	0.	0.
202	42.	41.95	4.346	0.	0.
203	44.	43.95	4.346	0.	0.
204	46.	45.95	4.346	0.	0.
205	48.	47.95	4.346	0.	0.
206	50.	49.95	4.346	0.	0.
207	52.	51.95	4.346	0.	0.
208	54.	53.95	4.346	0.	0.
209	56.	55.95	4.346	0.	0.
210	58.	57.95	4.346	0.	0.
211	60.	59.95	4.346	0.	0.

Aquifer Analysis March 19, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-4A (Falling)



Ho is 1.592 feet at 10.8 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: March 19, 2002
Project Number: 600.04
Import File: P:\MRR of High Point\Task 04 Hydrogeologic Report and WQMP\Slug Data\P-4AFH

Well Label: P-4A (Falling)
Aquifer Thickness: 30. feet
Screen Length: 10. feet
Casing Radius: 1.888 inches
Effective Radius: 4.125 inches
Static Water Level: 4.33 feet
Water Table to Screen Bottom: 14.05 feet
Anisotropy Ratio: 1.
Time Adjustment: 10.8 Seconds
Test starts with trial 50
There are 211 time and drawdown measurements
Maximum head is 4.153 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-0.18	3.902	0.428	0.103
2	3.3e-003	-0.1767	3.964	0.366	8.812e-002
3	6.6e-003	-0.1734	3.451	0.879	0.2116
4	1.e-002	-0.17	3.303	1.027	0.2473
5	1.33e-002	-0.1667	2.472	1.858	0.4473
6	1.66e-002	-0.1634	2.709	1.621	0.3903
7	2.e-002	-0.16	2.429	1.901	0.4577
8	2.33e-002	-0.1567	1.72	2.61	0.6284
9	2.66e-002	-0.1534	1.278	3.052	0.7348
10	3.e-002	-0.15	1.544	2.786	0.6708
11	3.33e-002	-0.1467	2.362	1.968	0.4738
12	3.66e-002	-0.1434	3.023	1.307	0.3147
13	4.e-002	-0.14	3.584	0.746	0.1796
14	4.33e-002	-0.1367	3.522	0.808	0.1945
15	4.66e-002	-0.1334	2.994	1.336	0.3217
16	5.e-002	-0.13	2.59	1.74	0.4189
17	5.33e-002	-0.1267	2.296	2.034	0.4897
18	5.66e-002	-0.1234	2.205	2.125	0.5116
19	6.e-002	-0.12	2.405	1.925	0.4635
20	6.33e-002	-0.1167	2.576	1.754	0.4223
21	6.66e-002	-0.1134	2.8	1.53	0.3684
22	7.e-002	-0.11	2.904	1.426	0.3433
23	7.33e-002	-0.1067	2.866	1.464	0.3525
24	7.66e-002	-0.1034	2.728	1.602	0.3857
25	8.e-002	-0.1	2.567	1.763	0.4245
26	8.33e-002	-9.67e-002	2.543	1.787	0.4302
27	8.66e-002	-9.34e-002	2.59	1.74	0.4189
28	9.e-002	-9.e-002	2.685	1.645	0.3961
29	9.33e-002	-8.67e-002	2.752	1.578	0.3799
30	9.66e-002	-8.34e-002	2.781	1.549	0.3729
31	0.1	-8.e-002	2.766	1.564	0.3766

32	0.1033	-7.67e-002	2.719	1.611	0.3879
33	0.1066	-7.34e-002	2.681	1.649	0.397
34	0.11	-7.e-002	2.662	1.668	0.4016
35	0.1133	-6.67e-002	2.652	1.678	0.404
36	0.1166	-6.34e-002	2.681	1.649	0.397
37	0.12	-6.e-002	2.709	1.621	0.3903
38	0.1233	-5.67e-002	2.733	1.597	0.3845
39	0.1266	-5.34e-002	2.743	1.587	0.3821
40	0.13	-5.e-002	2.728	1.602	0.3857
41	0.1333	-4.67e-002	2.719	1.611	0.3879
42	0.1366	-4.34e-002	2.704	1.626	0.3915
43	0.14	-4.e-002	2.704	1.626	0.3915
44	0.1433	-3.67e-002	2.704	1.626	0.3915
45	0.1466	-3.34e-002	2.714	1.616	0.3891
46	0.15	-3.e-002	2.733	1.597	0.3845
47	0.16	-2.e-002	2.728	1.602	0.3857
48	0.1633	-1.67e-002	2.723	1.607	0.3869
49	0.1666	-1.34e-002	2.733	1.597	0.3845
50	0.17	-1.e-002	2.723	1.607	0.3869
51	0.1733	-6.7e-003	0.1766	4.153	1.
52	0.18	0.	2.738	1.592	0.3833
53	0.1833	3.3e-003	2.743	1.587	0.3821
54	0.1866	6.6e-003	2.738	1.592	0.3833
55	0.19	1.e-002	2.738	1.592	0.3833
56	0.1933	1.33e-002	2.733	1.597	0.3845
57	0.1966	1.66e-002	2.733	1.597	0.3845
58	0.2	2.e-002	2.733	1.597	0.3845
59	0.2033	2.33e-002	2.738	1.592	0.3833
60	0.2066	2.66e-002	2.743	1.587	0.3821
61	0.21	3.e-002	2.743	1.587	0.3821
62	0.2133	3.33e-002	2.747	1.583	0.3811
63	0.2166	3.66e-002	2.743	1.587	0.3821
64	0.22	4.e-002	2.743	1.587	0.3821
65	0.2233	4.33e-002	2.743	1.587	0.3821
66	0.2266	4.66e-002	2.743	1.587	0.3821
67	0.23	5.e-002	2.747	1.583	0.3811
68	0.2333	5.33e-002	2.747	1.583	0.3811
69	0.2366	5.66e-002	2.747	1.583	0.3811
70	0.24	6.e-002	2.752	1.578	0.3799
71	0.2433	6.33e-002	2.752	1.578	0.3799
72	0.2466	6.66e-002	2.752	1.578	0.3799
73	0.25	7.e-002	2.752	1.578	0.3799
74	0.2533	7.33e-002	2.752	1.578	0.3799
75	0.2566	7.66e-002	2.752	1.578	0.3799
76	0.26	8.e-002	2.757	1.573	0.3787
77	0.2633	8.33e-002	2.757	1.573	0.3787
78	0.2666	8.66e-002	2.757	1.573	0.3787
79	0.27	9.e-002	2.757	1.573	0.3787
80	0.2733	9.33e-002	2.757	1.573	0.3787
81	0.2766	9.66e-002	2.757	1.573	0.3787
82	0.28	0.1	2.757	1.573	0.3787
83	0.2833	0.1033	2.762	1.568	0.3775
84	0.2866	0.1066	2.762	1.568	0.3775

85	0.29	0.11	2.762	1.568	0.3775
86	0.2933	0.1133	2.762	1.568	0.3775
87	0.2966	0.1166	2.766	1.564	0.3766
88	0.3	0.12	2.766	1.564	0.3766
89	0.3033	0.1233	2.766	1.564	0.3766
90	0.3066	0.1266	2.766	1.564	0.3766
91	0.31	0.13	2.766	1.564	0.3766
92	0.3133	0.1333	2.766	1.564	0.3766
93	0.3166	0.1366	2.766	1.564	0.3766
94	0.32	0.14	2.766	1.564	0.3766
95	0.3233	0.1433	2.771	1.559	0.3754
96	0.3266	0.1466	2.771	1.559	0.3754
97	0.33	0.15	2.771	1.559	0.3754
98	0.3333	0.1533	2.771	1.559	0.3754
99	0.35	0.17	2.776	1.554	0.3742
100	0.3666	0.1866	2.781	1.549	0.3729
101	0.3833	0.2033	2.785	1.545	0.372
102	0.4	0.22	2.79	1.54	0.3708
103	0.4166	0.2366	2.795	1.535	0.3696
104	0.4333	0.2533	2.8	1.53	0.3684
105	0.45	0.27	2.804	1.526	0.3674
106	0.4666	0.2866	2.809	1.521	0.3662
107	0.4833	0.3033	2.814	1.516	0.365
108	0.5	0.32	2.814	1.516	0.365
109	0.5166	0.3366	2.819	1.511	0.3638
110	0.5333	0.3533	2.823	1.507	0.3628
111	0.55	0.37	2.828	1.502	0.3616
112	0.5666	0.3866	2.833	1.497	0.3604
113	0.5833	0.4033	2.838	1.492	0.3592
114	0.6	0.42	2.842	1.488	0.3583
115	0.6166	0.4366	2.847	1.483	0.3571
116	0.6333	0.4533	2.852	1.478	0.3559
117	0.65	0.47	2.857	1.473	0.3546
118	0.6666	0.4866	2.857	1.473	0.3546
119	0.6833	0.5033	2.861	1.469	0.3537
120	0.7	0.52	2.866	1.464	0.3525
121	0.7166	0.5366	2.871	1.459	0.3513
122	0.7333	0.5533	2.876	1.454	0.3501
123	0.75	0.57	2.88	1.45	0.3491
124	0.7666	0.5866	2.885	1.445	0.3479
125	0.7833	0.6033	2.89	1.44	0.3467
126	0.8	0.62	2.89	1.44	0.3467
127	0.8166	0.6366	2.895	1.435	0.3455
128	0.8333	0.6533	2.899	1.431	0.3445
129	0.85	0.67	2.904	1.426	0.3433
130	0.8666	0.6866	2.909	1.421	0.3421
131	0.8833	0.7033	2.914	1.416	0.3409
132	0.9	0.72	2.914	1.416	0.3409
133	0.9166	0.7366	2.918	1.412	0.34
134	0.9333	0.7533	2.923	1.407	0.3388
135	0.95	0.77	2.928	1.402	0.3376
136	0.9666	0.7866	2.933	1.397	0.3364
137	0.9833	0.8033	2.933	1.397	0.3364

138	1.	0.82	2.937	1.393	0.3354
139	1.2	1.02	2.999	1.331	0.3205
140	1.4	1.22	3.042	1.288	0.3101
141	1.6	1.42	3.08	1.25	0.301
142	1.8	1.62	3.123	1.207	0.2906
143	2.	1.82	3.156	1.174	0.2827
144	2.2	2.02	3.194	1.136	0.2735
145	2.4	2.22	3.227	1.103	0.2656
146	2.6	2.42	3.261	1.069	0.2574
147	2.8	2.62	3.289	1.041	0.2506
148	3.	2.82	3.322	1.008	0.2427
149	3.2	3.02	3.351	0.979	0.2357
150	3.4	3.22	3.375	0.955	0.2299
151	3.6	3.42	3.398	0.932	0.2244
152	3.8	3.62	3.422	0.908	0.2186
153	4.	3.82	3.446	0.884	0.2128
154	4.2	4.02	3.47	0.86	0.2071
155	4.4	4.22	3.489	0.841	0.2025
156	4.6	4.42	3.508	0.822	0.1979
157	4.8	4.62	3.531	0.799	0.1924
158	5.	4.82	3.55	0.78	0.1878
159	5.2	5.02	3.565	0.765	0.1842
160	5.4	5.22	3.584	0.746	0.1796
161	5.6	5.42	3.598	0.732	0.1762
162	5.8	5.62	3.612	0.718	0.1729
163	6.	5.82	3.631	0.699	0.1683
164	6.2	6.02	3.641	0.689	0.1659
165	6.4	6.22	3.66	0.67	0.1613
166	6.6	6.42	3.669	0.661	0.1591
167	6.8	6.62	3.684	0.646	0.1555
168	7.	6.82	3.698	0.632	0.1522
169	7.2	7.02	3.712	0.618	0.1488
170	7.4	7.22	3.721	0.609	0.1466
171	7.6	7.42	3.736	0.594	0.143
172	7.8	7.62	3.745	0.585	0.1408
173	8.	7.82	3.76	0.57	0.1372
174	8.2	8.02	3.769	0.561	0.1351
175	8.4	8.22	3.779	0.551	0.1327
176	8.6	8.42	3.793	0.537	0.1293
177	8.8	8.62	3.802	0.528	0.1271
178	9.	8.82	3.812	0.518	0.1247
179	9.2	9.02	3.821	0.509	0.1226
180	9.4	9.22	3.831	0.499	0.1201
181	9.6	9.42	3.84	0.49	0.118
182	9.8	9.62	3.85	0.48	0.1156
183	10.	9.82	3.859	0.471	0.1134
184	12.	11.82	3.935	0.395	9.51e-002
185	14.	13.82	3.997	0.333	8.018e-002
186	16.	15.82	4.049	0.281	6.766e-002
187	18.	17.82	4.092	0.238	5.73e-002
188	20.	19.82	4.125	0.205	4.936e-002
189	22.	21.82	4.154	0.176	4.237e-002
190	24.	23.82	4.178	0.152	3.66e-002

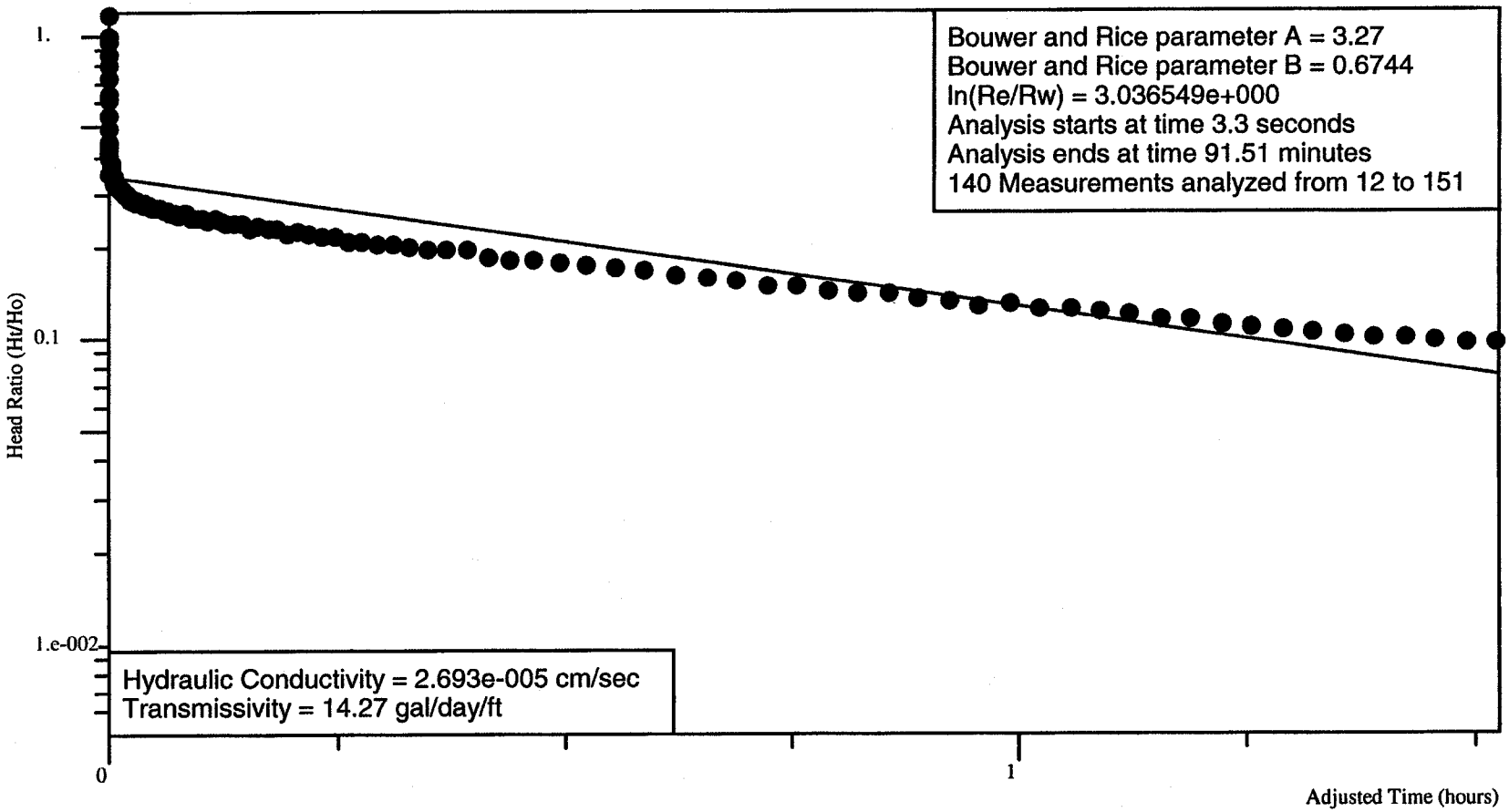
191	26.	25.82	4.197	0.133	3.202e-002
192	28.	27.82	4.216	0.114	2.745e-002
193	30.	29.82	4.23	0.1	2.408e-002
194	32.	31.82	4.244	8.6e-002	2.071e-002
195	34.	33.82	4.254	7.6e-002	1.83e-002
196	36.	35.82	4.263	6.7e-002	1.613e-002
197	38.	37.82	4.268	6.2e-002	1.493e-002
198	40.	39.82	4.273	5.7e-002	1.372e-002
199	42.	41.82	4.277	5.3e-002	1.276e-002
200	44.	43.82	4.282	4.8e-002	1.156e-002
201	46.	45.82	4.287	4.3e-002	1.035e-002
202	48.	47.82	4.296	3.4e-002	8.186e-003
203	50.	49.82	4.301	2.9e-002	6.982e-003
204	52.	51.82	4.306	2.4e-002	5.778e-003
205	54.	53.82	4.311	1.9e-002	4.575e-003
206	56.	55.82	4.311	1.9e-002	4.575e-003
207	58.	57.82	4.315	1.5e-002	3.611e-003
208	60.	59.82	4.32	1.e-002	2.408e-003
209	62.	61.82	4.325	5.e-003	1.204e-003
210	64.	63.82	4.325	5.e-003	1.204e-003
211	66.	65.82	4.33	0.	0.

Aquifer Analysis April 2, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-6 (Rising)



Ho is 1.7 feet at 3.3 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: April 2, 2002
Project Number: 600.04
Import File: P:\MRR of High Point\Task 04 Hydrogeologic Report and WQMP\Slug Data\Mini Troll Data\Copy of F

Well Label: P-6 (Rising)
Aquifer Thickness: 25. feet
Screen Length: 25. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 20.16 feet
Water Table to Screen Bottom: 15.34 feet
Anisotropy Ratio: 1.
Time Adjustment: 3.3 Seconds
Test starts with trial 0
There are 151 time and drawdown measurements
Maximum head is 6.994 feet
Minimum head is -1.285 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-5.5e-002	27.15	6.994	1.
2	5.e-003	-5.e-002	18.88	-1.285	-0.1837
3	1.e-002	-4.5e-002	22.33	2.166	0.3097
4	1.5e-002	-4.e-002	24.94	4.779	0.6833
5	2.e-002	-3.5e-002	19.37	-0.79	-0.113
6	2.5e-002	-3.e-002	22.31	2.148	0.3071
7	3.e-002	-2.5e-002	23.55	3.392	0.485
8	3.5e-002	-2.e-002	20.08	-8.3e-002	-1.187e-002
9	4.e-002	-1.5e-002	22.14	1.984	0.2837
10	4.5e-002	-1.e-002	22.66	2.497	0.357
11	5.e-002	-5.e-003	20.51	0.35	5.004e-002
12	5.5e-002	0.	21.86	1.7	0.2431
13	6.e-002	5.e-003	22.16	1.998	0.2857
14	6.5e-002	1.e-002	20.76	0.597	8.536e-002
15	7.e-002	1.5e-002	21.63	1.466	0.2096
16	7.5e-002	2.e-002	21.79	1.634	0.2336
17	8.e-002	2.5e-002	20.86	0.701	0.1002
18	8.48e-002	2.98e-002	21.38	1.223	0.1749
19	9.e-002	3.5e-002	21.53	1.368	0.1956
20	9.5e-002	4.e-002	20.9	0.737	0.1054
21	0.1	4.5e-002	21.21	1.049	0.15
22	0.1058	5.08e-002	21.25	1.089	0.1557
23	0.112	5.7e-002	20.9	0.741	0.1059
24	0.1185	6.35e-002	21.21	1.051	0.1503
25	0.1255	7.05e-002	20.89	0.731	0.1045
26	0.1328	7.78e-002	21.08	0.919	0.1314
27	0.1407	8.57e-002	20.88	0.719	0.1028
28	0.149	9.4e-002	21.	0.839	0.12
29	0.1578	0.1028	20.86	0.701	0.1002
30	0.167	0.112	20.92	0.759	0.1085
31	0.177	0.122	20.89	0.731	0.1045

32	0.1875	0.1325	20.84	0.683	9.766e-002
33	0.1985	0.1435	20.86	0.696	9.951e-002
34	0.2102	0.1552	20.85	0.692	9.894e-002
35	0.2227	0.1677	20.83	0.67	9.58e-002
36	0.2358	0.1808	20.81	0.654	9.351e-002
37	0.2498	0.1948	20.81	0.646	9.236e-002
38	0.2647	0.2097	20.8	0.638	9.122e-002
39	0.2803	0.2253	20.79	0.63	9.008e-002
40	0.297	0.242	20.78	0.62	8.865e-002
41	0.3147	0.2597	20.77	0.612	8.75e-002
42	0.3333	0.2783	20.77	0.61	8.722e-002
43	0.3532	0.2982	20.76	0.604	8.636e-002
44	0.3742	0.3192	20.76	0.596	8.522e-002
45	0.3963	0.3413	20.75	0.59	8.436e-002
46	0.4198	0.3648	20.74	0.584	8.35e-002
47	0.4447	0.3897	20.74	0.582	8.321e-002
48	0.4697	0.4147	20.73	0.574	8.207e-002
49	0.4963	0.4413	20.73	0.568	8.121e-002
50	0.5247	0.4697	20.72	0.564	8.064e-002
51	0.5547	0.4997	20.72	0.558	7.978e-002
52	0.5863	0.5313	20.72	0.556	7.95e-002
53	0.6213	0.5663	20.71	0.552	7.892e-002
54	0.6578	0.6028	20.71	0.55	7.864e-002
55	0.6963	0.6413	20.7	0.544	7.778e-002
56	0.738	0.683	20.7	0.538	7.692e-002
57	0.7813	0.7263	20.7	0.538	7.692e-002
58	0.828	0.773	20.69	0.534	7.635e-002
59	0.8763	0.8213	20.69	0.528	7.549e-002
60	0.928	0.873	20.69	0.526	7.521e-002
61	0.983	0.928	20.68	0.522	7.464e-002
62	1.041	0.9863	20.68	0.518	7.406e-002
63	1.103	1.048	20.68	0.516	7.378e-002
64	1.168	1.113	20.67	0.514	7.349e-002
65	1.238	1.183	20.67	0.51	7.292e-002
66	1.311	1.256	20.67	0.506	7.235e-002
67	1.39	1.335	20.67	0.508	7.263e-002
68	1.473	1.418	20.66	0.501	7.163e-002
69	1.561	1.506	20.66	0.495	7.077e-002
70	1.655	1.6	20.65	0.491	7.02e-002
71	1.753	1.698	20.65	0.491	7.02e-002
72	1.858	1.803	20.65	0.487	6.963e-002
73	1.968	1.913	20.65	0.485	6.935e-002
74	2.085	2.03	20.64	0.479	6.849e-002
75	2.21	2.155	20.64	0.479	6.849e-002
76	2.341	2.286	20.64	0.479	6.849e-002
77	2.481	2.426	20.63	0.473	6.763e-002
78	2.63	2.575	20.63	0.471	6.734e-002
79	2.786	2.731	20.63	0.467	6.677e-002
80	2.953	2.898	20.62	0.463	6.62e-002
81	3.13	3.075	20.62	0.463	6.62e-002
82	3.316	3.261	20.62	0.459	6.563e-002
83	3.515	3.46	20.62	0.459	6.563e-002
84	3.725	3.67	20.61	0.451	6.448e-002

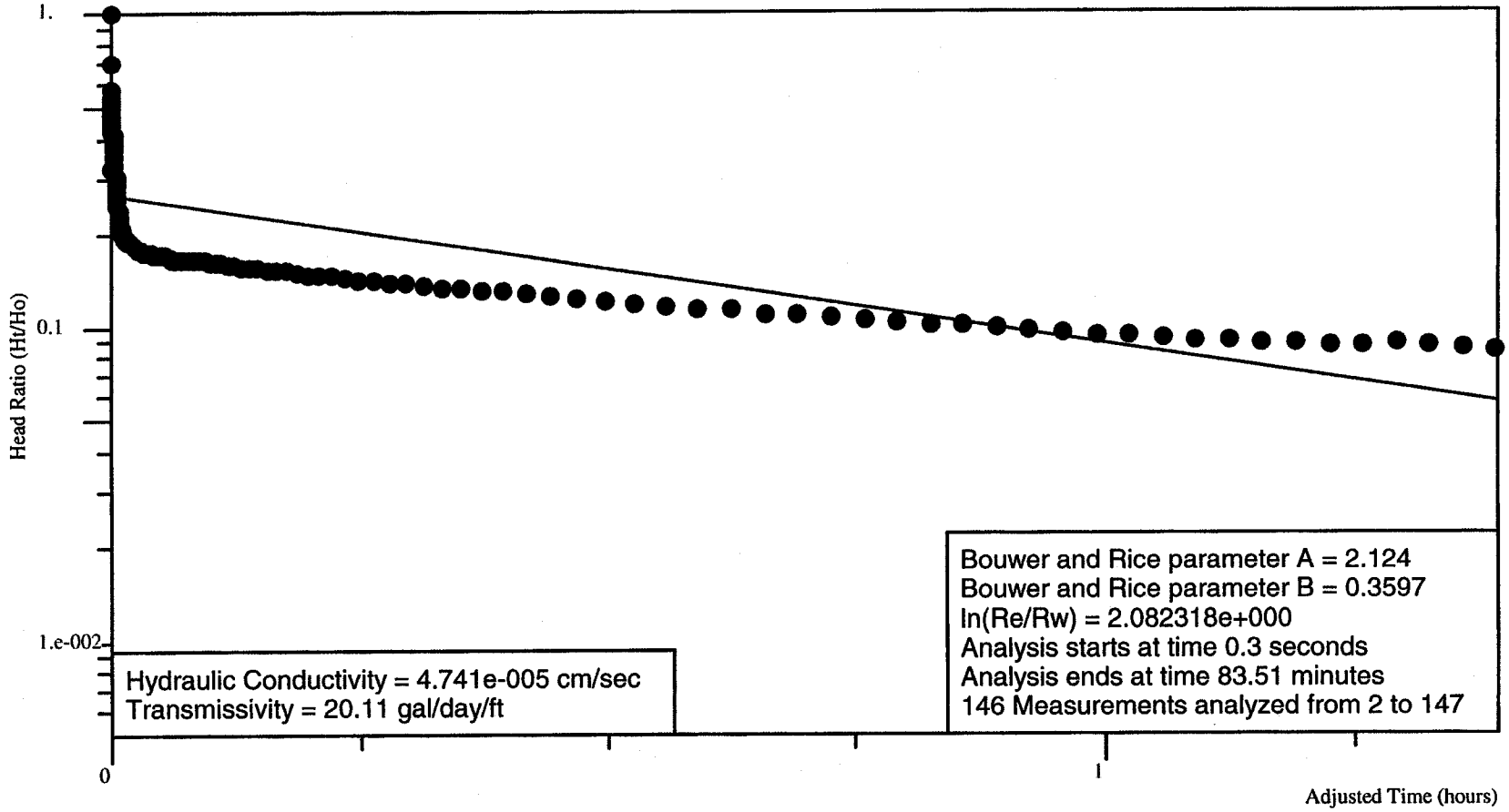
85	3.946	3.891	20.61	0.449	6.42e-002
86	4.181	4.126	20.61	0.447	6.391e-002
87	4.43	4.375	20.6	0.443	6.334e-002
88	4.693	4.638	20.6	0.439	6.277e-002
89	4.973	4.918	20.6	0.44	6.291e-002
90	5.27	5.215	20.6	0.443	6.334e-002
91	5.583	5.528	20.59	0.429	6.134e-002
92	5.915	5.86	20.59	0.427	6.105e-002
93	6.266	6.211	20.58	0.423	6.048e-002
94	6.64	6.585	20.58	0.421	6.019e-002
95	7.035	6.98	20.58	0.423	6.048e-002
96	7.453	7.398	20.57	0.415	5.934e-002
97	7.896	7.841	20.57	0.41	5.862e-002
98	8.366	8.311	20.57	0.406	5.805e-002
99	8.865	8.81	20.57	0.406	5.805e-002
100	9.391	9.336	20.56	0.396	5.662e-002
101	9.95	9.895	20.56	0.398	5.691e-002
102	10.54	10.49	20.55	0.394	5.633e-002
103	11.17	11.11	20.55	0.39	5.576e-002
104	11.83	11.78	20.54	0.382	5.462e-002
105	12.53	12.48	20.54	0.383	5.476e-002
106	13.28	13.22	20.54	0.375	5.362e-002
107	14.07	14.01	20.53	0.371	5.305e-002
108	14.91	14.85	20.53	0.371	5.305e-002
109	15.79	15.74	20.52	0.359	5.133e-002
110	16.73	16.67	20.52	0.359	5.133e-002
111	17.72	17.67	20.51	0.351	5.019e-002
112	18.78	18.72	20.51	0.349	4.99e-002
113	19.89	19.84	20.5	0.343	4.904e-002
114	21.07	21.02	20.5	0.335	4.79e-002
115	22.32	22.27	20.49	0.333	4.761e-002
116	23.65	23.59	20.49	0.333	4.761e-002
117	25.05	25.	20.48	0.319	4.561e-002
118	26.54	26.49	20.47	0.313	4.475e-002
119	28.12	28.06	20.47	0.311	4.447e-002
120	29.79	29.73	20.46	0.303	4.332e-002
121	31.55	31.5	20.46	0.297	4.246e-002
122	33.43	33.37	20.45	0.291	4.161e-002
123	35.41	35.36	20.45	0.289	4.132e-002
124	37.51	37.46	20.43	0.275	3.932e-002
125	39.51	39.46	20.43	0.271	3.875e-002
126	41.51	41.46	20.43	0.265	3.789e-002
127	43.51	43.46	20.41	0.255	3.646e-002
128	45.51	45.46	20.41	0.255	3.646e-002
129	47.51	47.46	20.41	0.245	3.503e-002
130	49.51	49.46	20.4	0.241	3.446e-002
131	51.51	51.46	20.4	0.237	3.389e-002
132	53.51	53.46	20.39	0.231	3.303e-002
133	55.51	55.46	20.39	0.225	3.217e-002
134	57.51	57.46	20.38	0.218	3.117e-002
135	59.51	59.46	20.38	0.22	3.146e-002
136	61.51	61.46	20.37	0.212	3.031e-002
137	63.51	63.46	20.37	0.212	3.031e-002

138	65.51	65.46	20.37	0.21	3.003e-002
139	67.51	67.46	20.36	0.204	2.917e-002
140	69.51	69.46	20.36	0.196	2.802e-002
141	71.51	71.46	20.36	0.195	2.788e-002
142	73.51	73.46	20.35	0.187	2.674e-002
143	75.51	75.46	20.34	0.184	2.631e-002
144	77.51	77.46	20.34	0.181	2.588e-002
145	79.51	79.46	20.34	0.179	2.559e-002
146	81.51	81.46	20.34	0.175	2.502e-002
147	83.51	83.46	20.33	0.171	2.445e-002
148	85.51	85.46	20.33	0.172	2.459e-002
149	87.51	87.46	20.33	0.167	2.388e-002
150	89.51	89.46	20.32	0.164	2.345e-002
151	91.51	91.46	20.32	0.163	2.331e-002

Aquifer Analysis April, 2, 2002

Bouwer and Rice Graph

P-7 (Rising)



Ho is 3.343 feet at 0.3 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Test Date: April, 2, 2002
Project Number: 600.04
Import File: P:\MRR of High Point\Task 04 Hydrogeologic Report and WQMP\Slug Data\Mini Troll Data\P-7(RISI

Well Label: P-7 (Rising)
Aquifer Thickness: 20. feet
Screen Length: 10. feet
Casing Radius: 1.888 inches
Effective Radius: 4.125 inches
Static Water Level: 9.85 feet
Water Table to Screen Bottom: 7.15 feet
Anisotropy Ratio: 1.
Time Adjustment: 0.3 Seconds
Test starts with trial 1
There are 147 time and drawdown measurements
Maximum head is 3.343 feet
Minimum head is -1.434 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-5.e-003	8.416	-1.434	-0.429
2	5.e-003	0.	13.19	3.343	1.
3	1.e-002	5.e-003	10.92	1.072	0.3207
4	1.5e-002	1.e-002	12.19	2.337	0.6991
5	2.e-002	1.5e-002	11.49	1.64	0.4906
6	2.5e-002	2.e-002	11.76	1.914	0.5725
7	3.e-002	2.5e-002	11.66	1.812	0.542
8	3.5e-002	3.e-002	11.63	1.776	0.5313
9	4.e-002	3.5e-002	11.66	1.812	0.542
10	4.5e-002	4.e-002	11.58	1.734	0.5187
11	5.e-002	4.5e-002	11.62	1.768	0.5289
12	5.5e-002	5.e-002	11.56	1.714	0.5127
13	6.e-002	5.5e-002	11.57	1.718	0.5139
14	6.5e-002	6.e-002	11.54	1.688	0.5049
15	7.e-002	6.5e-002	11.53	1.68	0.5025
16	7.5e-002	7.e-002	11.51	1.658	0.496
17	8.e-002	7.5e-002	11.49	1.642	0.4912
18	8.48e-002	7.98e-002	11.47	1.624	0.4858
19	9.e-002	8.5e-002	11.46	1.61	0.4816
20	9.5e-002	9.e-002	11.44	1.594	0.4768
21	0.1	9.5e-002	11.43	1.578	0.472
22	0.1058	0.1008	11.41	1.562	0.4672
23	0.112	0.107	11.39	1.544	0.4619
24	0.1185	0.1135	11.38	1.526	0.4565
25	0.1255	0.1205	11.35	1.504	0.4499
26	0.1328	0.1278	11.33	1.484	0.4439
27	0.1407	0.1357	11.31	1.46	0.4367
28	0.149	0.144	11.29	1.44	0.4308
29	0.1578	0.1528	11.27	1.418	0.4242
30	0.167	0.162	11.24	1.394	0.417
31	0.177	0.172	11.22	1.372	0.4104
32	0.1875	0.1825	11.2	1.346	0.4026

33	0.1985	0.1935	11.17	1.32	0.3949
34	0.2102	0.2052	11.14	1.291	0.3862
35	0.2227	0.2177	11.11	1.26	0.3769
36	0.2358	0.2308	11.08	1.227	0.367
37	0.2498	0.2448	11.05	1.197	0.3581
38	0.2647	0.2597	11.01	1.163	0.3479
39	0.2803	0.2753	10.98	1.131	0.3383
40	0.297	0.292	10.95	1.095	0.3276
41	0.3147	0.3097	10.91	1.061	0.3174
42	0.3333	0.3283	10.87	1.023	0.306
43	0.3532	0.3482	10.84	0.989	0.2958
44	0.3742	0.3692	10.8	0.953	0.2851
45	0.3963	0.3913	10.77	0.916	0.274
46	0.4198	0.4148	10.73	0.882	0.2638
47	0.4447	0.4397	10.7	0.85	0.2543
48	0.4697	0.4647	10.67	0.822	0.2459
49	0.4963	0.4913	10.64	0.792	0.2369
50	0.5247	0.5197	10.62	0.768	0.2297
51	0.5547	0.5497	10.6	0.746	0.2232
52	0.5863	0.5813	10.58	0.726	0.2172
53	0.6213	0.6163	10.56	0.71	0.2124
54	0.6578	0.6528	10.55	0.696	0.2082
55	0.6963	0.6913	10.54	0.686	0.2052
56	0.738	0.733	10.53	0.676	0.2022
57	0.7813	0.7763	10.52	0.668	0.1998
58	0.828	0.823	10.51	0.657	0.1965
59	0.8763	0.8713	10.5	0.651	0.1947
60	0.928	0.923	10.49	0.645	0.1929
61	0.983	0.978	10.49	0.639	0.1911
62	1.041	1.036	10.48	0.635	0.1899
63	1.103	1.098	10.48	0.629	0.1882
64	1.168	1.163	10.48	0.629	0.1882
65	1.238	1.233	10.48	0.625	0.187
66	1.311	1.306	10.47	0.617	0.1846
67	1.39	1.385	10.46	0.613	0.1834
68	1.473	1.468	10.46	0.607	0.1816
69	1.561	1.556	10.45	0.602	0.1801
70	1.655	1.65	10.45	0.596	0.1783
71	1.753	1.748	10.44	0.594	0.1777
72	1.858	1.853	10.44	0.59	0.1765
73	1.968	1.963	10.43	0.584	0.1747
74	2.085	2.08	10.43	0.582	0.1741
75	2.21	2.205	10.43	0.58	0.1735
76	2.341	2.336	10.43	0.577	0.1726
77	2.481	2.476	10.43	0.579	0.1732
78	2.63	2.625	10.42	0.573	0.1714
79	2.786	2.781	10.42	0.569	0.1702
80	2.953	2.948	10.42	0.567	0.1696
81	3.13	3.125	10.42	0.567	0.1696
82	3.316	3.311	10.41	0.565	0.169
83	3.515	3.51	10.41	0.556	0.1663
84	3.725	3.72	10.4	0.55	0.1645
85	3.946	3.941	10.4	0.549	0.1642

86	4.181	4.176	10.4	0.549	0.1642
87	4.43	4.424	10.4	0.547	0.1636
88	4.693	4.688	10.4	0.549	0.1642
89	4.973	4.968	10.4	0.547	0.1636
90	5.27	5.265	10.39	0.544	0.1627
91	5.583	5.578	10.39	0.544	0.1627
92	5.915	5.91	10.39	0.54	0.1615
93	6.266	6.261	10.39	0.536	0.1603
94	6.64	6.635	10.38	0.533	0.1594
95	7.035	7.03	10.38	0.53	0.1585
96	7.453	7.448	10.38	0.526	0.1573
97	7.896	7.891	10.37	0.521	0.1558
98	8.366	8.361	10.37	0.519	0.1552
99	8.865	8.86	10.36	0.514	0.1538
100	9.391	9.386	10.36	0.512	0.1532
101	9.95	9.945	10.36	0.506	0.1514
102	10.54	10.54	10.35	0.504	0.1508
103	11.17	11.16	10.35	0.498	0.149
104	11.83	11.83	10.34	0.491	0.1469
105	12.53	12.53	10.34	0.489	0.1463
106	13.28	13.27	10.34	0.485	0.1451
107	14.07	14.06	10.33	0.479	0.1433
108	14.91	14.9	10.32	0.474	0.1418
109	15.79	15.79	10.32	0.469	0.1403
110	16.73	16.72	10.32	0.465	0.1391
111	17.72	17.72	10.31	0.458	0.137
112	18.78	18.77	10.3	0.454	0.1358
113	19.89	19.89	10.29	0.444	0.1328
114	21.07	21.07	10.29	0.44	0.1316
115	22.32	22.32	10.28	0.433	0.1295
116	23.65	23.64	10.28	0.431	0.1289
117	25.05	25.05	10.28	0.425	0.1271
118	26.54	26.54	10.27	0.416	0.1244
119	28.12	28.11	10.26	0.412	0.1232
120	29.79	29.78	10.25	0.404	0.1208
121	31.55	31.55	10.25	0.398	0.1191
122	33.43	33.42	10.24	0.39	0.1167
123	35.41	35.41	10.23	0.38	0.1137
124	37.51	37.51	10.23	0.376	0.1125
125	39.51	39.51	10.22	0.367	0.1098
126	41.51	41.51	10.21	0.363	0.1086
127	43.51	43.51	10.21	0.355	0.1062
128	45.51	45.51	10.2	0.349	0.1044
129	47.51	47.51	10.2	0.345	0.1032
130	49.51	49.51	10.19	0.339	0.1014
131	51.51	51.51	10.19	0.337	0.1008
132	53.51	53.51	10.18	0.329	9.841e-002
133	55.51	55.51	10.18	0.325	9.722e-002
134	57.51	57.51	10.17	0.319	9.542e-002
135	59.51	59.51	10.16	0.315	9.423e-002
136	61.51	61.51	10.16	0.311	9.303e-002
137	63.51	63.51	10.16	0.309	9.243e-002
138	65.51	65.51	10.15	0.303	9.064e-002

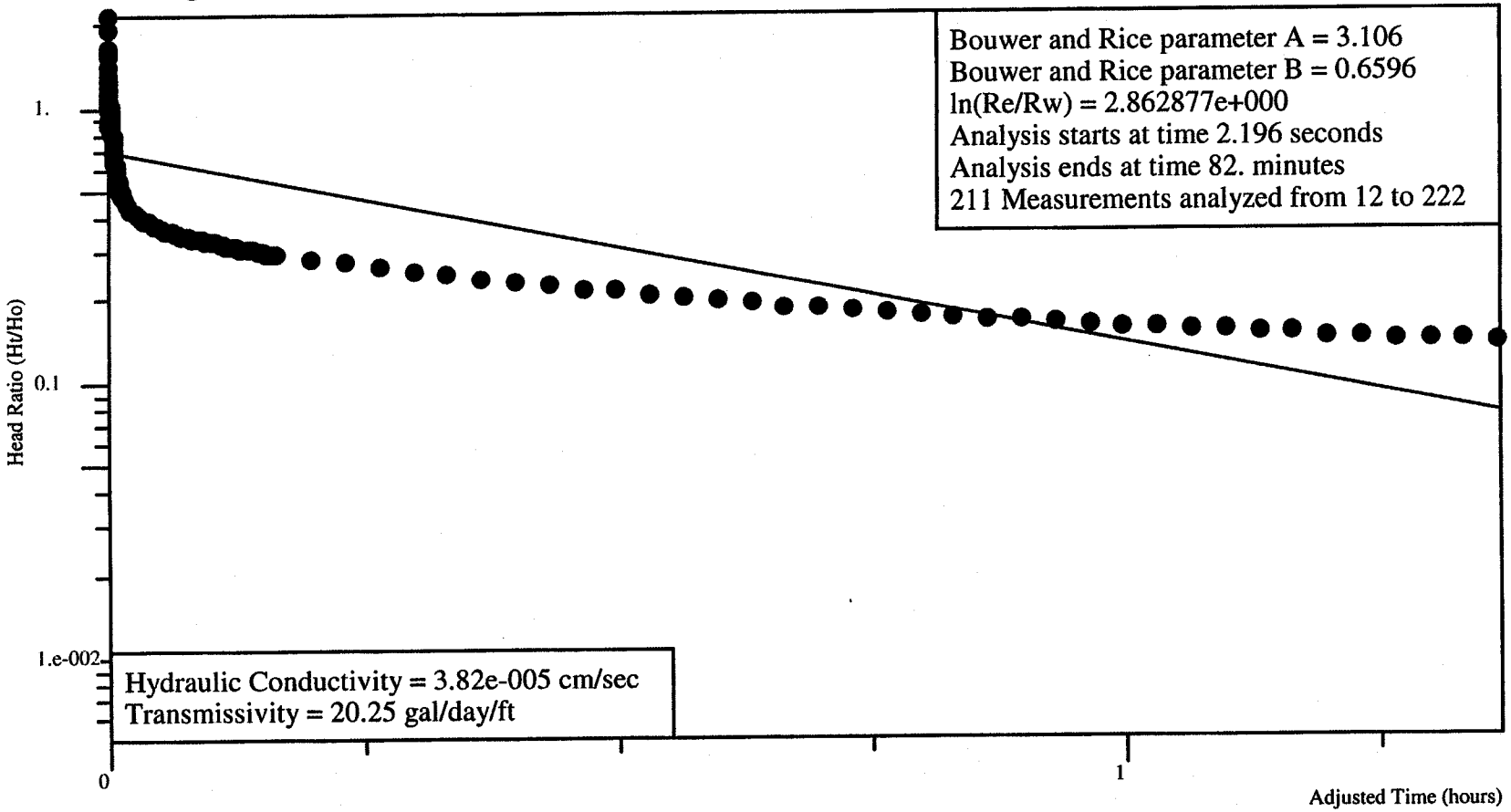
139	67.51	67.51	10.15	0.303	9.064e-002
140	69.51	69.51	10.15	0.297	8.884e-002
141	71.51	71.51	10.14	0.293	8.765e-002
142	73.51	73.51	10.14	0.288	8.615e-002
143	75.51	75.51	10.14	0.289	8.645e-002
144	77.51	77.51	10.14	0.294	8.794e-002
145	79.51	79.51	10.14	0.29	8.675e-002
146	81.51	81.51	10.13	0.282	8.436e-002
147	83.51	83.51	10.13	0.277	8.286e-002

Aquifer Analysis March 21, 2001

MRR of High Point, LLC

Bouwer and Rice Graph

P-9 (Rising)



Ho is 1.198 feet at 2.196 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: March 21, 2001
Project Number: 600.04
Import File: P:\MRR of High Point\Task 04 Hydrogeologic Report and WQMP\Slug Data\P-9RH

Well Label: P-9 (Rising)
Aquifer Thickness: 25. feet
Screen Length: 20. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 26.11 feet
Water Table to Screen Bottom: 13.89 feet
Anisotropy Ratio: 1.
Time Adjustment: 2.196 Seconds
Test starts with trial 2
There are 222 time and drawdown measurements
Maximum head is 5.189 feet
Minimum head is -1.418 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-3.66e-002	26.55	0.442	8.518e-002
2	3.3e-003	-3.33e-002	29.67	3.555	0.6851
3	6.6e-003	-3.e-002	31.3	5.189	1.
4	1.e-002	-2.66e-002	29.3	3.194	0.6155
5	1.33e-002	-2.33e-002	24.69	-1.418	-0.2733
6	1.66e-002	-2.e-002	26.08	-2.9e-002	-5.589e-003
7	2.e-002	-1.66e-002	28.16	2.054	0.3958
8	2.33e-002	-1.33e-002	29.84	3.731	0.719
9	2.66e-002	-1.e-002	28.96	2.852	0.5496
10	3.e-002	-6.6e-003	27.31	1.203	0.2318
11	3.33e-002	-3.3e-003	26.43	0.323	6.225e-002
12	3.66e-002	0.	27.31	1.198	0.2309
13	4.e-002	3.4e-003	28.39	2.282	0.4398
14	4.33e-002	6.7e-003	28.65	2.543	0.4901
15	4.66e-002	1.e-002	27.94	1.83	0.3527
16	5.e-002	1.34e-002	27.2	1.089	0.2099
17	5.33e-002	1.67e-002	27.15	1.041	0.2006
18	5.66e-002	2.e-002	27.68	1.574	0.3033
19	6.e-002	2.34e-002	28.09	1.982	0.382
20	6.33e-002	2.67e-002	27.99	1.878	0.3619
21	6.66e-002	3.e-002	27.6	1.488	0.2868
22	7.e-002	3.34e-002	27.34	1.231	0.2372
23	7.33e-002	3.67e-002	27.44	1.331	0.2565
24	7.66e-002	4.e-002	27.69	1.583	0.3051
25	8.e-002	4.34e-002	27.82	1.707	0.329
26	8.33e-002	4.67e-002	27.68	1.574	0.3033
27	8.66e-002	5.e-002	27.5	1.393	0.2685
28	9.e-002	5.34e-002	27.43	1.317	0.2538
29	9.33e-002	5.67e-002	27.52	1.407	0.2712
30	9.66e-002	6.e-002	27.62	1.507	0.2904
31	0.1	6.34e-002	27.62	1.512	0.2914

32	0.1033	6.67e-002	27.54	1.426	0.2748
33	0.1066	7.e-002	27.47	1.355	0.2611
34	0.11	7.34e-002	27.45	1.345	0.2592
35	0.1133	7.67e-002	27.49	1.383	0.2665
36	0.1166	8.e-002	27.54	1.431	0.2758
37	0.12	8.34e-002	27.52	1.412	0.2721
38	0.1233	8.67e-002	27.47	1.36	0.2621
39	0.1266	9.e-002	27.44	1.326	0.2555
40	0.13	9.34e-002	27.44	1.326	0.2555
41	0.1333	9.67e-002	27.45	1.345	0.2592
42	0.1366	0.1	27.47	1.355	0.2611
43	0.14	0.1034	27.45	1.336	0.2575
44	0.1433	0.1067	27.42	1.312	0.2528
45	0.1466	0.11	27.41	1.298	0.2501
46	0.15	0.1134	27.42	1.307	0.2519
47	0.1533	0.1167	27.42	1.312	0.2528
48	0.1566	0.12	27.4	1.288	0.2482
49	0.16	0.1234	27.45	1.336	0.2575
50	0.1633	0.1267	27.4	1.293	0.2492
51	0.1666	0.13	27.36	1.255	0.2419
52	0.17	0.1334	27.36	1.255	0.2419
53	0.1733	0.1367	27.36	1.25	0.2409
54	0.1766	0.14	27.36	1.25	0.2409
55	0.18	0.1434	27.34	1.231	0.2372
56	0.1833	0.1467	27.33	1.222	0.2355
57	0.1866	0.15	27.33	1.222	0.2355
58	0.19	0.1534	27.33	1.217	0.2345
59	0.1933	0.1567	27.32	1.212	0.2336
60	0.1966	0.16	27.31	1.203	0.2318
61	0.2	0.1634	27.31	1.198	0.2309
62	0.2033	0.1667	27.3	1.193	0.2299
63	0.2066	0.17	27.29	1.184	0.2282
64	0.21	0.1734	27.29	1.179	0.2272
65	0.2133	0.1767	27.28	1.169	0.2253
66	0.2166	0.18	27.27	1.165	0.2245
67	0.22	0.1834	27.27	1.16	0.2235
68	0.2233	0.1867	27.26	1.155	0.2226
69	0.2266	0.19	27.26	1.15	0.2216
70	0.23	0.1934	27.25	1.141	0.2199
71	0.2333	0.1967	27.25	1.136	0.2189
72	0.2366	0.2	27.24	1.131	0.218
73	0.24	0.2034	27.24	1.127	0.2172
74	0.2433	0.2067	27.23	1.122	0.2162
75	0.2466	0.21	27.22	1.112	0.2143
76	0.25	0.2134	27.22	1.108	0.2135
77	0.2533	0.2167	27.21	1.103	0.2126
78	0.2566	0.22	27.21	1.098	0.2116
79	0.26	0.2234	27.2	1.093	0.2106
80	0.2633	0.2267	27.2	1.089	0.2099
81	0.2666	0.23	27.19	1.079	0.2079
82	0.27	0.2334	27.18	1.074	0.207
83	0.2733	0.2367	27.18	1.07	0.2062
84	0.2766	0.24	27.18	1.065	0.2052

85	0.28	0.2434	27.17	1.06	0.2043
86	0.2833	0.2467	27.16	1.055	0.2033
87	0.2866	0.25	27.16	1.051	0.2025
88	0.29	0.2534	27.16	1.046	0.2016
89	0.2933	0.2567	27.15	1.041	0.2006
90	0.2966	0.26	27.14	1.032	0.1989
91	0.3	0.2634	27.14	1.027	0.1979
92	0.3033	0.2667	27.13	1.022	0.197
93	0.3066	0.27	27.13	1.017	0.196
94	0.31	0.2734	27.12	1.013	0.1952
95	0.3133	0.2767	27.12	1.008	0.1943
96	0.3166	0.28	27.11	1.003	0.1933
97	0.32	0.2834	27.11	0.998	0.1923
98	0.3233	0.2867	27.1	0.994	0.1916
99	0.3266	0.29	27.1	0.989	0.1906
100	0.33	0.2934	27.09	0.984	0.1896
101	0.3333	0.2967	27.09	0.979	0.1887
102	0.35	0.3134	27.07	0.956	0.1842
103	0.3666	0.33	27.04	0.932	0.1796
104	0.3833	0.3467	27.02	0.908	0.175
105	0.4	0.3634	26.99	0.884	0.1704
106	0.4166	0.38	26.97	0.86	0.1657
107	0.4333	0.3967	26.95	0.841	0.1621
108	0.45	0.4134	26.93	0.822	0.1584
109	0.4666	0.43	26.91	0.803	0.1548
110	0.4833	0.4467	26.89	0.784	0.1511
111	0.5	0.4634	26.88	0.77	0.1484
112	0.5166	0.48	26.86	0.751	0.1447
113	0.5333	0.4967	26.85	0.737	0.142
114	0.55	0.5134	26.83	0.722	0.1391
115	0.5666	0.53	26.82	0.713	0.1374
116	0.5833	0.5467	26.81	0.699	0.1347
117	0.6	0.5634	26.8	0.689	0.1328
118	0.6166	0.58	26.79	0.675	0.1301
119	0.6333	0.5967	26.78	0.67	0.1291
120	0.65	0.6134	26.77	0.661	0.1274
121	0.6666	0.63	26.76	0.651	0.1255
122	0.6833	0.6467	26.75	0.642	0.1237
123	0.7	0.6634	26.74	0.632	0.1218
124	0.7166	0.68	26.74	0.627	0.1208
125	0.7333	0.6967	26.73	0.623	0.1201
126	0.75	0.7134	26.73	0.618	0.1191
127	0.7666	0.73	26.72	0.608	0.1172
128	0.7833	0.7467	26.71	0.604	0.1164
129	0.8	0.7634	26.71	0.604	0.1164
130	0.8166	0.78	26.71	0.599	0.1154
131	0.8333	0.7967	26.7	0.594	0.1145
132	0.85	0.8134	26.7	0.589	0.1135
133	0.8666	0.83	26.7	0.585	0.1127
134	0.8833	0.8467	26.7	0.585	0.1127
135	0.9	0.8634	26.69	0.58	0.1118
136	0.9166	0.88	26.68	0.575	0.1108
137	0.9333	0.8967	26.68	0.575	0.1108

138	0.95	0.9134	26.68	0.57	0.1098
139	0.9666	0.93	26.68	0.57	0.1098
140	0.9833	0.9467	26.68	0.566	0.1091
141	1.	0.9634	26.68	0.566	0.1091
142	1.2	1.163	26.64	0.532	0.1025
143	1.4	1.363	26.63	0.518	9.983e-002
144	1.6	1.563	26.61	0.504	9.713e-002
145	1.8	1.763	26.6	0.489	9.424e-002
146	2.	1.963	26.59	0.48	9.25e-002
147	2.2	2.163	26.58	0.47	9.058e-002
148	2.4	2.363	26.58	0.466	8.981e-002
149	2.6	2.563	26.57	0.456	8.788e-002
150	2.8	2.763	26.56	0.451	8.691e-002
151	3.	2.963	26.56	0.447	8.614e-002
152	3.2	3.163	26.55	0.437	8.422e-002
153	3.4	3.363	26.54	0.432	8.325e-002
154	3.6	3.563	26.54	0.432	8.325e-002
155	3.8	3.763	26.54	0.428	8.248e-002
156	4.	3.963	26.53	0.423	8.152e-002
157	4.2	4.163	26.53	0.418	8.056e-002
158	4.4	4.363	26.52	0.413	7.959e-002
159	4.6	4.563	26.52	0.413	7.959e-002
160	4.8	4.763	26.52	0.409	7.882e-002
161	5.	4.963	26.51	0.404	7.786e-002
162	5.2	5.163	26.51	0.404	7.786e-002
163	5.4	5.363	26.51	0.399	7.689e-002
164	5.6	5.563	26.51	0.399	7.689e-002
165	5.8	5.763	26.5	0.394	7.593e-002
166	6.	5.963	26.5	0.39	7.516e-002
167	6.2	6.163	26.5	0.39	7.516e-002
168	6.4	6.363	26.5	0.39	7.516e-002
169	6.6	6.563	26.5	0.385	7.42e-002
170	6.8	6.763	26.5	0.385	7.42e-002
171	7.	6.963	26.49	0.38	7.323e-002
172	7.2	7.163	26.49	0.38	7.323e-002
173	7.4	7.363	26.48	0.375	7.227e-002
174	7.6	7.563	26.48	0.375	7.227e-002
175	7.8	7.763	26.48	0.371	7.15e-002
176	8.	7.963	26.48	0.371	7.15e-002
177	8.2	8.163	26.48	0.371	7.15e-002
178	8.4	8.363	26.48	0.366	7.053e-002
179	8.6	8.563	26.48	0.366	7.053e-002
180	8.8	8.763	26.47	0.361	6.957e-002
181	9.	8.963	26.47	0.361	6.957e-002
182	9.2	9.163	26.47	0.361	6.957e-002
183	9.4	9.363	26.47	0.356	6.861e-002
184	9.6	9.563	26.47	0.356	6.861e-002
185	9.8	9.763	26.47	0.356	6.861e-002
186	10.	9.963	26.46	0.352	6.784e-002
187	12.	11.96	26.45	0.337	6.495e-002
188	14.	13.96	26.44	0.328	6.321e-002
189	16.	15.96	26.42	0.313	6.032e-002
190	18.	17.96	26.41	0.304	5.859e-002

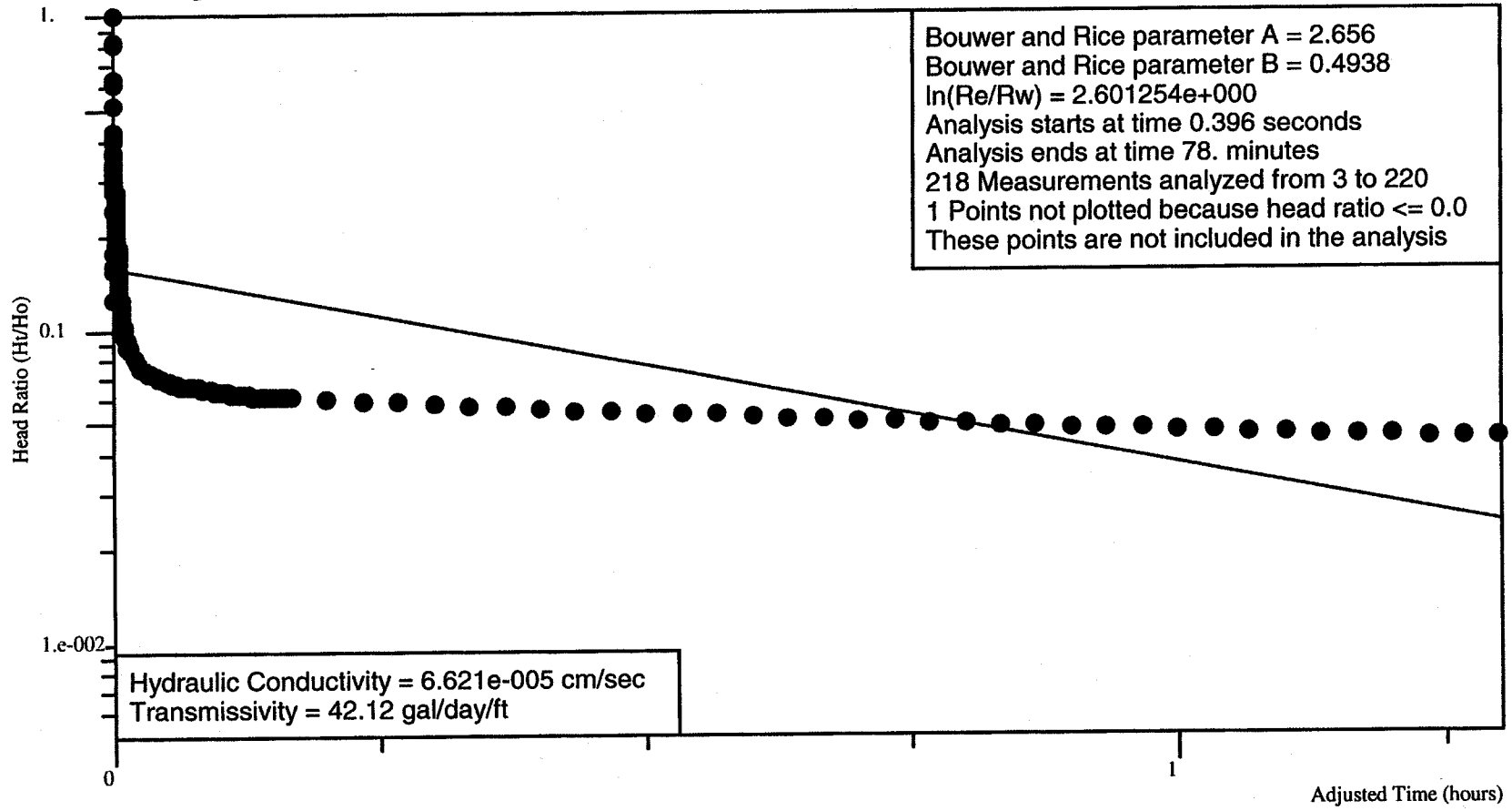
191	20.	19.96	26.4	0.294	5.666e-002
192	22.	21.96	26.4	0.285	5.492e-002
193	24.	23.96	26.38	0.275	5.3e-002
194	26.	25.96	26.38	0.271	5.223e-002
195	28.	27.96	26.37	0.261	5.03e-002
196	30.	29.96	26.37	0.256	4.934e-002
197	32.	31.96	26.36	0.247	4.76e-002
198	34.	33.96	26.35	0.242	4.664e-002
199	36.	35.96	26.35	0.237	4.567e-002
200	38.	37.96	26.34	0.233	4.49e-002
201	40.	39.96	26.33	0.223	4.298e-002
202	42.	41.96	26.33	0.223	4.298e-002
203	44.	43.96	26.33	0.218	4.201e-002
204	46.	45.96	26.32	0.214	4.124e-002
205	48.	47.96	26.32	0.209	4.028e-002
206	50.	49.96	26.31	0.204	3.931e-002
207	52.	51.96	26.31	0.199	3.835e-002
208	54.	53.96	26.31	0.199	3.835e-002
209	56.	55.96	26.31	0.195	3.758e-002
210	58.	57.96	26.3	0.19	3.662e-002
211	60.	59.96	26.3	0.185	3.565e-002
212	62.	61.96	26.3	0.185	3.565e-002
213	64.	63.96	26.29	0.18	3.469e-002
214	66.	65.96	26.29	0.18	3.469e-002
215	68.	67.96	26.29	0.176	3.392e-002
216	70.	69.96	26.29	0.176	3.392e-002
217	72.	71.96	26.28	0.171	3.295e-002
218	74.	73.96	26.28	0.171	3.295e-002
219	76.	75.96	26.28	0.166	3.199e-002
220	78.	77.96	26.28	0.166	3.199e-002
221	80.	79.96	26.28	0.166	3.199e-002
222	82.	81.96	26.27	0.161	3.103e-002

Aquifer Analysis March 21, 2002

Bouwer and Rice Graph

MRR of High Point, LLC

P-12 (Rising)



Ho is 4.852 feet at 0.396 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: March 21, 2002
Project Number: 600.04
Import File: C:\Documents and Settings\jdeem\My Documents\P-12RH

Well Label: P-12 (Rising)
Aquifer Thickness: 30. feet
Screen Length: 15. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 9.95 feet
Water Table to Screen Bottom: 10.05 feet
Anisotropy Ratio: 1.
Time Adjustment: 0.396 Seconds
Test starts with trial 2
There are 220 time and drawdown measurements
Maximum head is 4.852 feet
Minimum head is -1.729 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-6.6e-003	10.	5.2e-002	1.072e-002
2	3.3e-003	-3.3e-003	12.68	2.728	0.5622
3	6.6e-003	0.	14.8	4.852	1.
4	1.e-002	3.4e-003	13.89	3.942	0.8124
5	1.33e-002	6.7e-003	8.221	-1.729	-0.3563
6	1.66e-002	1.e-002	10.81	0.859	0.177
7	2.e-002	1.34e-002	13.98	4.028	0.8302
8	2.33e-002	1.67e-002	13.03	3.079	0.6346
9	2.66e-002	2.e-002	10.7	0.75	0.1546
10	3.e-002	2.34e-002	10.56	0.612	0.1261
11	3.33e-002	2.67e-002	12.48	2.534	0.5223
12	3.66e-002	3.e-002	12.93	2.98	0.6142
13	4.e-002	3.34e-002	11.56	1.609	0.3316
14	4.33e-002	3.67e-002	10.73	0.783	0.1614
15	4.66e-002	4.e-002	11.73	1.78	0.3669
16	5.e-002	4.34e-002	12.51	2.562	0.528
17	5.33e-002	4.67e-002	11.94	1.988	0.4097
18	5.66e-002	5.e-002	11.13	1.177	0.2426
19	6.e-002	5.34e-002	11.37	1.424	0.2935
20	6.33e-002	5.67e-002	12.04	2.093	0.4314
21	6.66e-002	6.e-002	12.01	2.055	0.4235
22	7.e-002	6.34e-002	11.44	1.485	0.3061
23	7.33e-002	6.67e-002	11.28	1.334	0.2749
24	7.66e-002	7.e-002	11.69	1.742	0.359
25	8.e-002	7.34e-002	11.89	1.936	0.399
26	8.33e-002	7.67e-002	11.59	1.642	0.3384
27	8.66e-002	8.e-002	11.34	1.386	0.2857
28	9.e-002	8.34e-002	11.49	1.538	0.317
29	9.33e-002	8.67e-002	11.71	1.756	0.3619
30	9.66e-002	9.e-002	11.63	1.675	0.3452
31	0.1	9.34e-002	11.4	1.452	0.2993

32	0.1033	9.67e-002	11.39	1.438	0.2964
33	0.1066	0.1	11.54	1.59	0.3277
34	0.11	0.1034	11.57	1.623	0.3345
35	0.1133	0.1067	11.44	1.485	0.3061
36	0.1166	0.11	11.35	1.4	0.2885
37	0.12	0.1134	11.42	1.471	0.3032
38	0.1233	0.1167	11.48	1.533	0.316
39	0.1266	0.12	11.43	1.481	0.3052
40	0.13	0.1234	11.34	1.39	0.2865
41	0.1333	0.1267	11.34	1.39	0.2865
42	0.1366	0.13	11.39	1.443	0.2974
43	0.14	0.1334	11.39	1.438	0.2964
44	0.1433	0.1367	11.33	1.376	0.2836
45	0.1466	0.14	11.29	1.343	0.2768
46	0.15	0.1434	11.31	1.362	0.2807
47	0.1533	0.1467	11.33	1.376	0.2836
48	0.1566	0.15	11.3	1.348	0.2778
49	0.16	0.1534	11.26	1.305	0.269
50	0.1633	0.1567	11.25	1.3	0.2679
51	0.1666	0.16	11.26	1.314	0.2708
52	0.17	0.1634	11.26	1.305	0.269
53	0.1733	0.1667	11.22	1.272	0.2622
54	0.1766	0.17	11.2	1.253	0.2582
55	0.18	0.1734	11.21	1.258	0.2593
56	0.1833	0.1767	11.2	1.253	0.2582
57	0.1866	0.18	11.18	1.234	0.2543
58	0.19	0.1834	11.16	1.215	0.2504
59	0.1933	0.1867	11.15	1.205	0.2484
60	0.1966	0.19	11.15	1.201	0.2475
61	0.2	0.1934	11.14	1.191	0.2455
62	0.2033	0.1967	11.13	1.177	0.2426
63	0.2066	0.2	11.11	1.163	0.2397
64	0.21	0.2034	11.1	1.153	0.2376
65	0.2133	0.2067	11.1	1.148	0.2366
66	0.2166	0.21	11.08	1.134	0.2337
67	0.22	0.2134	11.07	1.12	0.2308
68	0.2233	0.2167	11.06	1.11	0.2288
69	0.2266	0.22	11.06	1.106	0.2279
70	0.23	0.2234	11.05	1.096	0.2259
71	0.2333	0.2267	11.03	1.082	0.223
72	0.2366	0.23	11.02	1.072	0.2209
73	0.24	0.2334	11.01	1.063	0.2191
74	0.2433	0.2367	11.	1.053	0.217
75	0.2466	0.24	10.99	1.044	0.2152
76	0.25	0.2434	10.98	1.034	0.2131
77	0.2533	0.2467	10.98	1.025	0.2113
78	0.2566	0.25	10.97	1.015	0.2092
79	0.26	0.2534	10.96	1.006	0.2073
80	0.2633	0.2567	10.95	0.997	0.2055
81	0.2666	0.26	10.94	0.987	0.2034
82	0.27	0.2634	10.93	0.978	0.2016
83	0.2733	0.2667	10.92	0.968	0.1995
84	0.2766	0.27	10.91	0.959	0.1977

85	0.28	0.2734	10.9	0.949	0.1956
86	0.2833	0.2767	10.89	0.944	0.1946
87	0.2866	0.28	10.89	0.935	0.1927
88	0.29	0.2834	10.88	0.925	0.1906
89	0.2933	0.2867	10.87	0.916	0.1888
90	0.2966	0.29	10.86	0.911	0.1878
91	0.3	0.2934	10.85	0.902	0.1859
92	0.3033	0.2967	10.84	0.892	0.1838
93	0.3066	0.3	10.84	0.887	0.1828
94	0.31	0.3034	10.83	0.878	0.181
95	0.3133	0.3067	10.82	0.868	0.1789
96	0.3166	0.31	10.81	0.864	0.1781
97	0.32	0.3134	10.8	0.854	0.176
98	0.3233	0.3167	10.8	0.849	0.175
99	0.3266	0.32	10.79	0.84	0.1731
100	0.33	0.3234	10.79	0.835	0.1721
101	0.3333	0.3267	10.78	0.826	0.1702
102	0.35	0.3434	10.74	0.792	0.1632
103	0.3666	0.36	10.7	0.754	0.1554
104	0.3833	0.3767	10.67	0.721	0.1486
105	0.4	0.3934	10.64	0.693	0.1428
106	0.4166	0.41	10.62	0.669	0.1379
107	0.4333	0.4267	10.6	0.645	0.1329
108	0.45	0.4434	10.57	0.622	0.1282
109	0.4666	0.46	10.55	0.603	0.1243
110	0.4833	0.4767	10.54	0.588	0.1212
111	0.5	0.4934	10.52	0.569	0.1173
112	0.5166	0.51	10.51	0.555	0.1144
113	0.5333	0.5267	10.5	0.546	0.1125
114	0.55	0.5434	10.48	0.531	0.1094
115	0.5666	0.56	10.47	0.522	0.1076
116	0.5833	0.5767	10.46	0.512	0.1055
117	0.6	0.5934	10.45	0.503	0.1037
118	0.6166	0.61	10.45	0.498	0.1026
119	0.6333	0.6267	10.44	0.493	0.1016
120	0.65	0.6434	10.43	0.484	9.975e-002
121	0.6666	0.66	10.43	0.479	9.872e-002
122	0.6833	0.6767	10.42	0.474	9.769e-002
123	0.7	0.6934	10.42	0.47	9.687e-002
124	0.7166	0.71	10.41	0.465	9.584e-002
125	0.7333	0.7267	10.41	0.46	9.481e-002
126	0.75	0.7434	10.4	0.455	9.378e-002
127	0.7666	0.76	10.4	0.451	9.295e-002
128	0.7833	0.7767	10.4	0.451	9.295e-002
129	0.8	0.7934	10.4	0.446	9.192e-002
130	0.8166	0.81	10.39	0.441	9.089e-002
131	0.8333	0.8267	10.39	0.436	8.986e-002
132	0.85	0.8434	10.39	0.436	8.986e-002
133	0.8666	0.86	10.38	0.432	8.904e-002
134	0.8833	0.8767	10.38	0.432	8.904e-002
135	0.9	0.8934	10.38	0.427	8.8e-002
136	0.9166	0.91	10.38	0.427	8.8e-002
137	0.9333	0.9267	10.37	0.422	8.697e-002

138	0.95	0.9434	10.37	0.422	8.697e-002
139	0.9666	0.96	10.37	0.417	8.594e-002
140	0.9833	0.9767	10.37	0.417	8.594e-002
141	1.	0.9934	10.37	0.417	8.594e-002
142	1.2	1.193	10.34	0.394	8.12e-002
143	1.4	1.393	10.33	0.379	7.811e-002
144	1.6	1.593	10.32	0.37	7.626e-002
145	1.8	1.793	10.31	0.36	7.42e-002
146	2.	1.993	10.31	0.356	7.337e-002
147	2.2	2.193	10.3	0.351	7.234e-002
148	2.4	2.393	10.3	0.346	7.131e-002
149	2.6	2.593	10.29	0.341	7.028e-002
150	2.8	2.793	10.29	0.337	6.946e-002
151	3.	2.993	10.28	0.332	6.843e-002
152	3.2	3.193	10.28	0.332	6.843e-002
153	3.4	3.393	10.28	0.327	6.739e-002
154	3.6	3.593	10.28	0.327	6.739e-002
155	3.8	3.793	10.27	0.322	6.636e-002
156	4.	3.993	10.27	0.322	6.636e-002
157	4.2	4.193	10.27	0.322	6.636e-002
158	4.4	4.393	10.27	0.318	6.554e-002
159	4.6	4.593	10.27	0.318	6.554e-002
160	4.8	4.793	10.27	0.318	6.554e-002
161	5.	4.993	10.26	0.313	6.451e-002
162	5.2	5.193	10.26	0.313	6.451e-002
163	5.4	5.393	10.26	0.313	6.451e-002
164	5.6	5.593	10.26	0.313	6.451e-002
165	5.8	5.793	10.26	0.308	6.348e-002
166	6.	5.993	10.26	0.308	6.348e-002
167	6.2	6.193	10.26	0.308	6.348e-002
168	6.4	6.393	10.26	0.308	6.348e-002
169	6.6	6.593	10.25	0.303	6.245e-002
170	6.8	6.793	10.25	0.303	6.245e-002
171	7.	6.993	10.25	0.303	6.245e-002
172	7.2	7.193	10.25	0.303	6.245e-002
173	7.4	7.393	10.25	0.303	6.245e-002
174	7.6	7.593	10.25	0.303	6.245e-002
175	7.8	7.793	10.25	0.299	6.162e-002
176	8.	7.993	10.25	0.299	6.162e-002
177	8.2	8.193	10.25	0.299	6.162e-002
178	8.4	8.393	10.25	0.299	6.162e-002
179	8.6	8.593	10.25	0.299	6.162e-002
180	8.8	8.793	10.25	0.299	6.162e-002
181	9.	8.993	10.25	0.299	6.162e-002
182	9.2	9.193	10.25	0.299	6.162e-002
183	9.4	9.393	10.25	0.299	6.162e-002
184	9.6	9.593	10.24	0.294	6.059e-002
185	9.8	9.793	10.24	0.294	6.059e-002
186	10.	9.993	10.24	0.294	6.059e-002
187	12.	11.99	10.24	0.289	5.956e-002
188	14.	13.99	10.23	0.284	5.853e-002
189	16.	15.99	10.23	0.284	5.853e-002
190	18.	17.99	10.23	0.28	5.771e-002

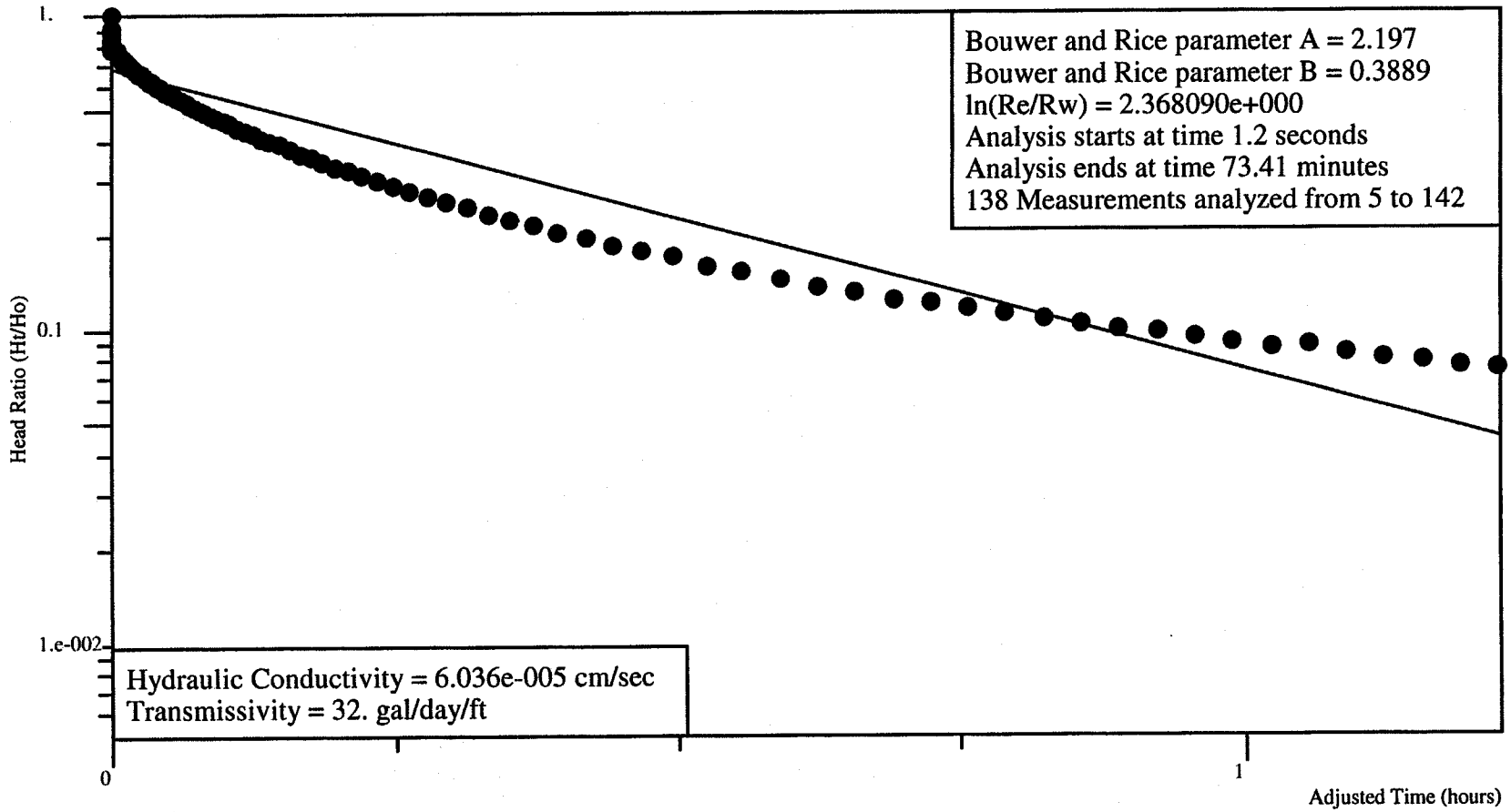
191	20.	19.99	10.23	0.275	5.668e-002
192	22.	21.99	10.23	0.275	5.668e-002
193	24.	23.99	10.22	0.27	5.565e-002
194	26.	25.99	10.22	0.265	5.462e-002
195	28.	27.99	10.22	0.265	5.462e-002
196	30.	29.99	10.21	0.261	5.379e-002
197	32.	31.99	10.21	0.261	5.379e-002
198	34.	33.99	10.21	0.261	5.379e-002
199	36.	35.99	10.21	0.256	5.276e-002
200	38.	37.99	10.2	0.251	5.173e-002
201	40.	39.99	10.2	0.251	5.173e-002
202	42.	41.99	10.2	0.246	5.07e-002
203	44.	43.99	10.2	0.246	5.07e-002
204	46.	45.99	10.19	0.242	4.988e-002
205	48.	47.99	10.19	0.242	4.988e-002
206	50.	49.99	10.19	0.237	4.885e-002
207	52.	51.99	10.19	0.237	4.885e-002
208	54.	53.99	10.18	0.232	4.782e-002
209	56.	55.99	10.18	0.232	4.782e-002
210	58.	57.99	10.18	0.232	4.782e-002
211	60.	59.99	10.18	0.227	4.678e-002
212	62.	61.99	10.18	0.227	4.678e-002
213	64.	63.99	10.17	0.223	4.596e-002
214	66.	65.99	10.17	0.223	4.596e-002
215	68.	67.99	10.17	0.218	4.493e-002
216	70.	69.99	10.17	0.218	4.493e-002
217	72.	71.99	10.17	0.218	4.493e-002
218	74.	73.99	10.16	0.213	4.39e-002
219	76.	75.99	10.16	0.213	4.39e-002
220	78.	77.99	10.16	0.213	4.39e-002

Aquifer Analysis December 27, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-13D(Rising)



Ho is 2.41 feet at 1.2 seconds

Project Number 600.06

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: December 27, 2002
Project Number: 600.06
Import File: P:\MRR of High Point\Task 06 Response to Comments\Hydrogeologic Comments\Revised slug tests\Sl

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Well Label: P-13D(Rising)
Aquifer Thickness: 25. feet
Screen Length: 10. feet
Casing Radius: 1.888 inches
Effective Radius: 5.125 inches
Static Water Level: 5.79 feet
Water Table to Screen Bottom: 19.77 feet
Anisotropy Ratio: 1.
Time Adjustment: 1.2 Seconds
Test starts with trial 1
There are 142 time and drawdown measurements
Maximum head is 3.716 feet
Minimum head is -0.543 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-2.e-002	5.247	-0.543	-0.1461
2	5.e-003	-1.5e-002	9.506	3.716	1.
3	1.e-002	-1.e-002	8.433	2.643	0.7112
4	1.5e-002	-5.e-003	7.129	1.339	0.3603
5	2.e-002	0.	8.2	2.41	0.6485
6	2.5e-002	5.e-003	7.992	2.202	0.5926
7	3.e-002	1.e-002	7.686	1.896	0.5102
8	3.5e-002	1.5e-002	7.928	2.138	0.5753
9	4.e-002	2.e-002	7.848	2.058	0.5538
10	4.5e-002	2.5e-002	7.81	2.02	0.5436
11	5.e-002	3.e-002	7.844	2.054	0.5527
12	5.5e-002	3.5e-002	7.82	2.03	0.5463
13	6.e-002	4.e-002	7.812	2.022	0.5441
14	6.5e-002	4.5e-002	7.813	2.023	0.5444
15	7.e-002	5.e-002	7.805	2.015	0.5422
16	7.5e-002	5.5e-002	7.799	2.009	0.5406
17	8.e-002	6.e-002	7.793	2.003	0.539
18	8.48e-002	6.48e-002	7.789	1.999	0.5379
19	9.e-002	7.e-002	7.783	1.993	0.5363
20	9.5e-002	7.5e-002	7.779	1.989	0.5353
21	0.1	8.e-002	7.774	1.984	0.5339
22	0.1058	8.58e-002	7.768	1.978	0.5323
23	0.112	9.2e-002	7.764	1.974	0.5312
24	0.1185	9.85e-002	7.758	1.968	0.5296
25	0.1255	0.1055	7.754	1.964	0.5285
26	0.1328	0.1128	7.748	1.958	0.5269
27	0.1407	0.1207	7.744	1.954	0.5258
28	0.149	0.129	7.738	1.948	0.5242
29	0.1578	0.1378	7.734	1.944	0.5231
30	0.167	0.147	7.732	1.942	0.5226
31	0.177	0.157	7.728	1.938	0.5215

32	0.1875	0.1675	7.724	1.934	0.5205
33	0.1985	0.1785	7.718	1.928	0.5188
34	0.2102	0.1902	7.712	1.922	0.5172
35	0.2227	0.2027	7.706	1.916	0.5156
36	0.2358	0.2158	7.702	1.912	0.5145
37	0.2498	0.2298	7.696	1.906	0.5129
38	0.2647	0.2447	7.69	1.9	0.5113
39	0.2803	0.2603	7.684	1.894	0.5097
40	0.297	0.277	7.678	1.888	0.5081
41	0.3147	0.2947	7.67	1.88	0.5059
42	0.3333	0.3133	7.664	1.874	0.5043
43	0.3532	0.3332	7.658	1.868	0.5027
44	0.3742	0.3542	7.65	1.86	0.5005
45	0.3963	0.3763	7.642	1.852	0.4984
46	0.4198	0.3998	7.634	1.844	0.4962
47	0.4447	0.4247	7.627	1.837	0.4943
48	0.4697	0.4497	7.619	1.829	0.4922
49	0.4963	0.4763	7.61	1.82	0.4898
50	0.5247	0.5047	7.602	1.812	0.4876
51	0.5547	0.5347	7.594	1.804	0.4855
52	0.5863	0.5663	7.586	1.796	0.4833
53	0.6213	0.6013	7.576	1.786	0.4806
54	0.6578	0.6378	7.566	1.776	0.4779
55	0.6963	0.6763	7.556	1.766	0.4752
56	0.738	0.718	7.546	1.756	0.4726
57	0.7813	0.7613	7.536	1.746	0.4699
58	0.828	0.808	7.524	1.734	0.4666
59	0.8763	0.8563	7.514	1.724	0.4639
60	0.928	0.908	7.502	1.712	0.4607
61	0.983	0.963	7.49	1.7	0.4575
62	1.041	1.021	7.477	1.687	0.454
63	1.103	1.083	7.465	1.675	0.4508
64	1.168	1.148	7.456	1.666	0.4483
65	1.238	1.218	7.444	1.654	0.4451
66	1.311	1.291	7.426	1.636	0.4403
67	1.39	1.37	7.411	1.621	0.4362
68	1.473	1.453	7.395	1.605	0.4319
69	1.561	1.541	7.382	1.592	0.4284
70	1.655	1.635	7.365	1.575	0.4238
71	1.753	1.733	7.347	1.557	0.419
72	1.858	1.838	7.331	1.541	0.4147
73	1.968	1.948	7.315	1.525	0.4104
74	2.085	2.065	7.297	1.507	0.4055
75	2.21	2.19	7.279	1.489	0.4007
76	2.341	2.321	7.261	1.471	0.3959
77	2.481	2.461	7.243	1.453	0.391
78	2.63	2.61	7.223	1.433	0.3856
79	2.786	2.766	7.203	1.413	0.3802
80	2.953	2.933	7.183	1.393	0.3749
81	3.13	3.11	7.163	1.373	0.3695
82	3.316	3.296	7.141	1.351	0.3636
83	3.515	3.495	7.119	1.329	0.3576
84	3.725	3.705	7.097	1.307	0.3517

85	3.946	3.926	7.075	1.285	0.3458
86	4.181	4.161	7.053	1.263	0.3399
87	4.43	4.41	7.029	1.239	0.3334
88	4.693	4.673	7.005	1.215	0.327
89	4.973	4.953	6.981	1.191	0.3205
90	5.27	5.25	6.957	1.167	0.314
91	5.583	5.563	6.931	1.141	0.3071
92	5.915	5.895	6.907	1.117	0.3006
93	6.266	6.246	6.881	1.091	0.2936
94	6.64	6.62	6.855	1.065	0.2866
95	7.035	7.015	6.829	1.039	0.2796
96	7.453	7.433	6.803	1.013	0.2726
97	7.896	7.876	6.777	0.987	0.2656
98	8.366	8.346	6.749	0.959	0.2581
99	8.865	8.845	6.729	0.939	0.2527
100	9.391	9.371	6.697	0.907	0.2441
101	9.95	9.93	6.671	0.881	0.2371
102	10.54	10.52	6.643	0.853	0.2295
103	11.17	11.15	6.615	0.825	0.222
104	11.83	11.81	6.587	0.797	0.2145
105	12.53	12.51	6.561	0.771	0.2075
106	13.28	13.26	6.533	0.743	0.1999
107	14.07	14.05	6.507	0.717	0.1929
108	14.91	14.89	6.482	0.692	0.1862
109	15.79	15.77	6.456	0.666	0.1792
110	16.73	16.71	6.428	0.638	0.1717
111	17.72	17.7	6.404	0.614	0.1652
112	18.78	18.76	6.378	0.588	0.1582
113	19.89	19.87	6.354	0.564	0.1518
114	21.07	21.05	6.328	0.538	0.1448
115	22.32	22.3	6.305	0.515	0.1386
116	23.65	23.63	6.281	0.491	0.1321
117	25.05	25.03	6.258	0.468	0.1259
118	26.54	26.52	6.236	0.446	0.12
119	28.12	28.1	6.214	0.424	0.1141
120	29.79	29.77	6.198	0.408	0.1098
121	31.55	31.53	6.173	0.383	0.1031
122	33.43	33.41	6.155	0.365	9.822e-002
123	35.41	35.39	6.135	0.345	9.284e-002
124	37.41	37.39	6.117	0.327	8.8e-002
125	39.41	39.39	6.104	0.314	8.45e-002
126	41.41	41.39	6.088	0.298	8.019e-002
127	43.41	43.39	6.078	0.288	7.75e-002
128	45.41	45.39	6.07	0.28	7.535e-002
129	47.41	47.39	6.06	0.27	7.266e-002
130	49.41	49.39	6.048	0.258	6.943e-002
131	51.41	51.39	6.04	0.25	6.728e-002
132	53.41	53.39	6.03	0.24	6.459e-002
133	55.41	55.39	6.024	0.234	6.297e-002
134	57.41	57.39	6.017	0.227	6.109e-002
135	59.41	59.39	6.007	0.217	5.84e-002
136	61.41	61.39	5.999	0.209	5.624e-002
137	63.41	63.39	6.001	0.211	5.678e-002

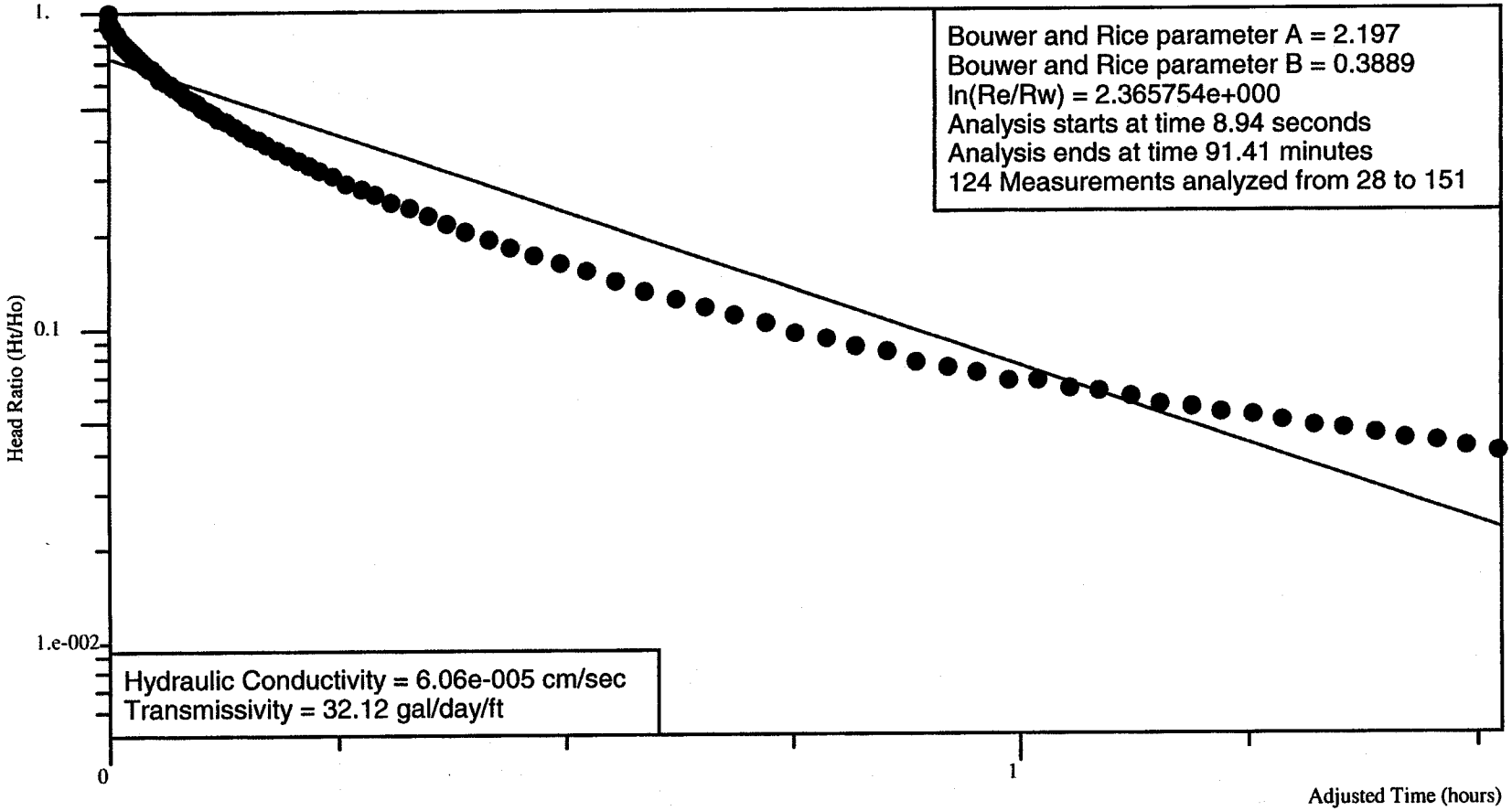
138	65.41	65.39	5.99	0.2	5.382e-002
139	67.41	67.39	5.983	0.193	5.194e-002
140	69.41	69.39	5.978	0.188	5.059e-002
141	71.41	71.39	5.972	0.182	4.898e-002
142	73.41	73.39	5.97	0.18	4.844e-002

Aquifer Analysis December 27, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-13D(Falling)



Ho is 2.035 feet at 8.94 seconds

Project Number 600.06

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: December 27, 2002
Project Number: 600.06
Import File: A:\p-13d in.txt

Well Label: P-13D(Falling)
Aquifer Thickness: 25. feet
Screen Length: 10. feet
Casing Radius: 1.888 inches
Effective Radius: 5.125 inches
Static Water Level: 5.85 feet
Water Table to Screen Bottom: 19.71 feet
Anisotropy Ratio: 1.
Time Adjustment: 8.94 Seconds
Test starts with trial 5
There are 151 time and drawdown measurements
Maximum head is 4.41 feet
Minimum head is -0.746 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-0.149	3.	2.85	0.6463
2	5.e-003	-0.144	1.453	4.397	0.9971
3	1.e-002	-0.139	3.422	2.428	0.5506
4	1.5e-002	-0.134	6.596	-0.746	-0.1692
5	2.e-002	-0.129	2.004	3.846	0.8721
6	2.5e-002	-0.124	1.44	4.41	1.
7	3.e-002	-0.119	4.285	1.565	0.3549
8	3.5e-002	-0.114	4.468	1.382	0.3134
9	4.e-002	-0.109	2.994	2.856	0.6476
10	4.5e-002	-0.104	3.478	2.372	0.5379
11	5.e-002	-9.9e-002	3.887	1.963	0.4451
12	5.5e-002	-9.4e-002	4.393	1.457	0.3304
13	6.e-002	-8.9e-002	4.051	1.799	0.4079
14	6.5e-002	-8.4e-002	3.532	2.318	0.5256
15	7.e-002	-7.9e-002	3.749	2.101	0.4764
16	7.5e-002	-7.4e-002	3.985	1.865	0.4229
17	8.e-002	-6.9e-002	3.891	1.959	0.4442
18	8.48e-002	-6.42e-002	3.803	2.047	0.4642
19	9.e-002	-5.9e-002	3.841	2.009	0.4556
20	9.5e-002	-5.4e-002	3.893	1.957	0.4438
21	0.1	-4.9e-002	3.875	1.975	0.4478
22	0.1058	-4.32e-002	3.847	2.003	0.4542
23	0.112	-3.7e-002	3.086	2.764	0.6268
24	0.1185	-3.05e-002	4.86	0.99	0.2245
25	0.1255	-2.35e-002	3.991	1.859	0.4215
26	0.1328	-1.62e-002	3.527	2.323	0.5268
27	0.1407	-8.3e-003	4.102	1.748	0.3964
28	0.149	0.	3.815	2.035	0.4615
29	0.1578	8.8e-003	3.927	1.923	0.4361
30	0.167	1.8e-002	3.903	1.947	0.4415
31	0.177	2.8e-002	3.921	1.929	0.4374

32	0.1875	3.85e-002	3.921	1.929	0.4374
33	0.1985	4.95e-002	3.929	1.921	0.4356
34	0.2102	6.12e-002	3.935	1.915	0.4342
35	0.2227	7.37e-002	3.943	1.907	0.4324
36	0.2358	8.68e-002	3.949	1.901	0.4311
37	0.2498	0.1008	3.955	1.895	0.4297
38	0.2647	0.1157	3.961	1.889	0.4283
39	0.2803	0.1313	3.967	1.883	0.427
40	0.297	0.148	3.974	1.876	0.4254
41	0.3147	0.1657	3.98	1.87	0.424
42	0.3333	0.1843	3.988	1.862	0.4222
43	0.3532	0.2042	3.996	1.854	0.4204
44	0.3742	0.2252	4.002	1.848	0.419
45	0.3963	0.2473	4.011	1.839	0.417
46	0.4198	0.2708	4.019	1.831	0.4152
47	0.4447	0.2957	4.029	1.821	0.4129
48	0.4697	0.3207	4.037	1.813	0.4111
49	0.4963	0.3473	4.045	1.805	0.4093
50	0.5247	0.3757	4.053	1.797	0.4075
51	0.5547	0.4057	4.063	1.787	0.4052
52	0.5863	0.4373	4.073	1.777	0.4029
53	0.6213	0.4723	4.081	1.769	0.4011
54	0.6578	0.5088	4.091	1.759	0.3989
55	0.6963	0.5473	4.101	1.749	0.3966
56	0.738	0.589	4.113	1.737	0.3939
57	0.7813	0.6323	4.123	1.727	0.3916
58	0.828	0.679	4.139	1.711	0.388
59	0.8763	0.7273	4.146	1.704	0.3864
60	0.928	0.779	4.162	1.688	0.3828
61	0.983	0.834	4.172	1.678	0.3805
62	1.041	0.8923	4.184	1.666	0.3778
63	1.103	0.954	4.198	1.652	0.3746
64	1.168	1.019	4.212	1.638	0.3714
65	1.238	1.089	4.226	1.624	0.3683
66	1.311	1.162	4.24	1.61	0.3651
67	1.39	1.241	4.256	1.594	0.3615
68	1.473	1.324	4.27	1.58	0.3583
69	1.561	1.412	4.286	1.564	0.3546
70	1.655	1.506	4.304	1.546	0.3506
71	1.753	1.604	4.32	1.53	0.3469
72	1.858	1.709	4.338	1.512	0.3429
73	1.968	1.819	4.354	1.496	0.3392
74	2.085	1.936	4.374	1.476	0.3347
75	2.21	2.061	4.392	1.458	0.3306
76	2.341	2.192	4.41	1.44	0.3265
77	2.481	2.332	4.432	1.418	0.3215
78	2.63	2.481	4.452	1.398	0.317
79	2.786	2.637	4.472	1.378	0.3125
80	2.953	2.804	4.494	1.356	0.3075
81	3.13	2.981	4.515	1.335	0.3027
82	3.316	3.167	4.539	1.311	0.2973
83	3.515	3.366	4.573	1.277	0.2896
84	3.725	3.576	4.585	1.265	0.2868

85	3.946	3.797	4.609	1.241	0.2814
86	4.181	4.032	4.634	1.216	0.2757
87	4.43	4.281	4.66	1.19	0.2698
88	4.693	4.544	4.684	1.166	0.2644
89	4.973	4.824	4.71	1.14	0.2585
90	5.27	5.121	4.737	1.113	0.2524
91	5.583	5.434	4.765	1.085	0.246
92	5.915	5.766	4.791	1.059	0.2401
93	6.266	6.117	4.819	1.031	0.2338
94	6.64	6.491	4.845	1.005	0.2279
95	7.035	6.886	4.873	0.977	0.2215
96	7.453	7.304	4.901	0.949	0.2152
97	7.896	7.747	4.929	0.921	0.2088
98	8.366	8.217	4.957	0.893	0.2025
99	8.865	8.716	4.985	0.865	0.1961
100	9.391	9.242	5.014	0.836	0.1896
101	9.95	9.801	5.042	0.808	0.1832
102	10.54	10.39	5.068	0.782	0.1773
103	11.17	11.02	5.095	0.755	0.1712
104	11.83	11.68	5.125	0.725	0.1644
105	12.53	12.39	5.151	0.699	0.1585
106	13.28	13.13	5.18	0.67	0.1519
107	14.07	13.92	5.208	0.642	0.1456
108	14.91	14.76	5.234	0.616	0.1397
109	15.79	15.64	5.26	0.59	0.1338
110	16.73	16.58	5.286	0.564	0.1279
111	17.72	17.57	5.314	0.536	0.1215
112	18.78	18.63	5.339	0.511	0.1159
113	19.89	19.74	5.363	0.487	0.1104
114	21.07	20.92	5.387	0.463	0.105
115	22.32	22.18	5.413	0.437	9.909e-002
116	23.65	23.5	5.435	0.415	9.41e-002
117	25.05	24.91	5.459	0.391	8.866e-002
118	26.54	26.39	5.481	0.369	8.367e-002
119	28.12	27.97	5.501	0.349	7.914e-002
120	29.79	29.64	5.523	0.327	7.415e-002
121	31.55	31.41	5.543	0.307	6.961e-002
122	33.43	33.28	5.563	0.287	6.508e-002
123	35.41	35.26	5.583	0.267	6.054e-002
124	37.41	37.26	5.599	0.251	5.692e-002
125	39.41	39.26	5.615	0.235	5.329e-002
126	41.41	41.26	5.629	0.221	5.011e-002
127	43.41	43.26	5.642	0.208	4.717e-002
128	45.41	45.26	5.654	0.196	4.444e-002
129	47.41	47.26	5.664	0.186	4.218e-002
130	49.41	49.26	5.674	0.176	3.991e-002
131	51.41	51.26	5.682	0.168	3.81e-002
132	53.41	53.26	5.692	0.158	3.583e-002
133	55.41	55.26	5.7	0.15	3.401e-002
134	57.41	57.26	5.706	0.144	3.265e-002
135	59.41	59.26	5.713	0.137	3.107e-002
136	61.41	61.26	5.714	0.136	3.084e-002
137	63.41	63.26	5.721	0.129	2.925e-002

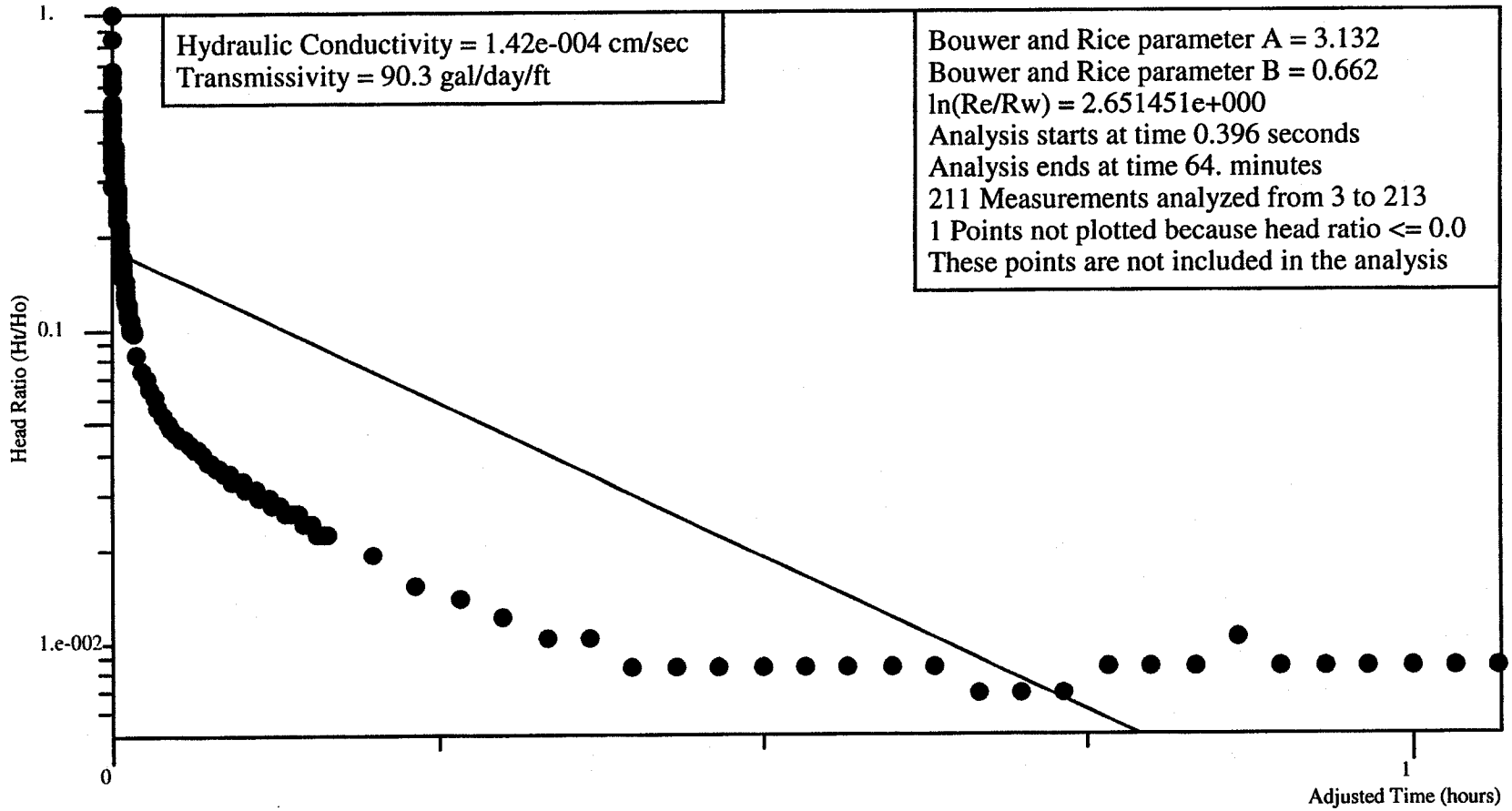
138	65.41	65.26	5.724	0.126	2.857e-002
139	67.41	67.26	5.728	0.122	2.766e-002
140	69.41	69.26	5.734	0.116	2.63e-002
141	71.41	71.26	5.738	0.112	2.54e-002
142	73.41	73.26	5.742	0.108	2.449e-002
143	75.41	75.26	5.744	0.106	2.404e-002
144	77.41	77.26	5.748	0.102	2.313e-002
145	79.41	79.26	5.752	9.8e-002	2.222e-002
146	81.41	81.26	5.754	9.6e-002	2.177e-002
147	83.41	83.26	5.756	9.4e-002	2.132e-002
148	85.41	85.26	5.76	9.e-002	2.041e-002
149	87.41	87.26	5.762	8.8e-002	1.995e-002
150	89.41	89.26	5.766	8.4e-002	1.905e-002
151	91.41	91.26	5.768	8.2e-002	1.859e-002

Aquifer Analysis March 19, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-15S (Rising)



Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Ho is 2.737 feet at 0.396 seconds

Aquifer Analysis

Site Name:	MRR of High Point, LLC
Test Date:	March 19, 2002
Project Number:	600.04
Import File:	C:\Documents and Settings\jdeem\My Documents\P-15SFH

Well Label:	P-15S (Falling)
Aquifer Thickness:	30. feet
Screen Length:	15. feet
Casing Radius:	1.888 inches
Effective Radius:	3.125 inches
Static Water Level:	5.92 feet
Water Table to Screen Bottom:	14.08 feet
Anisotropy Ratio:	1.
Time Adjustment:	1.8 Seconds

Test starts with trial 5
There are 216 time and drawdown measurements
Maximum head is 2.66 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-3.e-002	5.92	0.	0.
2	3.3e-003	-2.67e-002	5.881	3.9e-002	1.466e-002
3	6.6e-003	-2.34e-002	5.867	5.3e-002	1.992e-002
4	1.e-002	-2.e-002	4.497	1.423	0.535
5	1.33e-002	-1.67e-002	3.269	2.651	0.9966
6	1.66e-002	-1.34e-002	3.26	2.66	1.
7	2.e-002	-1.e-002	3.631	2.289	0.8605
8	2.33e-002	-6.7e-003	5.363	0.557	0.2094
9	2.66e-002	-3.4e-003	5.877	4.3e-002	1.617e-002
10	3.e-002	0.	4.297	1.623	0.6102
11	3.33e-002	3.3e-003	3.774	2.146	0.8068
12	3.66e-002	6.6e-003	4.088	1.832	0.6887
13	4.e-002	1.e-002	3.631	2.289	0.8605
14	4.33e-002	1.33e-002	3.417	2.503	0.941
15	4.66e-002	1.66e-002	4.335	1.585	0.5959
16	5.e-002	2.e-002	4.873	1.047	0.3936
17	5.33e-002	2.33e-002	5.04	0.88	0.3308
18	5.66e-002	2.66e-002	4.811	1.109	0.4169
19	6.e-002	3.e-002	4.312	1.608	0.6045
20	6.33e-002	3.33e-002	3.917	2.003	0.753
21	6.66e-002	3.66e-002	3.84	2.08	0.782
22	7.e-002	4.e-002	4.074	1.846	0.694
23	7.33e-002	4.33e-002	4.421	1.499	0.5635
24	7.66e-002	4.66e-002	4.716	1.204	0.4526
25	8.e-002	5.e-002	4.802	1.118	0.4203
26	8.33e-002	5.33e-002	4.654	1.266	0.4759
27	8.66e-002	5.66e-002	4.421	1.499	0.5635
28	9.e-002	6.e-002	4.245	1.675	0.6297
29	9.33e-002	6.33e-002	4.226	1.694	0.6368
30	9.66e-002	6.66e-002	4.354	1.566	0.5887
31	0.1	7.e-002	4.55	1.37	0.515

32	0.1033	7.33e-002	4.692	1.228	0.4617
33	0.1066	7.66e-002	4.711	1.209	0.4545
34	0.11	8.e-002	4.635	1.285	0.4831
35	0.1133	8.33e-002	4.535	1.385	0.5207
36	0.1166	8.66e-002	4.469	1.451	0.5455
37	0.12	9.e-002	4.435	1.485	0.5583
38	0.1233	9.33e-002	4.24	1.68	0.6316
39	0.1266	9.66e-002	4.84	1.08	0.406
40	0.13	0.1	4.911	1.009	0.3793
41	0.1333	0.1033	4.835	1.085	0.4079
42	0.1366	0.1066	4.764	1.156	0.4346
43	0.14	0.11	4.573	1.347	0.5064
44	0.1433	0.1133	4.497	1.423	0.535
45	0.1466	0.1166	4.55	1.37	0.515
46	0.15	0.12	4.645	1.275	0.4793
47	0.1533	0.1233	4.768	1.152	0.4331
48	0.1566	0.1266	4.859	1.061	0.3989
49	0.16	0.13	4.84	1.08	0.406
50	0.1633	0.1333	4.773	1.147	0.4312
51	0.1666	0.1366	4.702	1.218	0.4579
52	0.17	0.14	4.669	1.251	0.4703
53	0.1733	0.1433	4.707	1.213	0.456
54	0.1766	0.1466	4.773	1.147	0.4312
55	0.18	0.15	4.84	1.08	0.406
56	0.1833	0.1533	4.868	1.052	0.3955
57	0.1866	0.1566	4.854	1.066	0.4008
58	0.19	0.16	4.826	1.094	0.4113
59	0.1933	0.1633	4.806	1.114	0.4188
60	0.1966	0.1666	4.821	1.099	0.4132
61	0.2	0.17	4.859	1.061	0.3989
62	0.2033	0.1733	4.906	1.014	0.3812
63	0.2066	0.1766	4.93	0.99	0.3722
64	0.21	0.18	4.94	0.98	0.3684
65	0.2133	0.1833	4.93	0.99	0.3722
66	0.2166	0.1866	4.921	0.999	0.3756
67	0.22	0.19	4.93	0.99	0.3722
68	0.2233	0.1933	4.949	0.971	0.365
69	0.2266	0.1966	4.978	0.942	0.3541
70	0.23	0.2	5.002	0.918	0.3451
71	0.2333	0.2033	5.016	0.904	0.3398
72	0.2366	0.2066	5.016	0.904	0.3398
73	0.24	0.21	5.016	0.904	0.3398
74	0.2433	0.2133	5.021	0.899	0.338
75	0.2466	0.2166	5.035	0.885	0.3327
76	0.25	0.22	5.054	0.866	0.3256
77	0.2533	0.2233	5.073	0.847	0.3184
78	0.2566	0.2266	5.082	0.838	0.315
79	0.26	0.23	5.092	0.828	0.3113
80	0.2633	0.2333	5.092	0.828	0.3113
81	0.2666	0.2366	5.097	0.823	0.3094
82	0.27	0.24	5.106	0.814	0.306
83	0.2733	0.2433	5.121	0.799	0.3004
84	0.2766	0.2466	5.14	0.78	0.2932

85	0.28	0.25	5.144	0.776	0.2917
86	0.2833	0.2533	5.154	0.766	0.288
87	0.2866	0.2566	5.159	0.761	0.2861
88	0.29	0.26	5.163	0.757	0.2846
89	0.2933	0.2633	5.173	0.747	0.2808
90	0.2966	0.2666	5.182	0.738	0.2774
91	0.3	0.27	5.192	0.728	0.2737
92	0.3033	0.2733	5.201	0.719	0.2703
93	0.3066	0.2766	5.211	0.709	0.2665
94	0.31	0.28	5.216	0.704	0.2647
95	0.3133	0.2833	5.22	0.7	0.2632
96	0.3166	0.2866	5.23	0.69	0.2594
97	0.32	0.29	5.235	0.685	0.2575
98	0.3233	0.2933	5.244	0.676	0.2541
99	0.3266	0.2966	5.254	0.666	0.2504
100	0.33	0.3	5.258	0.662	0.2489
101	0.3333	0.3033	5.263	0.657	0.247
102	0.35	0.32	5.306	0.614	0.2308
103	0.3666	0.3366	5.339	0.581	0.2184
104	0.3833	0.3533	5.368	0.552	0.2075
105	0.4	0.37	5.396	0.524	0.197
106	0.4166	0.3866	5.425	0.495	0.1861
107	0.4333	0.4033	5.449	0.471	0.1771
108	0.45	0.42	5.468	0.452	0.1699
109	0.4666	0.4366	5.492	0.428	0.1609
110	0.4833	0.4533	5.511	0.409	0.1538
111	0.5	0.47	5.525	0.395	0.1485
112	0.5166	0.4866	5.539	0.381	0.1432
113	0.5333	0.5033	5.558	0.362	0.1361
114	0.55	0.52	5.572	0.348	0.1308
115	0.5666	0.5366	5.582	0.338	0.1271
116	0.5833	0.5533	5.591	0.329	0.1237
117	0.6	0.57	5.606	0.314	0.118
118	0.6166	0.5866	5.615	0.305	0.1147
119	0.6333	0.6033	5.62	0.3	0.1128
120	0.65	0.62	5.629	0.291	0.1094
121	0.6666	0.6366	5.639	0.281	0.1056
122	0.6833	0.6533	5.644	0.276	0.1038
123	0.7	0.67	5.653	0.267	0.1004
124	0.7166	0.6866	5.658	0.262	9.85e-002
125	0.7333	0.7033	5.663	0.257	9.662e-002
126	0.75	0.72	5.667	0.253	9.511e-002
127	0.7666	0.7366	5.672	0.248	9.323e-002
128	0.7833	0.7533	5.677	0.243	9.135e-002
129	0.8	0.77	5.682	0.238	8.947e-002
130	0.8166	0.7866	5.686	0.234	8.797e-002
131	0.8333	0.8033	5.691	0.229	8.609e-002
132	0.85	0.82	5.696	0.224	8.421e-002
133	0.8666	0.8366	5.701	0.219	8.233e-002
134	0.8833	0.8533	5.701	0.219	8.233e-002
135	0.9	0.87	5.706	0.214	8.045e-002
136	0.9166	0.8866	5.71	0.21	7.895e-002
137	0.9333	0.9033	5.71	0.21	7.895e-002

138	0.95	0.92	5.715	0.205	7.707e-002
139	0.9666	0.9366	5.715	0.205	7.707e-002
140	0.9833	0.9533	5.72	0.2	7.519e-002
141	1.	0.97	5.72	0.2	7.519e-002
142	1.2	1.17	5.753	0.167	6.278e-002
143	1.4	1.37	5.767	0.153	5.752e-002
144	1.6	1.57	5.782	0.138	5.188e-002
145	1.8	1.77	5.791	0.129	4.85e-002
146	2.	1.97	5.801	0.119	4.474e-002
147	2.2	2.17	5.81	0.11	4.135e-002
148	2.4	2.37	5.82	1.e-001	3.759e-002
149	2.6	2.57	5.824	9.6e-002	3.609e-002
150	2.8	2.77	5.829	9.1e-002	3.421e-002
151	3.	2.97	5.834	8.6e-002	3.233e-002
152	3.2	3.17	5.839	8.1e-002	3.045e-002
153	3.4	3.37	5.843	7.7e-002	2.895e-002
154	3.6	3.57	5.848	7.2e-002	2.707e-002
155	3.8	3.77	5.848	7.2e-002	2.707e-002
156	4.	3.97	5.853	6.7e-002	2.519e-002
157	4.2	4.17	5.858	6.2e-002	2.331e-002
158	4.4	4.37	5.858	6.2e-002	2.331e-002
159	4.6	4.57	5.862	5.8e-002	2.18e-002
160	4.8	4.77	5.862	5.8e-002	2.18e-002
161	5.	4.97	5.862	5.8e-002	2.18e-002
162	5.2	5.17	5.867	5.3e-002	1.992e-002
163	5.4	5.37	5.867	5.3e-002	1.992e-002
164	5.6	5.57	5.867	5.3e-002	1.992e-002
165	5.8	5.77	5.872	4.8e-002	1.805e-002
166	6.	5.97	5.872	4.8e-002	1.805e-002
167	6.2	6.17	5.872	4.8e-002	1.805e-002
168	6.4	6.37	5.877	4.3e-002	1.617e-002
169	6.6	6.57	5.877	4.3e-002	1.617e-002
170	6.8	6.77	5.877	4.3e-002	1.617e-002
171	7.	6.97	5.877	4.3e-002	1.617e-002
172	7.2	7.17	5.877	4.3e-002	1.617e-002
173	7.4	7.37	5.881	3.9e-002	1.466e-002
174	7.6	7.57	5.881	3.9e-002	1.466e-002
175	7.8	7.77	5.881	3.9e-002	1.466e-002
176	8.	7.97	5.881	3.9e-002	1.466e-002
177	8.2	8.17	5.881	3.9e-002	1.466e-002
178	8.4	8.37	5.881	3.9e-002	1.466e-002
179	8.6	8.57	5.881	3.9e-002	1.466e-002
180	8.8	8.77	5.881	3.9e-002	1.466e-002
181	9.	8.97	5.881	3.9e-002	1.466e-002
182	9.2	9.17	5.881	3.9e-002	1.466e-002
183	9.4	9.37	5.881	3.9e-002	1.466e-002
184	9.6	9.57	5.886	3.4e-002	1.278e-002
185	9.8	9.77	5.886	3.4e-002	1.278e-002
186	10.	9.97	5.886	3.4e-002	1.278e-002
187	12.	11.97	5.886	3.4e-002	1.278e-002
188	14.	13.97	5.891	2.9e-002	1.09e-002
189	16.	15.97	5.891	2.9e-002	1.09e-002
190	18.	17.97	5.896	2.4e-002	9.023e-003

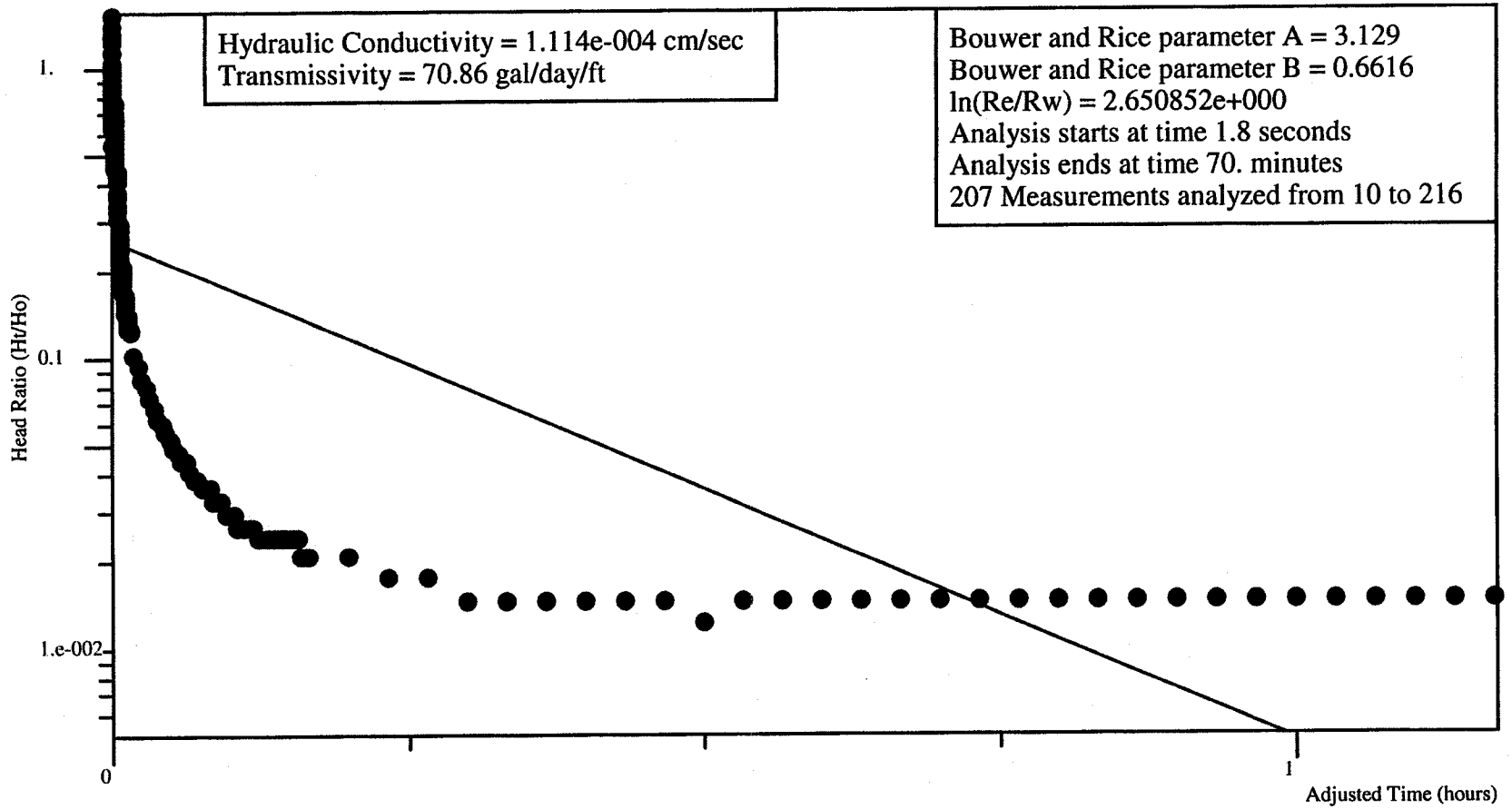
191	20.	19.97	5.896	2.4e-002	9.023e-003
192	22.	21.97	5.896	2.4e-002	9.023e-003
193	24.	23.97	5.896	2.4e-002	9.023e-003
194	26.	25.97	5.896	2.4e-002	9.023e-003
195	28.	27.97	5.896	2.4e-002	9.023e-003
196	30.	29.97	5.9	2.e-002	7.519e-003
197	32.	31.97	5.896	2.4e-002	9.023e-003
198	34.	33.97	5.896	2.4e-002	9.023e-003
199	36.	35.97	5.896	2.4e-002	9.023e-003
200	38.	37.97	5.896	2.4e-002	9.023e-003
201	40.	39.97	5.896	2.4e-002	9.023e-003
202	42.	41.97	5.896	2.4e-002	9.023e-003
203	44.	43.97	5.896	2.4e-002	9.023e-003
204	46.	45.97	5.896	2.4e-002	9.023e-003
205	48.	47.97	5.896	2.4e-002	9.023e-003
206	50.	49.97	5.896	2.4e-002	9.023e-003
207	52.	51.97	5.896	2.4e-002	9.023e-003
208	54.	53.97	5.896	2.4e-002	9.023e-003
209	56.	55.97	5.896	2.4e-002	9.023e-003
210	58.	57.97	5.896	2.4e-002	9.023e-003
211	60.	59.97	5.896	2.4e-002	9.023e-003
212	62.	61.97	5.896	2.4e-002	9.023e-003
213	64.	63.97	5.896	2.4e-002	9.023e-003
214	66.	65.97	5.896	2.4e-002	9.023e-003
215	68.	67.97	5.896	2.4e-002	9.023e-003
216	70.	69.97	5.896	2.4e-002	9.023e-003

Aquifer Analysis March 19, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-15S (Falling)



Ho is 1.623 feet at 1.8 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: March 19, 2002
Project Number: 600.04
Import File: C:\Documents and Settings\jdeem\My Documents\P-15SFH

Well Label: P-15S (Falling)
Aquifer Thickness: 30. feet
Screen Length: 15. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 5.92 feet
Water Table to Screen Bottom: 14.08 feet
Anisotropy Ratio: 1.
Time Adjustment: 1.8 Seconds
Test starts with trial 5
There are 216 time and drawdown measurements
Maximum head is 2.66 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-3.e-002	5.92	0.	0.
2	3.3e-003	-2.67e-002	5.881	3.9e-002	1.466e-002
3	6.6e-003	-2.34e-002	5.867	5.3e-002	1.992e-002
4	1.e-002	-2.e-002	4.497	1.423	0.535
5	1.33e-002	-1.67e-002	3.269	2.651	0.9966
6	1.66e-002	-1.34e-002	3.26	2.66	1.
7	2.e-002	-1.e-002	3.631	2.289	0.8605
8	2.33e-002	-6.7e-003	5.363	0.557	0.2094
9	2.66e-002	-3.4e-003	5.877	4.3e-002	1.617e-002
10	3.e-002	0.	4.297	1.623	0.6102
11	3.33e-002	3.3e-003	3.774	2.146	0.8068
12	3.66e-002	6.6e-003	4.088	1.832	0.6887
13	4.e-002	1.e-002	3.631	2.289	0.8605
14	4.33e-002	1.33e-002	3.417	2.503	0.941
15	4.66e-002	1.66e-002	4.335	1.585	0.5959
16	5.e-002	2.e-002	4.873	1.047	0.3936
17	5.33e-002	2.33e-002	5.04	0.88	0.3308
18	5.66e-002	2.66e-002	4.811	1.109	0.4169
19	6.e-002	3.e-002	4.312	1.608	0.6045
20	6.33e-002	3.33e-002	3.917	2.003	0.753
21	6.66e-002	3.66e-002	3.84	2.08	0.782
22	7.e-002	4.e-002	4.074	1.846	0.694
23	7.33e-002	4.33e-002	4.421	1.499	0.5635
24	7.66e-002	4.66e-002	4.716	1.204	0.4526
25	8.e-002	5.e-002	4.802	1.118	0.4203
26	8.33e-002	5.33e-002	4.654	1.266	0.4759
27	8.66e-002	5.66e-002	4.421	1.499	0.5635
28	9.e-002	6.e-002	4.245	1.675	0.6297
29	9.33e-002	6.33e-002	4.226	1.694	0.6368
30	9.66e-002	6.66e-002	4.354	1.566	0.5887
31	0.1	7.e-002	4.55	1.37	0.515

32	0.1033	7.33e-002	4.692	1.228	0.4617
33	0.1066	7.66e-002	4.711	1.209	0.4545
34	0.11	8.e-002	4.635	1.285	0.4831
35	0.1133	8.33e-002	4.535	1.385	0.5207
36	0.1166	8.66e-002	4.469	1.451	0.5455
37	0.12	9.e-002	4.435	1.485	0.5583
38	0.1233	9.33e-002	4.24	1.68	0.6316
39	0.1266	9.66e-002	4.84	1.08	0.406
40	0.13	0.1	4.911	1.009	0.3793
41	0.1333	0.1033	4.835	1.085	0.4079
42	0.1366	0.1066	4.764	1.156	0.4346
43	0.14	0.11	4.573	1.347	0.5064
44	0.1433	0.1133	4.497	1.423	0.535
45	0.1466	0.1166	4.55	1.37	0.515
46	0.15	0.12	4.645	1.275	0.4793
47	0.1533	0.1233	4.768	1.152	0.4331
48	0.1566	0.1266	4.859	1.061	0.3989
49	0.16	0.13	4.84	1.08	0.406
50	0.1633	0.1333	4.773	1.147	0.4312
51	0.1666	0.1366	4.702	1.218	0.4579
52	0.17	0.14	4.669	1.251	0.4703
53	0.1733	0.1433	4.707	1.213	0.456
54	0.1766	0.1466	4.773	1.147	0.4312
55	0.18	0.15	4.84	1.08	0.406
56	0.1833	0.1533	4.868	1.052	0.3955
57	0.1866	0.1566	4.854	1.066	0.4008
58	0.19	0.16	4.826	1.094	0.4113
59	0.1933	0.1633	4.806	1.114	0.4188
60	0.1966	0.1666	4.821	1.099	0.4132
61	0.2	0.17	4.859	1.061	0.3989
62	0.2033	0.1733	4.906	1.014	0.3812
63	0.2066	0.1766	4.93	0.99	0.3722
64	0.21	0.18	4.94	0.98	0.3684
65	0.2133	0.1833	4.93	0.99	0.3722
66	0.2166	0.1866	4.921	0.999	0.3756
67	0.22	0.19	4.93	0.99	0.3722
68	0.2233	0.1933	4.949	0.971	0.365
69	0.2266	0.1966	4.978	0.942	0.3541
70	0.23	0.2	5.002	0.918	0.3451
71	0.2333	0.2033	5.016	0.904	0.3398
72	0.2366	0.2066	5.016	0.904	0.3398
73	0.24	0.21	5.016	0.904	0.3398
74	0.2433	0.2133	5.021	0.899	0.338
75	0.2466	0.2166	5.035	0.885	0.3327
76	0.25	0.22	5.054	0.866	0.3256
77	0.2533	0.2233	5.073	0.847	0.3184
78	0.2566	0.2266	5.082	0.838	0.315
79	0.26	0.23	5.092	0.828	0.3113
80	0.2633	0.2333	5.092	0.828	0.3113
81	0.2666	0.2366	5.097	0.823	0.3094
82	0.27	0.24	5.106	0.814	0.306
83	0.2733	0.2433	5.121	0.799	0.3004
84	0.2766	0.2466	5.14	0.78	0.2932

85	0.28	0.25	5.144	0.776	0.2917
86	0.2833	0.2533	5.154	0.766	0.288
87	0.2866	0.2566	5.159	0.761	0.2861
88	0.29	0.26	5.163	0.757	0.2846
89	0.2933	0.2633	5.173	0.747	0.2808
90	0.2966	0.2666	5.182	0.738	0.2774
91	0.3	0.27	5.192	0.728	0.2737
92	0.3033	0.2733	5.201	0.719	0.2703
93	0.3066	0.2766	5.211	0.709	0.2665
94	0.31	0.28	5.216	0.704	0.2647
95	0.3133	0.2833	5.22	0.7	0.2632
96	0.3166	0.2866	5.23	0.69	0.2594
97	0.32	0.29	5.235	0.685	0.2575
98	0.3233	0.2933	5.244	0.676	0.2541
99	0.3266	0.2966	5.254	0.666	0.2504
100	0.33	0.3	5.258	0.662	0.2489
101	0.3333	0.3033	5.263	0.657	0.247
102	0.35	0.32	5.306	0.614	0.2308
103	0.3666	0.3366	5.339	0.581	0.2184
104	0.3833	0.3533	5.368	0.552	0.2075
105	0.4	0.37	5.396	0.524	0.197
106	0.4166	0.3866	5.425	0.495	0.1861
107	0.4333	0.4033	5.449	0.471	0.1771
108	0.45	0.42	5.468	0.452	0.1699
109	0.4666	0.4366	5.492	0.428	0.1609
110	0.4833	0.4533	5.511	0.409	0.1538
111	0.5	0.47	5.525	0.395	0.1485
112	0.5166	0.4866	5.539	0.381	0.1432
113	0.5333	0.5033	5.558	0.362	0.1361
114	0.55	0.52	5.572	0.348	0.1308
115	0.5666	0.5366	5.582	0.338	0.1271
116	0.5833	0.5533	5.591	0.329	0.1237
117	0.6	0.57	5.606	0.314	0.118
118	0.6166	0.5866	5.615	0.305	0.1147
119	0.6333	0.6033	5.62	0.3	0.1128
120	0.65	0.62	5.629	0.291	0.1094
121	0.6666	0.6366	5.639	0.281	0.1056
122	0.6833	0.6533	5.644	0.276	0.1038
123	0.7	0.67	5.653	0.267	0.1004
124	0.7166	0.6866	5.658	0.262	9.85e-002
125	0.7333	0.7033	5.663	0.257	9.662e-002
126	0.75	0.72	5.667	0.253	9.511e-002
127	0.7666	0.7366	5.672	0.248	9.323e-002
128	0.7833	0.7533	5.677	0.243	9.135e-002
129	0.8	0.77	5.682	0.238	8.947e-002
130	0.8166	0.7866	5.686	0.234	8.797e-002
131	0.8333	0.8033	5.691	0.229	8.609e-002
132	0.85	0.82	5.696	0.224	8.421e-002
133	0.8666	0.8366	5.701	0.219	8.233e-002
134	0.8833	0.8533	5.701	0.219	8.233e-002
135	0.9	0.87	5.706	0.214	8.045e-002
136	0.9166	0.8866	5.71	0.21	7.895e-002
137	0.9333	0.9033	5.71	0.21	7.895e-002

138	0.95	0.92	5.715	0.205	7.707e-002
139	0.9666	0.9366	5.715	0.205	7.707e-002
140	0.9833	0.9533	5.72	0.2	7.519e-002
141	1.	0.97	5.72	0.2	7.519e-002
142	1.2	1.17	5.753	0.167	6.278e-002
143	1.4	1.37	5.767	0.153	5.752e-002
144	1.6	1.57	5.782	0.138	5.188e-002
145	1.8	1.77	5.791	0.129	4.85e-002
146	2.	1.97	5.801	0.119	4.474e-002
147	2.2	2.17	5.81	0.11	4.135e-002
148	2.4	2.37	5.82	1.e-001	3.759e-002
149	2.6	2.57	5.824	9.6e-002	3.609e-002
150	2.8	2.77	5.829	9.1e-002	3.421e-002
151	3.	2.97	5.834	8.6e-002	3.233e-002
152	3.2	3.17	5.839	8.1e-002	3.045e-002
153	3.4	3.37	5.843	7.7e-002	2.895e-002
154	3.6	3.57	5.848	7.2e-002	2.707e-002
155	3.8	3.77	5.848	7.2e-002	2.707e-002
156	4.	3.97	5.853	6.7e-002	2.519e-002
157	4.2	4.17	5.858	6.2e-002	2.331e-002
158	4.4	4.37	5.858	6.2e-002	2.331e-002
159	4.6	4.57	5.862	5.8e-002	2.18e-002
160	4.8	4.77	5.862	5.8e-002	2.18e-002
161	5.	4.97	5.862	5.8e-002	2.18e-002
162	5.2	5.17	5.867	5.3e-002	1.992e-002
163	5.4	5.37	5.867	5.3e-002	1.992e-002
164	5.6	5.57	5.867	5.3e-002	1.992e-002
165	5.8	5.77	5.872	4.8e-002	1.805e-002
166	6.	5.97	5.872	4.8e-002	1.805e-002
167	6.2	6.17	5.872	4.8e-002	1.805e-002
168	6.4	6.37	5.877	4.3e-002	1.617e-002
169	6.6	6.57	5.877	4.3e-002	1.617e-002
170	6.8	6.77	5.877	4.3e-002	1.617e-002
171	7.	6.97	5.877	4.3e-002	1.617e-002
172	7.2	7.17	5.877	4.3e-002	1.617e-002
173	7.4	7.37	5.881	3.9e-002	1.466e-002
174	7.6	7.57	5.881	3.9e-002	1.466e-002
175	7.8	7.77	5.881	3.9e-002	1.466e-002
176	8.	7.97	5.881	3.9e-002	1.466e-002
177	8.2	8.17	5.881	3.9e-002	1.466e-002
178	8.4	8.37	5.881	3.9e-002	1.466e-002
179	8.6	8.57	5.881	3.9e-002	1.466e-002
180	8.8	8.77	5.881	3.9e-002	1.466e-002
181	9.	8.97	5.881	3.9e-002	1.466e-002
182	9.2	9.17	5.881	3.9e-002	1.466e-002
183	9.4	9.37	5.881	3.9e-002	1.466e-002
184	9.6	9.57	5.886	3.4e-002	1.278e-002
185	9.8	9.77	5.886	3.4e-002	1.278e-002
186	10.	9.97	5.886	3.4e-002	1.278e-002
187	12.	11.97	5.886	3.4e-002	1.278e-002
188	14.	13.97	5.891	2.9e-002	1.09e-002
189	16.	15.97	5.891	2.9e-002	1.09e-002
190	18.	17.97	5.896	2.4e-002	9.023e-003

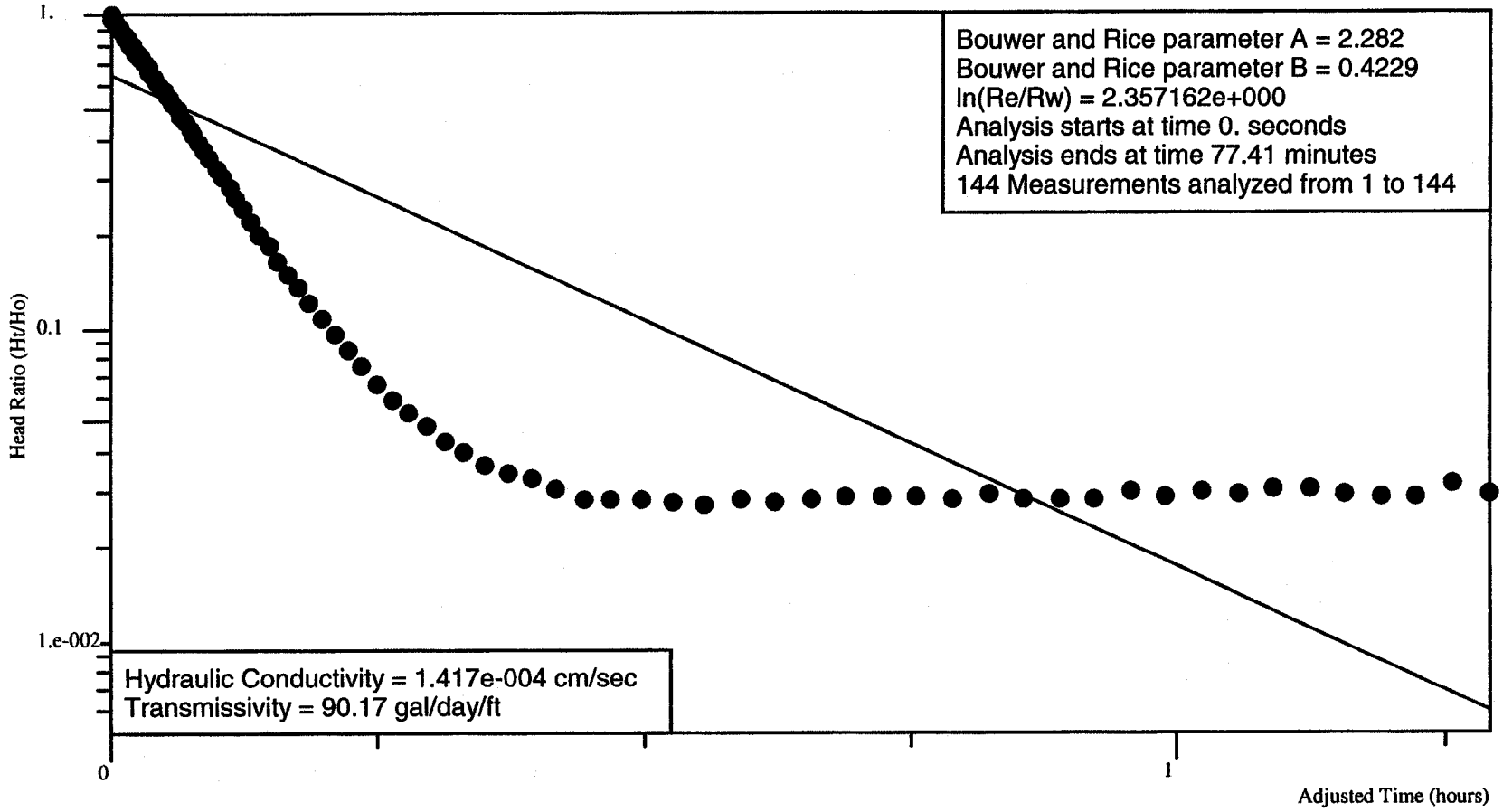
191	20.	19.97	5.896	2.4e-002	9.023e-003
192	22.	21.97	5.896	2.4e-002	9.023e-003
193	24.	23.97	5.896	2.4e-002	9.023e-003
194	26.	25.97	5.896	2.4e-002	9.023e-003
195	28.	27.97	5.896	2.4e-002	9.023e-003
196	30.	29.97	5.9	2.e-002	7.519e-003
197	32.	31.97	5.896	2.4e-002	9.023e-003
198	34.	33.97	5.896	2.4e-002	9.023e-003
199	36.	35.97	5.896	2.4e-002	9.023e-003
200	38.	37.97	5.896	2.4e-002	9.023e-003
201	40.	39.97	5.896	2.4e-002	9.023e-003
202	42.	41.97	5.896	2.4e-002	9.023e-003
203	44.	43.97	5.896	2.4e-002	9.023e-003
204	46.	45.97	5.896	2.4e-002	9.023e-003
205	48.	47.97	5.896	2.4e-002	9.023e-003
206	50.	49.97	5.896	2.4e-002	9.023e-003
207	52.	51.97	5.896	2.4e-002	9.023e-003
208	54.	53.97	5.896	2.4e-002	9.023e-003
209	56.	55.97	5.896	2.4e-002	9.023e-003
210	58.	57.97	5.896	2.4e-002	9.023e-003
211	60.	59.97	5.896	2.4e-002	9.023e-003
212	62.	61.97	5.896	2.4e-002	9.023e-003
213	64.	63.97	5.896	2.4e-002	9.023e-003
214	66.	65.97	5.896	2.4e-002	9.023e-003
215	68.	67.97	5.896	2.4e-002	9.023e-003
216	70.	69.97	5.896	2.4e-002	9.023e-003

Aquifer Analysis December 23, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-18 (Rising)



Ho is 1.867 feet at 0. seconds

Project Number 600.06

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name:	MRR of High Point, LLC
Test Date:	December 23, 2002
Project Number:	600.06
Import File:	P:\MRR of High Point\Task 06 Response to Comments\Hydrogeologic Comments\Revised slug tests\Slu

Well Label:	P-18 (Rising)
Aquifer Thickness:	30. feet
Screen Length:	7. feet
Casing Radius:	1.888 inches
Effective Radius:	3.125 inches
Static Water Level:	2.94 feet
Water Table to Screen Bottom:	14.26 feet
Anisotropy Ratio:	1.
Time Adjustment:	0. Seconds

Test starts with trial 0
There are 144 time and drawdown measurements
Maximum head is 1.867 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	4.807	1.867	1.
2	5.e-003	5.e-003	4.8	1.86	0.9963
3	1.e-002	1.e-002	4.796	1.856	0.9941
4	1.5e-002	1.5e-002	4.794	1.854	0.993
5	2.e-002	2.e-002	4.79	1.85	0.9909
6	2.5e-002	2.5e-002	4.788	1.848	0.9898
7	3.e-002	3.e-002	4.786	1.846	0.9888
8	3.5e-002	3.5e-002	4.784	1.844	0.9877
9	4.e-002	4.e-002	4.782	1.842	0.9866
10	4.5e-002	4.5e-002	4.78	1.84	0.9855
11	5.e-002	5.e-002	4.776	1.836	0.9834
12	5.5e-002	5.5e-002	4.776	1.836	0.9834
13	6.e-002	6.e-002	4.774	1.834	0.9823
14	6.5e-002	6.5e-002	4.772	1.832	0.9813
15	7.e-002	7.e-002	4.771	1.831	0.9807
16	7.5e-002	7.5e-002	4.769	1.829	0.9796
17	8.e-002	8.e-002	4.767	1.827	0.9786
18	8.48e-002	8.48e-002	4.765	1.825	0.9775
19	9.e-002	9.e-002	4.763	1.823	0.9764
20	9.5e-002	9.5e-002	4.761	1.821	0.9754
21	0.1	0.1	4.759	1.819	0.9743
22	0.1058	0.1058	4.757	1.817	0.9732
23	0.112	0.112	4.755	1.815	0.9721
24	0.1185	0.1185	4.753	1.813	0.9711
25	0.1255	0.1255	4.751	1.811	0.97
26	0.1328	0.1328	4.747	1.807	0.9679
27	0.1407	0.1407	4.745	1.805	0.9668
28	0.149	0.149	4.743	1.803	0.9657
29	0.1578	0.1578	4.739	1.799	0.9636
30	0.167	0.167	4.739	1.799	0.9636
31	0.177	0.177	4.736	1.796	0.962

32	0.1875	0.1875	4.732	1.792	0.9598
33	0.1985	0.1985	4.73	1.79	0.9588
34	0.2102	0.2102	4.726	1.786	0.9566
35	0.2227	0.2227	4.722	1.782	0.9545
36	0.2358	0.2358	4.72	1.78	0.9534
37	0.2498	0.2498	4.714	1.774	0.9502
38	0.2647	0.2647	4.71	1.77	0.948
39	0.2803	0.2803	4.704	1.764	0.9448
40	0.297	0.297	4.7	1.76	0.9427
41	0.3147	0.3147	4.694	1.754	0.9395
42	0.3333	0.3333	4.688	1.748	0.9363
43	0.3532	0.3532	4.682	1.742	0.933
44	0.3742	0.3742	4.676	1.736	0.9298
45	0.3963	0.3963	4.672	1.732	0.9277
46	0.4198	0.4198	4.666	1.726	0.9245
47	0.4447	0.4447	4.658	1.718	0.9202
48	0.4697	0.4697	4.652	1.712	0.917
49	0.4963	0.4963	4.644	1.704	0.9127
50	0.5247	0.5247	4.63	1.69	0.9052
51	0.5547	0.5547	4.62	1.68	0.8998
52	0.5863	0.5863	4.612	1.672	0.8956
53	0.6213	0.6213	4.6	1.66	0.8891
54	0.6578	0.6578	4.588	1.648	0.8827
55	0.6963	0.6963	4.578	1.638	0.8773
56	0.738	0.738	4.566	1.626	0.8709
57	0.7813	0.7813	4.552	1.612	0.8634
58	0.828	0.828	4.54	1.6	0.857
59	0.8763	0.8763	4.526	1.586	0.8495
60	0.928	0.928	4.512	1.572	0.842
61	0.983	0.983	4.495	1.555	0.8329
62	1.041	1.041	4.477	1.537	0.8232
63	1.103	1.103	4.461	1.521	0.8147
64	1.168	1.168	4.443	1.503	0.805
65	1.238	1.238	4.425	1.485	0.7954
66	1.311	1.311	4.403	1.463	0.7836
67	1.39	1.39	4.385	1.445	0.774
68	1.473	1.473	4.361	1.421	0.7611
69	1.561	1.561	4.338	1.398	0.7488
70	1.655	1.655	4.314	1.374	0.7359
71	1.753	1.753	4.29	1.35	0.7231
72	1.858	1.858	4.264	1.324	0.7092
73	1.968	1.968	4.236	1.296	0.6942
74	2.085	2.085	4.21	1.27	0.6802
75	2.21	2.21	4.18	1.24	0.6642
76	2.341	2.341	4.152	1.212	0.6492
77	2.481	2.481	4.119	1.179	0.6315
78	2.63	2.63	4.087	1.147	0.6144
79	2.786	2.786	4.054	1.114	0.5967
80	2.953	2.953	4.02	1.08	0.5785
81	3.13	3.13	3.985	1.045	0.5597
82	3.316	3.316	3.947	1.007	0.5394
83	3.515	3.515	3.909	0.969	0.519
84	3.725	3.725	3.873	0.933	0.4997

85	3.946	3.946	3.832	0.892	0.4778
86	4.181	4.181	3.792	0.852	0.4563
87	4.43	4.43	3.752	0.812	0.4349
88	4.693	4.693	3.712	0.772	0.4135
89	4.973	4.973	3.669	0.729	0.3905
90	5.27	5.27	3.63	0.69	0.3696
91	5.583	5.583	3.59	0.65	0.3482
92	5.915	5.915	3.548	0.608	0.3257
93	6.266	6.266	3.508	0.568	0.3042
94	6.64	6.64	3.468	0.528	0.2828
95	7.035	7.035	3.428	0.488	0.2614
96	7.453	7.453	3.388	0.448	0.24
97	7.896	7.896	3.35	0.41	0.2196
98	8.366	8.366	3.315	0.375	0.2009
99	8.865	8.865	3.281	0.341	0.1826
100	9.391	9.391	3.249	0.309	0.1655
101	9.95	9.95	3.217	0.277	0.1484
102	10.54	10.54	3.191	0.251	0.1344
103	11.17	11.17	3.163	0.223	0.1194
104	11.83	11.83	3.14	0.2	0.1071
105	12.53	12.53	3.118	0.178	9.534e-002
106	13.28	13.28	3.099	0.159	8.516e-002
107	14.07	14.07	3.081	0.141	7.552e-002
108	14.91	14.91	3.064	0.124	6.642e-002
109	15.79	15.79	3.05	0.11	5.892e-002
110	16.73	16.73	3.04	0.1	5.356e-002
111	17.72	17.72	3.03	9.e-002	4.821e-002
112	18.78	18.78	3.021	8.1e-002	4.339e-002
113	19.89	19.89	3.014	7.4e-002	3.964e-002
114	21.07	21.07	3.008	6.8e-002	3.642e-002
115	22.32	22.32	3.004	6.4e-002	3.428e-002
116	23.65	23.65	3.001	6.1e-002	3.267e-002
117	25.05	25.05	2.997	5.7e-002	3.053e-002
118	26.54	26.54	2.993	5.3e-002	2.839e-002
119	28.12	28.12	2.993	5.3e-002	2.839e-002
120	29.79	29.79	2.993	5.3e-002	2.839e-002
121	31.55	31.55	2.992	5.2e-002	2.785e-002
122	33.43	33.43	2.991	5.1e-002	2.732e-002
123	35.41	35.41	2.993	5.3e-002	2.839e-002
124	37.41	37.41	2.992	5.2e-002	2.785e-002
125	39.41	39.41	2.993	5.3e-002	2.839e-002
126	41.41	41.41	2.994	5.4e-002	2.892e-002
127	43.41	43.41	2.994	5.4e-002	2.892e-002
128	45.41	45.41	2.994	5.4e-002	2.892e-002
129	47.41	47.41	2.993	5.3e-002	2.839e-002
130	49.41	49.41	2.995	5.5e-002	2.946e-002
131	51.41	51.41	2.993	5.3e-002	2.839e-002
132	53.41	53.41	2.993	5.3e-002	2.839e-002
133	55.41	55.41	2.993	5.3e-002	2.839e-002
134	57.41	57.41	2.996	5.6e-002	2.999e-002
135	59.41	59.41	2.994	5.4e-002	2.892e-002
136	61.41	61.41	2.996	5.6e-002	2.999e-002
137	63.41	63.41	2.995	5.5e-002	2.946e-002

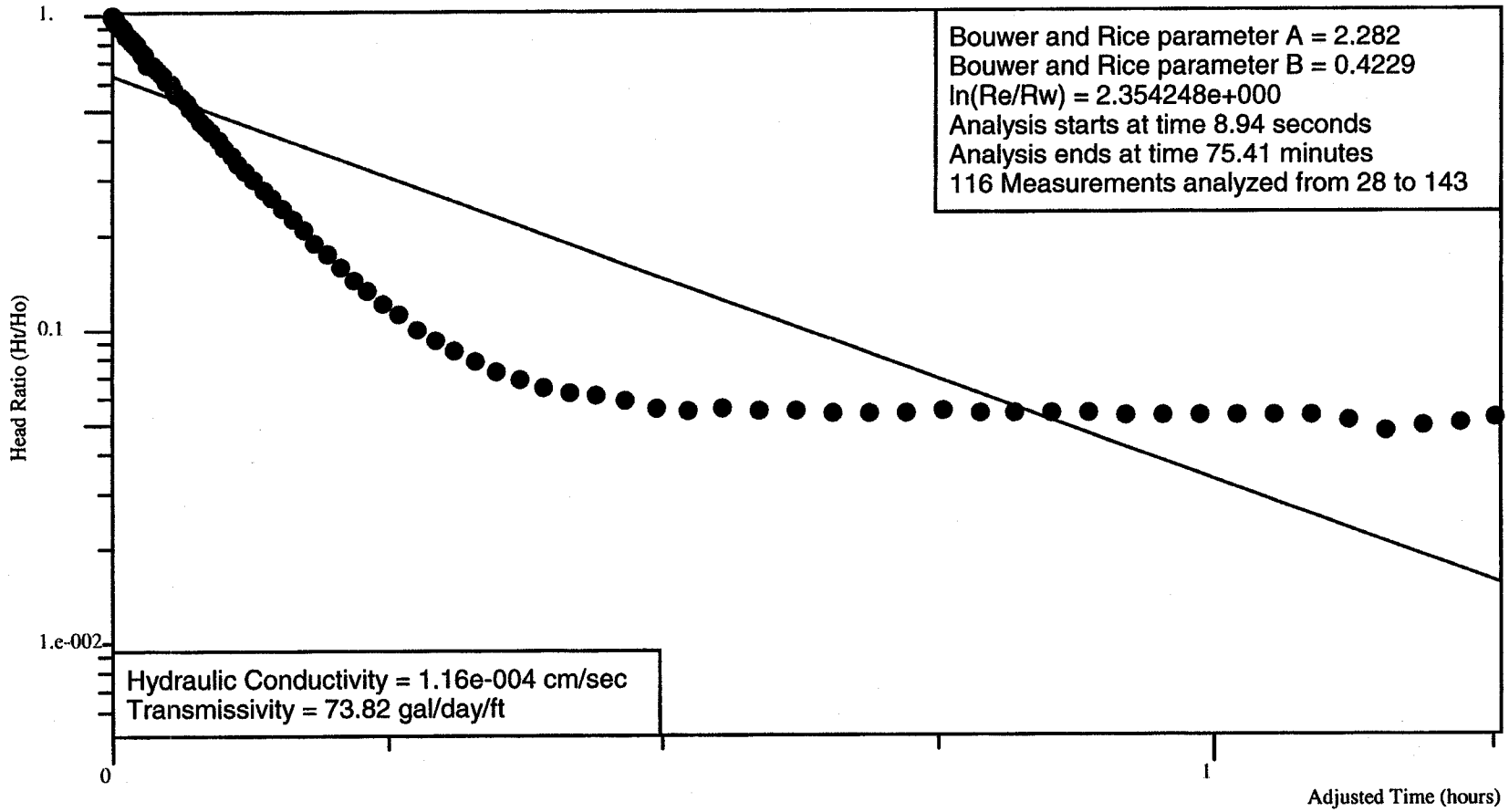
138	65.41	65.41	2.997	5.7e-002	3.053e-002
139	67.41	67.41	2.997	5.7e-002	3.053e-002
140	69.41	69.41	2.995	5.5e-002	2.946e-002
141	71.41	71.41	2.994	5.4e-002	2.892e-002
142	73.41	73.41	2.994	5.4e-002	2.892e-002
143	75.41	75.41	2.999	5.9e-002	3.16e-002
144	77.41	77.41	2.995	5.5e-002	2.946e-002

Aquifer Analysis December 23, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-18 (Falling)



Ho is 1.851 feet at 8.94 seconds

Project Number 600.06

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name: MRR of High Point, LLC
Test Date: December 23, 2002
Project Number: 600.06
Import File: P:\MRR of High Point\Task 06 Response to Comments\Hydrogeologic Comments\Revised slug tests\Sl

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Well Label: P-18 (Falling)
Aquifer Thickness: 30. feet
Screen Length: 7. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 3.03 feet
Water Table to Screen Bottom: 14.17 feet
Anisotropy Ratio: 1.
Time Adjustment: 8.94 Seconds
Test starts with trial 8
There are 143 time and drawdown measurements
Maximum head is 2.763 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-0.149	1.488	1.542	0.5581
2	5.e-003	-0.144	0.731	2.299	0.8321
3	1.e-002	-0.139	0.769	2.261	0.8183
4	1.5e-002	-0.134	1.617	1.413	0.5114
5	2.e-002	-0.129	1.21	1.82	0.6587
6	2.5e-002	-0.124	0.8	2.23	0.8071
7	3.e-002	-0.119	1.094	1.936	0.7007
8	3.5e-002	-0.114	1.123	1.907	0.6902
9	4.e-002	-0.109	0.267	2.763	1.
10	4.5e-002	-0.104	0.796	2.234	0.8085
11	5.e-002	-9.9e-002	0.56	2.47	0.894
12	5.5e-002	-9.4e-002	2.497	0.533	0.1929
13	6.e-002	-8.9e-002	1.523	1.507	0.5454
14	6.5e-002	-8.4e-002	0.369	2.661	0.9631
15	7.e-002	-7.9e-002	0.878	2.152	0.7789
16	7.5e-002	-7.4e-002	1.623	1.407	0.5092
17	8.e-002	-6.9e-002	1.253	1.777	0.6431
18	8.48e-002	-6.42e-002	0.806	2.224	0.8049
19	9.e-002	-5.9e-002	1.135	1.895	0.6858
20	9.5e-002	-5.4e-002	1.345	1.685	0.6098
21	0.1	-4.9e-002	0.865	2.165	0.7836
22	0.1058	-4.32e-002	1.331	1.699	0.6149
23	0.112	-3.7e-002	1.239	1.791	0.6482
24	0.1185	-3.05e-002	0.987	2.043	0.7394
25	0.1255	-2.35e-002	1.275	1.755	0.6352
26	0.1328	-1.62e-002	1.113	1.917	0.6938
27	0.1407	-8.3e-003	1.177	1.853	0.6706
28	0.149	0.	1.179	1.851	0.6699
29	0.1578	8.8e-003	1.169	1.861	0.6735
30	0.167	1.8e-002	1.183	1.847	0.6685
31	0.177	2.8e-002	1.191	1.839	0.6656

32	0.1875	3.85e-002	1.197	1.833	0.6634
33	0.1985	4.95e-002	1.203	1.827	0.6612
34	0.2102	6.12e-002	1.171	1.859	0.6728
35	0.2227	7.37e-002	1.217	1.813	0.6562
36	0.2358	8.68e-002	1.213	1.817	0.6576
37	0.2498	0.1008	1.215	1.815	0.6569
38	0.2647	0.1157	1.225	1.805	0.6533
39	0.2803	0.1313	1.231	1.799	0.6511
40	0.297	0.148	1.237	1.793	0.6489
41	0.3147	0.1657	1.245	1.785	0.646
42	0.3333	0.1843	1.227	1.803	0.6526
43	0.3532	0.2042	1.24	1.79	0.6478
44	0.3742	0.2252	1.268	1.762	0.6377
45	0.3963	0.2473	1.27	1.76	0.637
46	0.4198	0.2708	1.28	1.75	0.6334
47	0.4447	0.2957	1.288	1.742	0.6305
48	0.4697	0.3207	1.297	1.733	0.6272
49	0.4963	0.3473	1.305	1.725	0.6243
50	0.5247	0.3757	1.315	1.715	0.6207
51	0.5547	0.4057	1.323	1.707	0.6178
52	0.5863	0.4373	1.333	1.697	0.6142
53	0.6213	0.4723	1.343	1.687	0.6106
54	0.6578	0.5088	1.353	1.677	0.6069
55	0.6963	0.5473	1.363	1.667	0.6033
56	0.738	0.589	1.373	1.657	0.5997
57	0.7813	0.6323	1.385	1.645	0.5954
58	0.828	0.679	1.403	1.627	0.5889
59	0.8763	0.7273	1.413	1.617	0.5852
60	0.928	0.779	1.423	1.607	0.5816
61	0.983	0.834	1.436	1.594	0.5769
62	1.041	0.8923	1.45	1.58	0.5718
63	1.103	0.954	1.466	1.564	0.5661
64	1.168	1.019	1.482	1.548	0.5603
65	1.238	1.089	1.5	1.53	0.5537
66	1.311	1.162	1.516	1.514	0.548
67	1.39	1.241	1.534	1.496	0.5414
68	1.473	1.324	1.554	1.476	0.5342
69	1.561	1.412	1.574	1.456	0.527
70	1.655	1.506	1.596	1.434	0.519
71	1.753	1.604	1.618	1.412	0.511
72	1.858	1.709	1.641	1.389	0.5027
73	1.968	1.819	1.663	1.367	0.4948
74	2.085	1.936	1.757	1.273	0.4607
75	2.21	2.061	1.749	1.281	0.4636
76	2.341	2.192	1.749	1.281	0.4636
77	2.481	2.332	1.769	1.261	0.4564
78	2.63	2.481	1.799	1.231	0.4455
79	2.786	2.637	1.827	1.203	0.4354
80	2.953	2.804	1.859	1.171	0.4238
81	3.13	2.981	1.889	1.141	0.413
82	3.316	3.167	1.92	1.11	0.4017
83	3.515	3.366	1.956	1.074	0.3887
84	3.725	3.576	1.99	1.04	0.3764

85	3.946	3.797	2.024	1.006	0.3641
86	4.181	4.032	2.06	0.97	0.3511
87	4.43	4.281	2.098	0.932	0.3373
88	4.693	4.544	2.136	0.894	0.3236
89	4.973	4.824	2.174	0.856	0.3098
90	5.27	5.121	2.21	0.82	0.2968
91	5.583	5.434	2.248	0.782	0.283
92	5.915	5.766	2.288	0.742	0.2685
93	6.266	6.117	2.326	0.704	0.2548
94	6.64	6.491	2.366	0.664	0.2403
95	7.035	6.886	2.402	0.628	0.2273
96	7.453	7.304	2.44	0.59	0.2135
97	7.896	7.747	2.479	0.551	0.1994
98	8.366	8.217	2.513	0.517	0.1871
99	8.865	8.716	2.549	0.481	0.1741
100	9.391	9.242	2.584	0.446	0.1614
101	9.95	9.801	2.616	0.414	0.1498
102	10.54	10.39	2.648	0.382	0.1383
103	11.17	11.02	2.679	0.351	0.127
104	11.83	11.68	2.707	0.323	0.1169
105	12.53	12.39	2.737	0.293	0.106
106	13.28	13.13	2.762	0.268	9.7e-002
107	14.07	13.92	2.784	0.246	8.903e-002
108	14.91	14.76	2.807	0.223	8.071e-002
109	15.79	15.64	2.825	0.205	7.419e-002
110	16.73	16.58	2.846	0.184	6.659e-002
111	17.72	17.57	2.86	0.17	6.153e-002
112	18.78	18.63	2.873	0.157	5.682e-002
113	19.89	19.74	2.884	0.146	5.284e-002
114	21.07	20.92	2.896	0.134	4.85e-002
115	22.32	22.18	2.902	0.128	4.633e-002
116	23.65	23.5	2.909	0.121	4.379e-002
117	25.05	24.91	2.915	0.115	4.162e-002
118	26.54	26.39	2.917	0.113	4.09e-002
119	28.12	27.97	2.921	0.109	3.945e-002
120	29.79	29.64	2.926	0.104	3.764e-002
121	31.55	31.41	2.929	0.101	3.655e-002
122	33.43	33.28	2.927	0.103	3.728e-002
123	35.41	35.26	2.929	0.101	3.655e-002
124	37.41	37.26	2.929	0.101	3.655e-002
125	39.41	39.26	2.93	1.e-001	3.619e-002
126	41.41	41.26	2.931	9.9e-002	3.583e-002
127	43.41	43.26	2.931	9.9e-002	3.583e-002
128	45.41	45.26	2.929	0.101	3.655e-002
129	47.41	47.26	2.93	1.e-001	3.619e-002
130	49.41	49.26	2.93	1.e-001	3.619e-002
131	51.41	51.26	2.93	1.e-001	3.619e-002
132	53.41	53.26	2.931	9.9e-002	3.583e-002
133	55.41	55.26	2.932	9.8e-002	3.547e-002
134	57.41	57.26	2.933	9.7e-002	3.511e-002
135	59.41	59.26	2.933	9.7e-002	3.511e-002
136	61.41	61.26	2.933	9.7e-002	3.511e-002
137	63.41	63.26	2.932	9.8e-002	3.547e-002

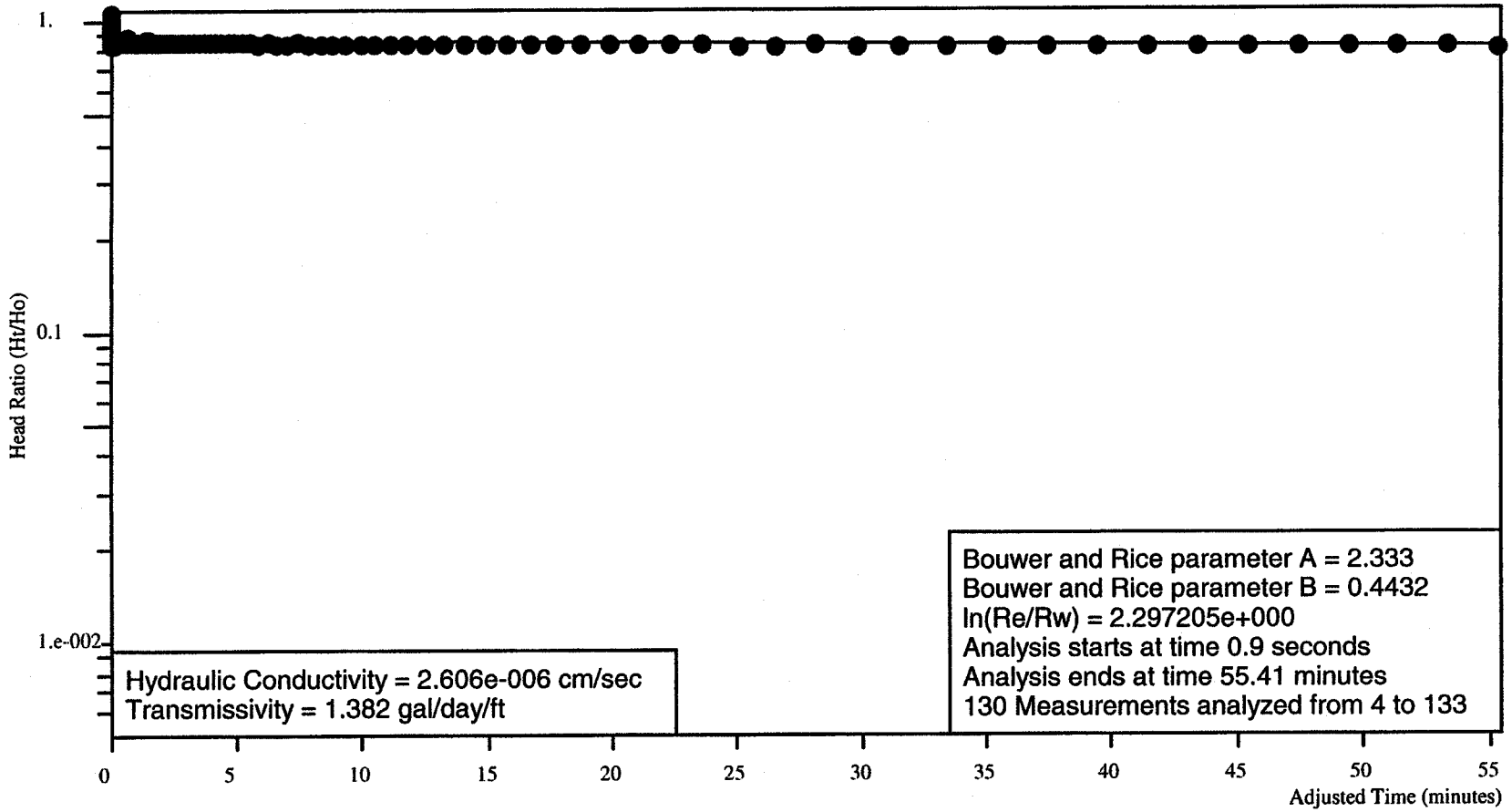
138	65.41	65.26	2.933	9.7e-002	3.511e-002
139	67.41	67.26	2.936	9.4e-002	3.402e-002
140	69.41	69.26	2.944	8.6e-002	3.113e-002
141	71.41	71.26	2.94	9.e-002	3.257e-002
142	73.41	73.26	2.938	9.2e-002	3.33e-002
143	75.41	75.26	2.934	9.6e-002	3.474e-002

Aquifer Analysis December 30, 2002

MRR of High Point, LLC

Bouwer and Rice Graph

P-20 (Rising)



Ho is 0.257 feet at 0.9 seconds

Project Number 600.06

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis

Site Name:	MRR of High Point, LLC
Test Date:	December 30, 2002
Project Number:	600.06
Import File:	P:\MRR of High Point\Task 06 Response to Comments\Hydrogeologic Comments\Revised slug tests\Sl

Well Label:	P-20 (Rising)
Aquifer Thickness:	25. feet
Screen Length:	10. feet
Casing Radius:	1.888 inches
Effective Radius:	3.125 inches
Static Water Level:	20.7 feet
Water Table to Screen Bottom:	7.6 feet
Anisotropy Ratio:	1.
Time Adjustment:	0.9 Seconds

Test starts with trial 1
There are 133 time and drawdown measurements
Maximum head is 0.381 feet
Minimum head is -0.789 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-1.5e-002	19.91	-0.789	-2.071
2	5.e-003	-1.e-002	21.08	0.381	1.
3	1.e-002	-5.e-003	21.	0.295	0.7743
4	1.5e-002	0.	20.96	0.257	0.6745
5	2.e-002	5.e-003	20.98	0.275	0.7218
6	2.5e-002	1.e-002	20.96	0.259	0.6798
7	3.e-002	1.5e-002	20.94	0.237	0.622
8	3.5e-002	2.e-002	20.94	0.243	0.6378
9	4.e-002	2.5e-002	20.95	0.249	0.6535
10	4.5e-002	3.e-002	20.93	0.231	0.6063
11	5.e-002	3.5e-002	20.93	0.234	0.6142
12	5.5e-002	4.e-002	20.92	0.224	0.5879
13	6.e-002	4.5e-002	20.93	0.23	0.6037
14	6.5e-002	5.e-002	20.92	0.222	0.5827
15	7.e-002	5.5e-002	20.92	0.218	0.5722
16	7.5e-002	6.e-002	20.92	0.218	0.5722
17	8.e-002	6.5e-002	20.92	0.218	0.5722
18	8.5e-002	7.e-002	20.92	0.216	0.5669
19	9.e-002	7.5e-002	20.92	0.216	0.5669
20	9.5e-002	8.e-002	20.92	0.216	0.5669
21	0.1	8.5e-002	20.92	0.216	0.5669
22	0.1067	9.167e-002	20.91	0.214	0.5617
23	0.1117	9.667e-002	20.91	0.214	0.5617
24	0.1183	0.1033	20.91	0.214	0.5617
25	0.125	0.11	20.91	0.214	0.5617
26	0.1333	0.1183	20.92	0.216	0.5669
27	0.14	0.125	20.91	0.214	0.5617
28	0.1483	0.1333	20.91	0.214	0.5617
29	0.1583	0.1433	20.91	0.214	0.5617
30	0.1667	0.1517	20.92	0.216	0.5669
31	0.1767	0.1617	20.92	0.218	0.5722

32	0.1883	0.1733	20.92	0.217	0.5696
33	0.1983	0.1833	20.92	0.217	0.5696
34	0.21	0.195	20.92	0.219	0.5748
35	0.2233	0.2083	20.92	0.219	0.5748
36	0.2367	0.2217	20.92	0.219	0.5748
37	0.25	0.235	20.92	0.219	0.5748
38	0.265	0.25	20.92	0.221	0.5801
39	0.28	0.265	20.92	0.219	0.5748
40	0.2967	0.2817	20.92	0.219	0.5748
41	0.315	0.3	20.92	0.221	0.5801
42	0.3333	0.3183	20.92	0.221	0.5801
43	0.3533	0.3383	20.92	0.221	0.5801
44	0.3733	0.3583	20.92	0.219	0.5748
45	0.3967	0.3817	20.92	0.221	0.5801
46	0.42	0.405	20.92	0.221	0.5801
47	0.445	0.43	20.92	0.221	0.5801
48	0.47	0.455	20.92	0.221	0.5801
49	0.4967	0.4817	20.92	0.221	0.5801
50	0.525	0.51	20.92	0.219	0.5748
51	0.555	0.54	20.92	0.219	0.5748
52	0.5867	0.5717	20.92	0.221	0.5801
53	0.6217	0.6067	20.93	0.225	0.5906
54	0.6583	0.6433	20.93	0.227	0.5958
55	0.6967	0.6817	20.92	0.221	0.5801
56	0.7383	0.7233	20.92	0.221	0.5801
57	0.7817	0.7667	20.92	0.221	0.5801
58	0.8283	0.8133	20.92	0.221	0.5801
59	0.8767	0.8617	20.92	0.221	0.5801
60	0.9283	0.9133	20.92	0.221	0.5801
61	0.9833	0.9683	20.92	0.221	0.5801
62	1.042	1.027	20.92	0.221	0.5801
63	1.103	1.088	20.92	0.221	0.5801
64	1.168	1.153	20.92	0.221	0.5801
65	1.238	1.223	20.92	0.221	0.5801
66	1.312	1.297	20.92	0.221	0.5801
67	1.39	1.375	20.92	0.221	0.5801
68	1.473	1.458	20.93	0.226	0.5932
69	1.562	1.547	20.92	0.223	0.5853
70	1.655	1.64	20.92	0.221	0.5801
71	1.753	1.738	20.92	0.221	0.5801
72	1.858	1.843	20.92	0.219	0.5748
73	1.968	1.953	20.92	0.221	0.5801
74	2.085	2.07	20.92	0.22	0.5774
75	2.21	2.195	20.92	0.221	0.5801
76	2.342	2.327	20.92	0.221	0.5801
77	2.482	2.467	20.92	0.221	0.5801
78	2.63	2.615	20.92	0.221	0.5801
79	2.787	2.772	20.92	0.221	0.5801
80	2.953	2.938	20.92	0.22	0.5774
81	3.13	3.115	20.92	0.22	0.5774
82	3.317	3.302	20.92	0.22	0.5774
83	3.515	3.5	20.92	0.22	0.5774
84	3.725	3.71	20.92	0.218	0.5722

85	3.947	3.932	20.92	0.22	0.5774
86	4.182	4.167	20.92	0.22	0.5774
87	4.43	4.415	20.92	0.219	0.5748
88	4.693	4.678	20.92	0.219	0.5748
89	4.973	4.958	20.92	0.219	0.5748
90	5.27	5.255	20.92	0.219	0.5748
91	5.583	5.568	20.92	0.219	0.5748
92	5.915	5.9	20.92	0.217	0.5696
93	6.267	6.252	20.92	0.219	0.5748
94	6.64	6.625	20.92	0.217	0.5696
95	7.035	7.02	20.92	0.217	0.5696
96	7.453	7.438	20.92	0.219	0.5748
97	7.897	7.882	20.92	0.217	0.5696
98	8.367	8.352	20.92	0.216	0.5669
99	8.865	8.85	20.92	0.216	0.5669
100	9.392	9.377	20.92	0.216	0.5669
101	9.95	9.935	20.92	0.216	0.5669
102	10.54	10.53	20.92	0.216	0.5669
103	11.17	11.15	20.92	0.216	0.5669
104	11.83	11.82	20.92	0.216	0.5669
105	12.54	12.52	20.92	0.216	0.5669
106	13.28	13.26	20.92	0.216	0.5669
107	14.07	14.05	20.92	0.216	0.5669
108	14.91	14.89	20.92	0.216	0.5669
109	15.79	15.78	20.91	0.214	0.5617
110	16.73	16.72	20.92	0.216	0.5669
111	17.72	17.71	20.91	0.214	0.5617
112	18.78	18.76	20.91	0.214	0.5617
113	19.89	19.88	20.91	0.214	0.5617
114	21.07	21.06	20.91	0.214	0.5617
115	22.32	22.31	20.91	0.214	0.5617
116	23.65	23.64	20.91	0.214	0.5617
117	25.06	25.04	20.91	0.212	0.5564
118	26.54	26.53	20.91	0.212	0.5564
119	28.12	28.1	20.91	0.214	0.5617
120	29.79	29.77	20.91	0.212	0.5564
121	31.56	31.54	20.91	0.212	0.5564
122	33.43	33.41	20.91	0.212	0.5564
123	35.41	35.4	20.91	0.212	0.5564
124	37.41	37.4	20.91	0.212	0.5564
125	39.41	39.4	20.91	0.21	0.5512
126	41.41	41.4	20.91	0.212	0.5564
127	43.41	43.4	20.91	0.213	0.5591
128	45.41	45.4	20.91	0.21	0.5512
129	47.41	47.4	20.91	0.21	0.5512
130	49.41	49.4	20.91	0.21	0.5512
131	51.41	51.4	20.91	0.21	0.5512
132	53.41	53.4	20.91	0.21	0.5512
133	55.41	55.4	20.91	0.208	0.5459

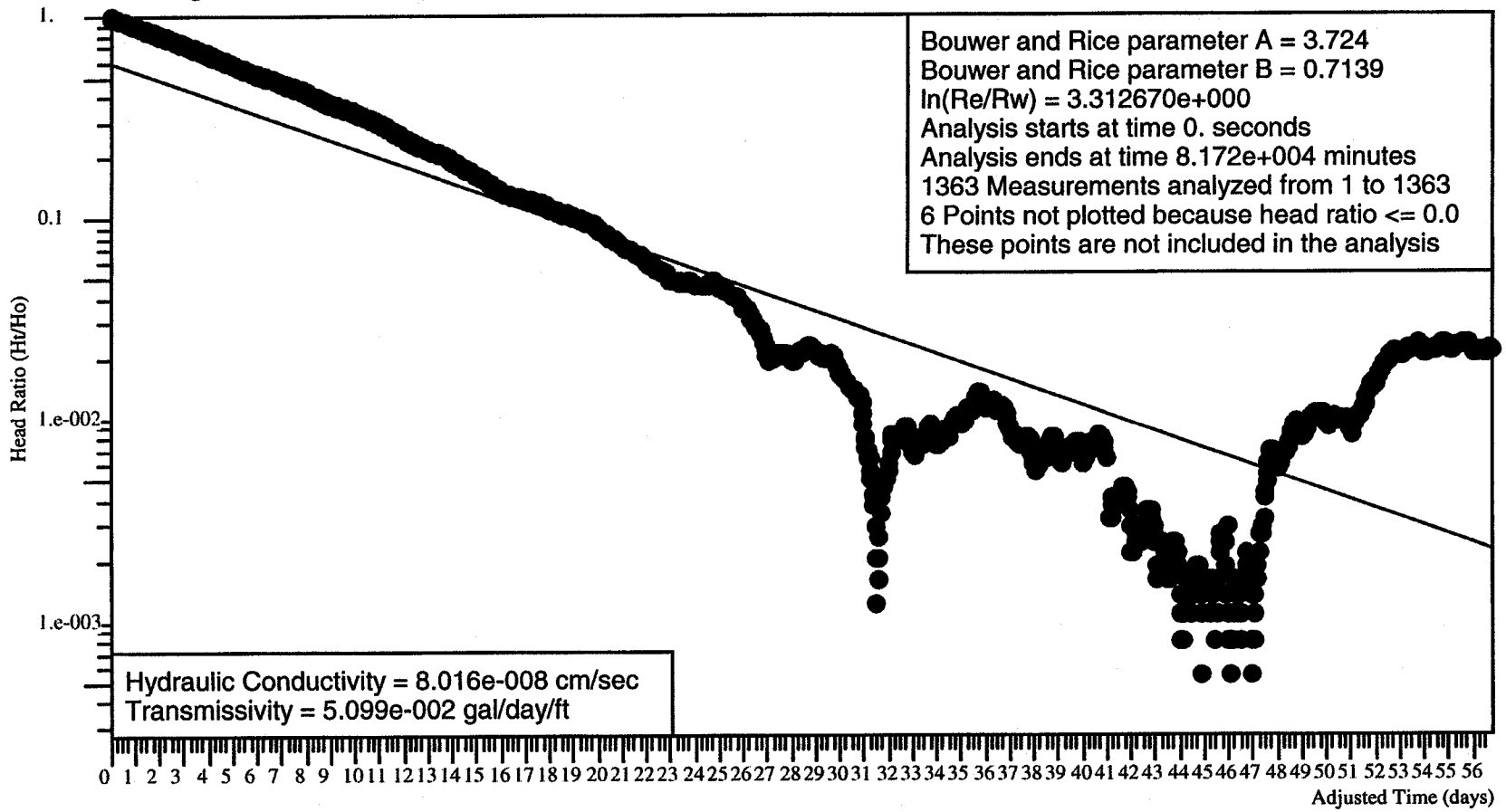
Additional Aquifer Tests

Aquifer Analysis April 16, 2002 - June 12, 2002

Bouwer and Rice Graph

MRR of High Point, LLC

P-1



Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Ho is 7.436 feet at 0. seconds

Aquifer Analysis April 16, 2002 - June 12, 2002

Site Name: MRR of High Point, LLC
Project Number: 600.04
Import File: P:\MRR of High Point\Task 04 Hydrogeologic Report and WQMP\Minitroll Data\New Text Document.

Well Label: P-1
Aquifer Thickness: 30. feet
Screen Length: 20. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 24.93 feet
Water Table to Screen Bottom: 28.11 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 1363 time and drawdown measurements
Maximum head is 7.436 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	32.37	7.436	1.
2	60.	60.	32.34	7.406	0.996
3	120.	120.	32.3	7.372	0.9914
4	180.	180.	32.27	7.344	0.9876
5	240.	240.	32.25	7.318	0.9841
6	300.	300.	32.22	7.292	0.9806
7	360.	360.	32.2	7.266	0.9771
8	420.	420.	32.17	7.236	0.9731
9	480.	480.	32.14	7.206	0.9691
10	540.	540.	32.1	7.174	0.9648
11	600.	600.	32.07	7.144	0.9607
12	660.	660.	32.04	7.114	0.9567
13	720.	720.	32.01	7.082	0.9524
14	780.	780.	31.98	7.05	0.9481
15	840.	840.	31.95	7.024	0.9446
16	900.	900.	31.93	7.004	0.9419
17	960.	960.	31.91	6.98	0.9387
18	1020	1020	31.88	6.952	0.9349
19	1080	1080	31.85	6.924	0.9311
20	1140	1140	31.82	6.893	0.927
21	1200	1200	31.79	6.859	0.9224
22	1260	1260	31.75	6.821	0.9173
23	1320	1320	31.72	6.785	0.9125
24	1380	1380	31.68	6.749	0.9076
25	1440	1440	31.65	6.715	0.903
26	1500	1500	31.61	6.685	0.899
27	1560	1560	31.59	6.659	0.8955
28	1620	1620	31.56	6.633	0.892
29	1680	1680	31.54	6.605	0.8882
30	1740	1740	31.51	6.583	0.8853
31	1800	1800	31.49	6.557	0.8818
32	1860	1860	31.46	6.533	0.8786

33	1920	1920	31.44	6.507	0.8751
34	1980	1980	31.41	6.477	0.871
35	2040	2040	31.38	6.451	0.8675
36	2100	2100	31.35	6.423	0.8638
37	2160	2160	31.32	6.392	0.8596
38	2220	2220	31.3	6.366	0.8561
39	2280	2280	31.27	6.34	0.8526
40	2340	2340	31.25	6.32	0.8499
41	2400	2400	31.23	6.299	0.8471
42	2460	2460	31.2	6.268	0.8429
43	2520	2520	31.17	6.242	0.8394
44	2580	2580	31.15	6.216	0.8359
45	2640	2640	31.11	6.184	0.8316
46	2700	2700	31.08	6.15	0.8271
47	2760	2760	31.05	6.12	0.823
48	2820	2820	31.02	6.088	0.8187
49	2880	2880	30.98	6.054	0.8141
50	2940	2940	30.95	6.022	0.8098
51	3000	3000	30.93	5.998	0.8066
52	3060	3060	30.9	5.97	0.8029
53	3120	3120	30.87	5.944	0.7994
54	3180	3180	30.85	5.922	0.7964
55	3240	3240	30.83	5.9	0.7934
56	3300	3300	30.81	5.876	0.7902
57	3360	3360	30.78	5.846	0.7862
58	3420	3420	30.75	5.82	0.7827
59	3480	3480	30.72	5.79	0.7786
60	3540	3540	30.69	5.764	0.7751
61	3600	3600	30.67	5.738	0.7717
62	3660	3660	30.64	5.714	0.7684
63	3720	3720	30.62	5.689	0.7651
64	3780	3780	30.6	5.666	0.762
65	3840	3840	30.57	5.644	0.759
66	3900	3900	30.55	5.62	0.7558
67	3960	3960	30.53	5.596	0.7526
68	4020	4020	30.5	5.567	0.7487
69	4080	4080	30.47	5.542	0.7453
70	4140	4140	30.44	5.51	0.741
71	4200	4200	30.41	5.479	0.7368
72	4260	4260	30.38	5.451	0.7331
73	4320	4320	30.36	5.425	0.7296
74	4380	4380	30.33	5.399	0.7261
75	4440	4440	30.3	5.373	0.7226
76	4500	4500	30.28	5.349	0.7193
77	4560	4560	30.25	5.325	0.7161
78	4620	4620	30.23	5.301	0.7129
79	4680	4680	30.21	5.279	0.7099
80	4740	4740	30.19	5.257	0.707
81	4800	4800	30.16	5.235	0.704
82	4860	4860	30.14	5.205	0.7
83	4920	4920	30.11	5.177	0.6962
84	4980	4980	30.08	5.149	0.6924
85	5040	5040	30.06	5.127	0.6895

86	5100	5100	30.03	5.101	0.686
87	5160	5160	30.01	5.079	0.683
88	5220	5220	29.99	5.059	0.6803
89	5280	5280	29.97	5.037	0.6774
90	5340	5340	29.94	5.015	0.6744
91	5400	5400	29.92	4.993	0.6715
92	5460	5460	29.9	4.966	0.6678
93	5520	5520	29.87	4.94	0.6643
94	5580	5580	29.85	4.918	0.6614
95	5640	5640	29.82	4.892	0.6579
96	5700	5700	29.79	4.864	0.6541
97	5760	5760	29.77	4.836	0.6503
98	5820	5820	29.74	4.81	0.6469
99	5880	5880	29.72	4.786	0.6436
100	5940	5940	29.69	4.764	0.6407
101	6000	6000	29.68	4.748	0.6385
102	6060	6060	29.66	4.73	0.6361
103	6120	6120	29.64	4.712	0.6337
104	6180	6180	29.62	4.69	0.6307
105	6240	6240	29.6	4.668	0.6278
106	6300	6300	29.57	4.644	0.6245
107	6360	6360	29.55	4.618	0.621
108	6420	6420	29.53	4.596	0.6181
109	6480	6480	29.51	4.576	0.6154
110	6540	6540	29.48	4.552	0.6122
111	6600	6600	29.46	4.53	0.6092
112	6660	6660	29.44	4.51	0.6065
113	6720	6720	29.42	4.494	0.6044
114	6780	6780	29.4	4.472	0.6014
115	6840	6840	29.38	4.452	0.5987
116	6900	6900	29.36	4.432	0.596
117	6960	6960	29.34	4.408	0.5928
118	7020	7020	29.31	4.382	0.5893
119	7080	7080	29.29	4.356	0.5858
120	7140	7140	29.26	4.334	0.5828
121	7200	7200	29.24	4.306	0.5791
122	7260	7260	29.21	4.282	0.5758
123	7320	7320	29.19	4.258	0.5726
124	7380	7380	29.17	4.238	0.5699
125	7440	7440	29.15	4.22	0.5675
126	7500	7500	29.13	4.202	0.5651
127	7560	7560	29.11	4.181	0.5623
128	7620	7620	29.09	4.161	0.5596
129	7680	7680	29.06	4.135	0.5561
130	7740	7740	29.04	4.113	0.5531
131	7800	7800	29.02	4.093	0.5504
132	7860	7860	29.	4.073	0.5477
133	7920	7920	28.99	4.055	0.5453
134	7980	7980	28.96	4.031	0.5421
135	8040	8040	28.94	4.011	0.5394
136	8100	8100	28.92	3.991	0.5367
137	8160	8160	28.91	3.977	0.5348
138	8220	8220	28.89	3.965	0.5332

139	8280	8280	28.88	3.949	0.5311
140	8340	8340	28.86	3.931	0.5286
141	8400	8400	28.84	3.913	0.5262
142	8460	8460	28.82	3.891	0.5233
143	8520	8520	28.8	3.869	0.5203
144	8580	8580	28.78	3.851	0.5179
145	8640	8640	28.76	3.829	0.5149
146	8700	8700	28.74	3.811	0.5125
147	8760	8760	28.73	3.795	0.5104
148	8820	8820	28.71	3.779	0.5082
149	8880	8880	28.7	3.769	0.5069
150	8940	8940	28.7	3.765	0.5063
151	9000	9000	28.68	3.755	0.505
152	9060	9060	28.67	3.741	0.5031
153	9120	9120	28.66	3.729	0.5015
154	9180	9180	28.65	3.717	0.4999
155	9240	9240	28.63	3.701	0.4977
156	9300	9300	28.61	3.685	0.4956
157	9360	9360	28.61	3.675	0.4942
158	9420	9420	28.59	3.661	0.4923
159	9480	9480	28.58	3.647	0.4905
160	9540	9540	28.57	3.639	0.4894
161	9600	9600	28.56	3.625	0.4875
162	9660	9660	28.54	3.615	0.4861
163	9720	9720	28.53	3.597	0.4837
164	9780	9780	28.51	3.581	0.4816
165	9840	9840	28.49	3.563	0.4792
166	9900	9900	28.47	3.541	0.4762
167	9960	9960	28.45	3.521	0.4735
168	1.002e+004	1.002e+004	28.43	3.501	0.4708
169	1.008e+004	1.008e+004	28.41	3.477	0.4676
170	1.014e+004	1.014e+004	28.39	3.457	0.4649
171	1.02e+004	1.02e+004	28.37	3.441	0.4627
172	1.026e+004	1.026e+004	28.36	3.427	0.4609
173	1.032e+004	1.032e+004	28.35	3.415	0.4593
174	1.038e+004	1.038e+004	28.34	3.408	0.4583
175	1.044e+004	1.044e+004	28.33	3.396	0.4567
176	1.05e+004	1.05e+004	28.31	3.382	0.4548
177	1.056e+004	1.056e+004	28.3	3.366	0.4527
178	1.062e+004	1.062e+004	28.28	3.35	0.4505
179	1.068e+004	1.068e+004	28.27	3.336	0.4486
180	1.074e+004	1.074e+004	28.25	3.322	0.4467
181	1.08e+004	1.08e+004	28.24	3.31	0.4451
182	1.086e+004	1.086e+004	28.23	3.296	0.4432
183	1.092e+004	1.092e+004	28.22	3.286	0.4419
184	1.098e+004	1.098e+004	28.2	3.272	0.44
185	1.104e+004	1.104e+004	28.19	3.26	0.4384
186	1.11e+004	1.11e+004	28.18	3.248	0.4368
187	1.116e+004	1.116e+004	28.16	3.232	0.4346
188	1.122e+004	1.122e+004	28.14	3.214	0.4322
189	1.128e+004	1.128e+004	28.13	3.198	0.4301
190	1.134e+004	1.134e+004	28.11	3.178	0.4274
191	1.14e+004	1.14e+004	28.09	3.156	0.4244

192	1.146e+004	1.146e+004	28.07	3.138	0.422
193	1.152e+004	1.152e+004	28.05	3.118	0.4193
194	1.158e+004	1.158e+004	28.03	3.098	0.4166
195	1.164e+004	1.164e+004	28.01	3.078	0.4139
196	1.17e+004	1.17e+004	27.99	3.064	0.412
197	1.176e+004	1.176e+004	27.98	3.046	0.4096
198	1.182e+004	1.182e+004	27.96	3.032	0.4077
199	1.188e+004	1.188e+004	27.95	3.018	0.4059
200	1.194e+004	1.194e+004	27.93	3.	0.4034
201	1.2e+004	1.2e+004	27.92	2.986	0.4016
202	1.206e+004	1.206e+004	27.9	2.966	0.3989
203	1.212e+004	1.212e+004	27.88	2.95	0.3967
204	1.218e+004	1.218e+004	27.87	2.94	0.3954
205	1.224e+004	1.224e+004	27.85	2.922	0.393
206	1.23e+004	1.23e+004	27.83	2.896	0.3895
207	1.236e+004	1.236e+004	27.81	2.88	0.3873
208	1.242e+004	1.242e+004	27.8	2.866	0.3854
209	1.248e+004	1.248e+004	27.78	2.85	0.3833
210	1.254e+004	1.254e+004	27.76	2.834	0.3811
211	1.26e+004	1.26e+004	27.75	2.818	0.379
212	1.266e+004	1.266e+004	27.74	2.806	0.3774
213	1.272e+004	1.272e+004	27.72	2.79	0.3752
214	1.278e+004	1.278e+004	27.7	2.772	0.3728
215	1.284e+004	1.284e+004	27.69	2.756	0.3706
216	1.29e+004	1.29e+004	27.68	2.746	0.3693
217	1.296e+004	1.296e+004	27.66	2.734	0.3677
218	1.302e+004	1.302e+004	27.66	2.726	0.3666
219	1.308e+004	1.308e+004	27.65	2.716	0.3653
220	1.314e+004	1.314e+004	27.63	2.702	0.3634
221	1.32e+004	1.32e+004	27.62	2.694	0.3623
222	1.326e+004	1.326e+004	27.62	2.688	0.3615
223	1.332e+004	1.332e+004	27.61	2.68	0.3604
224	1.338e+004	1.338e+004	27.6	2.674	0.3596
225	1.344e+004	1.344e+004	27.6	2.666	0.3585
226	1.35e+004	1.35e+004	27.59	2.656	0.3572
227	1.356e+004	1.356e+004	27.57	2.642	0.3553
228	1.362e+004	1.362e+004	27.56	2.632	0.354
229	1.368e+004	1.368e+004	27.55	2.622	0.3526
230	1.374e+004	1.374e+004	27.54	2.609	0.3509
231	1.38e+004	1.38e+004	27.53	2.597	0.3492
232	1.386e+004	1.386e+004	27.52	2.591	0.3484
233	1.392e+004	1.392e+004	27.52	2.585	0.3476
234	1.398e+004	1.398e+004	27.51	2.577	0.3466
235	1.404e+004	1.404e+004	27.5	2.567	0.3452
236	1.41e+004	1.41e+004	27.49	2.557	0.3439
237	1.416e+004	1.416e+004	27.48	2.545	0.3423
238	1.422e+004	1.422e+004	27.46	2.529	0.3401
239	1.428e+004	1.428e+004	27.45	2.515	0.3382
240	1.434e+004	1.434e+004	27.43	2.499	0.3361
241	1.44e+004	1.44e+004	27.41	2.483	0.3339
242	1.446e+004	1.446e+004	27.4	2.467	0.3318
243	1.452e+004	1.452e+004	27.39	2.457	0.3304
244	1.458e+004	1.458e+004	27.37	2.441	0.3283

245	1.464e+004	1.464e+004	27.36	2.429	0.3267
246	1.47e+004	1.47e+004	27.35	2.419	0.3253
247	1.476e+004	1.476e+004	27.34	2.411	0.3242
248	1.482e+004	1.482e+004	27.33	2.403	0.3232
249	1.488e+004	1.488e+004	27.32	2.391	0.3215
250	1.494e+004	1.494e+004	27.31	2.381	0.3202
251	1.5e+004	1.5e+004	27.3	2.365	0.318
252	1.506e+004	1.506e+004	27.28	2.351	0.3162
253	1.512e+004	1.512e+004	27.27	2.341	0.3148
254	1.518e+004	1.518e+004	27.26	2.329	0.3132
255	1.524e+004	1.524e+004	27.25	2.319	0.3119
256	1.53e+004	1.53e+004	27.25	2.315	0.3113
257	1.536e+004	1.536e+004	27.23	2.305	0.31
258	1.542e+004	1.542e+004	27.22	2.295	0.3086
259	1.548e+004	1.548e+004	27.22	2.285	0.3073
260	1.554e+004	1.554e+004	27.2	2.273	0.3057
261	1.56e+004	1.56e+004	27.19	2.259	0.3038
262	1.566e+004	1.566e+004	27.18	2.247	0.3022
263	1.572e+004	1.572e+004	27.16	2.231	0.3
264	1.578e+004	1.578e+004	27.15	2.215	0.2979
265	1.584e+004	1.584e+004	27.13	2.197	0.2955
266	1.59e+004	1.59e+004	27.11	2.183	0.2936
267	1.596e+004	1.596e+004	27.1	2.171	0.292
268	1.602e+004	1.602e+004	27.09	2.157	0.2901
269	1.608e+004	1.608e+004	27.08	2.149	0.289
270	1.614e+004	1.614e+004	27.07	2.139	0.2877
271	1.62e+004	1.62e+004	27.06	2.129	0.2863
272	1.626e+004	1.626e+004	27.04	2.106	0.2832
273	1.632e+004	1.632e+004	27.02	2.094	0.2816
274	1.638e+004	1.638e+004	27.01	2.081	0.2799
275	1.644e+004	1.644e+004	26.99	2.062	0.2773
276	1.65e+004	1.65e+004	26.98	2.046	0.2751
277	1.656e+004	1.656e+004	26.96	2.03	0.273
278	1.662e+004	1.662e+004	26.94	2.014	0.2708
279	1.668e+004	1.668e+004	26.93	1.996	0.2684
280	1.674e+004	1.674e+004	26.92	1.992	0.2679
281	1.68e+004	1.68e+004	26.91	1.98	0.2663
282	1.686e+004	1.686e+004	26.89	1.962	0.2639
283	1.692e+004	1.692e+004	26.88	1.946	0.2617
284	1.698e+004	1.698e+004	26.86	1.932	0.2598
285	1.704e+004	1.704e+004	26.85	1.918	0.2579
286	1.71e+004	1.71e+004	26.83	1.902	0.2558
287	1.716e+004	1.716e+004	26.82	1.89	0.2542
288	1.722e+004	1.722e+004	26.8	1.871	0.2516
289	1.728e+004	1.728e+004	26.78	1.85	0.2488
290	1.734e+004	1.734e+004	26.77	1.836	0.2469
291	1.74e+004	1.74e+004	26.75	1.825	0.2454
292	1.746e+004	1.746e+004	26.75	1.816	0.2442
293	1.752e+004	1.752e+004	26.73	1.804	0.2426
294	1.758e+004	1.758e+004	26.73	1.796	0.2415
295	1.764e+004	1.764e+004	26.71	1.784	0.2399
296	1.77e+004	1.77e+004	26.7	1.774	0.2386
297	1.776e+004	1.776e+004	26.69	1.762	0.237

298	1.782e+004	1.782e+004	26.68	1.75	0.2353
299	1.788e+004	1.788e+004	26.67	1.74	0.234
300	1.794e+004	1.794e+004	26.66	1.728	0.2324
301	1.8e+004	1.8e+004	26.65	1.72	0.2313
302	1.806e+004	1.806e+004	26.64	1.712	0.2302
303	1.812e+004	1.812e+004	26.63	1.704	0.2292
304	1.818e+004	1.818e+004	26.63	1.698	0.2283
305	1.824e+004	1.824e+004	26.62	1.692	0.2275
306	1.83e+004	1.83e+004	26.62	1.686	0.2267
307	1.836e+004	1.836e+004	26.61	1.678	0.2257
308	1.842e+004	1.842e+004	26.6	1.67	0.2246
309	1.848e+004	1.848e+004	26.59	1.66	0.2232
310	1.854e+004	1.854e+004	26.58	1.652	0.2222
311	1.86e+004	1.86e+004	26.57	1.644	0.2211
312	1.866e+004	1.866e+004	26.56	1.634	0.2197
313	1.872e+004	1.872e+004	26.55	1.622	0.2181
314	1.878e+004	1.878e+004	26.54	1.612	0.2168
315	1.884e+004	1.884e+004	26.53	1.604	0.2157
316	1.89e+004	1.89e+004	26.53	1.598	0.2149
317	1.896e+004	1.896e+004	26.52	1.592	0.2141
318	1.902e+004	1.902e+004	26.52	1.588	0.2136
319	1.908e+004	1.908e+004	26.52	1.588	0.2136
320	1.914e+004	1.914e+004	26.51	1.582	0.2127
321	1.92e+004	1.92e+004	26.5	1.574	0.2117
322	1.926e+004	1.926e+004	26.5	1.57	0.2111
323	1.932e+004	1.932e+004	26.49	1.564	0.2103
324	1.938e+004	1.938e+004	26.49	1.556	0.2093
325	1.944e+004	1.944e+004	26.48	1.552	0.2087
326	1.95e+004	1.95e+004	26.48	1.546	0.2079
327	1.956e+004	1.956e+004	26.47	1.538	0.2068
328	1.962e+004	1.962e+004	26.46	1.53	0.2058
329	1.968e+004	1.968e+004	26.46	1.526	0.2052
330	1.974e+004	1.974e+004	26.45	1.518	0.2041
331	1.98e+004	1.98e+004	26.44	1.51	0.2031
332	1.986e+004	1.986e+004	26.43	1.502	0.202
333	1.992e+004	1.992e+004	26.42	1.492	0.2006
334	1.998e+004	1.998e+004	26.41	1.478	0.1988
335	2.004e+004	2.004e+004	26.4	1.466	0.1971
336	2.01e+004	2.01e+004	26.38	1.452	0.1953
337	2.016e+004	2.016e+004	26.37	1.438	0.1934
338	2.022e+004	2.022e+004	26.35	1.422	0.1912
339	2.028e+004	2.028e+004	26.35	1.416	0.1904
340	2.034e+004	2.034e+004	26.34	1.408	0.1893
341	2.04e+004	2.04e+004	26.33	1.4	0.1883
342	2.046e+004	2.046e+004	26.32	1.392	0.1872
343	2.052e+004	2.052e+004	26.31	1.384	0.1861
344	2.058e+004	2.058e+004	26.3	1.372	0.1845
345	2.064e+004	2.064e+004	26.29	1.36	0.1829
346	2.07e+004	2.07e+004	26.28	1.349	0.1814
347	2.076e+004	2.076e+004	26.27	1.337	0.1798
348	2.082e+004	2.082e+004	26.26	1.327	0.1785
349	2.088e+004	2.088e+004	26.25	1.319	0.1774
350	2.094e+004	2.094e+004	26.24	1.311	0.1763

351	2.1e+004	2.1e+004	26.23	1.301	0.175
352	2.106e+004	2.106e+004	26.23	1.295	0.1742
353	2.112e+004	2.112e+004	26.23	1.295	0.1742
354	2.118e+004	2.118e+004	26.21	1.281	0.1723
355	2.124e+004	2.124e+004	26.2	1.273	0.1712
356	2.13e+004	2.13e+004	26.2	1.267	0.1704
357	2.136e+004	2.136e+004	26.19	1.257	0.169
358	2.142e+004	2.142e+004	26.18	1.245	0.1674
359	2.148e+004	2.148e+004	26.16	1.233	0.1658
360	2.154e+004	2.154e+004	26.15	1.223	0.1645
361	2.16e+004	2.16e+004	26.15	1.215	0.1634
362	2.166e+004	2.166e+004	26.14	1.205	0.162
363	2.172e+004	2.172e+004	26.13	1.199	0.1612
364	2.178e+004	2.178e+004	26.12	1.193	0.1604
365	2.184e+004	2.184e+004	26.11	1.185	0.1594
366	2.19e+004	2.19e+004	26.11	1.179	0.1586
367	2.196e+004	2.196e+004	26.1	1.171	0.1575
368	2.202e+004	2.202e+004	26.09	1.165	0.1567
369	2.208e+004	2.208e+004	26.09	1.159	0.1559
370	2.214e+004	2.214e+004	26.08	1.149	0.1545
371	2.22e+004	2.22e+004	26.07	1.135	0.1526
372	2.226e+004	2.226e+004	26.05	1.121	0.1508
373	2.232e+004	2.232e+004	26.04	1.113	0.1497
374	2.238e+004	2.238e+004	26.03	1.101	0.1481
375	2.244e+004	2.244e+004	26.02	1.095	0.1473
376	2.25e+004	2.25e+004	26.01	1.083	0.1456
377	2.256e+004	2.256e+004	26.01	1.081	0.1454
378	2.262e+004	2.262e+004	26.01	1.077	0.1448
379	2.268e+004	2.268e+004	25.99	1.063	0.143
380	2.274e+004	2.274e+004	25.99	1.057	0.1421
381	2.28e+004	2.28e+004	25.98	1.051	0.1413
382	2.286e+004	2.286e+004	25.97	1.041	0.14
383	2.292e+004	2.292e+004	25.96	1.033	0.1389
384	2.298e+004	2.298e+004	25.95	1.023	0.1376
385	2.304e+004	2.304e+004	25.94	1.013	0.1362
386	2.31e+004	2.31e+004	25.93	1.003	0.1349
387	2.316e+004	2.316e+004	25.93	0.999	0.1343
388	2.322e+004	2.322e+004	25.92	0.991	0.1333
389	2.328e+004	2.328e+004	25.92	0.989	0.133
390	2.334e+004	2.334e+004	25.92	0.989	0.133
391	2.34e+004	2.34e+004	25.92	0.989	0.133
392	2.346e+004	2.346e+004	25.93	0.995	0.1338
393	2.352e+004	2.352e+004	25.91	0.979	0.1317
394	2.358e+004	2.358e+004	25.91	0.977	0.1314
395	2.364e+004	2.364e+004	25.9	0.971	0.1306
396	2.37e+004	2.37e+004	25.89	0.959	0.129
397	2.376e+004	2.376e+004	25.88	0.953	0.1282
398	2.382e+004	2.382e+004	25.89	0.959	0.129
399	2.388e+004	2.388e+004	25.88	0.953	0.1282
400	2.394e+004	2.394e+004	25.89	0.963	0.1295
401	2.4e+004	2.4e+004	25.9	0.965	0.1298
402	2.406e+004	2.406e+004	25.89	0.961	0.1292
403	2.412e+004	2.412e+004	25.89	0.957	0.1287

404	2.418e+004	2.418e+004	25.89	0.955	0.1284
405	2.424e+004	2.424e+004	25.88	0.947	0.1274
406	2.43e+004	2.43e+004	25.86	0.935	0.1257
407	2.436e+004	2.436e+004	25.86	0.935	0.1257
408	2.442e+004	2.442e+004	25.86	0.931	0.1252
409	2.448e+004	2.448e+004	25.86	0.933	0.1255
410	2.454e+004	2.454e+004	25.86	0.925	0.1244
411	2.46e+004	2.46e+004	25.85	0.923	0.1241
412	2.466e+004	2.466e+004	25.85	0.923	0.1241
413	2.472e+004	2.472e+004	25.85	0.923	0.1241
414	2.478e+004	2.478e+004	25.85	0.921	0.1239
415	2.484e+004	2.484e+004	25.84	0.913	0.1228
416	2.49e+004	2.49e+004	25.84	0.911	0.1225
417	2.496e+004	2.496e+004	25.84	0.909	0.1222
418	2.502e+004	2.502e+004	25.84	0.909	0.1222
419	2.508e+004	2.508e+004	25.83	0.9	0.121
420	2.514e+004	2.514e+004	25.82	0.894	0.1202
421	2.52e+004	2.52e+004	25.82	0.89	0.1197
422	2.526e+004	2.526e+004	25.82	0.891	0.1198
423	2.532e+004	2.532e+004	25.82	0.89	0.1197
424	2.538e+004	2.538e+004	25.82	0.894	0.1202
425	2.544e+004	2.544e+004	25.82	0.89	0.1197
426	2.55e+004	2.55e+004	25.81	0.884	0.1189
427	2.556e+004	2.556e+004	25.81	0.878	0.1181
428	2.562e+004	2.562e+004	25.8	0.872	0.1173
429	2.568e+004	2.568e+004	25.8	0.866	0.1165
430	2.574e+004	2.574e+004	25.79	0.858	0.1154
431	2.58e+004	2.58e+004	25.78	0.852	0.1146
432	2.586e+004	2.586e+004	25.78	0.846	0.1138
433	2.592e+004	2.592e+004	25.77	0.838	0.1127
434	2.598e+004	2.598e+004	25.76	0.832	0.1119
435	2.604e+004	2.604e+004	25.76	0.826	0.1111
436	2.61e+004	2.61e+004	25.75	0.824	0.1108
437	2.616e+004	2.616e+004	25.75	0.82	0.1103
438	2.622e+004	2.622e+004	25.75	0.818	0.11
439	2.628e+004	2.628e+004	25.75	0.816	0.1097
440	2.634e+004	2.634e+004	25.74	0.814	0.1095
441	2.64e+004	2.64e+004	25.74	0.808	0.1087
442	2.646e+004	2.646e+004	25.73	0.802	0.1079
443	2.652e+004	2.652e+004	25.73	0.796	0.107
444	2.658e+004	2.658e+004	25.72	0.79	0.1062
445	2.664e+004	2.664e+004	25.72	0.786	0.1057
446	2.67e+004	2.67e+004	25.71	0.78	0.1049
447	2.676e+004	2.676e+004	25.71	0.782	0.1052
448	2.682e+004	2.682e+004	25.72	0.786	0.1057
449	2.688e+004	2.688e+004	25.72	0.786	0.1057
450	2.694e+004	2.694e+004	25.72	0.786	0.1057
451	2.7e+004	2.7e+004	25.71	0.784	0.1054
452	2.706e+004	2.706e+004	25.71	0.78	0.1049
453	2.712e+004	2.712e+004	25.71	0.778	0.1046
454	2.718e+004	2.718e+004	25.7	0.774	0.1041
455	2.724e+004	2.724e+004	25.7	0.766	0.103
456	2.73e+004	2.73e+004	25.69	0.76	0.1022

457	2.736e+004	2.736e+004	25.68	0.754	0.1014
458	2.742e+004	2.742e+004	25.68	0.748	0.1006
459	2.748e+004	2.748e+004	25.68	0.746	0.1003
460	2.754e+004	2.754e+004	25.67	0.742	9.978e-002
461	2.76e+004	2.76e+004	25.67	0.74	9.952e-002
462	2.766e+004	2.766e+004	25.67	0.74	9.952e-002
463	2.772e+004	2.772e+004	25.67	0.738	9.925e-002
464	2.778e+004	2.778e+004	25.66	0.734	9.871e-002
465	2.784e+004	2.784e+004	25.66	0.73	9.817e-002
466	2.79e+004	2.79e+004	25.66	0.726	9.763e-002
467	2.796e+004	2.796e+004	25.65	0.722	9.71e-002
468	2.802e+004	2.802e+004	25.65	0.718	9.656e-002
469	2.808e+004	2.808e+004	25.64	0.712	9.575e-002
470	2.814e+004	2.814e+004	25.64	0.714	9.602e-002
471	2.82e+004	2.82e+004	25.64	0.71	9.548e-002
472	2.826e+004	2.826e+004	25.64	0.71	9.548e-002
473	2.832e+004	2.832e+004	25.63	0.704	9.467e-002
474	2.838e+004	2.838e+004	25.63	0.704	9.467e-002
475	2.844e+004	2.844e+004	25.63	0.702	9.441e-002
476	2.85e+004	2.85e+004	25.63	0.696	9.36e-002
477	2.856e+004	2.856e+004	25.62	0.69	9.279e-002
478	2.862e+004	2.862e+004	25.61	0.682	9.172e-002
479	2.868e+004	2.868e+004	25.61	0.676	9.091e-002
480	2.874e+004	2.874e+004	25.6	0.668	8.983e-002
481	2.88e+004	2.88e+004	25.59	0.658	8.849e-002
482	2.886e+004	2.886e+004	25.58	0.65	8.741e-002
483	2.892e+004	2.892e+004	25.57	0.642	8.634e-002
484	2.898e+004	2.898e+004	25.57	0.636	8.553e-002
485	2.904e+004	2.904e+004	25.57	0.64	8.607e-002
486	2.91e+004	2.91e+004	25.57	0.636	8.553e-002
487	2.916e+004	2.916e+004	25.56	0.629	8.459e-002
488	2.922e+004	2.922e+004	25.55	0.622	8.365e-002
489	2.928e+004	2.928e+004	25.55	0.618	8.311e-002
490	2.934e+004	2.934e+004	25.54	0.608	8.176e-002
491	2.94e+004	2.94e+004	25.53	0.604	8.123e-002
492	2.946e+004	2.946e+004	25.53	0.6	8.069e-002
493	2.952e+004	2.952e+004	25.53	0.596	8.015e-002
494	2.958e+004	2.958e+004	25.52	0.59	7.934e-002
495	2.964e+004	2.964e+004	25.52	0.587	7.894e-002
496	2.97e+004	2.97e+004	25.52	0.588	7.907e-002
497	2.976e+004	2.976e+004	25.52	0.586	7.881e-002
498	2.982e+004	2.982e+004	25.51	0.581	7.813e-002
499	2.988e+004	2.988e+004	25.51	0.579	7.786e-002
500	2.994e+004	2.994e+004	25.51	0.576	7.746e-002
501	3.e+004	3.e+004	25.5	0.57	7.665e-002
502	3.006e+004	3.006e+004	25.49	0.562	7.558e-002
503	3.012e+004	3.012e+004	25.49	0.556	7.477e-002
504	3.018e+004	3.018e+004	25.48	0.547	7.356e-002
505	3.024e+004	3.024e+004	25.47	0.539	7.249e-002
506	3.03e+004	3.03e+004	25.47	0.536	7.208e-002
507	3.036e+004	3.036e+004	25.46	0.529	7.114e-002
508	3.042e+004	3.042e+004	25.46	0.529	7.114e-002
509	3.048e+004	3.048e+004	25.45	0.525	7.06e-002

510	3.054e+004	3.054e+004	25.45	0.525	7.06e-002
511	3.06e+004	3.06e+004	25.45	0.523	7.033e-002
512	3.066e+004	3.066e+004	25.45	0.522	7.02e-002
513	3.072e+004	3.072e+004	25.45	0.519	6.98e-002
514	3.078e+004	3.078e+004	25.45	0.515	6.926e-002
515	3.084e+004	3.084e+004	25.44	0.507	6.818e-002
516	3.09e+004	3.09e+004	25.43	0.503	6.764e-002
517	3.096e+004	3.096e+004	25.43	0.5	6.724e-002
518	3.102e+004	3.102e+004	25.43	0.496	6.67e-002
519	3.108e+004	3.108e+004	25.43	0.495	6.657e-002
520	3.114e+004	3.114e+004	25.43	0.495	6.657e-002
521	3.12e+004	3.12e+004	25.43	0.495	6.657e-002
522	3.126e+004	3.126e+004	25.42	0.493	6.63e-002
523	3.132e+004	3.132e+004	25.42	0.493	6.63e-002
524	3.138e+004	3.138e+004	25.42	0.489	6.576e-002
525	3.144e+004	3.144e+004	25.41	0.483	6.495e-002
526	3.15e+004	3.15e+004	25.41	0.477	6.415e-002
527	3.156e+004	3.156e+004	25.4	0.472	6.347e-002
528	3.162e+004	3.162e+004	25.39	0.463	6.226e-002
529	3.168e+004	3.168e+004	25.39	0.459	6.173e-002
530	3.174e+004	3.174e+004	25.38	0.451	6.065e-002
531	3.18e+004	3.18e+004	25.38	0.445	5.984e-002
532	3.186e+004	3.186e+004	25.37	0.443	5.958e-002
533	3.192e+004	3.192e+004	25.37	0.439	5.904e-002
534	3.198e+004	3.198e+004	25.37	0.439	5.904e-002
535	3.204e+004	3.204e+004	25.37	0.437	5.877e-002
536	3.21e+004	3.21e+004	25.36	0.433	5.823e-002
537	3.216e+004	3.216e+004	25.36	0.431	5.796e-002
538	3.222e+004	3.222e+004	25.36	0.425	5.715e-002
539	3.228e+004	3.228e+004	25.35	0.421	5.662e-002
540	3.234e+004	3.234e+004	25.34	0.415	5.581e-002
541	3.24e+004	3.24e+004	25.34	0.411	5.527e-002
542	3.246e+004	3.246e+004	25.34	0.407	5.473e-002
543	3.252e+004	3.252e+004	25.34	0.405	5.446e-002
544	3.258e+004	3.258e+004	25.34	0.405	5.446e-002
545	3.264e+004	3.264e+004	25.33	0.403	5.42e-002
546	3.27e+004	3.27e+004	25.33	0.403	5.42e-002
547	3.276e+004	3.276e+004	25.33	0.401	5.393e-002
548	3.282e+004	3.282e+004	25.33	0.399	5.366e-002
549	3.288e+004	3.288e+004	25.32	0.395	5.312e-002
550	3.294e+004	3.294e+004	25.32	0.387	5.204e-002
551	3.3e+004	3.3e+004	25.31	0.381	5.124e-002
552	3.306e+004	3.306e+004	25.31	0.375	5.043e-002
553	3.312e+004	3.312e+004	25.3	0.369	4.962e-002
554	3.318e+004	3.318e+004	25.3	0.367	4.935e-002
555	3.324e+004	3.324e+004	25.29	0.361	4.855e-002
556	3.33e+004	3.33e+004	25.29	0.361	4.855e-002
557	3.336e+004	3.336e+004	25.3	0.365	4.909e-002
558	3.342e+004	3.342e+004	25.29	0.363	4.882e-002
559	3.348e+004	3.348e+004	25.29	0.364	4.895e-002
560	3.354e+004	3.354e+004	25.3	0.365	4.909e-002
561	3.36e+004	3.36e+004	25.29	0.363	4.882e-002
562	3.366e+004	3.366e+004	25.29	0.361	4.855e-002

563	3.372e+004	3.372e+004	25.29	0.356	4.788e-002
564	3.378e+004	3.378e+004	25.29	0.357	4.801e-002
565	3.384e+004	3.384e+004	25.29	0.355	4.774e-002
566	3.39e+004	3.39e+004	25.29	0.355	4.774e-002
567	3.396e+004	3.396e+004	25.28	0.354	4.761e-002
568	3.402e+004	3.402e+004	25.29	0.359	4.828e-002
569	3.408e+004	3.408e+004	25.29	0.359	4.828e-002
570	3.414e+004	3.414e+004	25.29	0.361	4.855e-002
571	3.42e+004	3.42e+004	25.29	0.361	4.855e-002
572	3.426e+004	3.426e+004	25.29	0.361	4.855e-002
573	3.432e+004	3.432e+004	25.29	0.359	4.828e-002
574	3.438e+004	3.438e+004	25.29	0.357	4.801e-002
575	3.444e+004	3.444e+004	25.28	0.354	4.761e-002
576	3.45e+004	3.45e+004	25.28	0.349	4.693e-002
577	3.456e+004	3.456e+004	25.27	0.342	4.599e-002
578	3.462e+004	3.462e+004	25.27	0.341	4.586e-002
579	3.468e+004	3.468e+004	25.27	0.342	4.599e-002
580	3.474e+004	3.474e+004	25.27	0.339	4.559e-002
581	3.48e+004	3.48e+004	25.27	0.34	4.572e-002
582	3.486e+004	3.486e+004	25.27	0.34	4.572e-002
583	3.492e+004	3.492e+004	25.27	0.344	4.626e-002
584	3.498e+004	3.498e+004	25.27	0.344	4.626e-002
585	3.504e+004	3.504e+004	25.27	0.343	4.613e-002
586	3.51e+004	3.51e+004	25.27	0.345	4.64e-002
587	3.516e+004	3.516e+004	25.27	0.342	4.599e-002
588	3.522e+004	3.522e+004	25.27	0.342	4.599e-002
589	3.528e+004	3.528e+004	25.27	0.342	4.599e-002
590	3.534e+004	3.534e+004	25.27	0.345	4.64e-002
591	3.54e+004	3.54e+004	25.28	0.35	4.707e-002
592	3.546e+004	3.546e+004	25.29	0.356	4.788e-002
593	3.552e+004	3.552e+004	25.29	0.356	4.788e-002
594	3.558e+004	3.558e+004	25.29	0.356	4.788e-002
595	3.564e+004	3.564e+004	25.29	0.36	4.841e-002
596	3.57e+004	3.57e+004	25.29	0.36	4.841e-002
597	3.576e+004	3.576e+004	25.29	0.36	4.841e-002
598	3.582e+004	3.582e+004	25.29	0.355	4.774e-002
599	3.588e+004	3.588e+004	25.28	0.351	4.72e-002
600	3.594e+004	3.594e+004	25.27	0.344	4.626e-002
601	3.6e+004	3.6e+004	25.27	0.342	4.599e-002
602	3.606e+004	3.606e+004	25.27	0.338	4.545e-002
603	3.612e+004	3.612e+004	25.27	0.338	4.545e-002
604	3.618e+004	3.618e+004	25.26	0.334	4.492e-002
605	3.624e+004	3.624e+004	25.26	0.332	4.465e-002
606	3.63e+004	3.63e+004	25.26	0.332	4.465e-002
607	3.636e+004	3.636e+004	25.26	0.33	4.438e-002
608	3.642e+004	3.642e+004	25.26	0.326	4.384e-002
609	3.648e+004	3.648e+004	25.25	0.324	4.357e-002
610	3.654e+004	3.654e+004	25.25	0.32	4.303e-002
611	3.66e+004	3.66e+004	25.25	0.318	4.276e-002
612	3.666e+004	3.666e+004	25.24	0.314	4.223e-002
613	3.672e+004	3.672e+004	25.24	0.31	4.169e-002
614	3.678e+004	3.678e+004	25.24	0.308	4.142e-002
615	3.684e+004	3.684e+004	25.24	0.308	4.142e-002

616	3.69e+004	3.69e+004	25.24	0.308	4.142e-002
617	3.696e+004	3.696e+004	25.24	0.306	4.115e-002
618	3.702e+004	3.702e+004	25.23	0.302	4.061e-002
619	3.708e+004	3.708e+004	25.23	0.3	4.034e-002
620	3.714e+004	3.714e+004	25.23	0.298	4.008e-002
621	3.72e+004	3.72e+004	25.22	0.294	3.954e-002
622	3.726e+004	3.726e+004	25.22	0.29	3.9e-002
623	3.732e+004	3.732e+004	25.22	0.286	3.846e-002
624	3.738e+004	3.738e+004	25.21	0.28	3.765e-002
625	3.744e+004	3.744e+004	25.2	0.272	3.658e-002
626	3.75e+004	3.75e+004	25.2	0.266	3.577e-002
627	3.756e+004	3.756e+004	25.19	0.262	3.523e-002
628	3.762e+004	3.762e+004	25.19	0.26	3.497e-002
629	3.768e+004	3.768e+004	25.19	0.26	3.497e-002
630	3.774e+004	3.774e+004	25.19	0.256	3.443e-002
631	3.78e+004	3.78e+004	25.18	0.252	3.389e-002
632	3.786e+004	3.786e+004	25.18	0.246	3.308e-002
633	3.792e+004	3.792e+004	25.17	0.242	3.254e-002
634	3.798e+004	3.798e+004	25.16	0.234	3.147e-002
635	3.804e+004	3.804e+004	25.16	0.23	3.093e-002
636	3.81e+004	3.81e+004	25.15	0.224	3.012e-002
637	3.816e+004	3.816e+004	25.15	0.22	2.959e-002
638	3.822e+004	3.822e+004	25.15	0.216	2.905e-002
639	3.828e+004	3.828e+004	25.14	0.214	2.878e-002
640	3.834e+004	3.834e+004	25.14	0.212	2.851e-002
641	3.84e+004	3.84e+004	25.14	0.208	2.797e-002
642	3.846e+004	3.846e+004	25.13	0.204	2.743e-002
643	3.852e+004	3.852e+004	25.13	0.198	2.663e-002
644	3.858e+004	3.858e+004	25.12	0.192	2.582e-002
645	3.864e+004	3.864e+004	25.12	0.186	2.501e-002
646	3.87e+004	3.87e+004	25.11	0.18	2.421e-002
647	3.876e+004	3.876e+004	25.1	0.172	2.313e-002
648	3.882e+004	3.882e+004	25.09	0.162	2.179e-002
649	3.888e+004	3.888e+004	25.08	0.152	2.044e-002
650	3.894e+004	3.894e+004	25.07	0.144	1.937e-002
651	3.9e+004	3.9e+004	25.07	0.142	1.91e-002
652	3.906e+004	3.906e+004	25.08	0.148	1.99e-002
653	3.912e+004	3.912e+004	25.08	0.148	1.99e-002
654	3.918e+004	3.918e+004	25.08	0.148	1.99e-002
655	3.924e+004	3.924e+004	25.08	0.148	1.99e-002
656	3.93e+004	3.93e+004	25.08	0.15	2.017e-002
657	3.936e+004	3.936e+004	25.08	0.154	2.071e-002
658	3.942e+004	3.942e+004	25.09	0.156	2.098e-002
659	3.948e+004	3.948e+004	25.09	0.156	2.098e-002
660	3.954e+004	3.954e+004	25.08	0.154	2.071e-002
661	3.96e+004	3.96e+004	25.09	0.156	2.098e-002
662	3.966e+004	3.966e+004	25.08	0.154	2.071e-002
663	3.972e+004	3.972e+004	25.09	0.156	2.098e-002
664	3.978e+004	3.978e+004	25.09	0.156	2.098e-002
665	3.984e+004	3.984e+004	25.09	0.158	2.125e-002
666	3.99e+004	3.99e+004	25.09	0.158	2.125e-002
667	3.996e+004	3.996e+004	25.09	0.156	2.098e-002
668	4.002e+004	4.002e+004	25.09	0.156	2.098e-002

669	4.008e+004	4.008e+004	25.08	0.154	2.071e-002
670	4.014e+004	4.014e+004	25.08	0.152	2.044e-002
671	4.02e+004	4.02e+004	25.08	0.15	2.017e-002
672	4.026e+004	4.026e+004	25.08	0.15	2.017e-002
673	4.032e+004	4.032e+004	25.08	0.146	1.963e-002
674	4.038e+004	4.038e+004	25.08	0.148	1.99e-002
675	4.044e+004	4.044e+004	25.08	0.148	1.99e-002
676	4.05e+004	4.05e+004	25.08	0.146	1.963e-002
677	4.056e+004	4.056e+004	25.08	0.15	2.017e-002
678	4.062e+004	4.062e+004	25.08	0.152	2.044e-002
679	4.068e+004	4.068e+004	25.09	0.156	2.098e-002
680	4.074e+004	4.074e+004	25.09	0.158	2.125e-002
681	4.08e+004	4.08e+004	25.09	0.16	2.152e-002
682	4.086e+004	4.086e+004	25.09	0.16	2.152e-002
683	4.092e+004	4.092e+004	25.09	0.16	2.152e-002
684	4.098e+004	4.098e+004	25.09	0.16	2.152e-002
685	4.104e+004	4.104e+004	25.09	0.158	2.125e-002
686	4.11e+004	4.11e+004	25.09	0.16	2.152e-002
687	4.116e+004	4.116e+004	25.09	0.162	2.179e-002
688	4.122e+004	4.122e+004	25.1	0.166	2.232e-002
689	4.128e+004	4.128e+004	25.1	0.17	2.286e-002
690	4.134e+004	4.134e+004	25.1	0.172	2.313e-002
691	4.14e+004	4.14e+004	25.1	0.174	2.34e-002
692	4.146e+004	4.146e+004	25.1	0.174	2.34e-002
693	4.152e+004	4.152e+004	25.1	0.172	2.313e-002
694	4.158e+004	4.158e+004	25.1	0.168	2.259e-002
695	4.164e+004	4.164e+004	25.1	0.168	2.259e-002
696	4.17e+004	4.17e+004	25.09	0.164	2.205e-002
697	4.176e+004	4.176e+004	25.09	0.16	2.152e-002
698	4.182e+004	4.182e+004	25.09	0.16	2.152e-002
699	4.188e+004	4.188e+004	25.09	0.156	2.098e-002
700	4.194e+004	4.194e+004	25.08	0.154	2.071e-002
701	4.2e+004	4.2e+004	25.09	0.156	2.098e-002
702	4.206e+004	4.206e+004	25.09	0.156	2.098e-002
703	4.212e+004	4.212e+004	25.08	0.154	2.071e-002
704	4.218e+004	4.218e+004	25.08	0.154	2.071e-002
705	4.224e+004	4.224e+004	25.08	0.152	2.044e-002
706	4.23e+004	4.23e+004	25.08	0.15	2.017e-002
707	4.236e+004	4.236e+004	25.08	0.15	2.017e-002
708	4.242e+004	4.242e+004	25.08	0.148	1.99e-002
709	4.248e+004	4.248e+004	25.08	0.148	1.99e-002
710	4.254e+004	4.254e+004	25.08	0.15	2.017e-002
711	4.26e+004	4.26e+004	25.08	0.152	2.044e-002
712	4.266e+004	4.266e+004	25.09	0.156	2.098e-002
713	4.272e+004	4.272e+004	25.08	0.154	2.071e-002
714	4.278e+004	4.278e+004	25.08	0.154	2.071e-002
715	4.284e+004	4.284e+004	25.08	0.152	2.044e-002
716	4.29e+004	4.29e+004	25.08	0.15	2.017e-002
717	4.296e+004	4.296e+004	25.08	0.148	1.99e-002
718	4.302e+004	4.302e+004	25.07	0.14	1.883e-002
719	4.308e+004	4.308e+004	25.07	0.136	1.829e-002
720	4.314e+004	4.314e+004	25.06	0.132	1.775e-002
721	4.32e+004	4.32e+004	25.06	0.126	1.694e-002

722	4.326e+004	4.326e+004	25.05	0.124	1.668e-002
723	4.332e+004	4.332e+004	25.05	0.124	1.668e-002
724	4.338e+004	4.338e+004	25.05	0.12	1.614e-002
725	4.344e+004	4.344e+004	25.05	0.118	1.587e-002
726	4.35e+004	4.35e+004	25.05	0.118	1.587e-002
727	4.356e+004	4.356e+004	25.05	0.116	1.56e-002
728	4.362e+004	4.362e+004	25.04	0.114	1.533e-002
729	4.368e+004	4.368e+004	25.04	0.112	1.506e-002
730	4.374e+004	4.374e+004	25.04	0.108	1.452e-002
731	4.38e+004	4.38e+004	25.04	0.106	1.425e-002
732	4.386e+004	4.386e+004	25.04	0.106	1.425e-002
733	4.392e+004	4.392e+004	25.03	0.103	1.385e-002
734	4.398e+004	4.398e+004	25.03	0.102	1.372e-002
735	4.404e+004	4.404e+004	25.03	0.102	1.372e-002
736	4.41e+004	4.41e+004	25.03	0.102	1.372e-002
737	4.416e+004	4.416e+004	25.03	0.1	1.345e-002
738	4.422e+004	4.422e+004	25.03	9.7e-002	1.304e-002
739	4.428e+004	4.428e+004	25.02	9.4e-002	1.264e-002
740	4.434e+004	4.434e+004	25.03	9.8e-002	1.318e-002
741	4.44e+004	4.44e+004	25.03	9.6e-002	1.291e-002
742	4.446e+004	4.446e+004	25.02	9.2e-002	1.237e-002
743	4.452e+004	4.452e+004	25.02	9.e-002	1.21e-002
744	4.458e+004	4.458e+004	25.01	8.e-002	1.076e-002
745	4.464e+004	4.464e+004	25.	7.e-002	9.414e-003
746	4.47e+004	4.47e+004	24.99	6.e-002	8.069e-003
747	4.476e+004	4.476e+004	24.99	5.8e-002	7.8e-003
748	4.482e+004	4.482e+004	24.98	5.4e-002	7.262e-003
749	4.488e+004	4.488e+004	24.98	5.2e-002	6.993e-003
750	4.494e+004	4.494e+004	24.98	4.8e-002	6.455e-003
751	4.5e+004	4.5e+004	24.98	4.7e-002	6.321e-003
752	4.506e+004	4.506e+004	24.97	4.1e-002	5.514e-003
753	4.512e+004	4.512e+004	24.97	3.7e-002	4.976e-003
754	4.518e+004	4.518e+004	24.96	3.1e-002	4.169e-003
755	4.524e+004	4.524e+004	24.96	2.8e-002	3.765e-003
756	4.53e+004	4.53e+004	24.95	2.2e-002	2.959e-003
757	4.536e+004	4.536e+004	24.95	1.5e-002	2.017e-003
758	4.542e+004	4.542e+004	24.94	9.e-003	1.21e-003
759	4.548e+004	4.548e+004	24.94	1.2e-002	1.614e-003
760	4.554e+004	4.554e+004	24.95	1.5e-002	2.017e-003
761	4.56e+004	4.56e+004	24.95	1.9e-002	2.555e-003
762	4.566e+004	4.566e+004	24.95	2.5e-002	3.362e-003
763	4.572e+004	4.572e+004	24.96	3.e-002	4.034e-003
764	4.578e+004	4.578e+004	24.96	3.4e-002	4.572e-003
765	4.584e+004	4.584e+004	24.97	3.5e-002	4.707e-003
766	4.59e+004	4.59e+004	24.97	3.5e-002	4.707e-003
767	4.596e+004	4.596e+004	24.97	3.7e-002	4.976e-003
768	4.602e+004	4.602e+004	24.97	3.8e-002	5.11e-003
769	4.608e+004	4.608e+004	24.97	4.1e-002	5.514e-003
770	4.614e+004	4.614e+004	24.97	4.4e-002	5.917e-003
771	4.62e+004	4.62e+004	24.98	4.5e-002	6.052e-003
772	4.626e+004	4.626e+004	24.98	5.1e-002	6.859e-003
773	4.632e+004	4.632e+004	24.99	5.8e-002	7.8e-003
774	4.638e+004	4.638e+004	24.99	6.2e-002	8.338e-003

775	4.644e+004	4.644e+004	24.99	6.2e-002	8.338e-003
776	4.65e+004	4.65e+004	24.99	6.3e-002	8.472e-003
777	4.656e+004	4.656e+004	24.99	6.3e-002	8.472e-003
778	4.662e+004	4.662e+004	24.99	6.2e-002	8.338e-003
779	4.668e+004	4.668e+004	24.99	6.1e-002	8.203e-003
780	4.674e+004	4.674e+004	24.99	5.9e-002	7.934e-003
781	4.68e+004	4.68e+004	24.99	5.9e-002	7.934e-003
782	4.686e+004	4.686e+004	24.99	5.9e-002	7.934e-003
783	4.692e+004	4.692e+004	24.99	6.3e-002	8.472e-003
784	4.698e+004	4.698e+004	24.99	6.3e-002	8.472e-003
785	4.704e+004	4.704e+004	24.99	6.3e-002	8.472e-003
786	4.71e+004	4.71e+004	25.	6.5e-002	8.741e-003
787	4.716e+004	4.716e+004	25.	6.7e-002	9.01e-003
788	4.722e+004	4.722e+004	25.	6.7e-002	9.01e-003
789	4.728e+004	4.728e+004	25.	6.7e-002	9.01e-003
790	4.734e+004	4.734e+004	24.99	6.3e-002	8.472e-003
791	4.74e+004	4.74e+004	24.99	5.9e-002	7.934e-003
792	4.746e+004	4.746e+004	24.98	5.5e-002	7.396e-003
793	4.752e+004	4.752e+004	24.98	5.3e-002	7.127e-003
794	4.758e+004	4.758e+004	24.98	5.1e-002	6.859e-003
795	4.764e+004	4.764e+004	24.98	4.9e-002	6.59e-003
796	4.77e+004	4.77e+004	24.98	5.1e-002	6.859e-003
797	4.776e+004	4.776e+004	24.98	5.3e-002	7.127e-003
798	4.782e+004	4.782e+004	24.98	5.3e-002	7.127e-003
799	4.788e+004	4.788e+004	24.99	5.9e-002	7.934e-003
800	4.794e+004	4.794e+004	24.99	5.9e-002	7.934e-003
801	4.8e+004	4.8e+004	24.99	5.9e-002	7.934e-003
802	4.806e+004	4.806e+004	24.99	5.7e-002	7.665e-003
803	4.812e+004	4.812e+004	24.99	5.7e-002	7.665e-003
804	4.818e+004	4.818e+004	24.98	5.5e-002	7.396e-003
805	4.824e+004	4.824e+004	24.99	5.7e-002	7.665e-003
806	4.83e+004	4.83e+004	24.99	5.7e-002	7.665e-003
807	4.836e+004	4.836e+004	24.99	6.3e-002	8.472e-003
808	4.842e+004	4.842e+004	24.99	6.3e-002	8.472e-003
809	4.848e+004	4.848e+004	25.	6.7e-002	9.01e-003
810	4.854e+004	4.854e+004	25.	6.7e-002	9.01e-003
811	4.86e+004	4.86e+004	25.	6.9e-002	9.279e-003
812	4.866e+004	4.866e+004	25.	6.9e-002	9.279e-003
813	4.872e+004	4.872e+004	25.	6.7e-002	9.01e-003
814	4.878e+004	4.878e+004	24.99	6.3e-002	8.472e-003
815	4.884e+004	4.884e+004	24.99	5.9e-002	7.934e-003
816	4.89e+004	4.89e+004	24.99	5.7e-002	7.665e-003
817	4.896e+004	4.896e+004	24.98	5.5e-002	7.396e-003
818	4.902e+004	4.902e+004	24.98	5.5e-002	7.396e-003
819	4.908e+004	4.908e+004	24.98	5.5e-002	7.396e-003
820	4.914e+004	4.914e+004	24.99	5.7e-002	7.665e-003
821	4.92e+004	4.92e+004	24.99	5.7e-002	7.665e-003
822	4.926e+004	4.926e+004	24.99	5.9e-002	7.934e-003
823	4.932e+004	4.932e+004	24.99	6.1e-002	8.203e-003
824	4.938e+004	4.938e+004	24.99	6.3e-002	8.472e-003
825	4.944e+004	4.944e+004	25.	6.5e-002	8.741e-003
826	4.95e+004	4.95e+004	25.	6.5e-002	8.741e-003
827	4.956e+004	4.956e+004	25.	6.5e-002	8.741e-003

828	4.962e+004	4.962e+004	24.99	6.3e-002	8.472e-003
829	4.968e+004	4.968e+004	25.	6.5e-002	8.741e-003
830	4.974e+004	4.974e+004	24.99	6.1e-002	8.203e-003
831	4.98e+004	4.98e+004	25.	6.5e-002	8.741e-003
832	4.986e+004	4.986e+004	25.	6.7e-002	9.01e-003
833	4.992e+004	4.992e+004	25.	7.1e-002	9.548e-003
834	4.998e+004	4.998e+004	25.	7.3e-002	9.817e-003
835	5.004e+004	5.004e+004	25.	7.3e-002	9.817e-003
836	5.01e+004	5.01e+004	25.	7.5e-002	1.009e-002
837	5.016e+004	5.016e+004	25.01	7.7e-002	1.036e-002
838	5.022e+004	5.022e+004	25.	7.5e-002	1.009e-002
839	5.028e+004	5.028e+004	25.	7.3e-002	9.817e-003
840	5.034e+004	5.034e+004	25.	7.3e-002	9.817e-003
841	5.04e+004	5.04e+004	25.	7.1e-002	9.548e-003
842	5.046e+004	5.046e+004	25.	7.1e-002	9.548e-003
843	5.052e+004	5.052e+004	25.	7.3e-002	9.817e-003
844	5.058e+004	5.058e+004	25.	7.3e-002	9.817e-003
845	5.064e+004	5.064e+004	25.	7.3e-002	9.817e-003
846	5.07e+004	5.07e+004	25.	7.5e-002	1.009e-002
847	5.076e+004	5.076e+004	25.01	7.9e-002	1.062e-002
848	5.082e+004	5.082e+004	25.01	8.1e-002	1.089e-002
849	5.088e+004	5.088e+004	25.01	8.3e-002	1.116e-002
850	5.094e+004	5.094e+004	25.01	8.3e-002	1.116e-002
851	5.1e+004	5.1e+004	25.01	8.3e-002	1.116e-002
852	5.106e+004	5.106e+004	25.01	8.3e-002	1.116e-002
853	5.112e+004	5.112e+004	25.01	8.1e-002	1.089e-002
854	5.118e+004	5.118e+004	25.01	8.3e-002	1.116e-002
855	5.124e+004	5.124e+004	25.02	8.7e-002	1.17e-002
856	5.13e+004	5.13e+004	25.02	8.9e-002	1.197e-002
857	5.136e+004	5.136e+004	25.02	9.5e-002	1.278e-002
858	5.142e+004	5.142e+004	25.03	9.7e-002	1.304e-002
859	5.148e+004	5.148e+004	25.03	9.9e-002	1.331e-002
860	5.154e+004	5.154e+004	25.03	0.101	1.358e-002
861	5.16e+004	5.16e+004	25.03	9.7e-002	1.304e-002
862	5.166e+004	5.166e+004	25.02	9.5e-002	1.278e-002
863	5.172e+004	5.172e+004	25.02	9.3e-002	1.251e-002
864	5.178e+004	5.178e+004	25.02	9.1e-002	1.224e-002
865	5.184e+004	5.184e+004	25.02	8.7e-002	1.17e-002
866	5.19e+004	5.19e+004	25.02	8.5e-002	1.143e-002
867	5.196e+004	5.196e+004	25.02	8.5e-002	1.143e-002
868	5.202e+004	5.202e+004	25.02	8.7e-002	1.17e-002
869	5.208e+004	5.208e+004	25.02	8.7e-002	1.17e-002
870	5.214e+004	5.214e+004	25.02	8.9e-002	1.197e-002
871	5.22e+004	5.22e+004	25.02	8.9e-002	1.197e-002
872	5.226e+004	5.226e+004	25.02	8.9e-002	1.197e-002
873	5.232e+004	5.232e+004	25.02	9.1e-002	1.224e-002
874	5.238e+004	5.238e+004	25.02	8.7e-002	1.17e-002
875	5.244e+004	5.244e+004	25.02	8.5e-002	1.143e-002
876	5.25e+004	5.25e+004	25.01	8.3e-002	1.116e-002
877	5.256e+004	5.256e+004	25.01	8.1e-002	1.089e-002
878	5.262e+004	5.262e+004	25.01	8.1e-002	1.089e-002
879	5.268e+004	5.268e+004	25.01	8.3e-002	1.116e-002
880	5.274e+004	5.274e+004	25.01	8.3e-002	1.116e-002

881	5.28e+004	5.28e+004	25.02	8.7e-002	1.17e-002
882	5.286e+004	5.286e+004	25.02	8.7e-002	1.17e-002
883	5.292e+004	5.292e+004	25.02	8.7e-002	1.17e-002
884	5.298e+004	5.298e+004	25.02	8.5e-002	1.143e-002
885	5.304e+004	5.304e+004	25.02	8.5e-002	1.143e-002
886	5.31e+004	5.31e+004	25.01	7.9e-002	1.062e-002
887	5.316e+004	5.316e+004	25.	7.5e-002	1.009e-002
888	5.322e+004	5.322e+004	25.	7.1e-002	9.548e-003
889	5.328e+004	5.328e+004	25.	6.7e-002	9.01e-003
890	5.334e+004	5.334e+004	25.	6.5e-002	8.741e-003
891	5.34e+004	5.34e+004	24.99	6.3e-002	8.472e-003
892	5.346e+004	5.346e+004	24.99	6.3e-002	8.472e-003
893	5.352e+004	5.352e+004	24.99	6.1e-002	8.203e-003
894	5.358e+004	5.358e+004	24.99	6.1e-002	8.203e-003
895	5.364e+004	5.364e+004	24.99	6.1e-002	8.203e-003
896	5.37e+004	5.37e+004	24.99	6.3e-002	8.472e-003
897	5.376e+004	5.376e+004	24.99	6.1e-002	8.203e-003
898	5.382e+004	5.382e+004	24.99	5.7e-002	7.665e-003
899	5.388e+004	5.388e+004	24.98	5.5e-002	7.396e-003
900	5.394e+004	5.394e+004	24.98	5.5e-002	7.396e-003
901	5.4e+004	5.4e+004	24.98	5.5e-002	7.396e-003
902	5.406e+004	5.406e+004	24.98	5.5e-002	7.396e-003
903	5.412e+004	5.412e+004	24.99	5.7e-002	7.665e-003
904	5.418e+004	5.418e+004	24.99	5.9e-002	7.934e-003
905	5.424e+004	5.424e+004	24.99	6.1e-002	8.203e-003
906	5.43e+004	5.43e+004	24.99	6.1e-002	8.203e-003
907	5.436e+004	5.436e+004	24.99	6.1e-002	8.203e-003
908	5.442e+004	5.442e+004	24.99	5.9e-002	7.934e-003
909	5.448e+004	5.448e+004	24.99	5.9e-002	7.934e-003
910	5.454e+004	5.454e+004	24.99	5.7e-002	7.665e-003
911	5.46e+004	5.46e+004	24.98	5.1e-002	6.859e-003
912	5.466e+004	5.466e+004	24.98	4.9e-002	6.59e-003
913	5.472e+004	5.472e+004	24.98	4.5e-002	6.052e-003
914	5.478e+004	5.478e+004	24.98	4.5e-002	6.052e-003
915	5.484e+004	5.484e+004	24.97	4.3e-002	5.783e-003
916	5.49e+004	5.49e+004	24.97	4.1e-002	5.514e-003
917	5.496e+004	5.496e+004	24.97	4.3e-002	5.783e-003
918	5.502e+004	5.502e+004	24.98	4.5e-002	6.052e-003
919	5.508e+004	5.508e+004	24.98	4.7e-002	6.321e-003
920	5.514e+004	5.514e+004	24.98	4.9e-002	6.59e-003
921	5.52e+004	5.52e+004	24.98	5.1e-002	6.859e-003
922	5.526e+004	5.526e+004	24.98	5.1e-002	6.859e-003
923	5.532e+004	5.532e+004	24.98	4.9e-002	6.59e-003
924	5.538e+004	5.538e+004	24.98	4.7e-002	6.321e-003
925	5.544e+004	5.544e+004	24.98	4.7e-002	6.321e-003
926	5.55e+004	5.55e+004	24.98	4.7e-002	6.321e-003
927	5.556e+004	5.556e+004	24.98	4.9e-002	6.59e-003
928	5.562e+004	5.562e+004	24.98	5.3e-002	7.127e-003
929	5.568e+004	5.568e+004	24.99	5.7e-002	7.665e-003
930	5.574e+004	5.574e+004	24.99	5.9e-002	7.934e-003
931	5.58e+004	5.58e+004	24.99	6.1e-002	8.203e-003
932	5.586e+004	5.586e+004	24.99	6.1e-002	8.203e-003
933	5.592e+004	5.592e+004	24.99	6.1e-002	8.203e-003

934	5.598e+004	5.598e+004	24.99	5.9e-002	7.934e-003
935	5.604e+004	5.604e+004	24.98	5.5e-002	7.396e-003
936	5.61e+004	5.61e+004	24.98	5.3e-002	7.127e-003
937	5.616e+004	5.616e+004	24.98	4.7e-002	6.321e-003
938	5.622e+004	5.622e+004	24.98	4.6e-002	6.186e-003
939	5.628e+004	5.628e+004	24.98	4.6e-002	6.186e-003
940	5.634e+004	5.634e+004	24.98	4.7e-002	6.321e-003
941	5.64e+004	5.64e+004	24.98	4.5e-002	6.052e-003
942	5.646e+004	5.646e+004	24.98	4.6e-002	6.186e-003
943	5.652e+004	5.652e+004	24.98	4.9e-002	6.59e-003
944	5.658e+004	5.658e+004	24.98	5.1e-002	6.859e-003
945	5.664e+004	5.664e+004	24.98	5.1e-002	6.859e-003
946	5.67e+004	5.67e+004	24.98	5.3e-002	7.127e-003
947	5.676e+004	5.676e+004	24.98	5.3e-002	7.127e-003
948	5.682e+004	5.682e+004	24.98	5.e-002	6.724e-003
949	5.688e+004	5.688e+004	24.98	5.1e-002	6.859e-003
950	5.694e+004	5.694e+004	24.98	5.1e-002	6.859e-003
951	5.7e+004	5.7e+004	24.98	5.1e-002	6.859e-003
952	5.706e+004	5.706e+004	24.98	5.3e-002	7.127e-003
953	5.712e+004	5.712e+004	24.98	5.5e-002	7.396e-003
954	5.718e+004	5.718e+004	24.99	5.7e-002	7.665e-003
955	5.724e+004	5.724e+004	24.98	5.4e-002	7.262e-003
956	5.73e+004	5.73e+004	24.99	5.6e-002	7.531e-003
957	5.736e+004	5.736e+004	24.99	5.7e-002	7.665e-003
958	5.742e+004	5.742e+004	24.99	5.7e-002	7.665e-003
959	5.748e+004	5.748e+004	24.99	5.7e-002	7.665e-003
960	5.754e+004	5.754e+004	24.98	5.2e-002	6.993e-003
961	5.76e+004	5.76e+004	24.98	5.1e-002	6.859e-003
962	5.766e+004	5.766e+004	24.98	4.9e-002	6.59e-003
963	5.772e+004	5.772e+004	24.98	4.5e-002	6.052e-003
964	5.778e+004	5.778e+004	24.98	4.7e-002	6.321e-003
965	5.784e+004	5.784e+004	24.98	4.9e-002	6.59e-003
966	5.79e+004	5.79e+004	24.98	4.9e-002	6.59e-003
967	5.796e+004	5.796e+004	24.98	5.e-002	6.724e-003
968	5.802e+004	5.802e+004	24.98	5.3e-002	7.127e-003
969	5.808e+004	5.808e+004	24.99	5.6e-002	7.531e-003
970	5.814e+004	5.814e+004	24.99	5.7e-002	7.665e-003
971	5.82e+004	5.82e+004	24.99	5.6e-002	7.531e-003
972	5.826e+004	5.826e+004	24.98	5.5e-002	7.396e-003
973	5.832e+004	5.832e+004	24.98	5.4e-002	7.262e-003
974	5.838e+004	5.838e+004	24.98	5.5e-002	7.396e-003
975	5.844e+004	5.844e+004	24.98	5.5e-002	7.396e-003
976	5.85e+004	5.85e+004	24.99	5.8e-002	7.8e-003
977	5.856e+004	5.856e+004	24.99	5.8e-002	7.8e-003
978	5.862e+004	5.862e+004	24.99	6.1e-002	8.203e-003
979	5.868e+004	5.868e+004	24.99	6.2e-002	8.338e-003
980	5.874e+004	5.874e+004	24.99	6.e-002	8.069e-003
981	5.88e+004	5.88e+004	24.99	6.e-002	8.069e-003
982	5.886e+004	5.886e+004	24.99	5.6e-002	7.531e-003
983	5.892e+004	5.892e+004	24.98	5.4e-002	7.262e-003
984	5.898e+004	5.898e+004	24.98	5.e-002	6.724e-003
985	5.904e+004	5.904e+004	24.98	4.8e-002	6.455e-003
986	5.91e+004	5.91e+004	24.98	4.8e-002	6.455e-003

987	5.916e+004	5.916e+004	24.95	2.4e-002	3.228e-003
988	5.922e+004	5.922e+004	24.95	2.4e-002	3.228e-003
989	5.928e+004	5.928e+004	24.95	2.4e-002	3.228e-003
990	5.934e+004	5.934e+004	24.95	2.4e-002	3.228e-003
991	5.94e+004	5.94e+004	24.96	2.8e-002	3.765e-003
992	5.946e+004	5.946e+004	24.96	3.e-002	4.034e-003
993	5.952e+004	5.952e+004	24.96	3.e-002	4.034e-003
994	5.958e+004	5.958e+004	24.96	3.e-002	4.034e-003
995	5.964e+004	5.964e+004	24.96	2.8e-002	3.765e-003
996	5.97e+004	5.97e+004	24.96	3.e-002	4.034e-003
997	5.976e+004	5.976e+004	24.96	2.8e-002	3.765e-003
998	5.982e+004	5.982e+004	24.96	2.8e-002	3.765e-003
999	5.988e+004	5.988e+004	24.96	2.8e-002	3.765e-003
1000	5.994e+004	5.994e+004	24.96	3.e-002	4.034e-003
1001	6.e+004	6.e+004	24.96	3.2e-002	4.303e-003
1002	6.006e+004	6.006e+004	24.96	3.4e-002	4.572e-003
1003	6.012e+004	6.012e+004	24.96	3.4e-002	4.572e-003
1004	6.018e+004	6.018e+004	24.96	3.2e-002	4.303e-003
1005	6.024e+004	6.024e+004	24.96	3.2e-002	4.303e-003
1006	6.03e+004	6.03e+004	24.96	3.2e-002	4.303e-003
1007	6.036e+004	6.036e+004	24.96	3.e-002	4.034e-003
1008	6.042e+004	6.042e+004	24.96	2.6e-002	3.497e-003
1009	6.048e+004	6.048e+004	24.95	2.2e-002	2.959e-003
1010	6.054e+004	6.054e+004	24.95	1.6e-002	2.152e-003
1011	6.06e+004	6.06e+004	24.95	1.6e-002	2.152e-003
1012	6.066e+004	6.066e+004	24.95	1.6e-002	2.152e-003
1013	6.072e+004	6.072e+004	24.95	1.8e-002	2.421e-003
1014	6.078e+004	6.078e+004	24.95	1.8e-002	2.421e-003
1015	6.084e+004	6.084e+004	24.95	2.e-002	2.69e-003
1016	6.09e+004	6.09e+004	24.95	2.e-002	2.69e-003
1017	6.096e+004	6.096e+004	24.95	2.2e-002	2.959e-003
1018	6.102e+004	6.102e+004	24.95	2.e-002	2.69e-003
1019	6.108e+004	6.108e+004	24.95	1.8e-002	2.421e-003
1020	6.114e+004	6.114e+004	24.95	1.8e-002	2.421e-003
1021	6.12e+004	6.12e+004	24.95	2.e-002	2.69e-003
1022	6.126e+004	6.126e+004	24.95	2.2e-002	2.959e-003
1023	6.132e+004	6.132e+004	24.95	2.2e-002	2.959e-003
1024	6.138e+004	6.138e+004	24.96	2.6e-002	3.497e-003
1025	6.144e+004	6.144e+004	24.96	2.6e-002	3.497e-003
1026	6.15e+004	6.15e+004	24.96	2.6e-002	3.497e-003
1027	6.156e+004	6.156e+004	24.96	2.6e-002	3.497e-003
1028	6.162e+004	6.162e+004	24.96	2.6e-002	3.497e-003
1029	6.168e+004	6.168e+004	24.96	2.6e-002	3.497e-003
1030	6.174e+004	6.174e+004	24.95	2.4e-002	3.228e-003
1031	6.18e+004	6.18e+004	24.95	2.2e-002	2.959e-003
1032	6.186e+004	6.186e+004	24.95	2.e-002	2.69e-003
1033	6.192e+004	6.192e+004	24.95	1.8e-002	2.421e-003
1034	6.198e+004	6.198e+004	24.94	1.4e-002	1.883e-003
1035	6.204e+004	6.204e+004	24.94	1.2e-002	1.614e-003
1036	6.21e+004	6.21e+004	24.94	1.2e-002	1.614e-003
1037	6.216e+004	6.216e+004	24.94	1.4e-002	1.883e-003
1038	6.222e+004	6.222e+004	24.94	1.4e-002	1.883e-003
1039	6.228e+004	6.228e+004	24.95	1.8e-002	2.421e-003

1040	6.234e+004	6.234e+004	24.95	1.8e-002	2.421e-003
1041	6.24e+004	6.24e+004	24.95	1.8e-002	2.421e-003
1042	6.246e+004	6.246e+004	24.95	1.6e-002	2.152e-003
1043	6.252e+004	6.252e+004	24.94	1.4e-002	1.883e-003
1044	6.258e+004	6.258e+004	24.94	1.4e-002	1.883e-003
1045	6.264e+004	6.264e+004	24.94	1.4e-002	1.883e-003
1046	6.27e+004	6.27e+004	24.94	1.2e-002	1.614e-003
1047	6.276e+004	6.276e+004	24.94	1.2e-002	1.614e-003
1048	6.282e+004	6.282e+004	24.95	1.6e-002	2.152e-003
1049	6.288e+004	6.288e+004	24.95	1.6e-002	2.152e-003
1050	6.294e+004	6.294e+004	24.95	1.8e-002	2.421e-003
1051	6.3e+004	6.3e+004	24.95	1.8e-002	2.421e-003
1052	6.306e+004	6.306e+004	24.95	1.8e-002	2.421e-003
1053	6.312e+004	6.312e+004	24.95	1.8e-002	2.421e-003
1054	6.318e+004	6.318e+004	24.95	1.8e-002	2.421e-003
1055	6.324e+004	6.324e+004	24.95	1.6e-002	2.152e-003
1056	6.33e+004	6.33e+004	24.94	1.4e-002	1.883e-003
1057	6.336e+004	6.336e+004	24.94	1.e-002	1.345e-003
1058	6.342e+004	6.342e+004	24.94	8.e-003	1.076e-003
1059	6.348e+004	6.348e+004	24.94	6.e-003	8.069e-004
1060	6.354e+004	6.354e+004	24.94	6.e-003	8.069e-004
1061	6.36e+004	6.36e+004	24.94	8.e-003	1.076e-003
1062	6.366e+004	6.366e+004	24.94	6.e-003	8.069e-004
1063	6.372e+004	6.372e+004	24.94	1.e-002	1.345e-003
1064	6.378e+004	6.378e+004	24.94	1.2e-002	1.614e-003
1065	6.384e+004	6.384e+004	24.94	1.2e-002	1.614e-003
1066	6.39e+004	6.39e+004	24.94	1.2e-002	1.614e-003
1067	6.396e+004	6.396e+004	24.94	1.e-002	1.345e-003
1068	6.402e+004	6.402e+004	24.94	8.e-003	1.076e-003
1069	6.408e+004	6.408e+004	24.94	8.e-003	1.076e-003
1070	6.414e+004	6.414e+004	24.94	1.e-002	1.345e-003
1071	6.42e+004	6.42e+004	24.94	1.2e-002	1.614e-003
1072	6.426e+004	6.426e+004	24.94	1.2e-002	1.614e-003
1073	6.432e+004	6.432e+004	24.94	1.4e-002	1.883e-003
1074	6.438e+004	6.438e+004	24.94	1.4e-002	1.883e-003
1075	6.444e+004	6.444e+004	24.94	1.2e-002	1.614e-003
1076	6.45e+004	6.45e+004	24.94	1.4e-002	1.883e-003
1077	6.456e+004	6.456e+004	24.94	1.2e-002	1.614e-003
1078	6.462e+004	6.462e+004	24.94	1.e-002	1.345e-003
1079	6.468e+004	6.468e+004	24.94	8.e-003	1.076e-003
1080	6.474e+004	6.474e+004	24.93	4.e-003	5.379e-004
1081	6.48e+004	6.48e+004	24.93	2.e-003	2.69e-004
1082	6.486e+004	6.486e+004	24.93	2.e-003	2.69e-004
1083	6.492e+004	6.492e+004	24.93	0.	0.
1084	6.498e+004	6.498e+004	24.93	0.	0.
1085	6.504e+004	6.504e+004	24.93	0.	0.
1086	6.51e+004	6.51e+004	24.93	2.e-003	2.69e-004
1087	6.516e+004	6.516e+004	24.94	8.e-003	1.076e-003
1088	6.522e+004	6.522e+004	24.94	1.2e-002	1.614e-003
1089	6.528e+004	6.528e+004	24.94	1.2e-002	1.614e-003
1090	6.534e+004	6.534e+004	24.94	1.e-002	1.345e-003
1091	6.54e+004	6.54e+004	24.94	6.e-003	8.069e-004
1092	6.546e+004	6.546e+004	24.94	6.e-003	8.069e-004

1093	6.552e+004	6.552e+004	24.94	6.e-003	8.069e-004
1094	6.558e+004	6.558e+004	24.94	8.e-003	1.076e-003
1095	6.564e+004	6.564e+004	24.94	1.2e-002	1.614e-003
1096	6.57e+004	6.57e+004	24.95	1.6e-002	2.152e-003
1097	6.576e+004	6.576e+004	24.95	1.8e-002	2.421e-003
1098	6.582e+004	6.582e+004	24.95	2.e-002	2.69e-003
1099	6.588e+004	6.588e+004	24.95	1.8e-002	2.421e-003
1100	6.594e+004	6.594e+004	24.95	1.8e-002	2.421e-003
1101	6.6e+004	6.6e+004	24.95	1.8e-002	2.421e-003
1102	6.606e+004	6.606e+004	24.94	1.4e-002	1.883e-003
1103	6.612e+004	6.612e+004	24.94	1.e-002	1.345e-003
1104	6.618e+004	6.618e+004	24.94	8.e-003	1.076e-003
1105	6.624e+004	6.624e+004	24.94	6.e-003	8.069e-004
1106	6.63e+004	6.63e+004	24.95	2.2e-002	2.959e-003
1107	6.636e+004	6.636e+004	24.94	6.e-003	8.069e-004
1108	6.642e+004	6.642e+004	24.93	4.e-003	5.379e-004
1109	6.648e+004	6.648e+004	24.94	6.e-003	8.069e-004
1110	6.654e+004	6.654e+004	24.94	8.e-003	1.076e-003
1111	6.66e+004	6.66e+004	24.94	1.2e-002	1.614e-003
1112	6.666e+004	6.666e+004	24.94	1.2e-002	1.614e-003
1113	6.672e+004	6.672e+004	24.94	1.e-002	1.345e-003
1114	6.678e+004	6.678e+004	24.94	1.2e-002	1.614e-003
1115	6.684e+004	6.684e+004	24.94	1.e-002	1.345e-003
1116	6.69e+004	6.69e+004	24.94	8.e-003	1.076e-003
1117	6.696e+004	6.696e+004	24.94	6.e-003	8.069e-004
1118	6.702e+004	6.702e+004	24.94	8.e-003	1.076e-003
1119	6.708e+004	6.708e+004	24.94	6.e-003	8.069e-004
1120	6.714e+004	6.714e+004	24.94	1.2e-002	1.614e-003
1121	6.72e+004	6.72e+004	24.94	1.2e-002	1.614e-003
1122	6.726e+004	6.726e+004	24.94	1.4e-002	1.883e-003
1123	6.732e+004	6.732e+004	24.94	1.4e-002	1.883e-003
1124	6.738e+004	6.738e+004	24.95	1.6e-002	2.152e-003
1125	6.744e+004	6.744e+004	24.94	1.4e-002	1.883e-003
1126	6.75e+004	6.75e+004	24.94	1.2e-002	1.614e-003
1127	6.756e+004	6.756e+004	24.94	1.e-002	1.345e-003
1128	6.762e+004	6.762e+004	24.94	6.e-003	8.069e-004
1129	6.768e+004	6.768e+004	24.93	4.e-003	5.379e-004
1130	6.774e+004	6.774e+004	24.94	1.e-002	1.345e-003
1131	6.78e+004	6.78e+004	24.94	6.e-003	8.069e-004
1132	6.786e+004	6.786e+004	24.94	8.e-003	1.076e-003
1133	6.792e+004	6.792e+004	24.94	1.2e-002	1.614e-003
1134	6.798e+004	6.798e+004	24.94	1.4e-002	1.883e-003
1135	6.804e+004	6.804e+004	24.95	1.6e-002	2.152e-003
1136	6.81e+004	6.81e+004	24.95	2.e-002	2.69e-003
1137	6.816e+004	6.816e+004	24.95	2.e-002	2.69e-003
1138	6.822e+004	6.822e+004	24.95	2.2e-002	2.959e-003
1139	6.828e+004	6.828e+004	24.95	2.e-002	2.69e-003
1140	6.834e+004	6.834e+004	24.95	2.4e-002	3.228e-003
1141	6.84e+004	6.84e+004	24.96	3.e-002	4.034e-003
1142	6.846e+004	6.846e+004	24.96	3.2e-002	4.303e-003
1143	6.852e+004	6.852e+004	24.97	3.6e-002	4.841e-003
1144	6.858e+004	6.858e+004	24.97	4.e-002	5.379e-003
1145	6.864e+004	6.864e+004	24.97	4.4e-002	5.917e-003

1146	6.87e+004	6.87e+004	24.98	5.e-002	6.724e-003
1147	6.876e+004	6.876e+004	24.98	5.2e-002	6.993e-003
1148	6.882e+004	6.882e+004	24.98	5.e-002	6.724e-003
1149	6.888e+004	6.888e+004	24.98	5.2e-002	6.993e-003
1150	6.894e+004	6.894e+004	24.98	5.2e-002	6.993e-003
1151	6.9e+004	6.9e+004	24.98	5.e-002	6.724e-003
1152	6.906e+004	6.906e+004	24.98	4.8e-002	6.455e-003
1153	6.912e+004	6.912e+004	24.97	4.4e-002	5.917e-003
1154	6.918e+004	6.918e+004	24.97	4.4e-002	5.917e-003
1155	6.924e+004	6.924e+004	24.97	4.2e-002	5.648e-003
1156	6.93e+004	6.93e+004	24.97	4.4e-002	5.917e-003
1157	6.936e+004	6.936e+004	24.97	4.4e-002	5.917e-003
1158	6.942e+004	6.942e+004	24.97	4.4e-002	5.917e-003
1159	6.948e+004	6.948e+004	24.98	5.e-002	6.724e-003
1160	6.954e+004	6.954e+004	24.98	5.2e-002	6.993e-003
1161	6.96e+004	6.96e+004	24.98	5.2e-002	6.993e-003
1162	6.966e+004	6.966e+004	24.98	5.1e-002	6.859e-003
1163	6.972e+004	6.972e+004	24.98	5.2e-002	6.993e-003
1164	6.978e+004	6.978e+004	24.98	5.4e-002	7.262e-003
1165	6.984e+004	6.984e+004	24.99	5.6e-002	7.531e-003
1166	6.99e+004	6.99e+004	24.99	5.8e-002	7.8e-003
1167	6.996e+004	6.996e+004	24.99	5.9e-002	7.934e-003
1168	7.002e+004	7.002e+004	24.99	6.4e-002	8.607e-003
1169	7.008e+004	7.008e+004	25.	6.6e-002	8.876e-003
1170	7.014e+004	7.014e+004	25.	6.8e-002	9.145e-003
1171	7.02e+004	7.02e+004	25.	7.e-002	9.414e-003
1172	7.026e+004	7.026e+004	25.	7.2e-002	9.683e-003
1173	7.032e+004	7.032e+004	25.	7.e-002	9.414e-003
1174	7.038e+004	7.038e+004	25.	6.8e-002	9.145e-003
1175	7.044e+004	7.044e+004	25.	6.8e-002	9.145e-003
1176	7.05e+004	7.05e+004	24.99	6.4e-002	8.607e-003
1177	7.056e+004	7.056e+004	24.99	6.4e-002	8.607e-003
1178	7.062e+004	7.062e+004	24.99	6.1e-002	8.203e-003
1179	7.068e+004	7.068e+004	24.99	6.2e-002	8.338e-003
1180	7.074e+004	7.074e+004	24.99	6.2e-002	8.338e-003
1181	7.08e+004	7.08e+004	24.99	6.2e-002	8.338e-003
1182	7.086e+004	7.086e+004	25.	6.5e-002	8.741e-003
1183	7.092e+004	7.092e+004	25.	7.2e-002	9.683e-003
1184	7.098e+004	7.098e+004	25.	7.5e-002	1.009e-002
1185	7.104e+004	7.104e+004	25.	7.5e-002	1.009e-002
1186	7.11e+004	7.11e+004	25.	7.5e-002	1.009e-002
1187	7.116e+004	7.116e+004	25.	7.4e-002	9.952e-003
1188	7.122e+004	7.122e+004	25.	7.5e-002	1.009e-002
1189	7.128e+004	7.128e+004	25.01	7.7e-002	1.036e-002
1190	7.134e+004	7.134e+004	25.01	7.9e-002	1.062e-002
1191	7.14e+004	7.14e+004	25.01	8.e-002	1.076e-002
1192	7.146e+004	7.146e+004	25.01	7.9e-002	1.062e-002
1193	7.152e+004	7.152e+004	25.01	7.9e-002	1.062e-002
1194	7.158e+004	7.158e+004	25.01	8.e-002	1.076e-002
1195	7.164e+004	7.164e+004	25.01	7.8e-002	1.049e-002
1196	7.17e+004	7.17e+004	25.01	7.9e-002	1.062e-002
1197	7.176e+004	7.176e+004	25.01	8.e-002	1.076e-002
1198	7.182e+004	7.182e+004	25.01	7.7e-002	1.036e-002

1199	7.188e+004	7.188e+004	25.01	7.7e-002	1.036e-002
1200	7.194e+004	7.194e+004	25.	7.5e-002	1.009e-002
1201	7.2e+004	7.2e+004	25.	7.3e-002	9.817e-003
1202	7.206e+004	7.206e+004	25.	6.9e-002	9.279e-003
1203	7.212e+004	7.212e+004	25.	6.7e-002	9.01e-003
1204	7.218e+004	7.218e+004	25.	7.e-002	9.414e-003
1205	7.224e+004	7.224e+004	25.	7.2e-002	9.683e-003
1206	7.23e+004	7.23e+004	25.	7.3e-002	9.817e-003
1207	7.236e+004	7.236e+004	25.	7.5e-002	1.009e-002
1208	7.242e+004	7.242e+004	25.01	7.6e-002	1.022e-002
1209	7.248e+004	7.248e+004	25.	7.5e-002	1.009e-002
1210	7.254e+004	7.254e+004	25.	7.5e-002	1.009e-002
1211	7.26e+004	7.26e+004	25.	7.5e-002	1.009e-002
1212	7.266e+004	7.266e+004	25.	7.3e-002	9.817e-003
1213	7.272e+004	7.272e+004	25.	7.3e-002	9.817e-003
1214	7.278e+004	7.278e+004	25.	7.3e-002	9.817e-003
1215	7.284e+004	7.284e+004	25.	7.3e-002	9.817e-003
1216	7.29e+004	7.29e+004	25.	7.5e-002	1.009e-002
1217	7.296e+004	7.296e+004	25.	7.5e-002	1.009e-002
1218	7.302e+004	7.302e+004	25.	7.3e-002	9.817e-003
1219	7.308e+004	7.308e+004	25.	7.3e-002	9.817e-003
1220	7.314e+004	7.314e+004	25.	7.3e-002	9.817e-003
1221	7.32e+004	7.32e+004	25.	7.3e-002	9.817e-003
1222	7.326e+004	7.326e+004	25.	7.4e-002	9.952e-003
1223	7.332e+004	7.332e+004	25.	7.1e-002	9.548e-003
1224	7.338e+004	7.338e+004	25.	6.7e-002	9.01e-003
1225	7.344e+004	7.344e+004	25.	6.5e-002	8.741e-003
1226	7.35e+004	7.35e+004	24.99	6.3e-002	8.472e-003
1227	7.356e+004	7.356e+004	24.99	6.3e-002	8.472e-003
1228	7.362e+004	7.362e+004	25.	7.3e-002	9.817e-003
1229	7.368e+004	7.368e+004	25.	7.1e-002	9.548e-003
1230	7.374e+004	7.374e+004	25.	7.5e-002	1.009e-002
1231	7.38e+004	7.38e+004	25.01	7.7e-002	1.036e-002
1232	7.386e+004	7.386e+004	25.	7.5e-002	1.009e-002
1233	7.392e+004	7.392e+004	25.01	7.7e-002	1.036e-002
1234	7.398e+004	7.398e+004	25.01	7.7e-002	1.036e-002
1235	7.404e+004	7.404e+004	25.01	7.9e-002	1.062e-002
1236	7.41e+004	7.41e+004	25.01	8.1e-002	1.089e-002
1237	7.416e+004	7.416e+004	25.01	8.3e-002	1.116e-002
1238	7.422e+004	7.422e+004	25.02	8.5e-002	1.143e-002
1239	7.428e+004	7.428e+004	25.02	8.6e-002	1.157e-002
1240	7.434e+004	7.434e+004	25.02	8.9e-002	1.197e-002
1241	7.44e+004	7.44e+004	25.02	9.4e-002	1.264e-002
1242	7.446e+004	7.446e+004	25.03	9.9e-002	1.331e-002
1243	7.452e+004	7.452e+004	25.03	0.101	1.358e-002
1244	7.458e+004	7.458e+004	25.03	0.104	1.399e-002
1245	7.464e+004	7.464e+004	25.04	0.107	1.439e-002
1246	7.47e+004	7.47e+004	25.04	0.109	1.466e-002
1247	7.476e+004	7.476e+004	25.04	0.109	1.466e-002
1248	7.482e+004	7.482e+004	25.04	0.113	1.52e-002
1249	7.488e+004	7.488e+004	25.04	0.111	1.493e-002
1250	7.494e+004	7.494e+004	25.04	0.113	1.52e-002
1251	7.5e+004	7.5e+004	25.05	0.115	1.547e-002

1252	7.506e+004	7.506e+004	25.05	0.119	1.6e-002
1253	7.512e+004	7.512e+004	25.05	0.121	1.627e-002
1254	7.518e+004	7.518e+004	25.05	0.123	1.654e-002
1255	7.524e+004	7.524e+004	25.06	0.129	1.735e-002
1256	7.53e+004	7.53e+004	25.06	0.131	1.762e-002
1257	7.536e+004	7.536e+004	25.07	0.135	1.815e-002
1258	7.542e+004	7.542e+004	25.07	0.137	1.842e-002
1259	7.548e+004	7.548e+004	25.07	0.141	1.896e-002
1260	7.554e+004	7.554e+004	25.07	0.143	1.923e-002
1261	7.56e+004	7.56e+004	25.07	0.143	1.923e-002
1262	7.566e+004	7.566e+004	25.07	0.145	1.95e-002
1263	7.572e+004	7.572e+004	25.08	0.147	1.977e-002
1264	7.578e+004	7.578e+004	25.08	0.151	2.031e-002
1265	7.584e+004	7.584e+004	25.09	0.155	2.084e-002
1266	7.59e+004	7.59e+004	25.09	0.157	2.111e-002
1267	7.596e+004	7.596e+004	25.09	0.159	2.138e-002
1268	7.602e+004	7.602e+004	25.09	0.159	2.138e-002
1269	7.608e+004	7.608e+004	25.09	0.161	2.165e-002
1270	7.614e+004	7.614e+004	25.09	0.159	2.138e-002
1271	7.62e+004	7.62e+004	25.09	0.159	2.138e-002
1272	7.626e+004	7.626e+004	25.09	0.157	2.111e-002
1273	7.632e+004	7.632e+004	25.08	0.153	2.058e-002
1274	7.638e+004	7.638e+004	25.08	0.151	2.031e-002
1275	7.644e+004	7.644e+004	25.08	0.151	2.031e-002
1276	7.65e+004	7.65e+004	25.08	0.151	2.031e-002
1277	7.656e+004	7.656e+004	25.09	0.155	2.084e-002
1278	7.662e+004	7.662e+004	25.09	0.157	2.111e-002
1279	7.668e+004	7.668e+004	25.09	0.161	2.165e-002
1280	7.674e+004	7.674e+004	25.09	0.163	2.192e-002
1281	7.68e+004	7.68e+004	25.09	0.163	2.192e-002
1282	7.686e+004	7.686e+004	25.09	0.165	2.219e-002
1283	7.692e+004	7.692e+004	25.09	0.165	2.219e-002
1284	7.698e+004	7.698e+004	25.09	0.165	2.219e-002
1285	7.704e+004	7.704e+004	25.09	0.163	2.192e-002
1286	7.71e+004	7.71e+004	25.09	0.165	2.219e-002
1287	7.716e+004	7.716e+004	25.09	0.165	2.219e-002
1288	7.722e+004	7.722e+004	25.09	0.165	2.219e-002
1289	7.728e+004	7.728e+004	25.1	0.167	2.246e-002
1290	7.734e+004	7.734e+004	25.1	0.169	2.273e-002
1291	7.74e+004	7.74e+004	25.1	0.172	2.313e-002
1292	7.746e+004	7.746e+004	25.11	0.175	2.353e-002
1293	7.752e+004	7.752e+004	25.1	0.171	2.3e-002
1294	7.758e+004	7.758e+004	25.1	0.171	2.3e-002
1295	7.764e+004	7.764e+004	25.1	0.167	2.246e-002
1296	7.77e+004	7.77e+004	25.09	0.161	2.165e-002
1297	7.776e+004	7.776e+004	25.09	0.159	2.138e-002
1298	7.782e+004	7.782e+004	25.09	0.159	2.138e-002
1299	7.788e+004	7.788e+004	25.09	0.159	2.138e-002
1300	7.794e+004	7.794e+004	25.09	0.161	2.165e-002
1301	7.8e+004	7.8e+004	25.09	0.161	2.165e-002
1302	7.806e+004	7.806e+004	25.09	0.161	2.165e-002
1303	7.812e+004	7.812e+004	25.09	0.161	2.165e-002
1304	7.818e+004	7.818e+004	25.09	0.163	2.192e-002

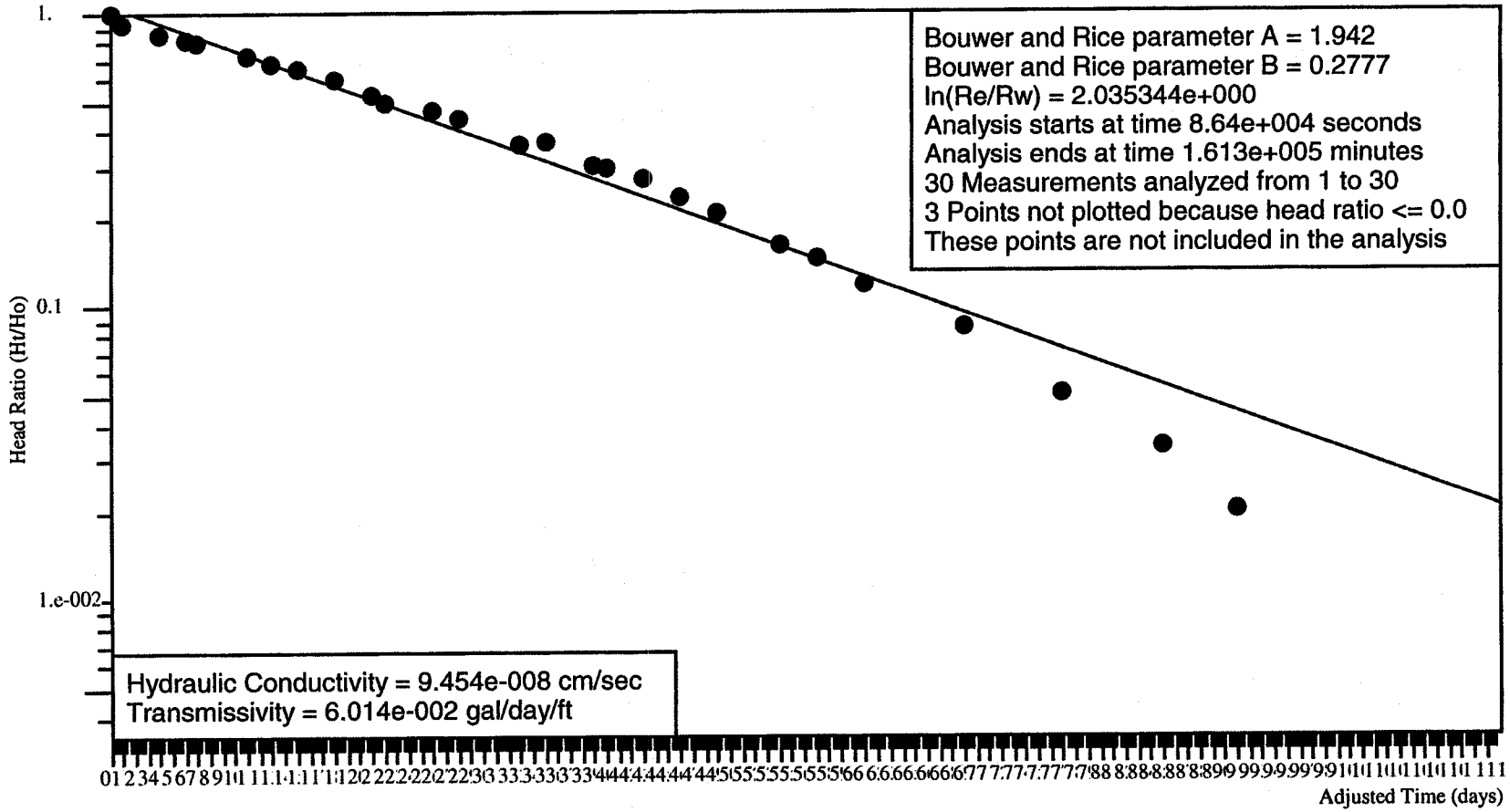
1305	7.824e+004	7.824e+004	25.09	0.161	2.165e-002
1306	7.83e+004	7.83e+004	25.09	0.165	2.219e-002
1307	7.836e+004	7.836e+004	25.09	0.163	2.192e-002
1308	7.842e+004	7.842e+004	25.09	0.163	2.192e-002
1309	7.848e+004	7.848e+004	25.09	0.163	2.192e-002
1310	7.854e+004	7.854e+004	25.09	0.165	2.219e-002
1311	7.86e+004	7.86e+004	25.1	0.167	2.246e-002
1312	7.866e+004	7.866e+004	25.1	0.169	2.273e-002
1313	7.872e+004	7.872e+004	25.1	0.171	2.3e-002
1314	7.878e+004	7.878e+004	25.1	0.171	2.3e-002
1315	7.884e+004	7.884e+004	25.1	0.173	2.327e-002
1316	7.89e+004	7.89e+004	25.11	0.175	2.353e-002
1317	7.896e+004	7.896e+004	25.11	0.176	2.367e-002
1318	7.902e+004	7.902e+004	25.1	0.173	2.327e-002
1319	7.908e+004	7.908e+004	25.1	0.172	2.313e-002
1320	7.914e+004	7.914e+004	25.1	0.169	2.273e-002
1321	7.92e+004	7.92e+004	25.09	0.165	2.219e-002
1322	7.926e+004	7.926e+004	25.09	0.163	2.192e-002
1323	7.932e+004	7.932e+004	25.09	0.163	2.192e-002
1324	7.938e+004	7.938e+004	25.09	0.161	2.165e-002
1325	7.944e+004	7.944e+004	25.09	0.163	2.192e-002
1326	7.95e+004	7.95e+004	25.09	0.165	2.219e-002
1327	7.956e+004	7.956e+004	25.1	0.167	2.246e-002
1328	7.962e+004	7.962e+004	25.1	0.171	2.3e-002
1329	7.968e+004	7.968e+004	25.1	0.173	2.327e-002
1330	7.974e+004	7.974e+004	25.1	0.173	2.327e-002
1331	7.98e+004	7.98e+004	25.1	0.173	2.327e-002
1332	7.986e+004	7.986e+004	25.1	0.171	2.3e-002
1333	7.992e+004	7.992e+004	25.1	0.171	2.3e-002
1334	7.998e+004	7.998e+004	25.1	0.171	2.3e-002
1335	8.004e+004	8.004e+004	25.1	0.171	2.3e-002
1336	8.01e+004	8.01e+004	25.1	0.173	2.327e-002
1337	8.016e+004	8.016e+004	25.11	0.175	2.353e-002
1338	8.022e+004	8.022e+004	25.11	0.177	2.38e-002
1339	8.028e+004	8.028e+004	25.11	0.177	2.38e-002
1340	8.034e+004	8.034e+004	25.11	0.177	2.38e-002
1341	8.04e+004	8.04e+004	25.11	0.177	2.38e-002
1342	8.046e+004	8.046e+004	25.1	0.173	2.327e-002
1343	8.052e+004	8.052e+004	25.1	0.169	2.273e-002
1344	8.058e+004	8.058e+004	25.1	0.167	2.246e-002
1345	8.064e+004	8.064e+004	25.09	0.163	2.192e-002
1346	8.07e+004	8.07e+004	25.09	0.161	2.165e-002
1347	8.076e+004	8.076e+004	25.09	0.159	2.138e-002
1348	8.082e+004	8.082e+004	25.09	0.159	2.138e-002
1349	8.088e+004	8.088e+004	25.09	0.159	2.138e-002
1350	8.094e+004	8.094e+004	25.09	0.161	2.165e-002
1351	8.1e+004	8.1e+004	25.09	0.161	2.165e-002
1352	8.106e+004	8.106e+004	25.09	0.161	2.165e-002
1353	8.112e+004	8.112e+004	25.09	0.163	2.192e-002
1354	8.118e+004	8.118e+004	25.09	0.163	2.192e-002
1355	8.124e+004	8.124e+004	25.09	0.161	2.165e-002
1356	8.13e+004	8.13e+004	25.09	0.159	2.138e-002
1357	8.136e+004	8.136e+004	25.09	0.157	2.111e-002

Aquifer Analysis February 21, 2002 - June 12, 2002

Bouwer and Rice Graph

MRR of High Point, LLC

P-11



Ho is 2.95 feet at 8.64e+004 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis February 21, 2002 - June 12, 2002

Site Name: MRR of High Point, LLC
Project Number: 600.04
Import File: P:\MRR of High Point\Task 04 Hydrogeologic Report and WQMP\Slug Data\P-11.txt

---

Well Label: P-11
Aquifer Thickness: 30. feet
Screen Length: 15. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 39.05 feet
Water Table to Screen Bottom: 3.26 feet
Anisotropy Ratio: 1.
Time Adjustment: 8.64e+004 Seconds
Test starts with trial 0
There are 30 time and drawdown measurements
Maximum head is 2.95 feet
Minimum head is 0. feet

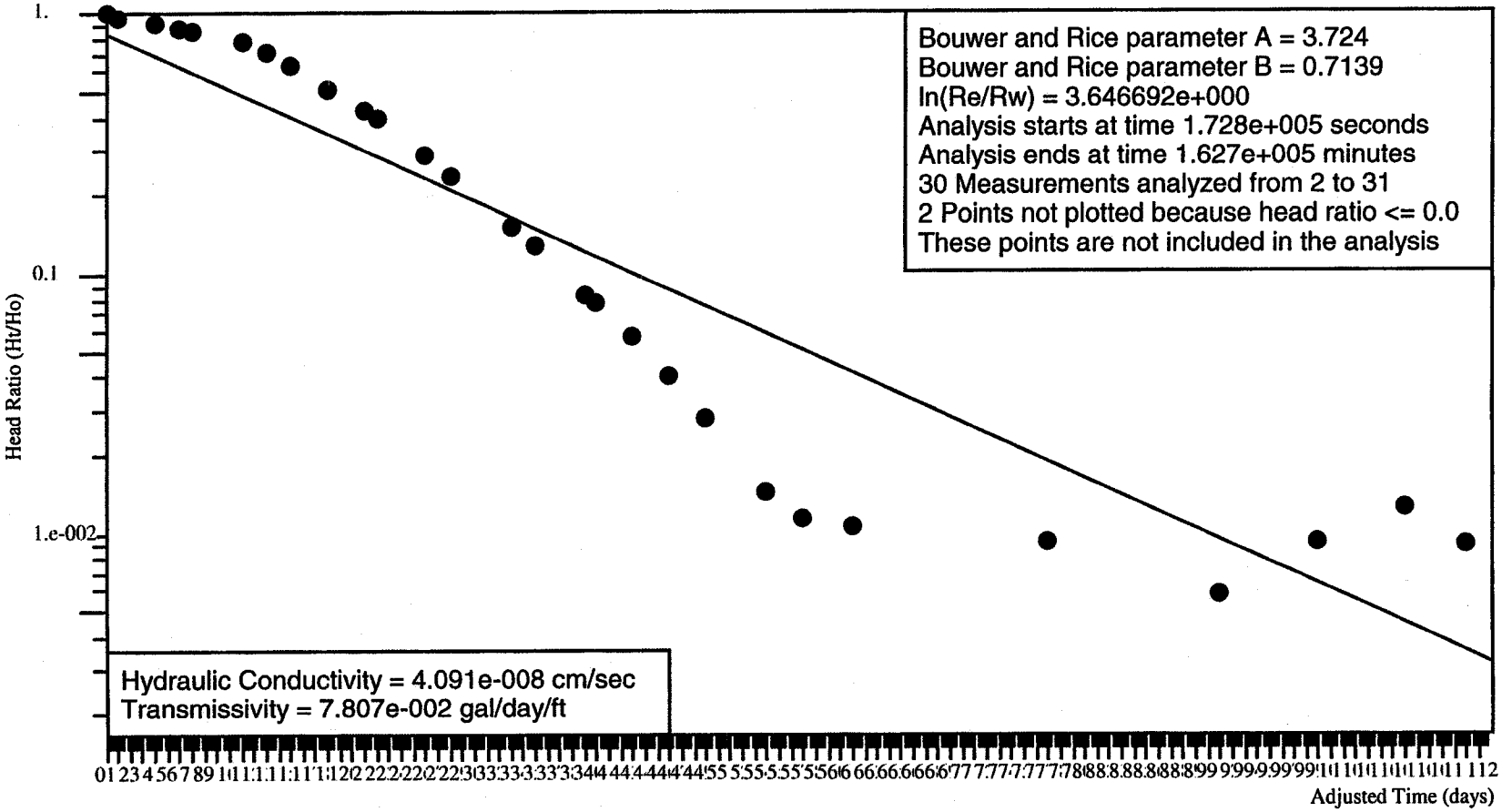
Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	1440	0.	42.	2.95	1.
2	2880	1440	41.82	2.77	0.939
3	7200	5760	41.6	2.55	0.8644
4	1.008e+004	8640	41.46	2.41	0.8169
5	1.152e+004	1.008e+004	41.4	2.35	0.7966
6	1.728e+004	1.584e+004	41.19	2.14	0.7254
7	2.016e+004	1.872e+004	41.08	2.03	0.6881
8	2.304e+004	2.16e+004	40.98	1.93	0.6542
9	2.736e+004	2.592e+004	40.82	1.77	0.6
10	3.168e+004	3.024e+004	40.63	1.58	0.5356
11	3.312e+004	3.168e+004	40.52	1.47	0.4983
12	3.888e+004	3.744e+004	40.43	1.38	0.4678
13	4.176e+004	4.032e+004	40.35	1.3	0.4407
14	4.896e+004	4.752e+004	40.11	1.06	0.3593
15	5.184e+004	5.04e+004	40.12	1.07	0.3627
16	5.76e+004	5.616e+004	39.95	0.9	0.3051
17	5.904e+004	5.76e+004	39.93	0.88	0.2983
18	6.336e+004	6.192e+004	39.86	0.81	0.2746
19	6.768e+004	6.624e+004	39.75	0.7	0.2373
20	7.2e+004	7.056e+004	39.67	0.62	0.2102
21	7.92e+004	7.776e+004	39.53	0.48	0.1627
22	8.352e+004	8.208e+004	39.48	0.43	0.1458
23	8.928e+004	8.784e+004	39.4	0.35	0.1186
24	1.008e+005	9.936e+004	39.3	0.25	8.475e-002
25	1.123e+005	1.109e+005	39.2	0.15	5.085e-002
26	1.238e+005	1.224e+005	39.15	0.1	3.39e-002
27	1.325e+005	1.31e+005	39.11	6.e-002	2.034e-002
28	1.44e+005	1.426e+005	39.06	1.e-002	3.39e-003
29	1.541e+005	1.526e+005	39.05	0.	0.
30	1.613e+005	1.598e+005	39.05	0.	0.

Aquifer Analysis February 20, 2002 - June 12, 2002

Bouwer and Rice Graph

MRR of High Point, LLC

P-15D



Ho is 78.48 feet at 1.728e+005 seconds

Project Number 600.04

Analysis by JAD of Joyce Engineering, Inc.

Aquifer Analysis February 20, 2002 - June 12, 2002

Site Name: MRR of High Point, LLC
Project Number: 600.04
Import File: P:\MRR of High Point\Task 04 Hydrogeologic Report and WQMP\Slug Data\P-15D.txt

---

Well Label: P-15D
Aquifer Thickness: 90. feet
Screen Length: 20. feet
Casing Radius: 1.888 inches
Effective Radius: 3.125 inches
Static Water Level: 1.59 feet
Water Table to Screen Bottom: 80.17 feet
Anisotropy Ratio: 1.
Time Adjustment: 1.728e+005 Seconds
Test starts with trial 1
There are 31 time and drawdown measurements
Maximum head is 78.48 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	1440	-1440	80.02	78.43	0.9994
2	2880	0.	80.07	78.48	1.
3	4320	1440	78.05	76.46	0.9743
4	8640	5760	73.29	71.7	0.9136
5	1.152e+004	8640	70.16	68.57	0.8737
6	1.296e+004	1.008e+004	68.72	67.13	0.8554
7	1.872e+004	1.584e+004	63.4	61.81	0.7876
8	2.16e+004	1.872e+004	57.54	55.95	0.7129
9	2.448e+004	2.16e+004	51.12	49.53	0.6311
10	2.88e+004	2.592e+004	42.24	40.65	0.518
11	3.312e+004	3.024e+004	34.8	33.21	0.4232
12	3.456e+004	3.168e+004	32.58	30.99	0.3949
13	4.032e+004	3.744e+004	24.08	22.49	0.2866
14	4.32e+004	4.032e+004	20.41	18.82	0.2398
15	5.04e+004	4.752e+004	13.58	11.99	0.1528
16	5.328e+004	5.04e+004	11.66	10.07	0.1283
17	5.904e+004	5.616e+004	8.18	6.59	8.397e-002
18	6.048e+004	5.76e+004	7.66	6.07	7.734e-002
19	6.48e+004	6.192e+004	6.1	4.51	5.747e-002
20	6.912e+004	6.624e+004	4.78	3.19	4.065e-002
21	7.344e+004	7.056e+004	3.75	2.16	2.752e-002
22	8.064e+004	7.776e+004	2.72	1.13	1.44e-002
23	8.496e+004	8.208e+004	2.49	0.9	1.147e-002
24	9.072e+004	8.784e+004	2.42	0.83	1.058e-002
25	1.022e+005	9.936e+004	1.59	0.	0.
26	1.138e+005	1.109e+005	2.32	0.73	9.302e-003
27	1.253e+005	1.224e+005	1.72	0.13	1.656e-003
28	1.339e+005	1.31e+005	2.04	0.45	5.734e-003
29	1.454e+005	1.426e+005	2.31	0.72	9.174e-003
30	1.555e+005	1.526e+005	2.57	0.98	1.249e-002
31	1.627e+005	1.598e+005	2.3	0.71	9.047e-003

APPENDIX 6

Geologic Map of Region G, North Carolina

APPENDIX 7

Photographs

Photograph 1. Granite outcrop in stream approximately 100 feet from P-15S and P-15D. Outcrop is typical of the area; medium-grained; quartz, biotite and feldspar were noted. Photograph is viewed to the northeast.

Photograph 2. Section of granite rock core from P-10 showing fractures and slight preferred orientation of biotite.

Photograph 3. Section of granite rock core from P-13 showing fractures, partially weathered zone, and slight preferred orientation of biotite.

Photograph 4. Section of granite rock core from P-15S showing fractures and slight preferred orientation of biotite.

Photograph 5. Quartz pegmatite veins and weathered dike in background. Photograph was taken near P-7 and is viewed to the West.

Photograph 6. Diabase outcrop in stream approximately 400 feet west of P-17. Photograph is viewed to the west.

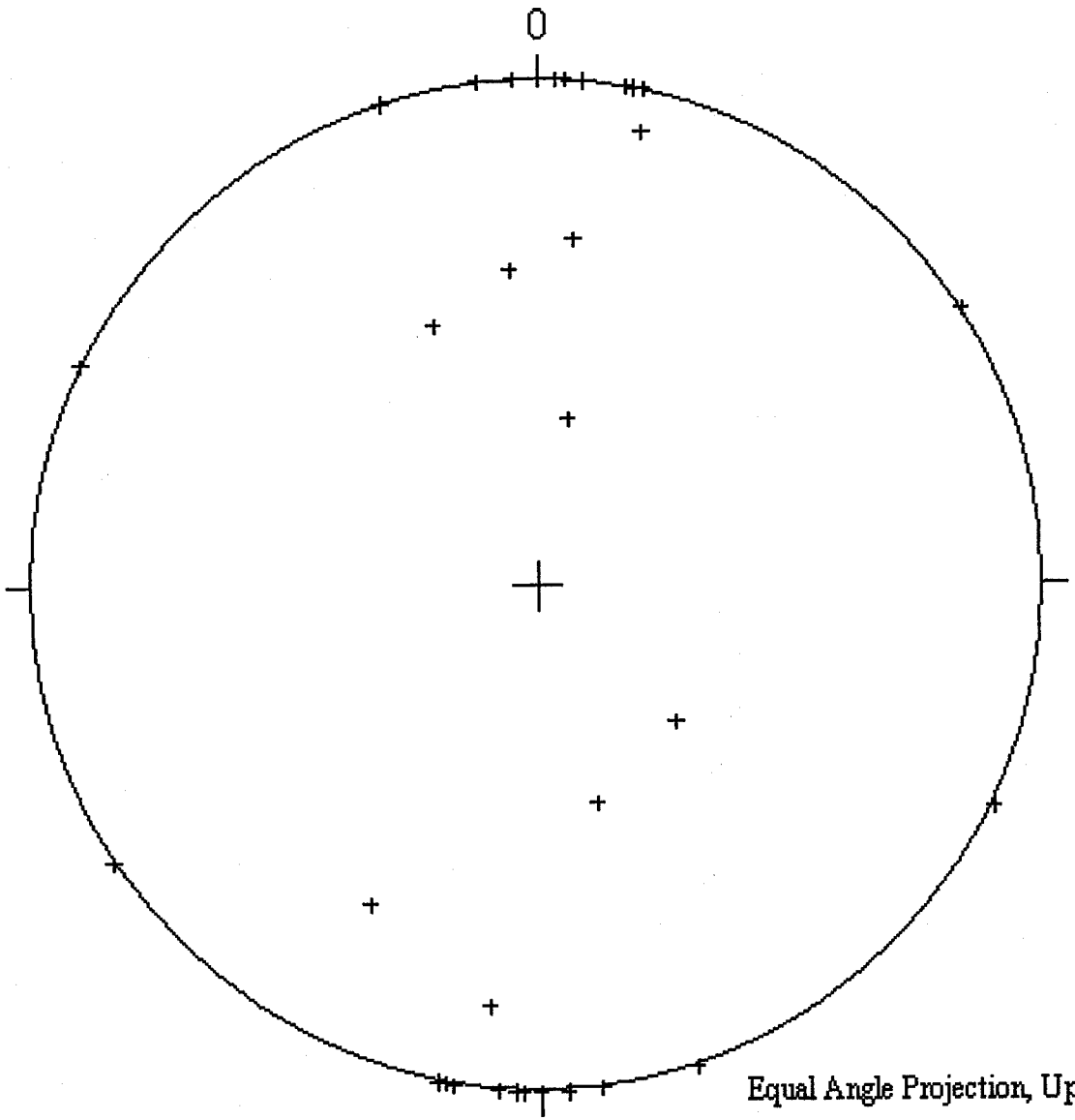
Photograph 7. Diabase outcrop near stream at southwest border of property. Outcrop has approximate orientation of Northeast. Photograph is viewed to the North.

Photograph 8. Partially weathered granite auger cutting from B-2.

APPENDIX 8

Stereograms, Density Plots and Rose Diagrams of Dike and Foliation Orientations

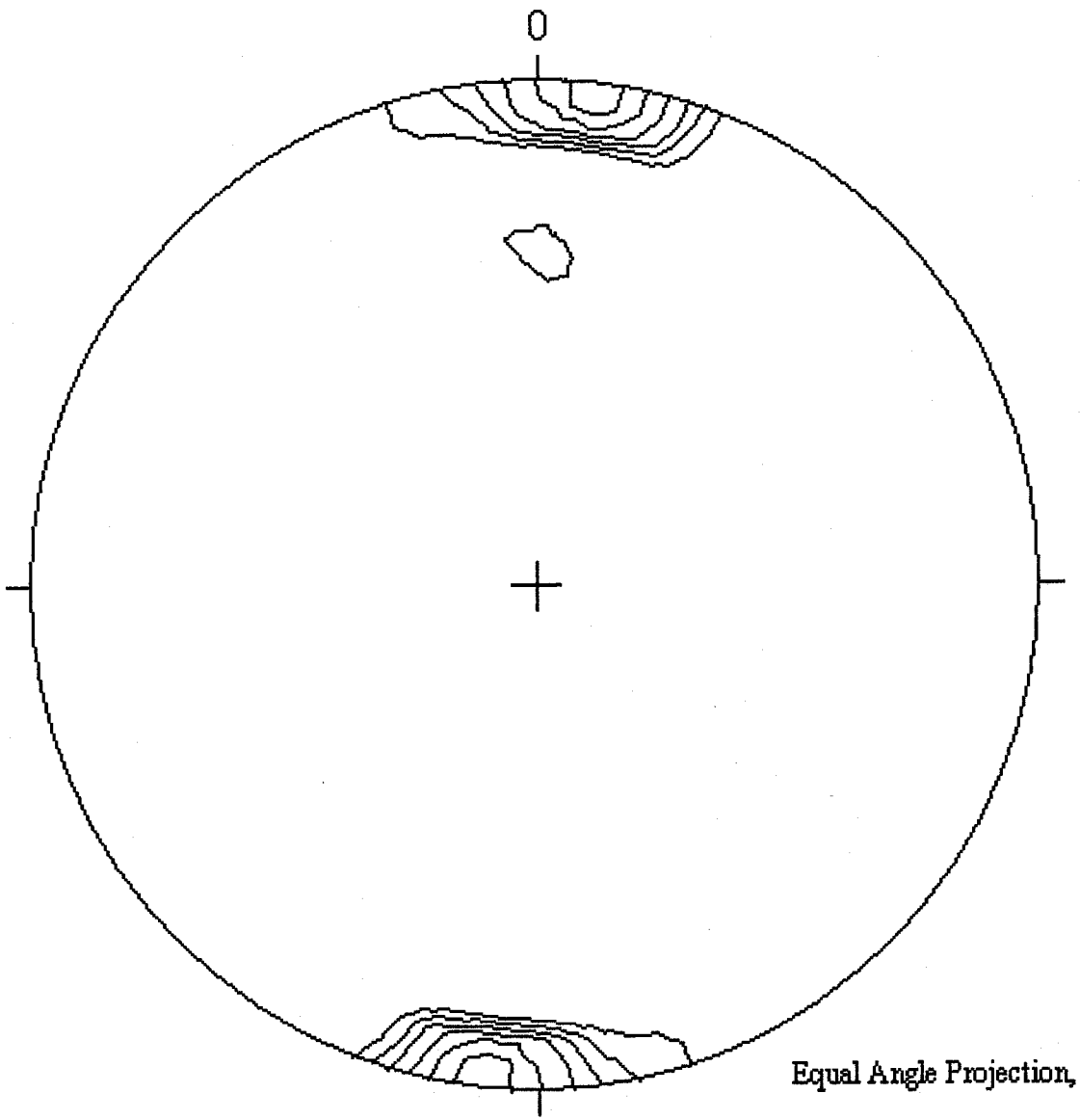
Diabase Dike Stereonet



MRR of High Point, LLC
C and D Permit Application – Volume One-Section II
High Point, NC

Joyce Engineering, Inc.
June 2002

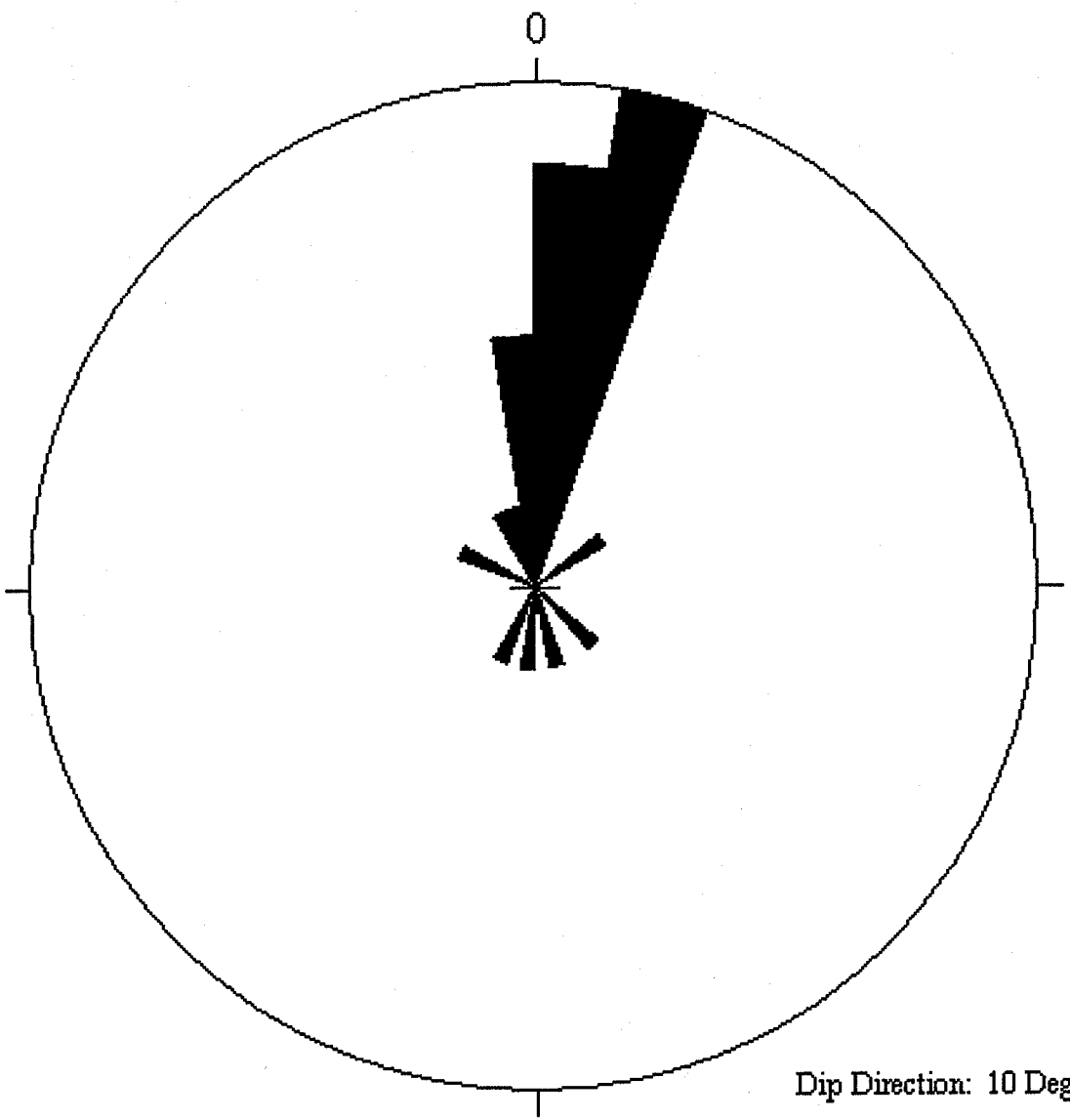
Diabase Dike Density Plot



n=22
max. dens.=28.49 (at 6/ 3)
min. dens.=0.00
Contours at:
4.30,8.60,12.90,21.50,25.80
(Multiples of Random Distribution)

Equal Angle Projection, Upper Hemisphere

Diabase Dike Rose Diagram



n=22
Largest Petal: 6.00 Values
Largest Petal: 27% of all Values

Dip Direction: 10 Degree Classes

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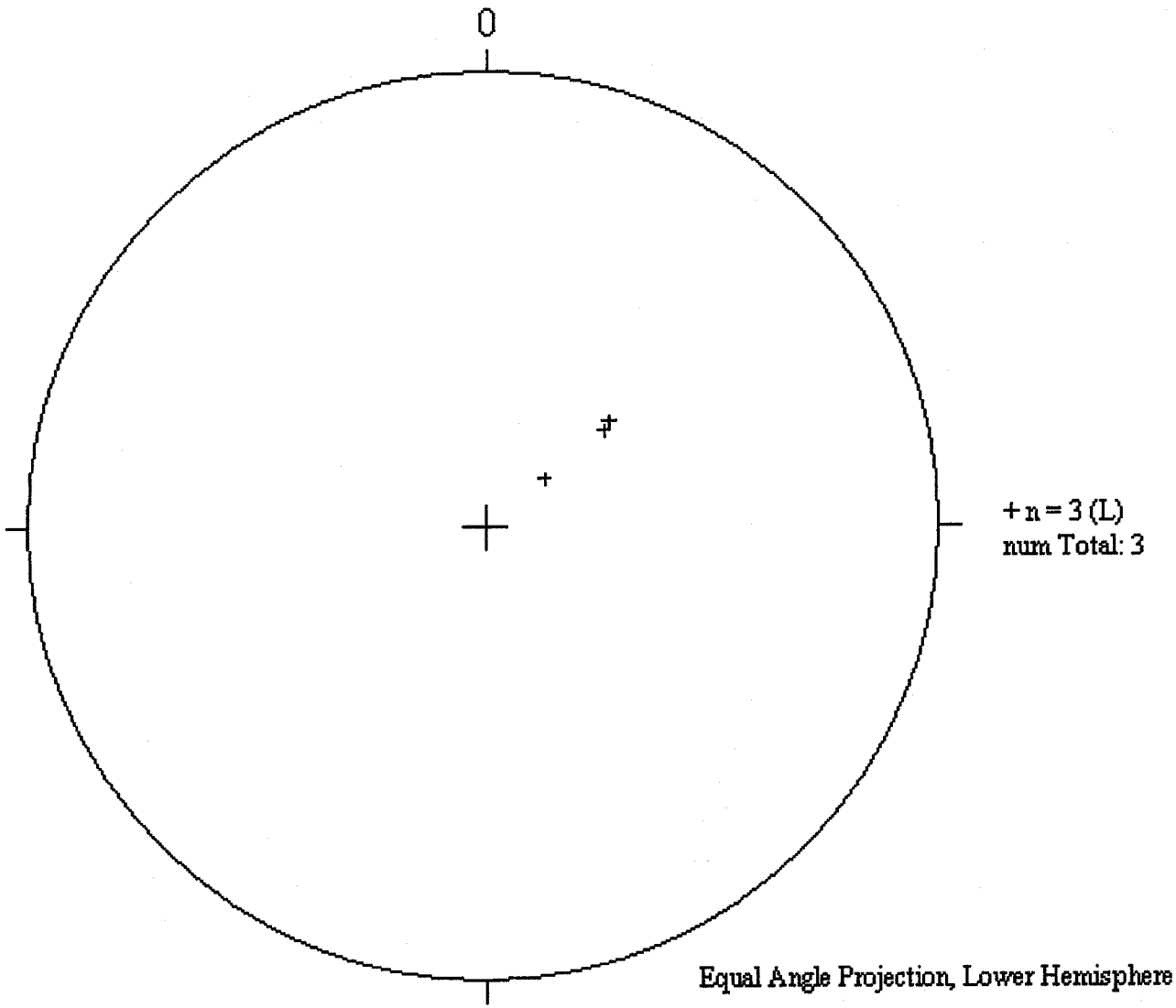
High Point, NC

Joyce Engineering, Inc.
June 2002

Metamorphic Foliation Stereonet



APPENDIX 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

RECEIVED
APR 12 2002

LETTER OF TRANSMITTAL

TO: Ms. Rachel Kirkman
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	9	Laboratory Test Data Summary	

Job Number: 013-02-050

SIGNATURE: _____
Steve Pistole
Construction Services Manager

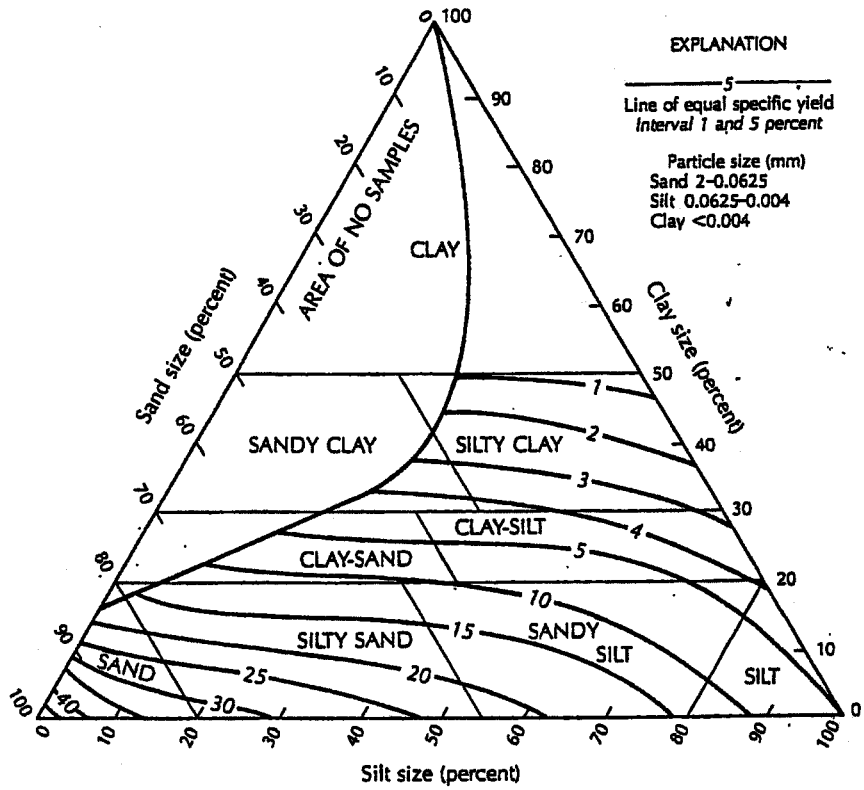


FIGURE 4.11 Textural classification triangle for unconsolidated materials showing the relation between particle size and specific yield. Source: A.I. Johnson, U.S. Geological Survey Water-Supply Paper 1662-D, 1967.

GUIDE SHEET 18 - LIQUID LIMIT

WHERE ENGINEERING TEST DATA ARE NOT AVAILABLE, USE THE FOLLOWING PROCEDURE TO ESTIMATE THE SOIL CHARACTERISTICS AND PROPERTIES.

Give all estimates to the closest 5 percent and show ranges indicate the normal or average variation for the depth considered, t extreme ranges for individual thin strata.

LIQUID LIMIT

When test data is lacking, the liquid limit can be estimated by the formula (.9 x % clay) + 10 = LL. This guide shows the relationship of family particle size class and USDA texture to percent clay and calculated liquid limit. Values are rounded to nearest whole number.

Particle size class of fine earth fraction		USDA texture	Percent clay	Liquid Limit
coarse-loamy or coarse-silty	sandy	s	5	15
			8	17
			10	19
		ls	12	21
			15	24
		sl	18	26
			20	28
fine-loamy or fine-silty		scl	25	33
			27	34
		cl	30	37
		sicl	35	42
			40	46
fine		sc	45	51
		sic	50	55
			55	60
			60	64
			65	69
			70	73
		c	75	78
			80	82
			85	87
very fine			90	91

a. LL of 15 is the lowest entry to use
b. If LL is <25 or <30, put in bottom limit (i.e 15-25 or 15-30

http://www.mn.nrcs.usda.gov/mo10/mo10guides/liquidlimit.html

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

November 22, 2002

Mr. Jason Deem
Joyce Engineering, Inc.
Henderson Building, Suite 203
2301 West Meadowview Road
Greensboro, North Carolina 27407

Reference: **Material Recovery & Reclamation of High Point**
High Point, North Carolina
Trigon Project Number 013-02-050

Dear Mr. Deem:

Per your request, this letter summarizes the expected range of effective porosity values for the previously tested soil samples provided to us. The range of expected effective porosity values for strata not tested can be estimated based on published correlations (Freeze and Cherry, 1976).

The effective porosity is defined as the ratio of the volume of the voids where the water can circulate to the total volume of the soil. Based on the results of the previously performed laboratory tests, we estimate the effective porosity as follows:

Sample Designation	Total Porosity, %	Expected Range in Effective Porosity, %
P-2	38.5	29 – 33
P-3	32.4	24 – 28

Also attached are the raw permeability laboratory test data, and a corrected laboratory summary sheet indicating the revised USCS soil classification for sample P-1.

Trigon Engineering Consultants, Inc. appreciates the opportunity to continue our services to you on this project. If you have any questions or require additional information, please call.

Respectfully,
TRIGON ENGINEERING CONSULTANTS, INC.

Stephen P. Pistole
Construction Services Manager

Xavier C. Barrett, P.E.
Vice President

SDP/XCB:mos

Laboratory Test Data Summary

Material Recovery and Reclamation of High Point, LLC

Trigon Project Number 013-02-050

Sample No.	Sample Type	Depth	USCS Class.	Unit Weight		Atterberg Limits			Gradation Results									Natural Moisture Content (%)	Total Porosity (%)	Permeability			
									Percent Passing												Unit Weight (pcf)		
				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	Wet	Dry	cm/sec
P-1	SS	0-2'	SC-SM	--	--	19	13	6	100.0	100.0	100.0	100.0	100.0	98.0	73.6	45.4	35.5	--	--	--	--	--	--
P-2	UD	7-9'	SC	--	--	37	22	15	100.0	100.0	100.0	100.0	100.0	97.5	70.9	43.0	35.7	25.2	38.5	25.2	126.4	101.0	$9.58\ E^{-8}$
P-3	Bulk	0-10'	SC	120.2	12.0	36	23	13	100.0	100.0	100.0	100.0	98.8	95.1	67.3	45.4	37.0	--	32.4	10.3	127.5	115.6	$8.76\ E^{-8}$
P-3	SS	4.5-6.5	SC	--	--	35	24	11	100.0	100.0	100.0	100.0	100.0	95.3	67.5	44.9	36.6	--	--	--	--	--	--
P-13	SS	5-7'	SM	--	--	22	21	1	100.0	100.0	100.0	100.0	99.6	91.9	51.3	31.1	24.1	--	--	--	--	--	--
P-14	SS	10-11'	CL	--	--	32	23	9	100.0	100.0	100.0	100.0	99.8	98.4	92.6	77.9	55.0	--	--	--	--	--	--
P-15D	UD	5-7'	ML	--	--	35	34	1	100.0	100.0	100.0	100.0	100.0	99.6	97.6	88.5	76.3	--	--	--	--	--	--

TRIGON ENGINEERING CONSULTANTS, INC.

M10

CONSTANT HEAD PERMEABILITY TEST

OJECT: 013-02-050
B No.:
t:

Boring No.: P-2
Sample Depth: 7.0-9.0
Sample Type:
Soil Description:

mple Dimensions
am.: 2.85
ea (A): 6.38 41.16 cm²
ngth (L): 3.0 7.62 cm

Moisture Content
Pre-Test:
Post-Test:
Unit Wt. (wet):
Unit Wt. (dry):

K= QL/Aht $K = \frac{Q}{t}\left(\frac{L}{(A)(h)(H)}\right)$ $K = \frac{Q}{t}\left(\frac{7.62}{(2)(41.16)(70.31)}\right)$ $K = \frac{Q}{t}(1.32 \times 10^{-3})$

st	Date	Hour	Q (cm^3)	Time (min)	t (sec)	Head (H) (psi)	Head (h) cm H_2O	Permeability (K)
		8:50	8.1 8.2			2	70.31 = 1 psi	
		9:50	8.4					
	→	.3	60	3600			K = 1.10 E-7 ✓	
	→							
		10:50	8.6					
	→	.5	120	7200			K = 9.17 E-8 ✓	
	→							
		11:50	8.8					
	→	.7	180	10800			K = 8.56 E-8 ✓	
	→							
							AVG	K = 9.56 E-8 ✓

K_{ave} =

TRIGON ENGINEERING CONSULTANTS, INC.

CONSTANT HEAD PERMEABILITY TEST

ROJECT: 013-02-050
OB No.:
a[redacted]

Boring No.: P-3
Sample Depth:
Sample Type:
Soil Description:

ample Dimensions
iam.: 2.85
rea (A): 6.38
ength (L): 3.0

Moisture Content
Pre-Test: 10.3
Post-Test:
Unit Wt. (wet): 127.5
Unit Wt. (dry): 115.6

R

K= QL/Aht

est	Date	Hour	Q (cm^3)	Time (min)	t (sec)	Head (H) (psi)	Head (h) cm H_2O	Permeability (K)
		7:25	15.8 14			2	70.31 = 1psi	
		8:35	16.0				140.62 = 2psi	
	→		.2	60	3600			K = 7.33 E-8 ✓
	→							
		9:35	16.2					
	→		.5	120	7200			K = 9.17 E-8 ✓
	→							
		10:35	16.5					
			.8	180	10800			K = 9.77 E-8 ✓
							AVG	K = 8.76 E-8

K_{ave} =

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. Jason Deer
Joyce Engineering, Inc.
Henderson Building, Suite 203
2301 West Meadowview Road
Greensboro, NC 27407

Date: 12/10/02
Regular Mail: X
Express Mail:
Federal Express:
Hand Carried:
Other:

COPIES	DESCRIPTION
1	Grain Size Distribution

Comments:

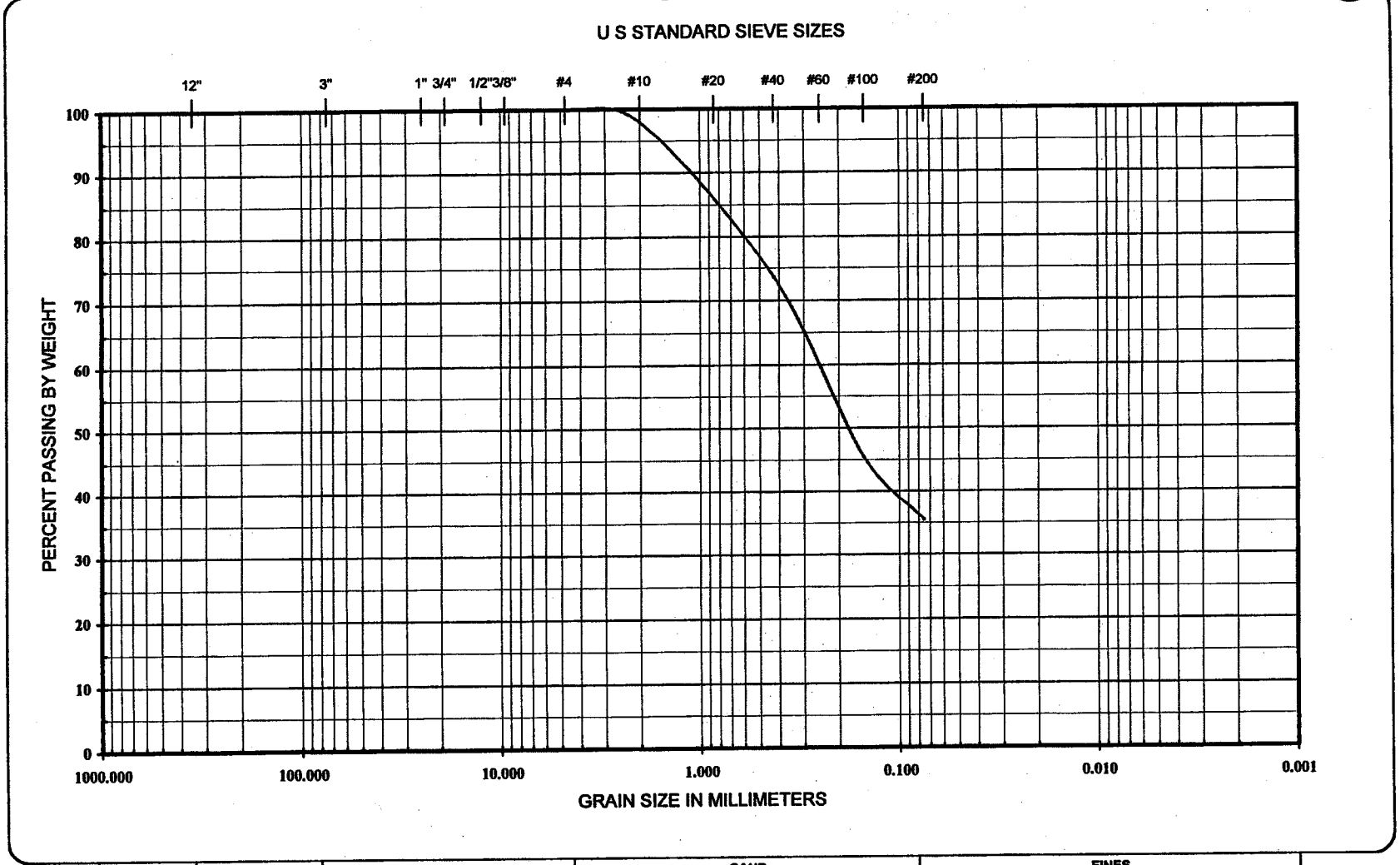
Please find the Grain Size Distribution results for Material Recovery and Reclamation of High Point, LLC.

If you should have any questions, feel free to contact me at (336) 668-0093.

Xavier Barrett

Xavier C. Barrett, P.E.

TRIGON JOB NO.: 013-02-050



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-1	0-2'		19	13	6	Silty Sand Grey & Tan Clayey SAND SC-SM A-2-4/A-4

GRAIN SIZE DISTRIBUTION

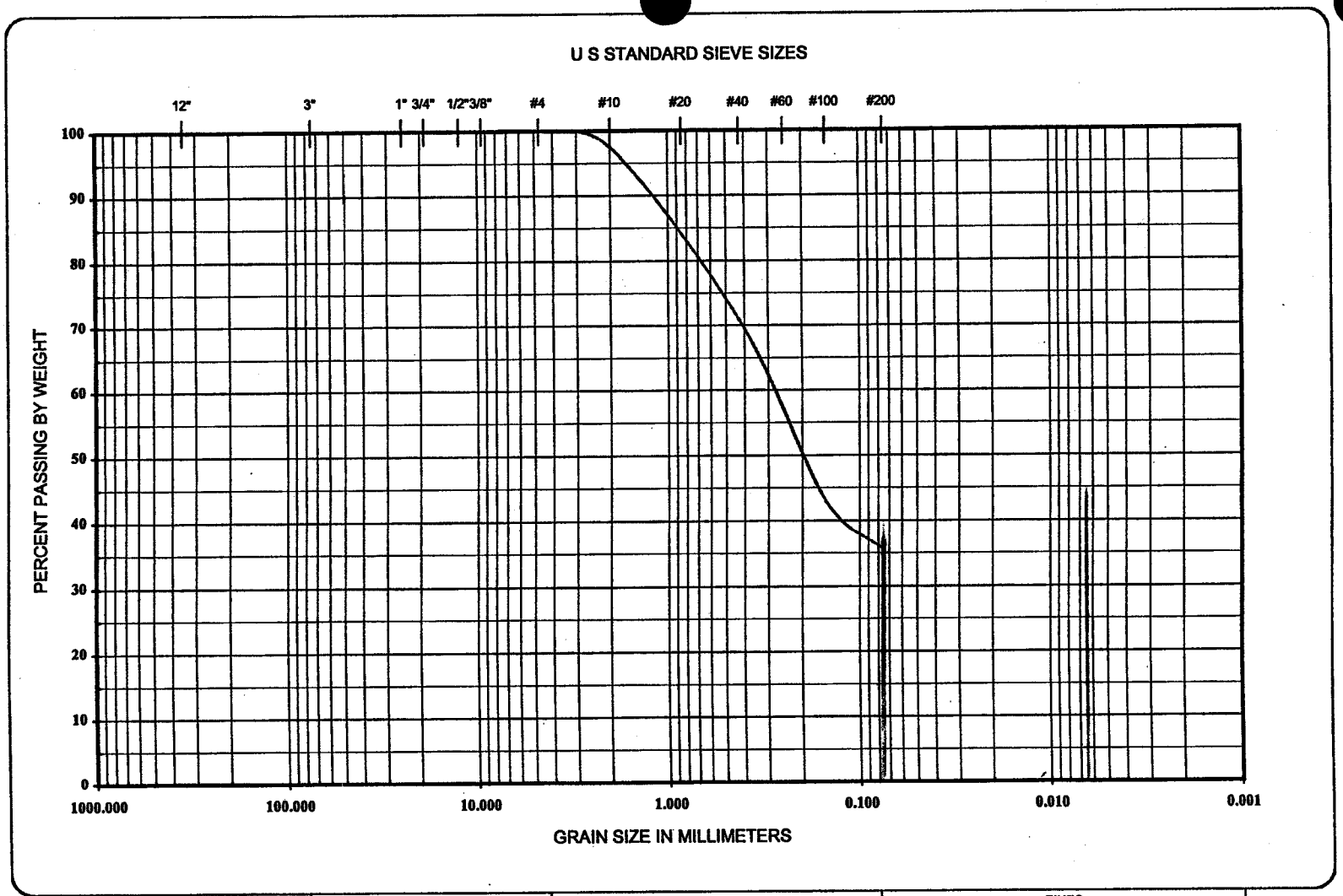
Material Recovery and Reclamation of High Point, LLC

Trigon Project Number 013-02-050

Date 3/29/2002

(Revised 12/9/02)

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-2 UD	7-9'		37	22	15	Grey & Tan Clayey SAND SC A-2-6 / A-6

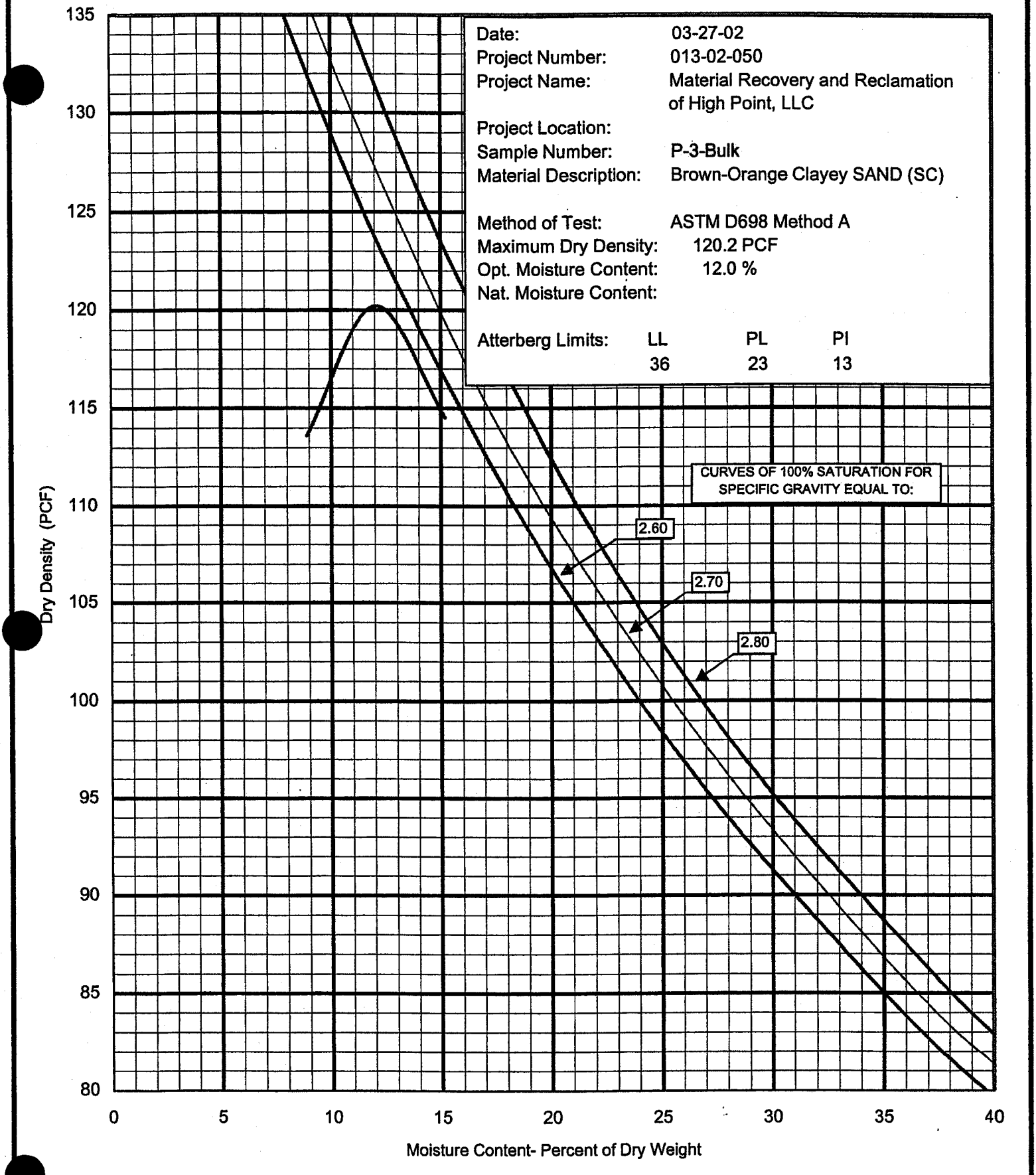
GRAIN SIZE DISTRIBUTION

Material Recovery and Reclamation of High Point, LLC

Trigon Project Number 013-02-050

Date 3/29/02

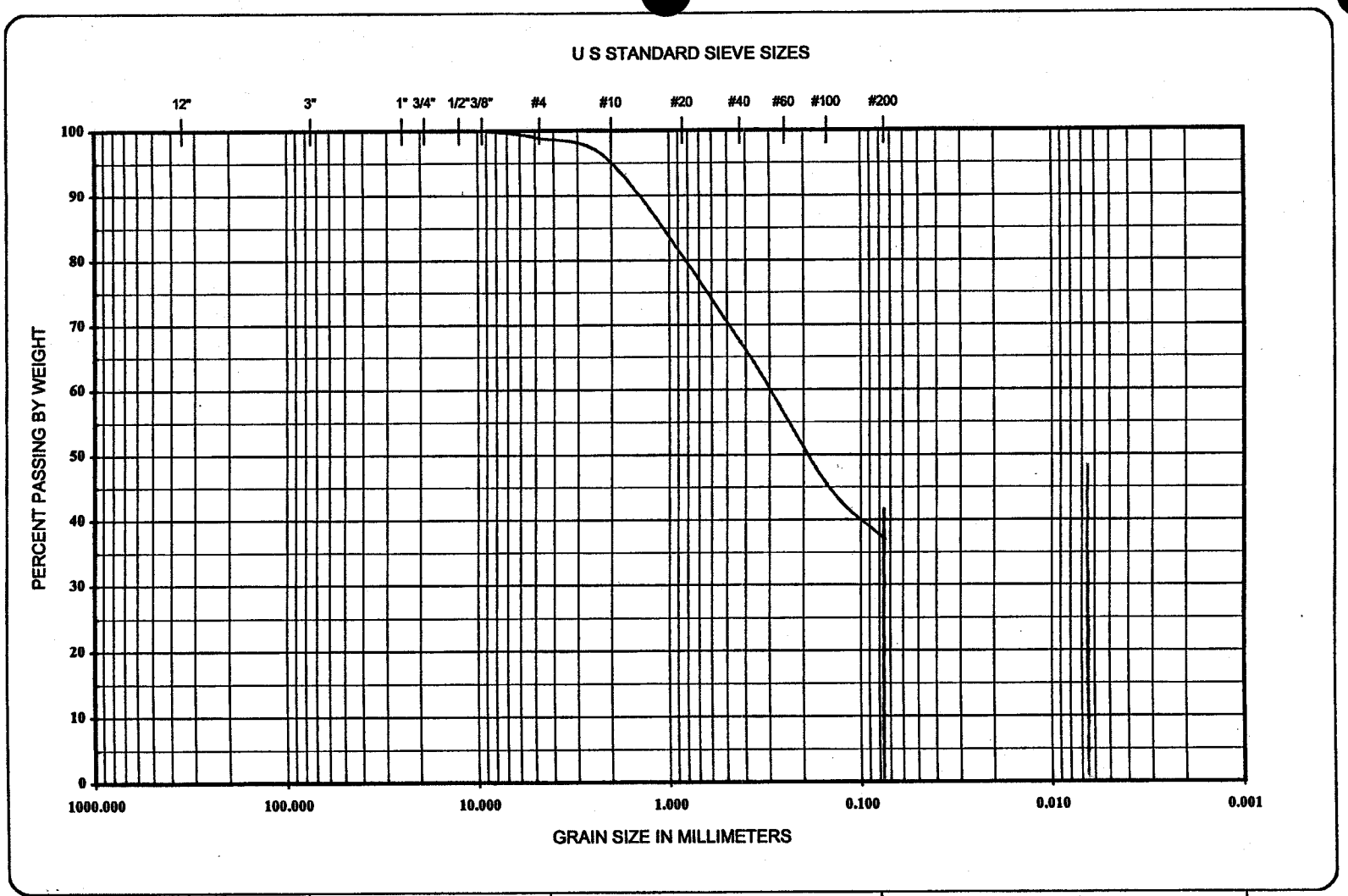
TRIGON



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-3 Bulk	0-10'		36	23	13	Brown-Orange Clayey SAND SC A-6

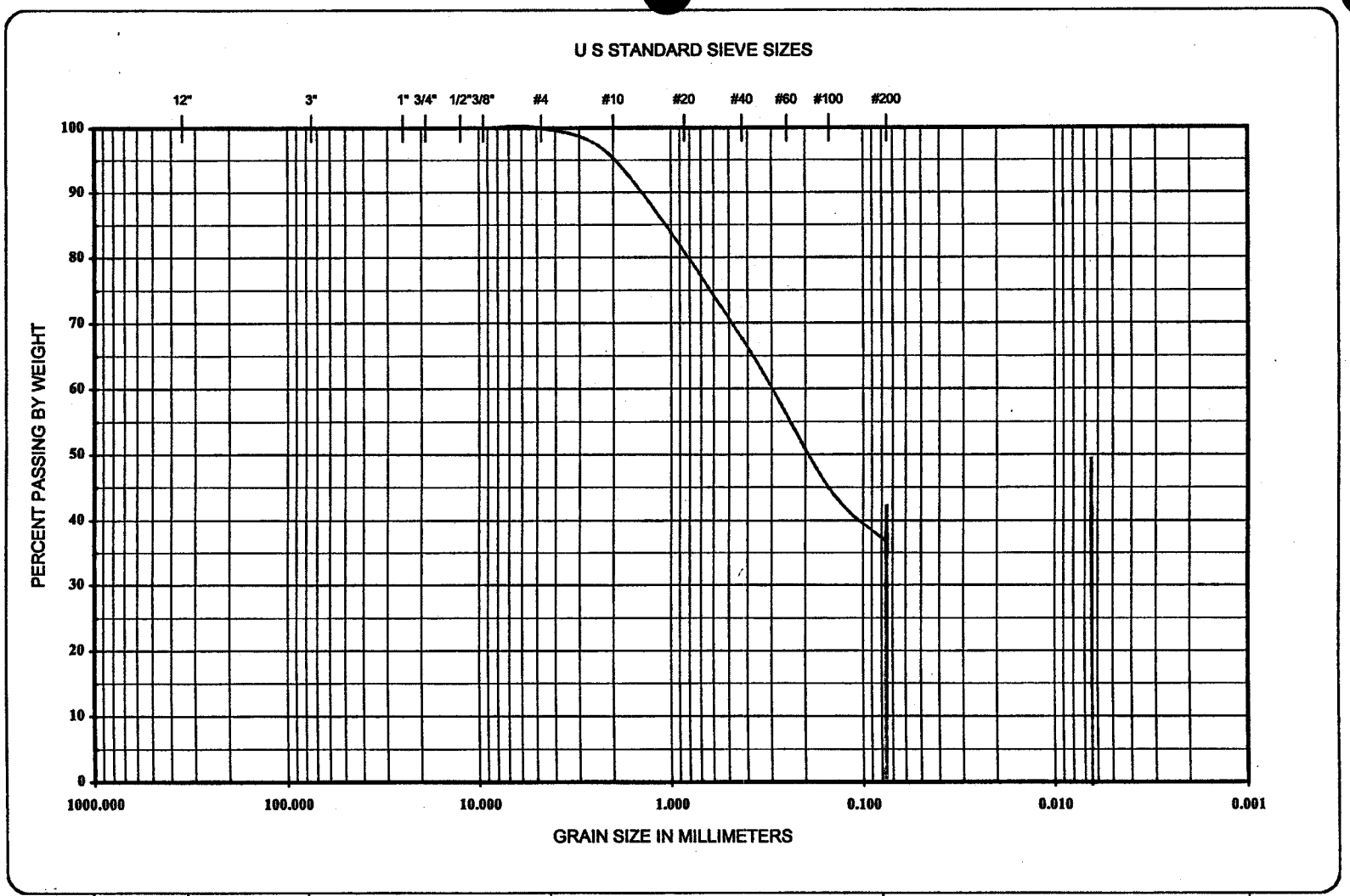
GRAIN SIZE DISTRIBUTION

Material Recovery and Reclamation of High Point, LLC

Trigon Project Number 013-02-050

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-3 SS	4.5-6.5'		35	24	11	Brown-Orange Clayey SAND SC A-6

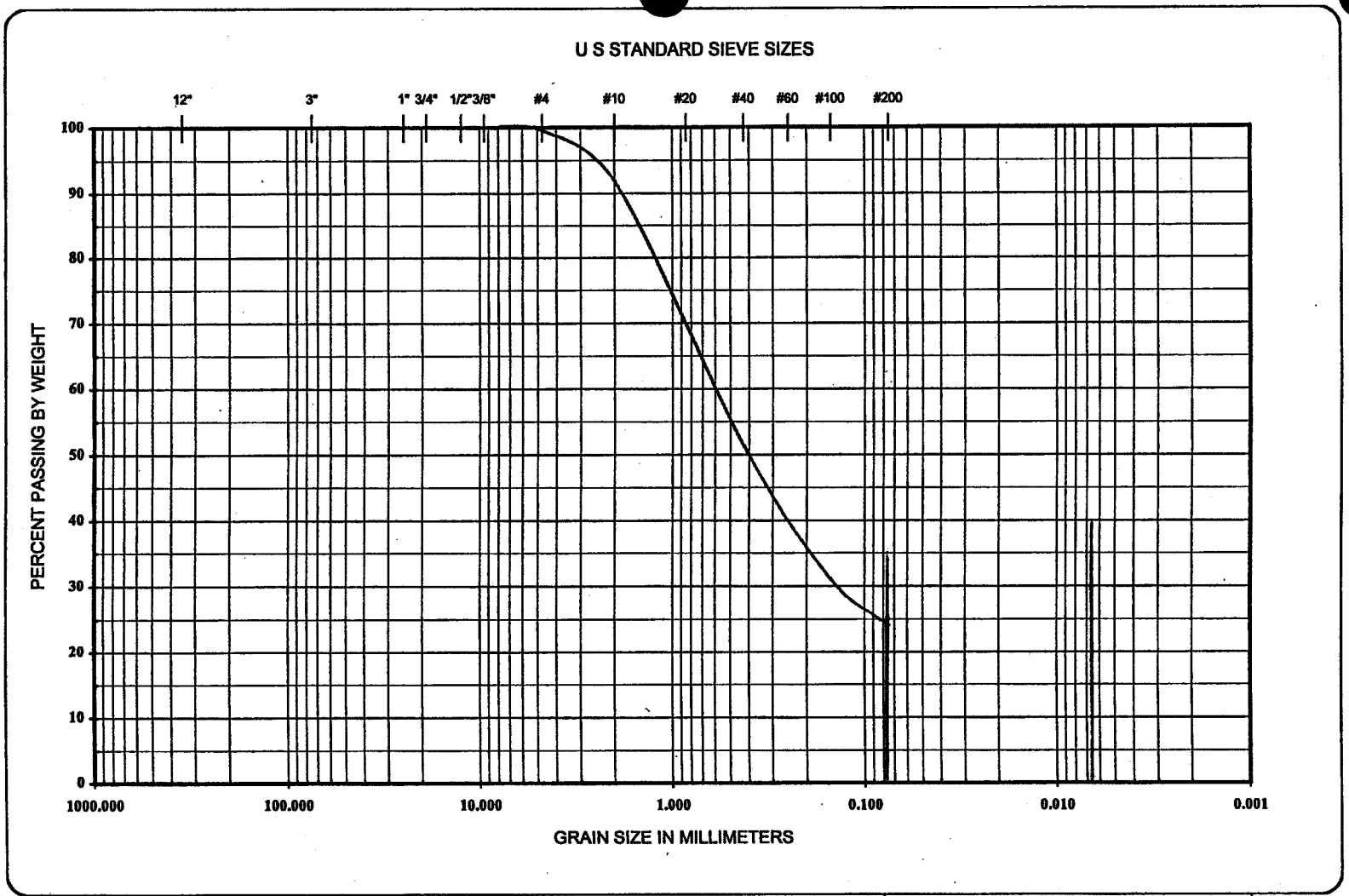
GRAIN SIZE DISTRIBUTION

Material Recovery and Reclamation of High Point, LLC

Trigon Project Number 013-02-050

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-13	5-7'		22	21	1	Tan Silty SAND SM A-2-4

GRAIN SIZE DISTRIBUTION

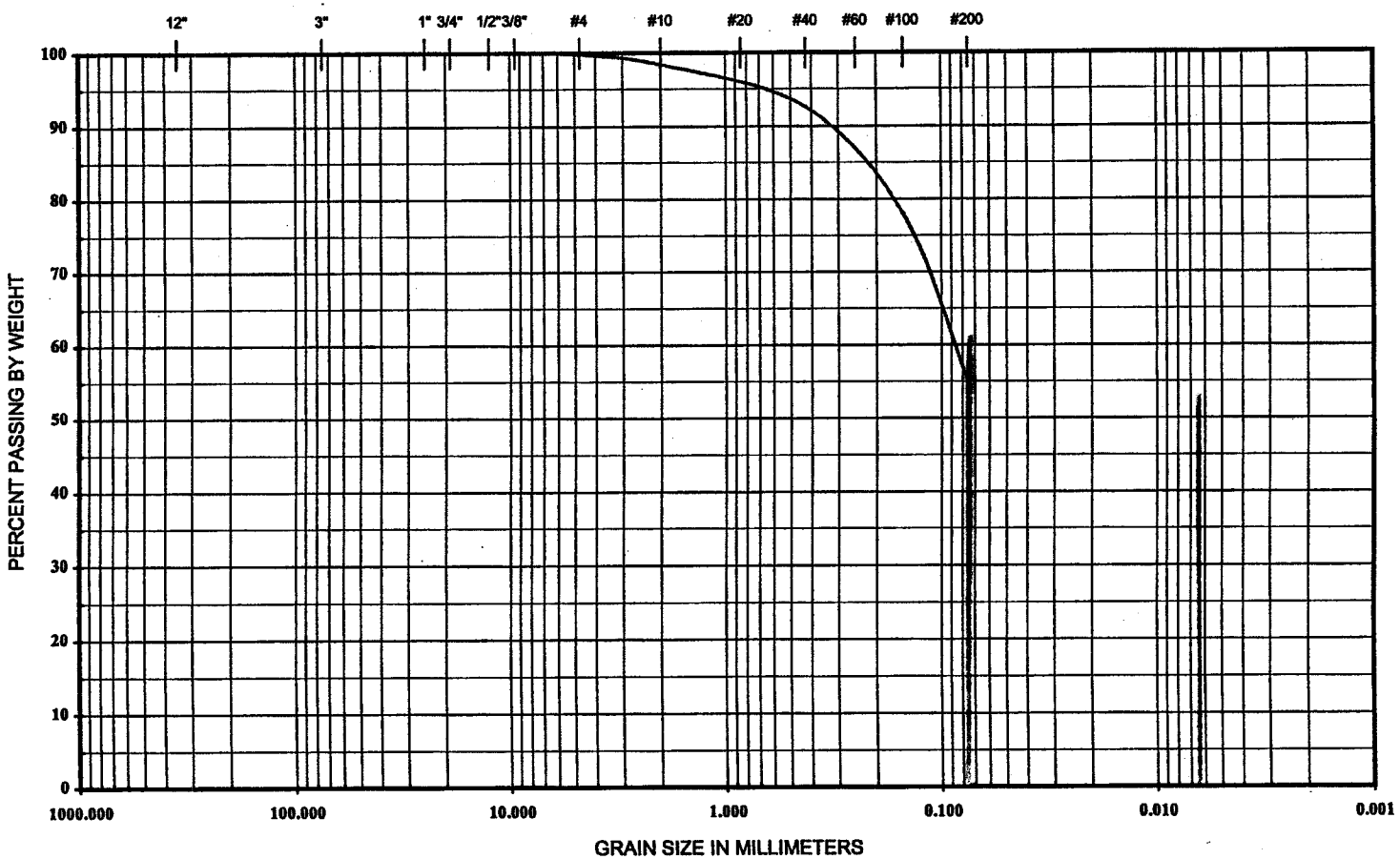
Material Recovery and Reclamation of High Point, LLC

Trigon Project Number 013-02-050

Date 3/29/02

TRIGON

U S STANDARD SIEVE SIZES



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-14	10-11'		32	23	9	Grey-Brown Sandy Lean CLAY CL A-4

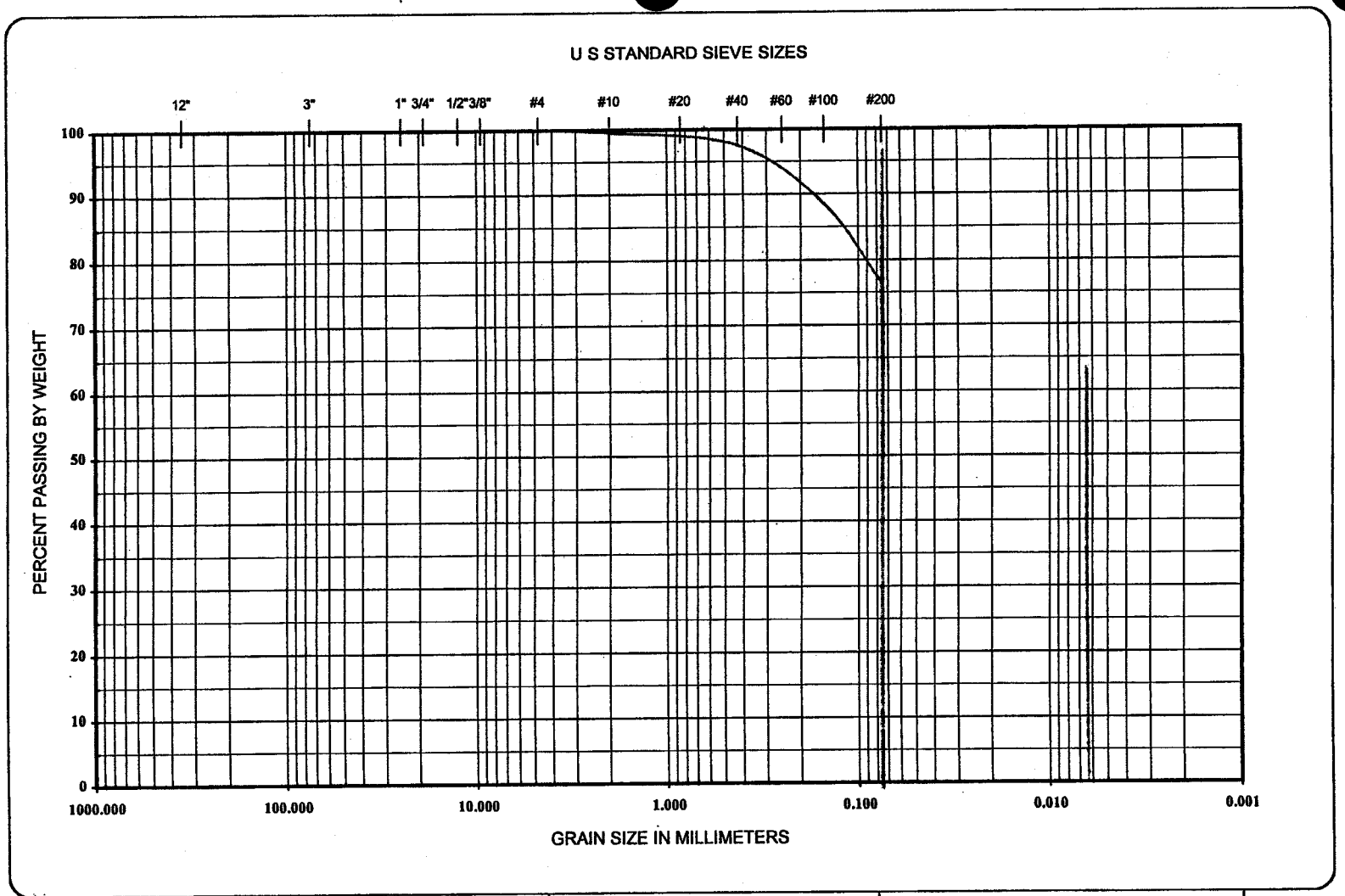
GRAIN SIZE DISTRIBUTION

Material Recovery and Reclamation of High Point, LLC

Trigon Project Number 013-02-050

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-15	5-7		35	34	1	Dark Grey Sandy SILT ML A-4

GRAIN SIZE DISTRIBUTION

Material Recovery and Reclamation of High Point, LLC

Trigon Project Number 013-02-050

Date 3/29/02

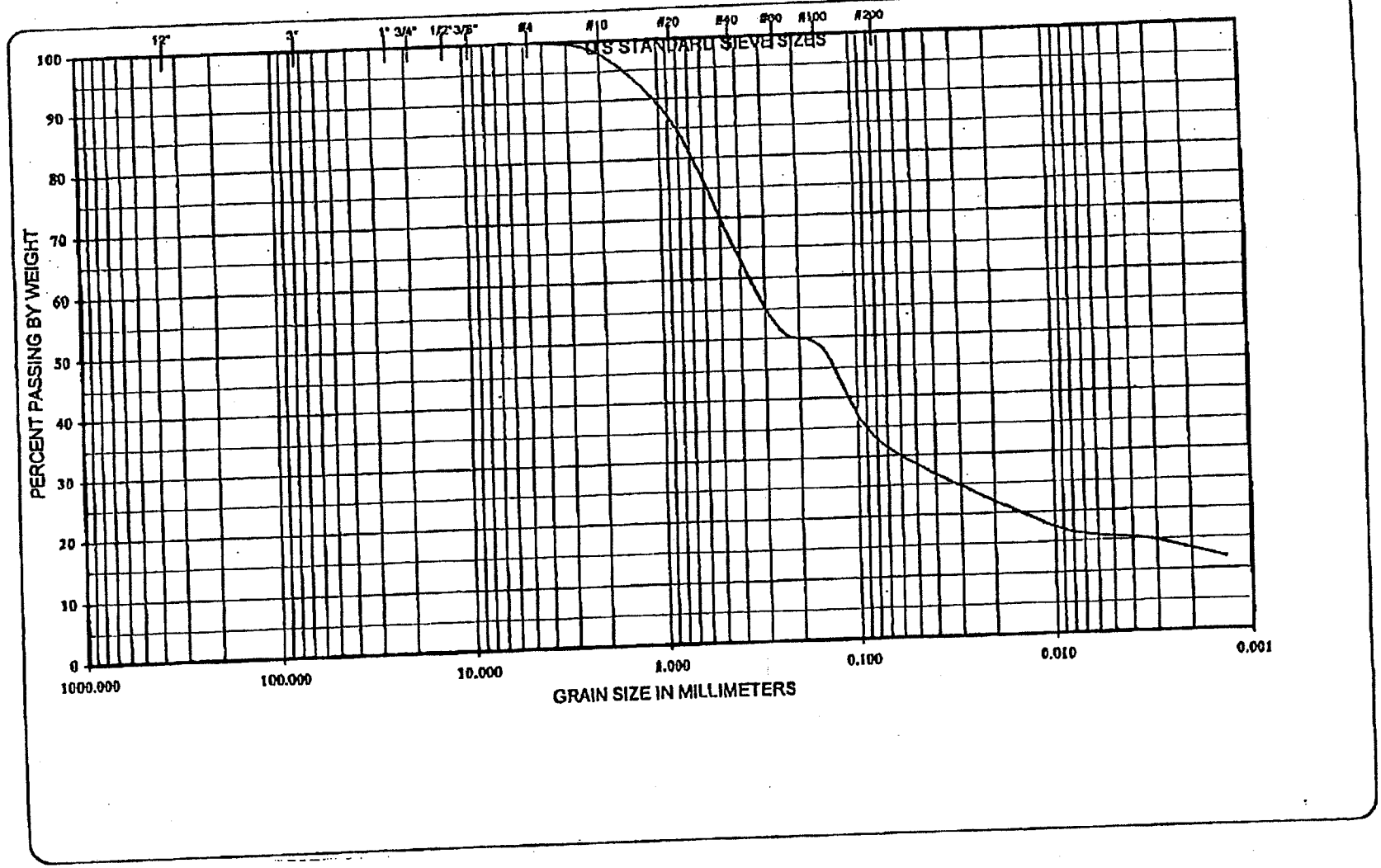
TRIGON

Laboratory Test Data Summary

Material Recovery and Reclamation of High Point, LLC

Trigon Project Number 013-02-050

Sample No.	Sample Type	Depth	USCS Class.	Unit Weight		Atterberg Limits			Gradation Results									Natural Moisture Content (%)	Clay Content (%)	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)		cm/sec
																					Wet	Dry	
P-13	Bulk	0-2'	SM						100.0	100.0	100.0	100.0	100.0	97.9	64.9	48.1	32.2		14.5				
P-19	Bulk	5-7'	SM						100.0	100.0	100.0	100.0	97.3	79.9	45.5	26.5	19.3		9.4				



BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
P-13	Bulk	0.0-2.0					Light Brown Clayey Medium to Fine SAND

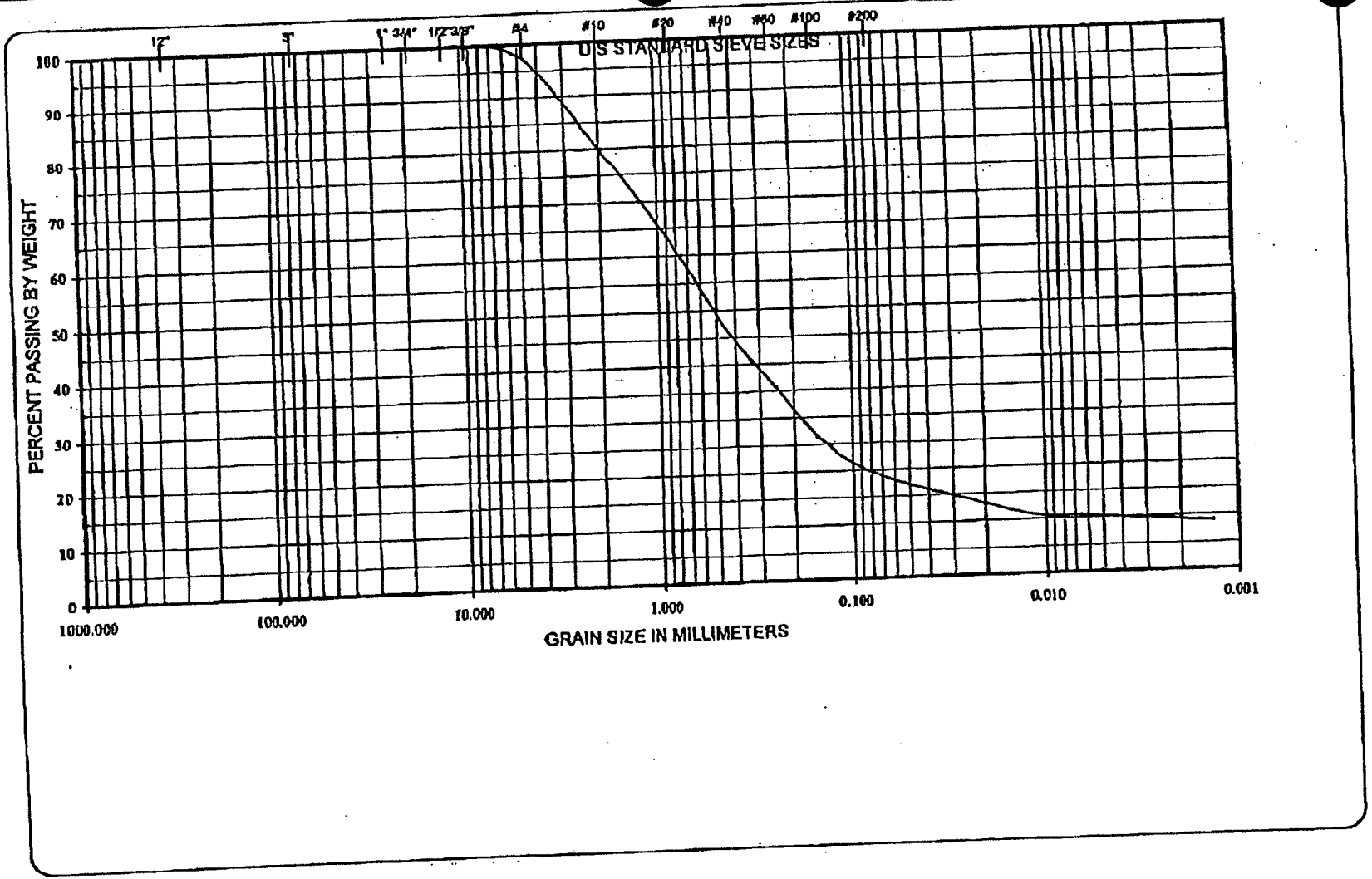
GRAIN SIZE DISTRIBUTION

MRR of High Point, LLC

013-02-050

2/10/2003

TRIGON



BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
P-19	Bulk	5.0-7.0					Light Brown Clayey Medium to Fine SAND

GRAIN SIZE DISTRIBUTION

MRR of High Point, LLC

013-02-050

2/10/2003

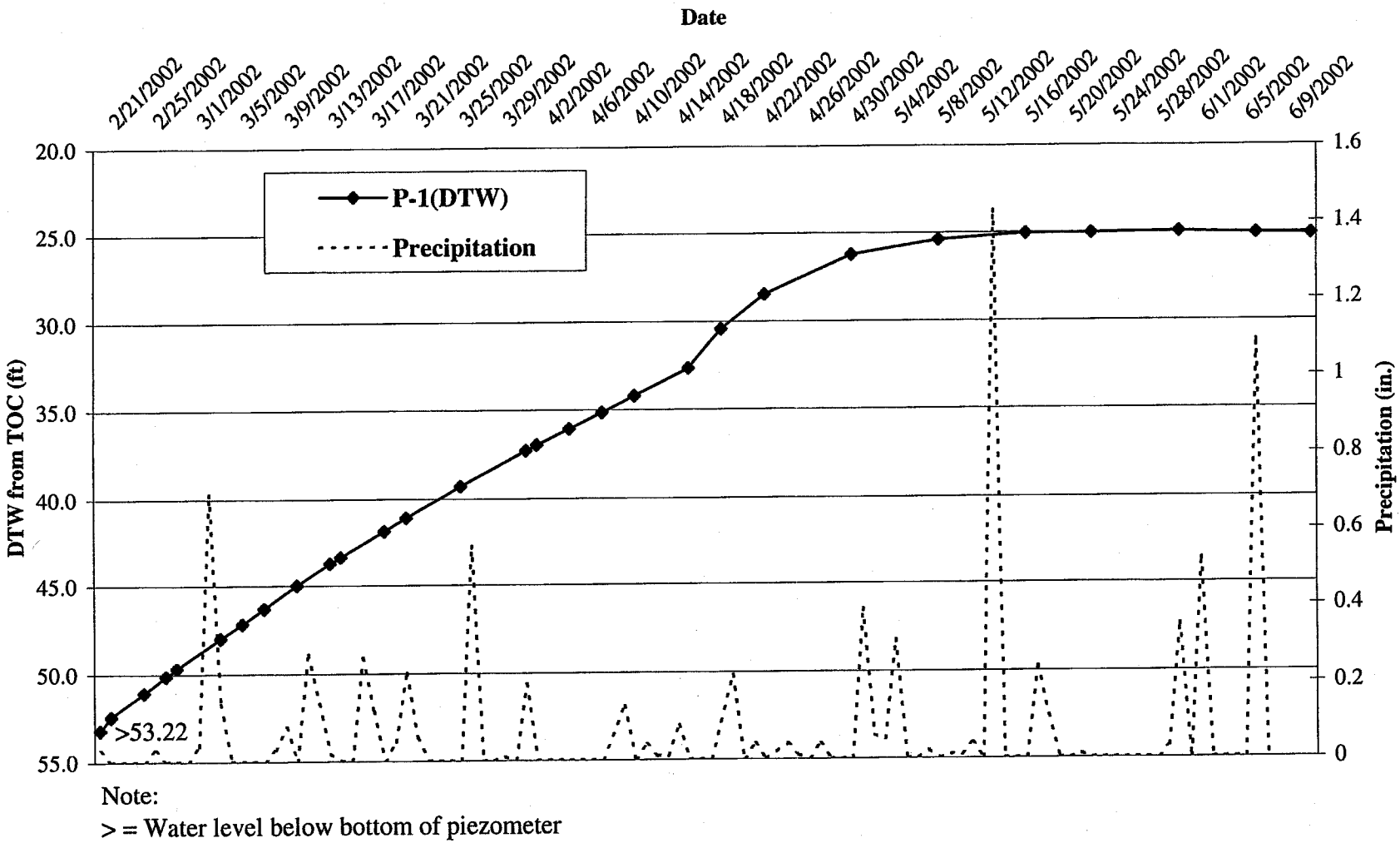
TRIGON

APPENDIX 10

Water Level Hydrographs for Piezometer and Test Pits

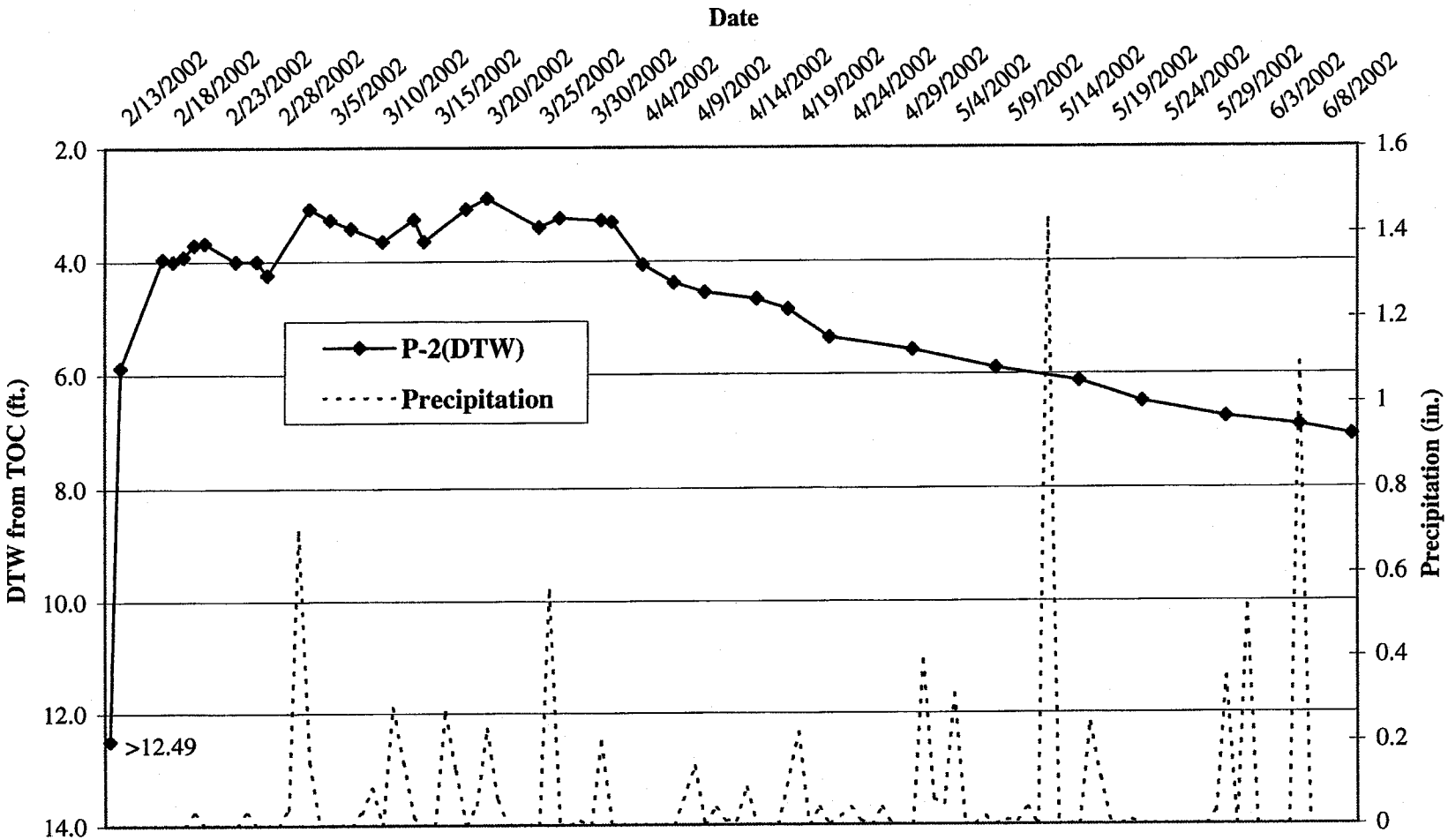
PIEZOMETER WATER LEVEL AND PRECIPITATION TRENDS

Water Level and Precipitation Trends
P-1



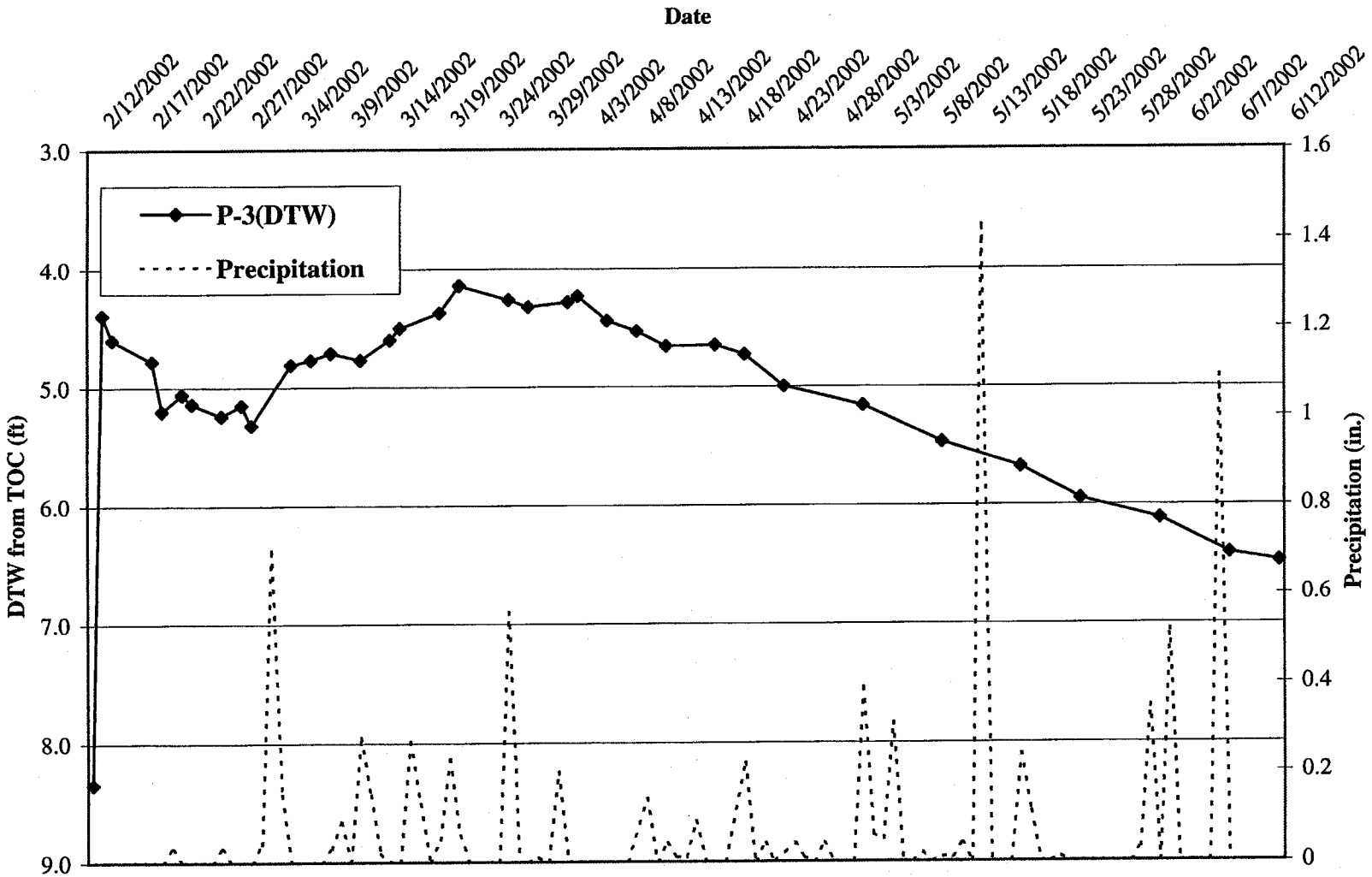
Note:
> = Water level below bottom of piezometer

Water Level and Precipitation Trends
P-2

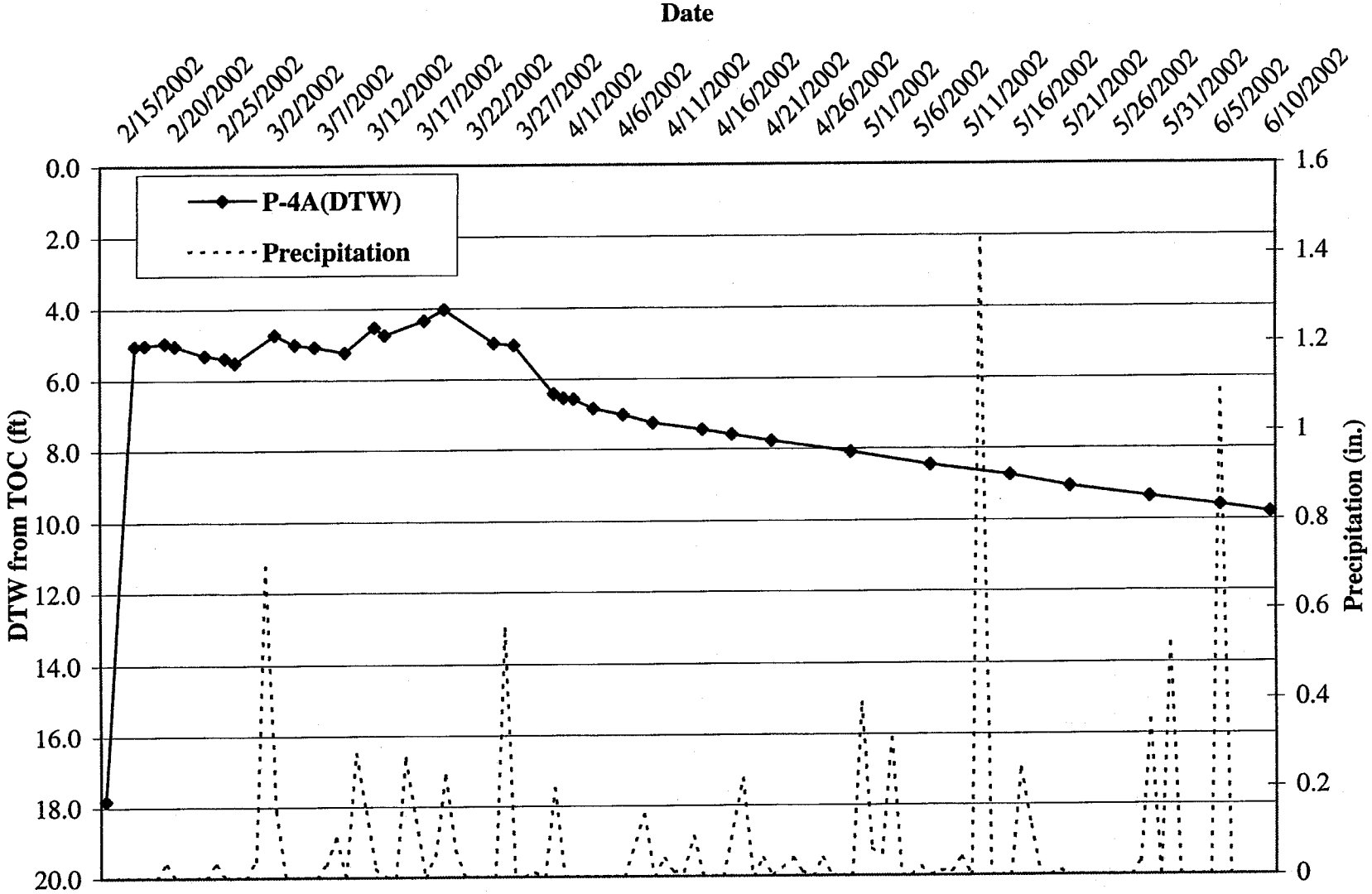


Note:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
P-3



Water Level and Precipitation Trends
P-4A



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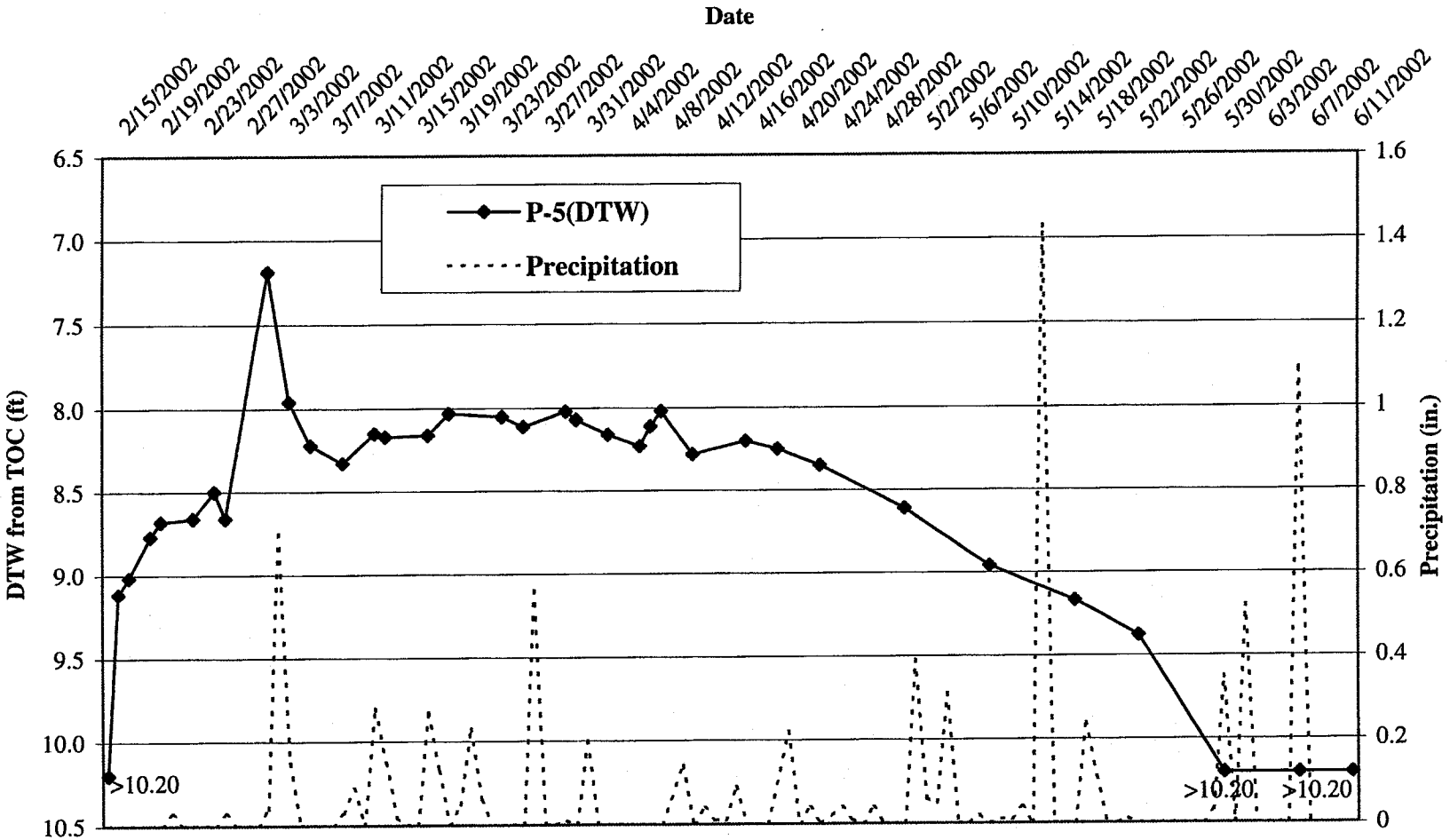
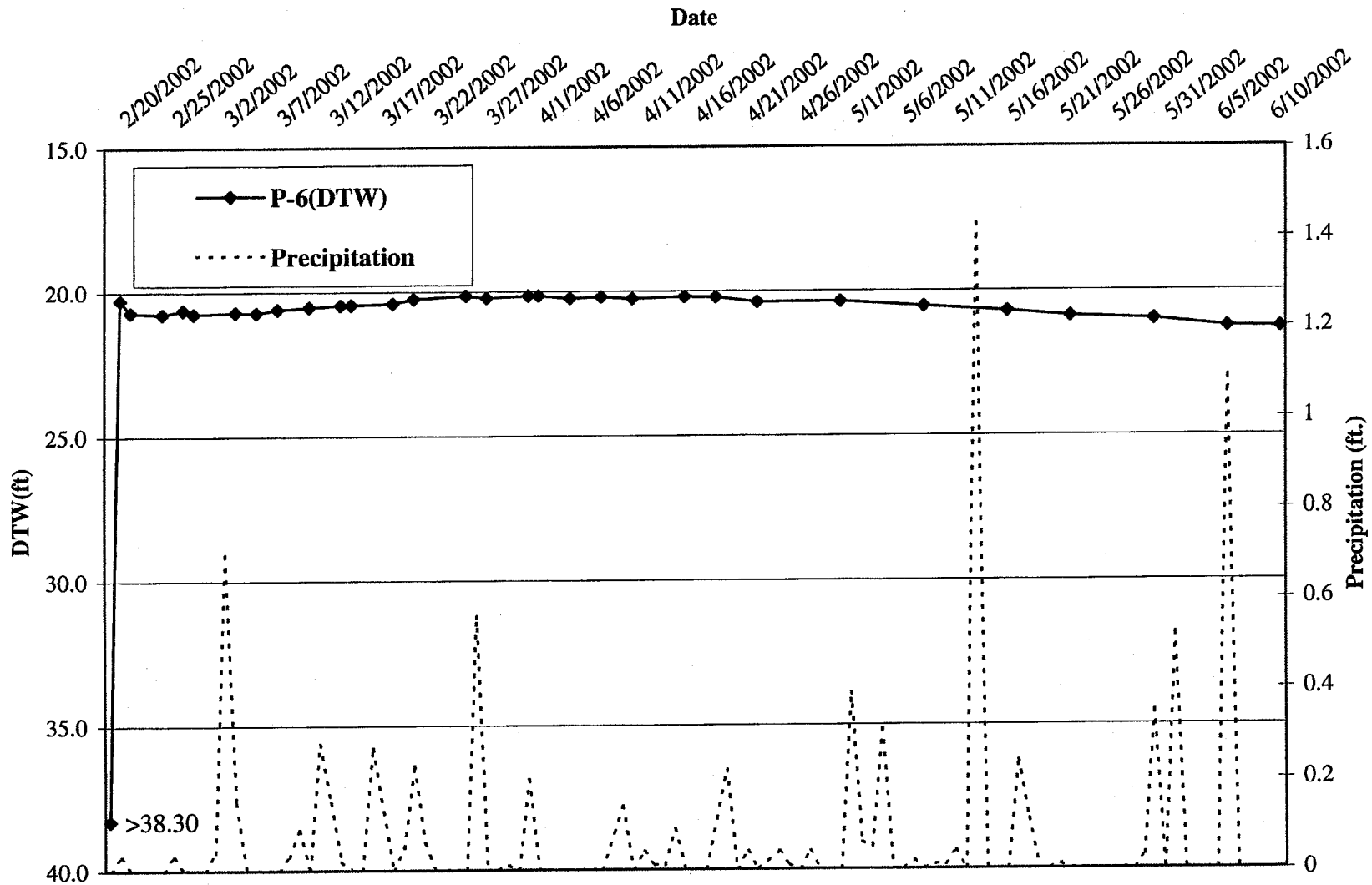
Water Level and Precipitation Trends
P-5



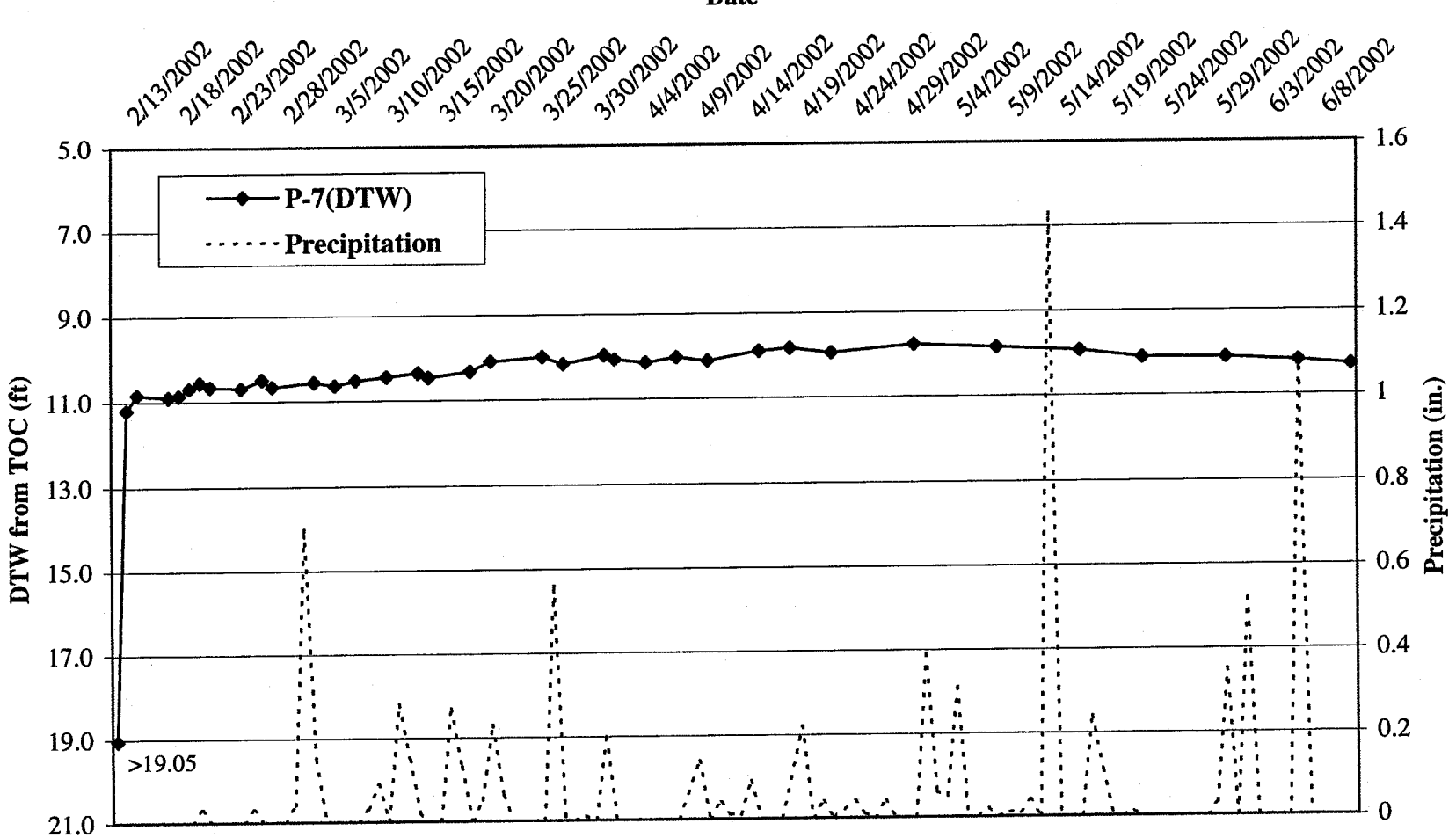
Notes:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
P-6



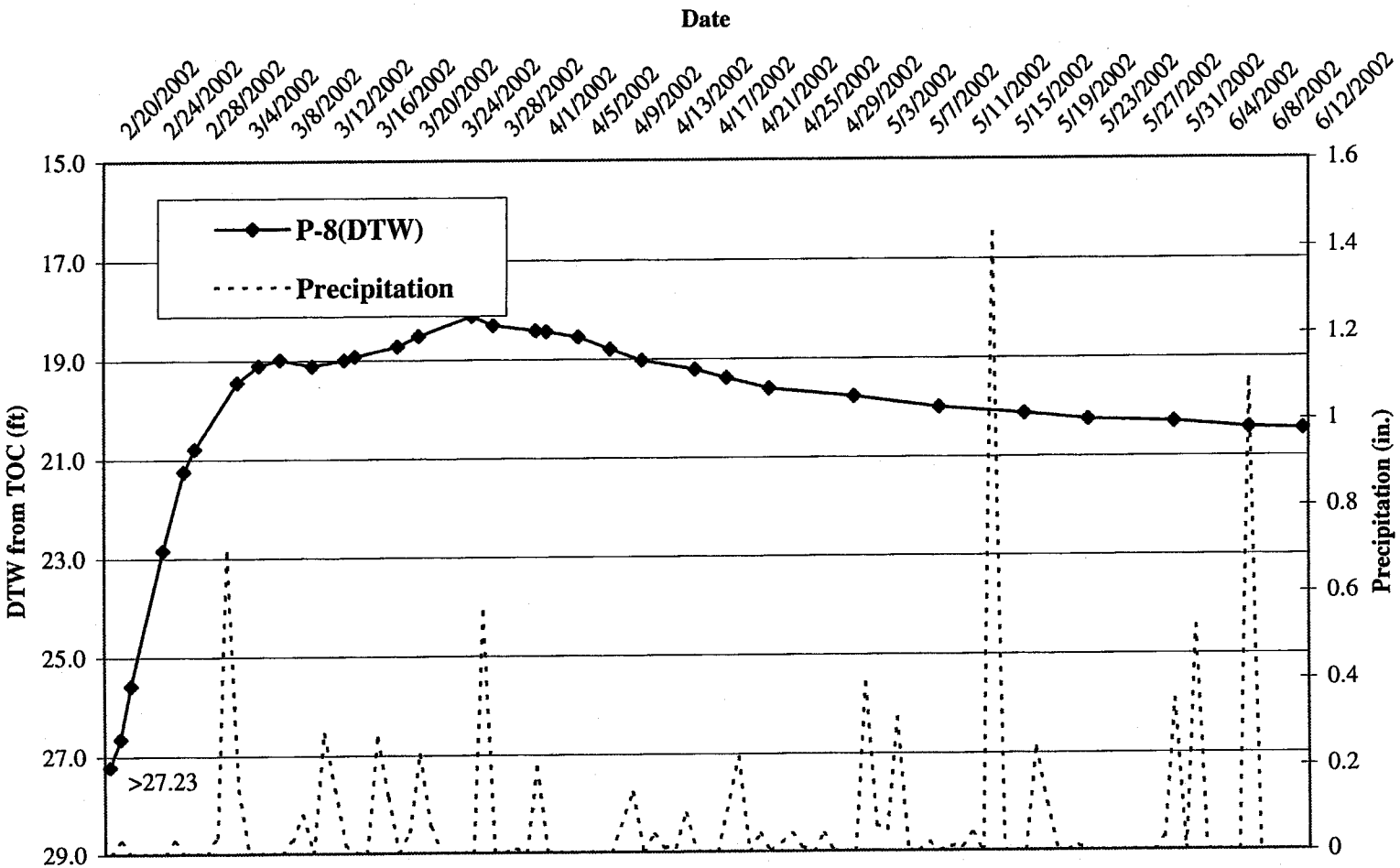
Notes:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
P-7



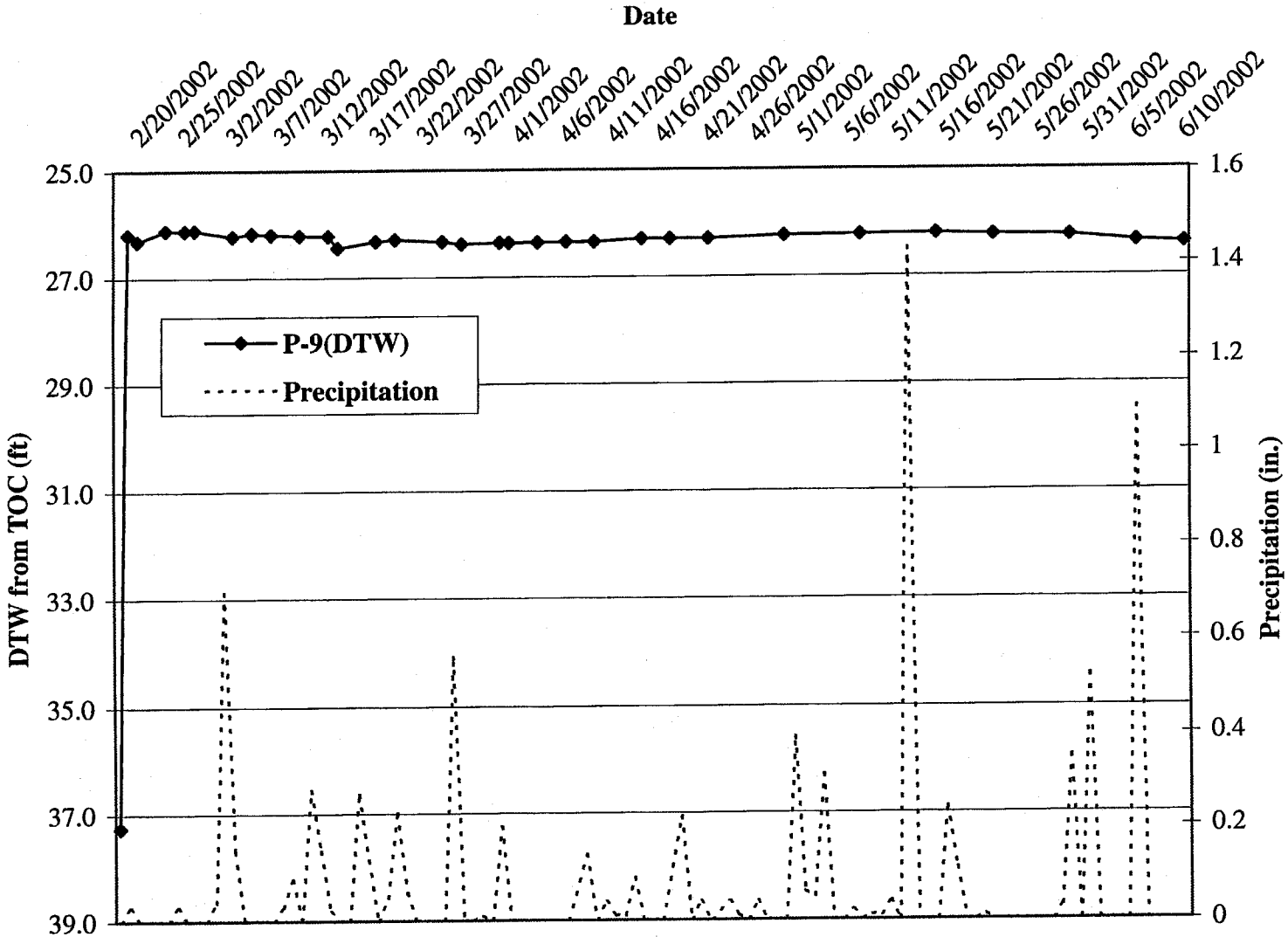
Note:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
P-8

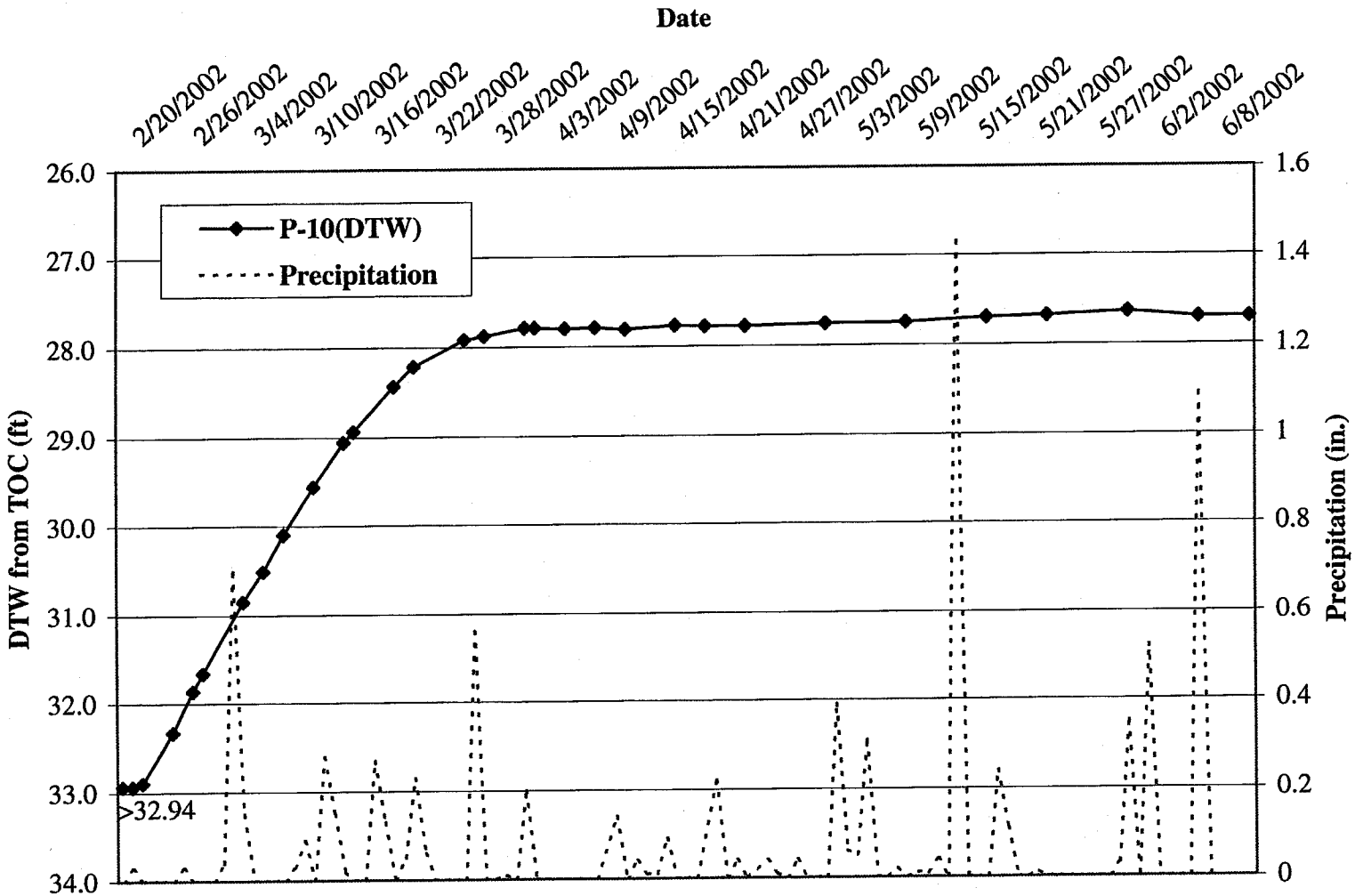


Note:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
P-9

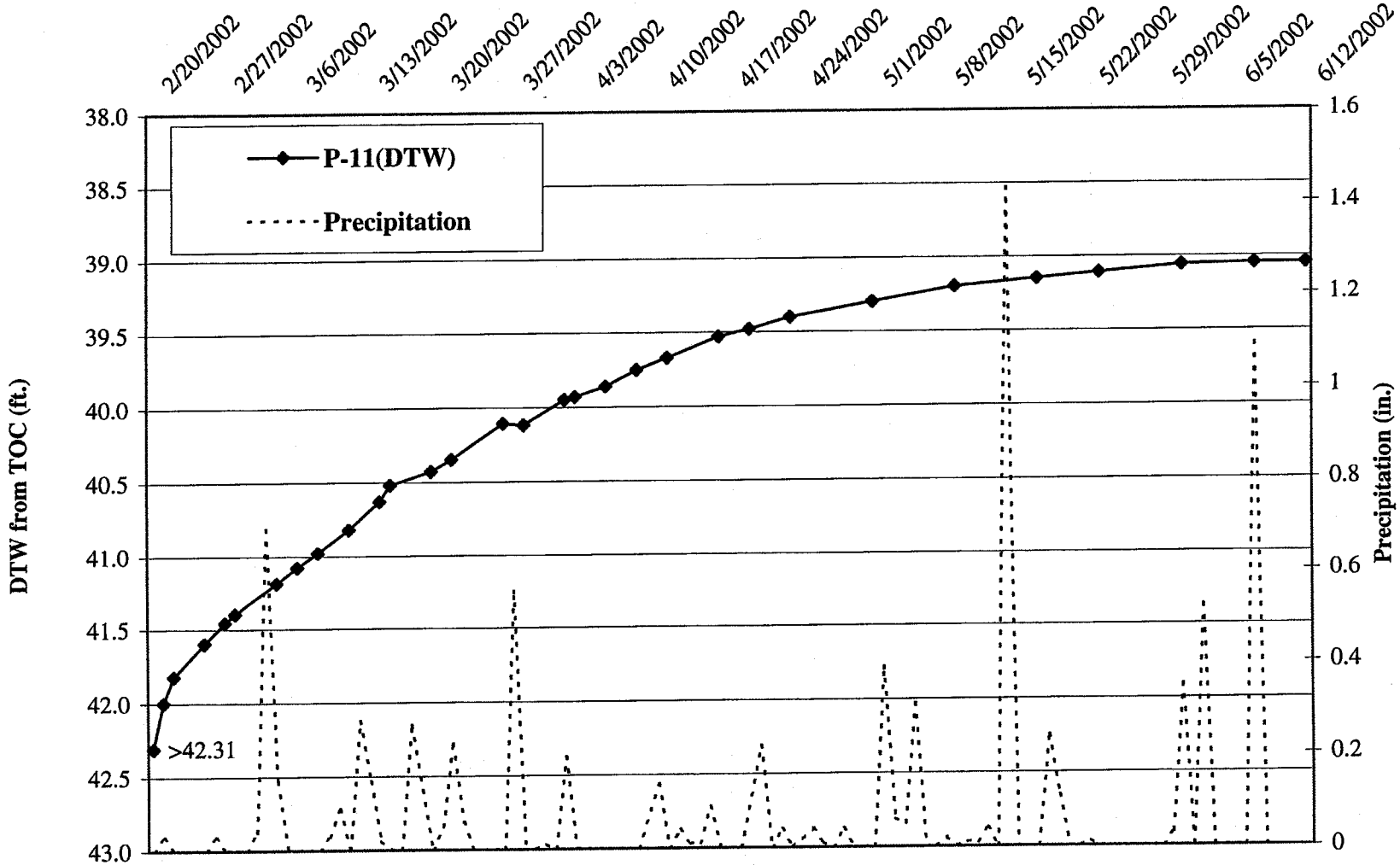


Water Level and Precipitation Trends
P-10



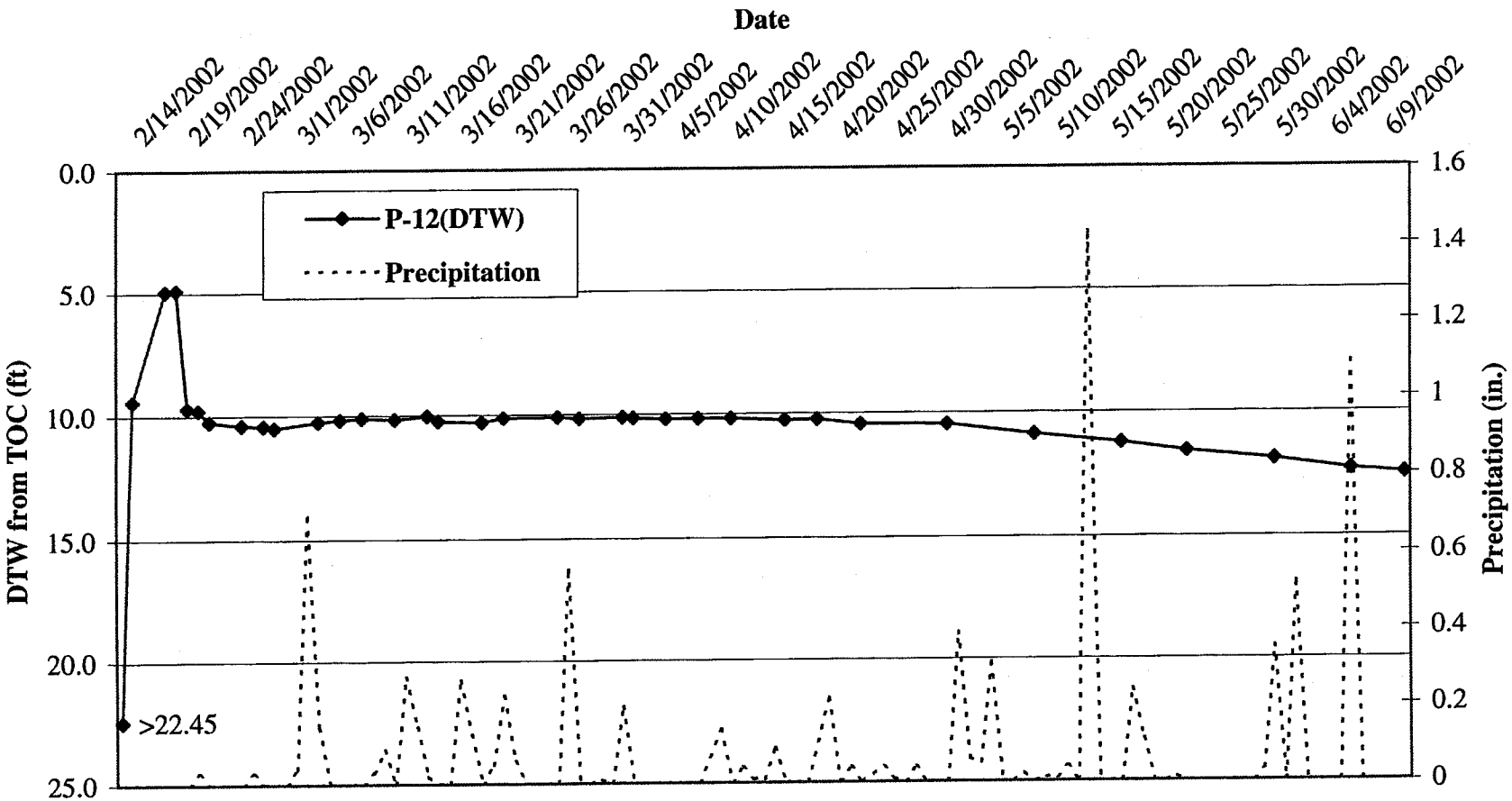
Note:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
P-11



Note:
> = Water level below depth to bottom of piezometer

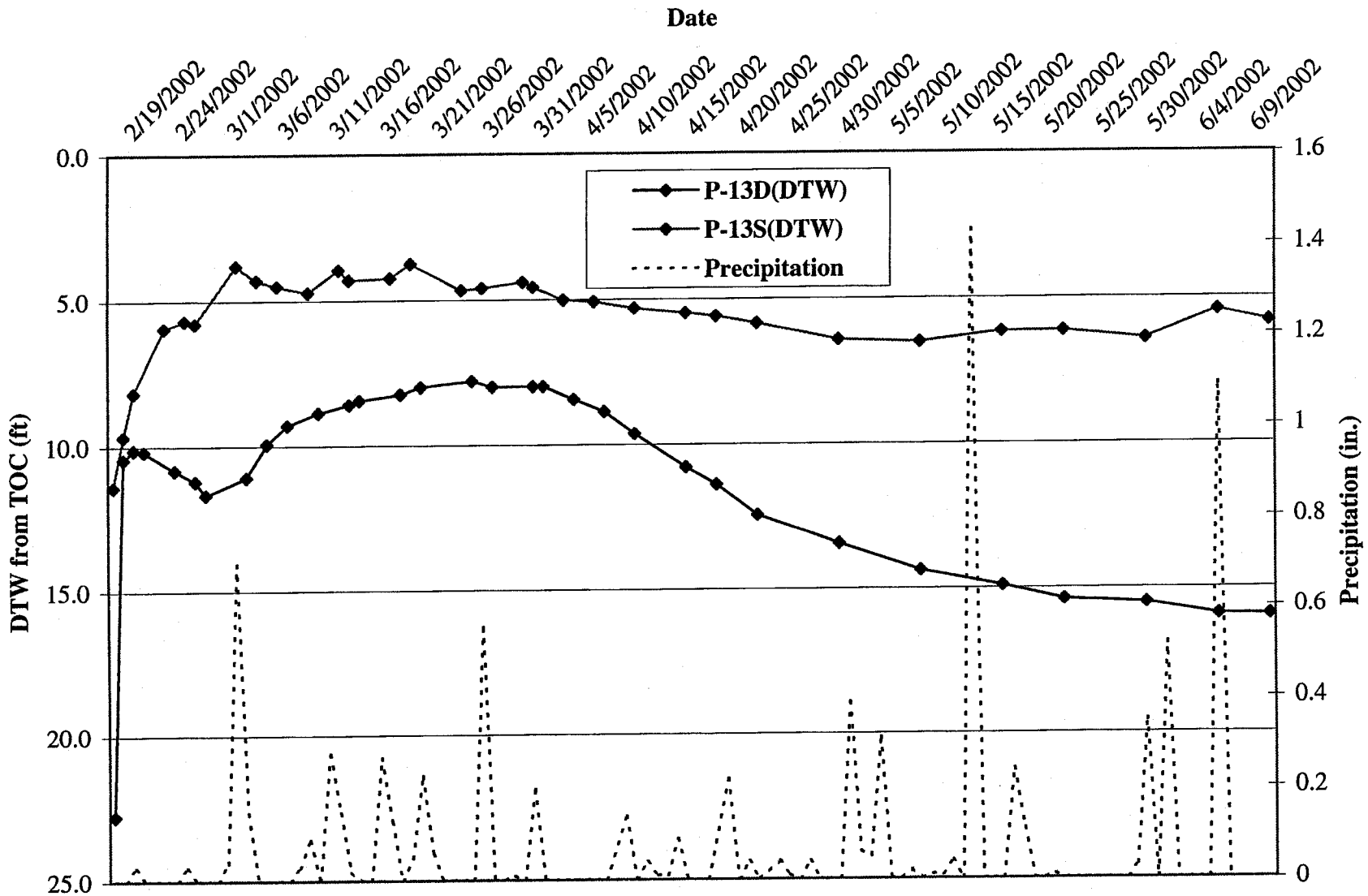
Water Level and Precipitation Trends
P-12



Notes:

1. Green line represents DTW after auger refusal was reached at 10 feet on 02/14/02 (water levels adjusted to reference point at TOC).
2. Blue line represents DTW after borehole was advanced to 20 feet with air rotary rig on 02/19/02 and well was installed.
3. > = Water level below depth to bottom of piezometer.

Water Level and Precipitation Trends
P-13S and P-13D



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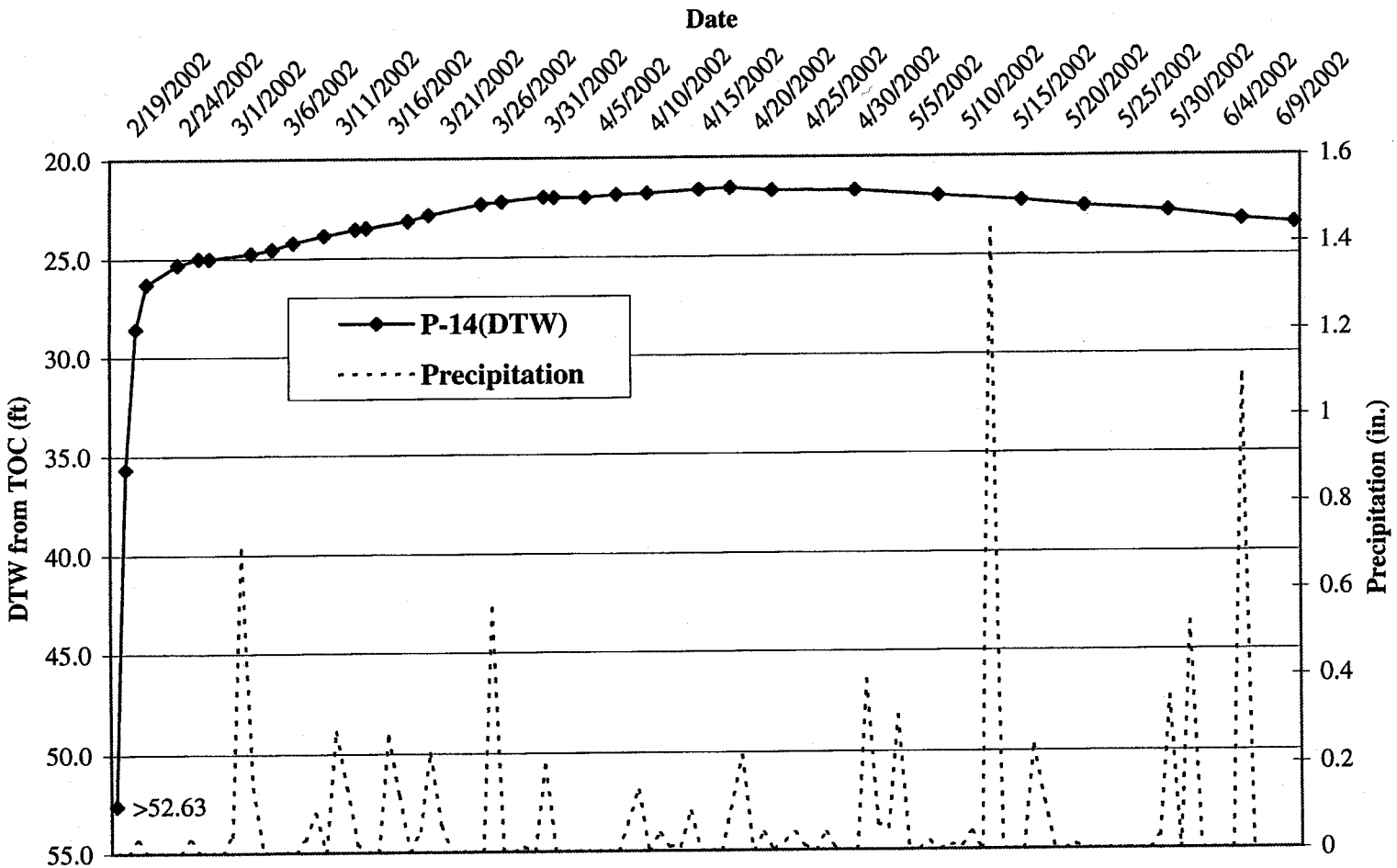
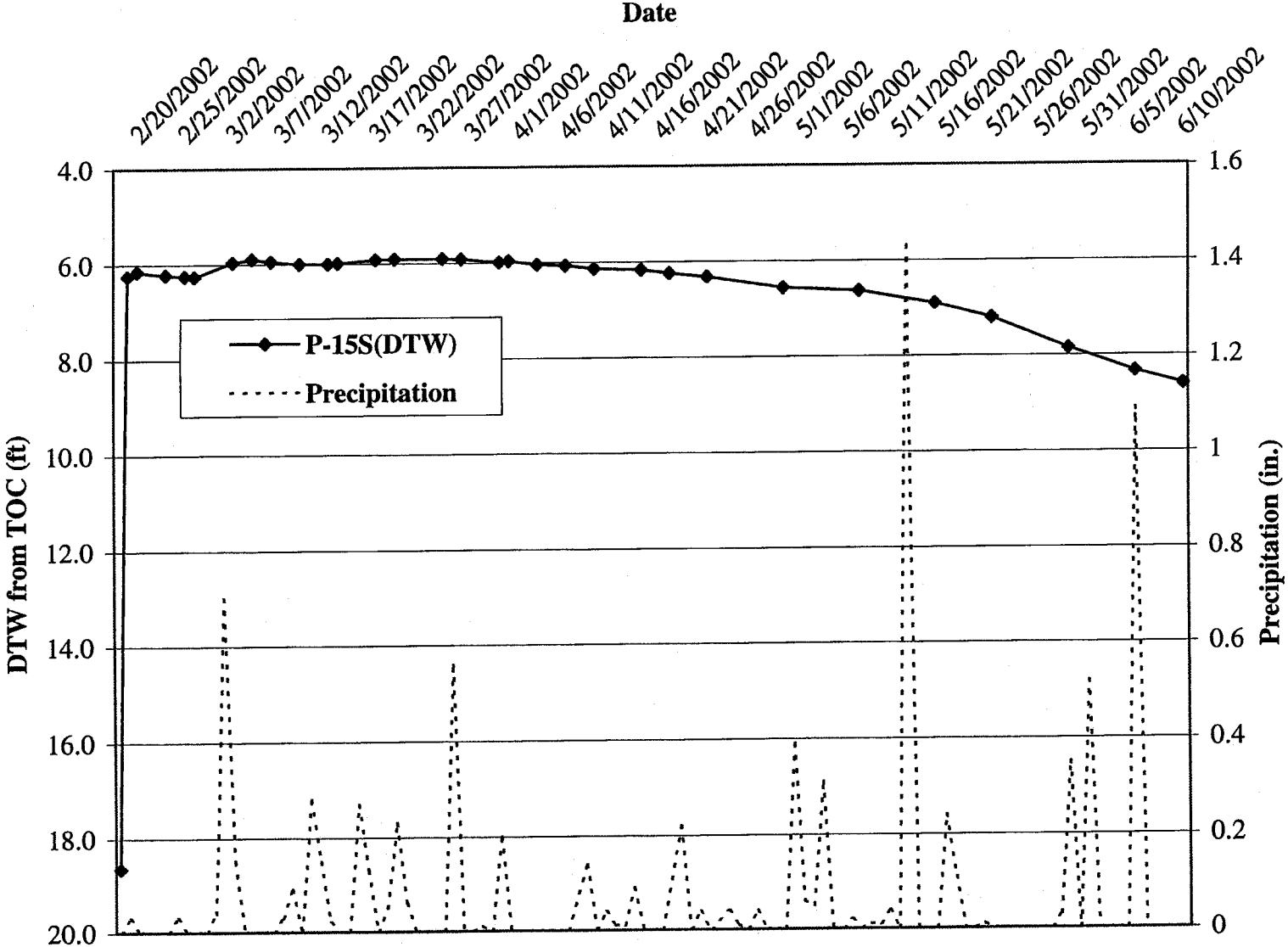
Water Level and Precipitation Trends
P-14

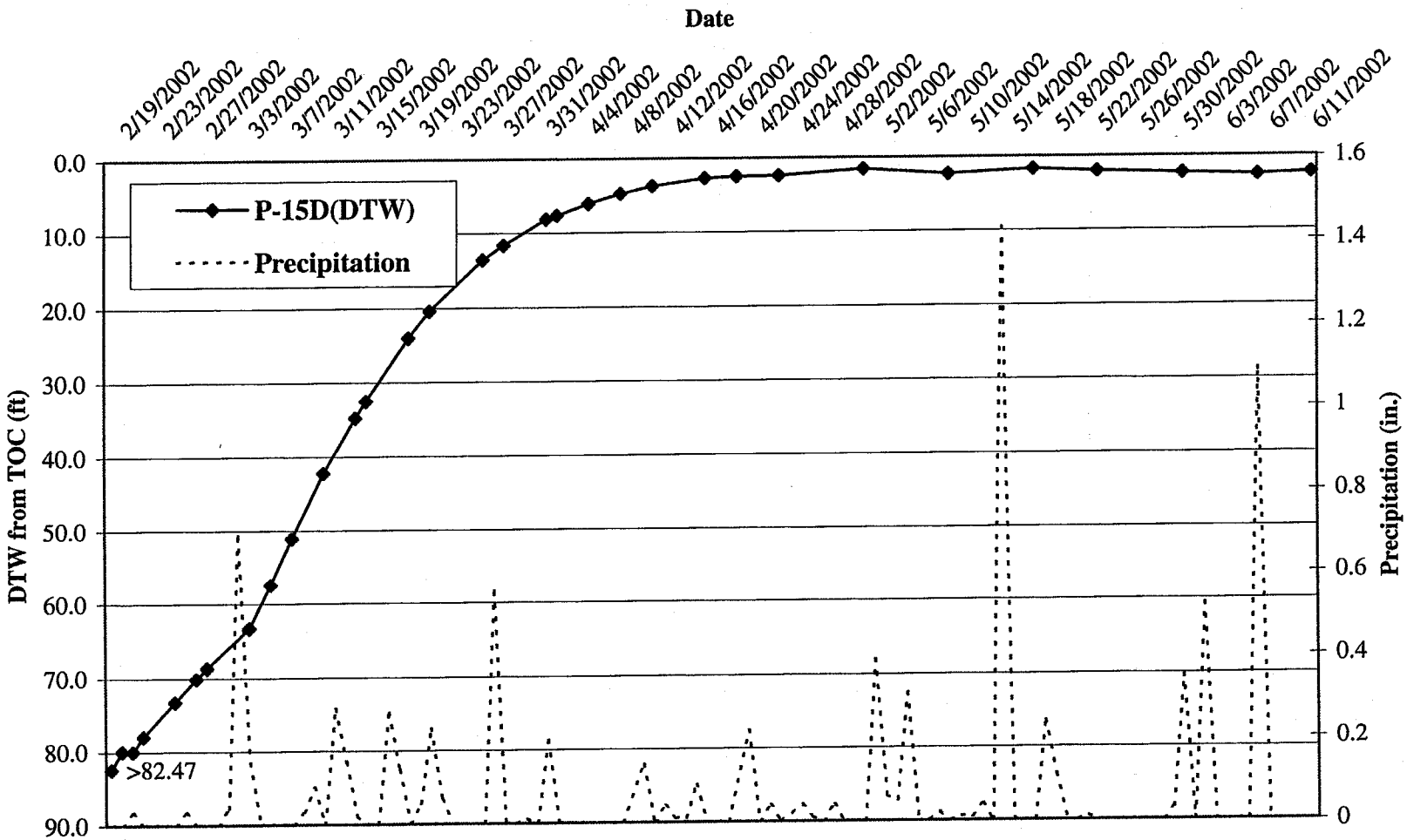


Note:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
P-15S

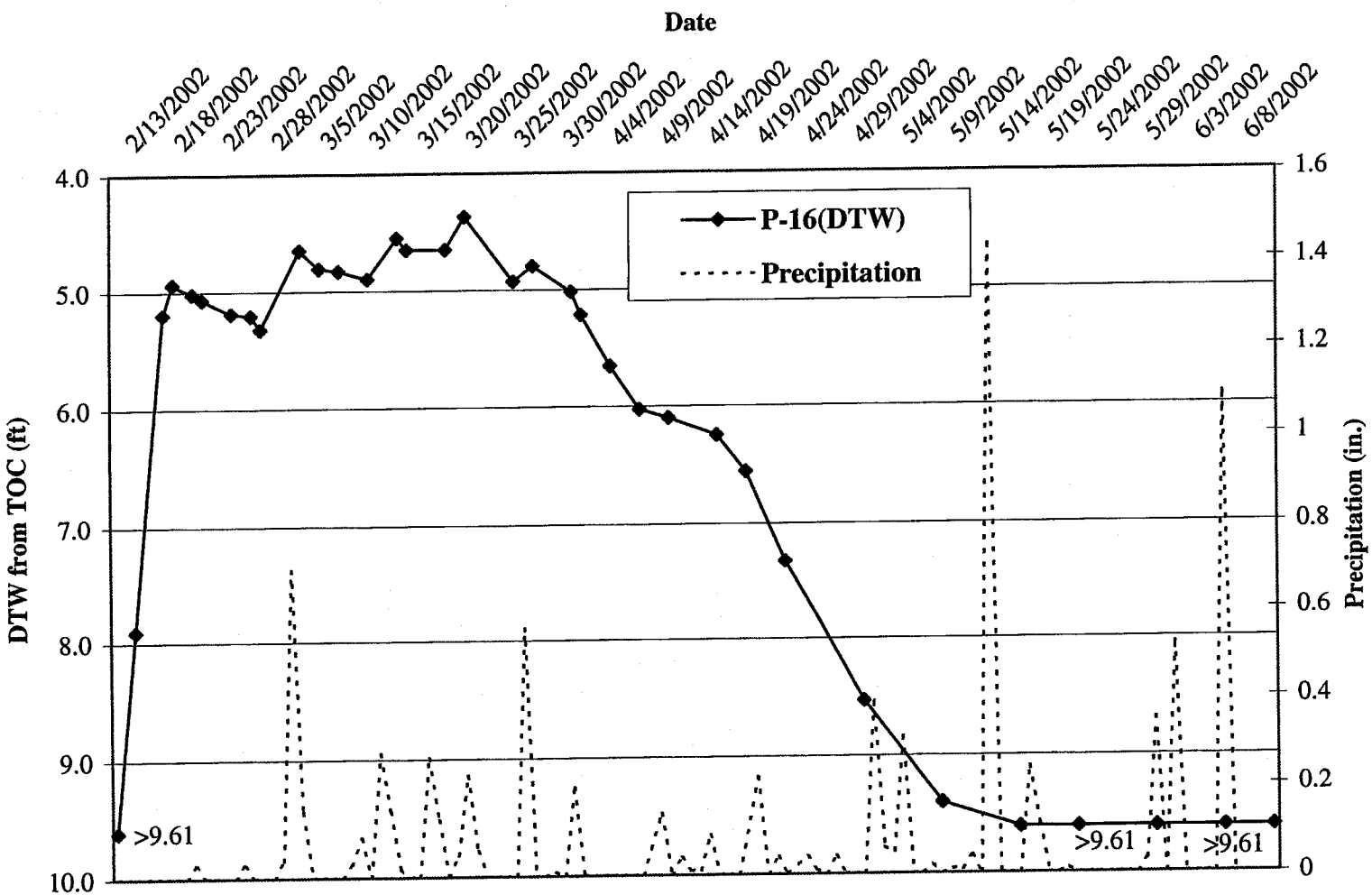


Water Level and Precipitation Trends
P-15D



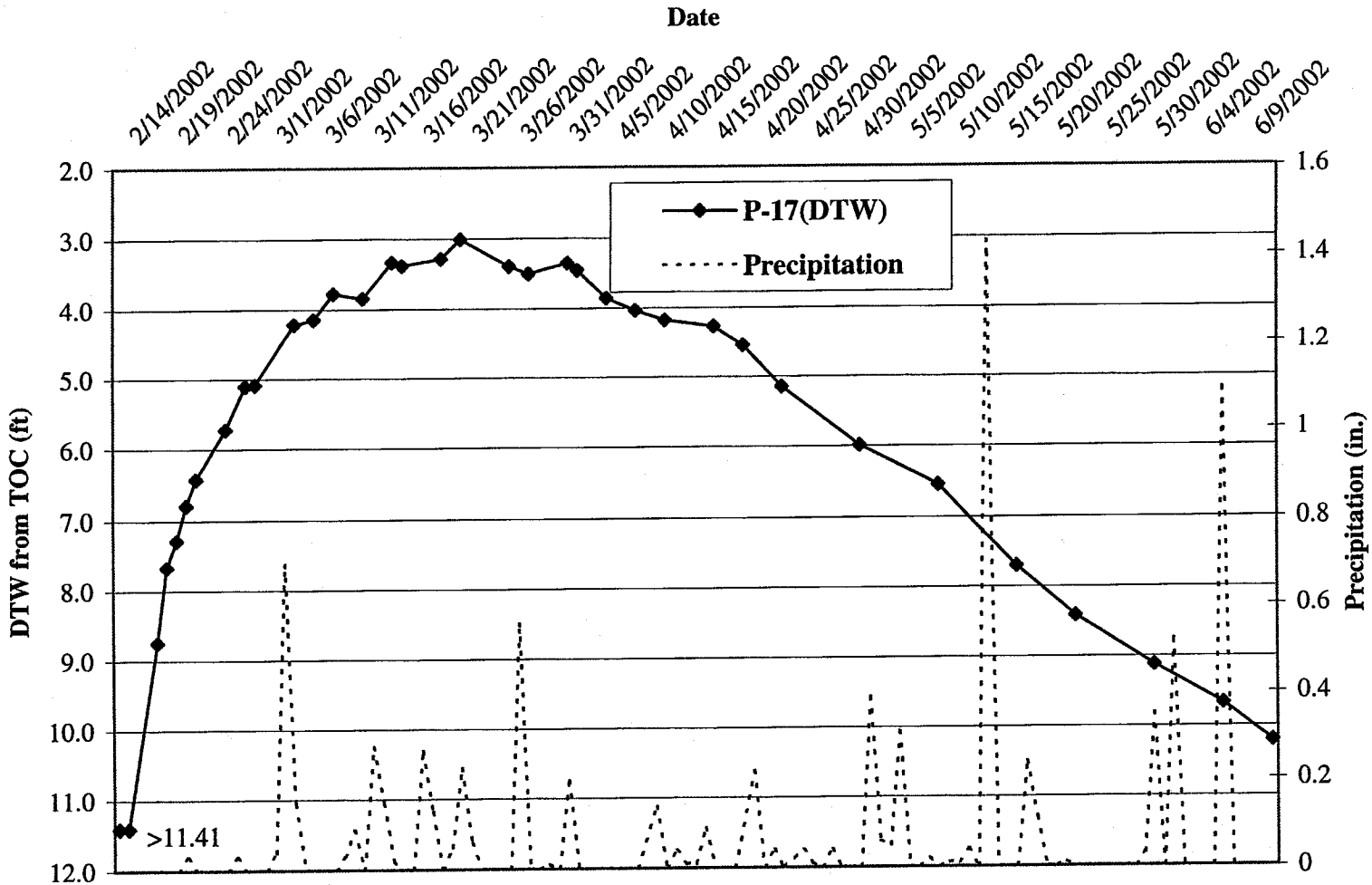
Note:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
P-16



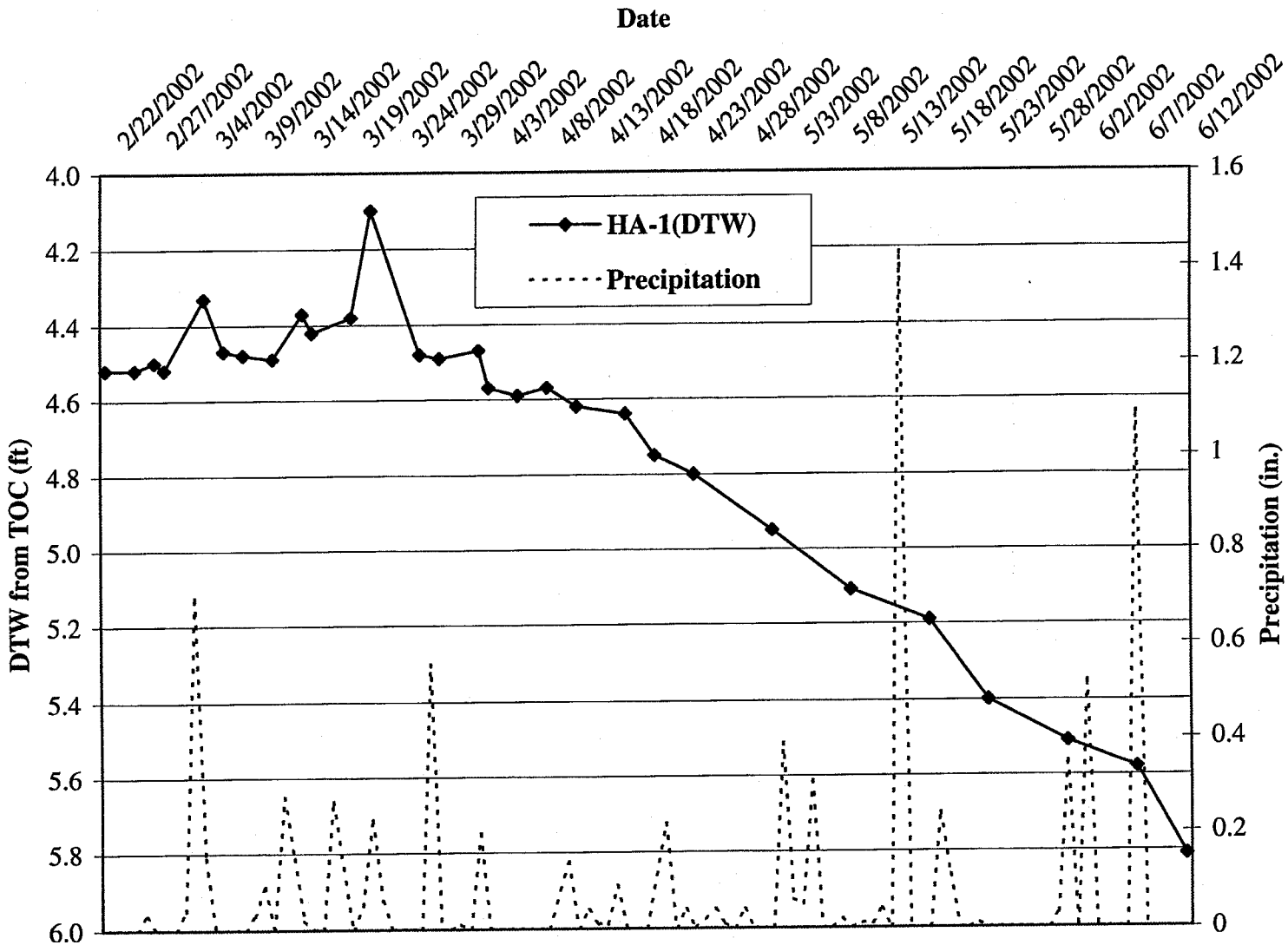
Note:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
P-17

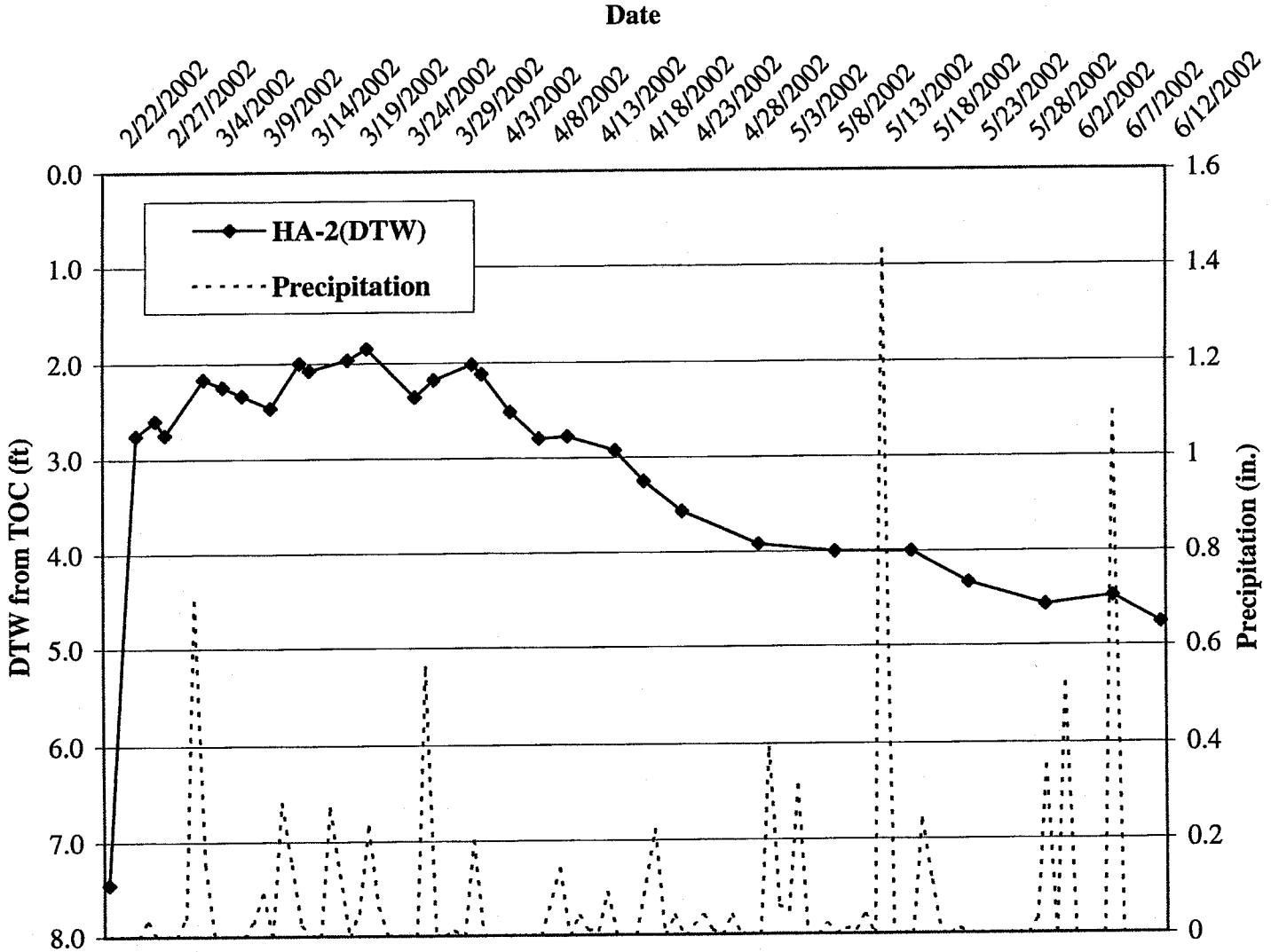


Note:
> = Water level below depth to bottom of piezometer

Water Level and Precipitation Trends
HA-1

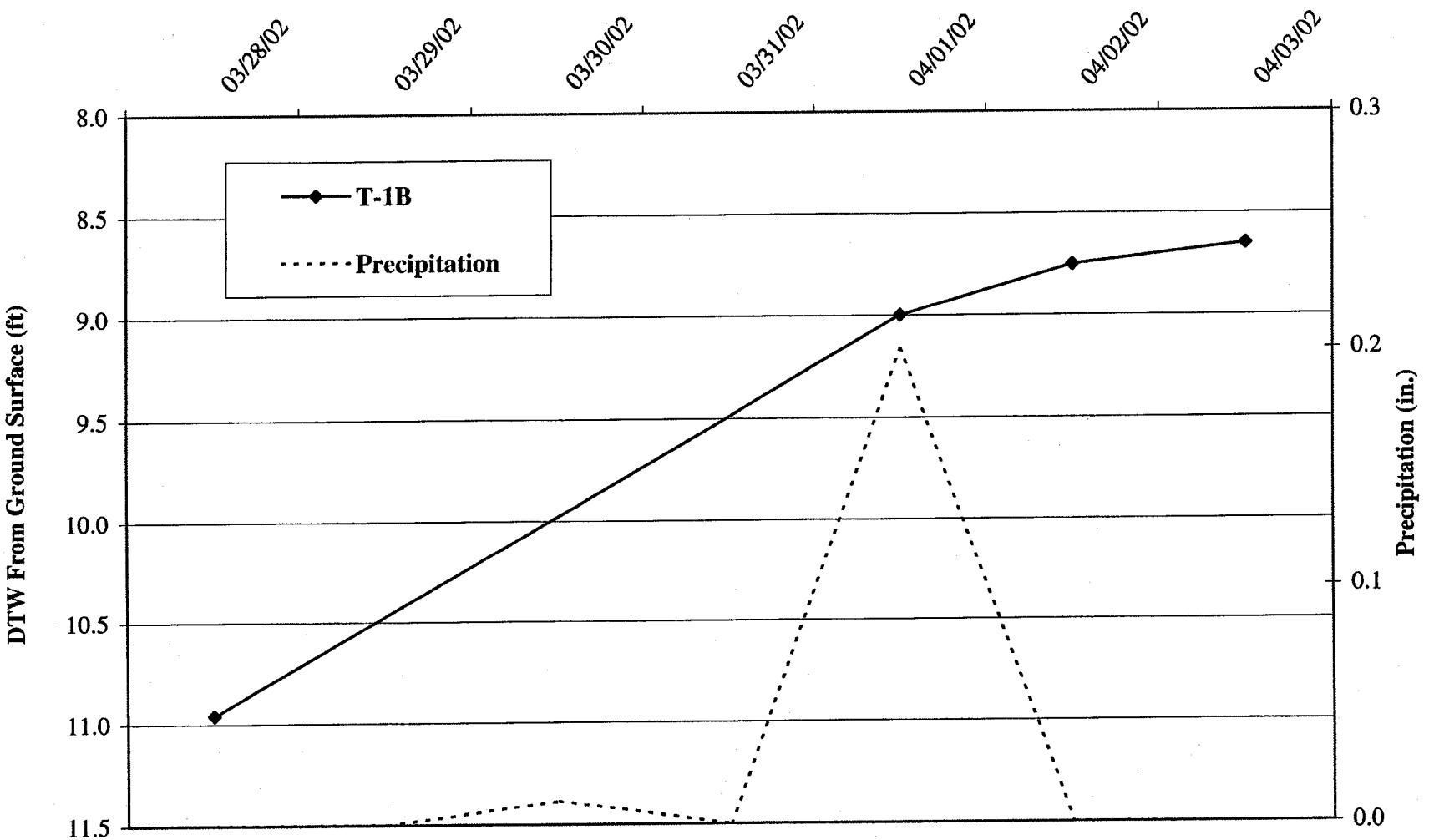


Water Level and Precipitation Trends
HA-2



TEST PIT WATER LEVEL AND PRECIPITATION TRENDS

Test Pit Water Level and Precipitation Trends
T-1B



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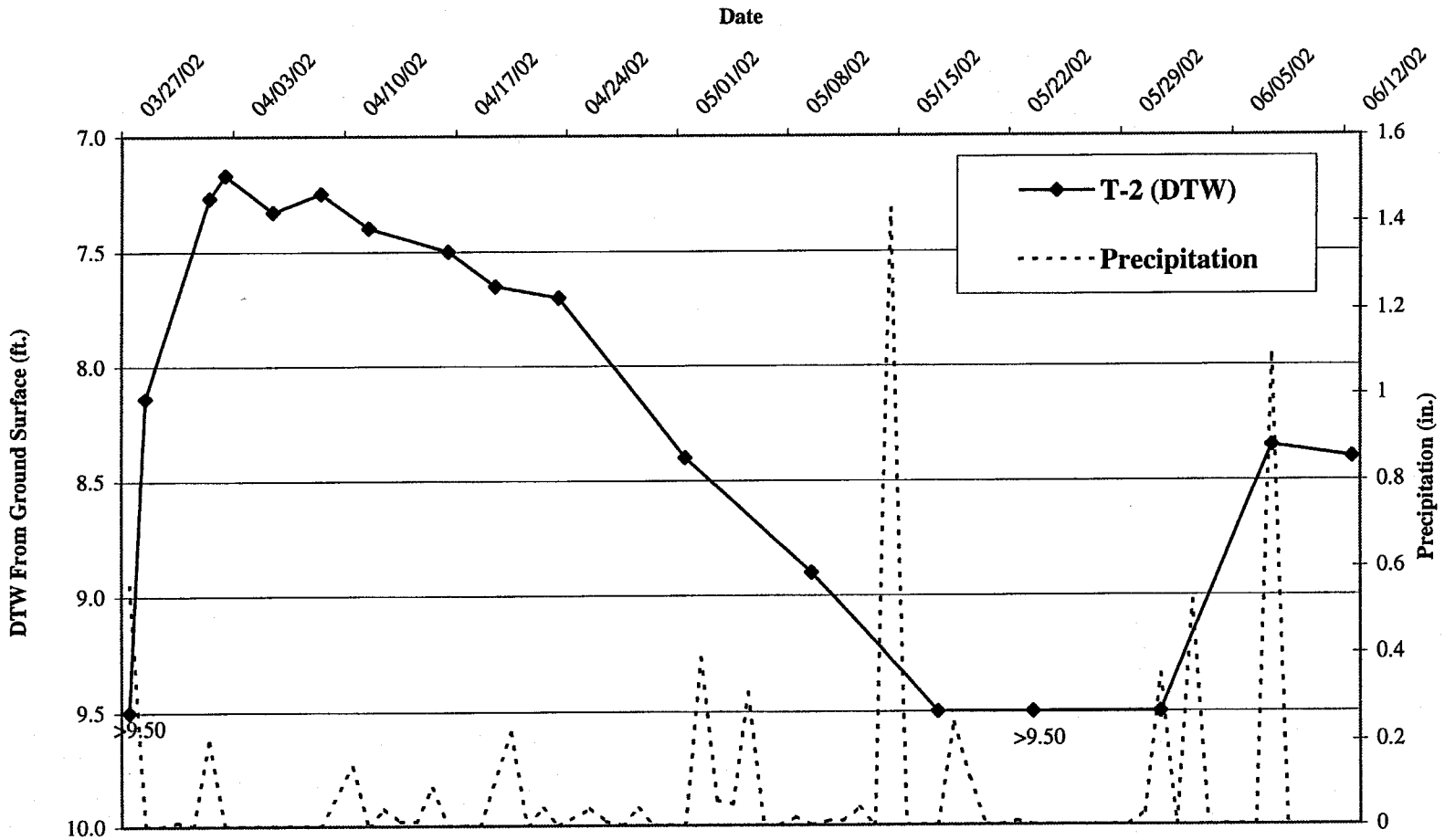
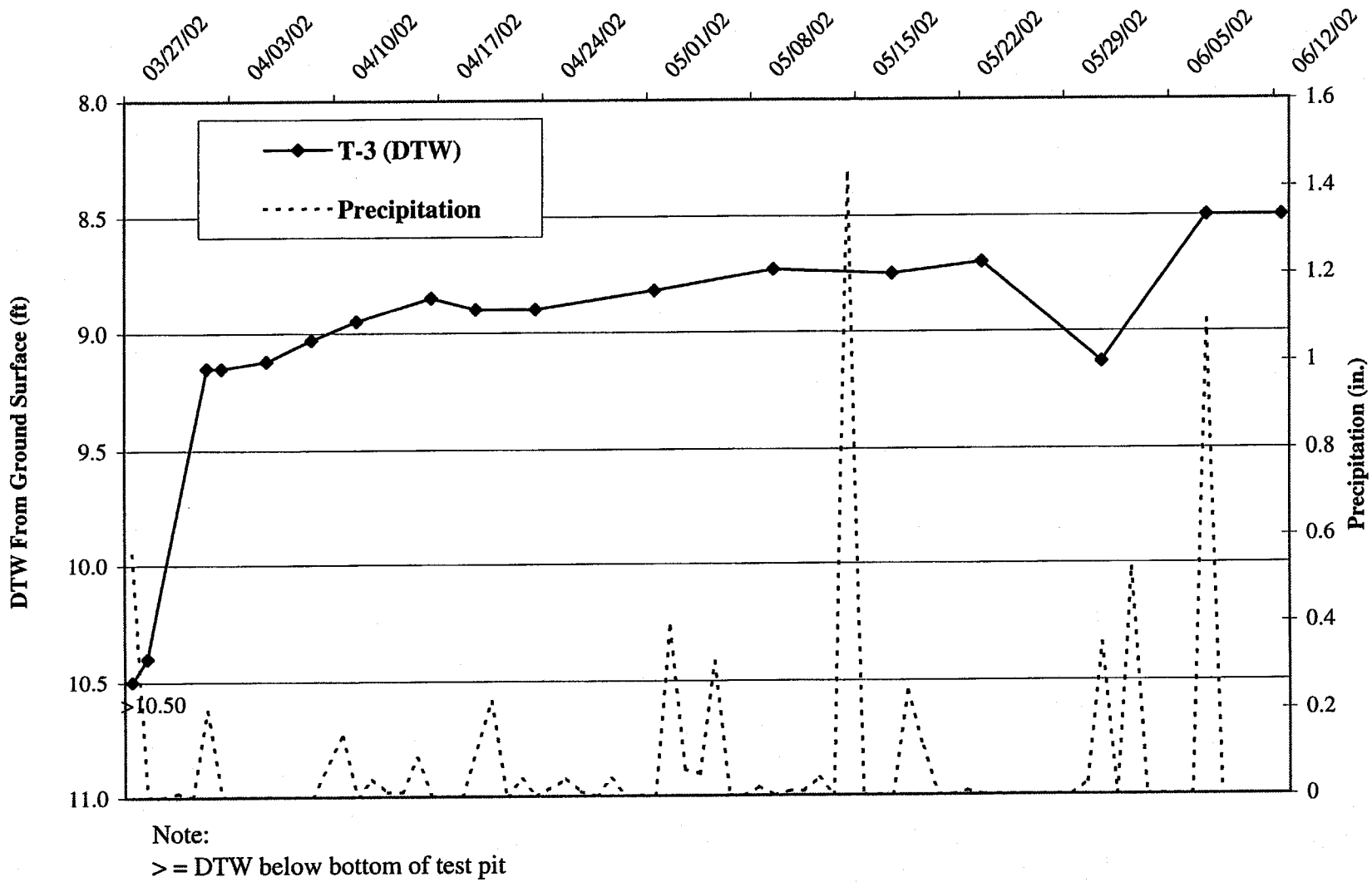
Test Pit Water Level and Precipitation Trends
T-2



Note:
> = DTW below bottom of test pit

Test Pit Water Level and Precipitation Trends
T-3



Note:
> = DTW below bottom of test pit

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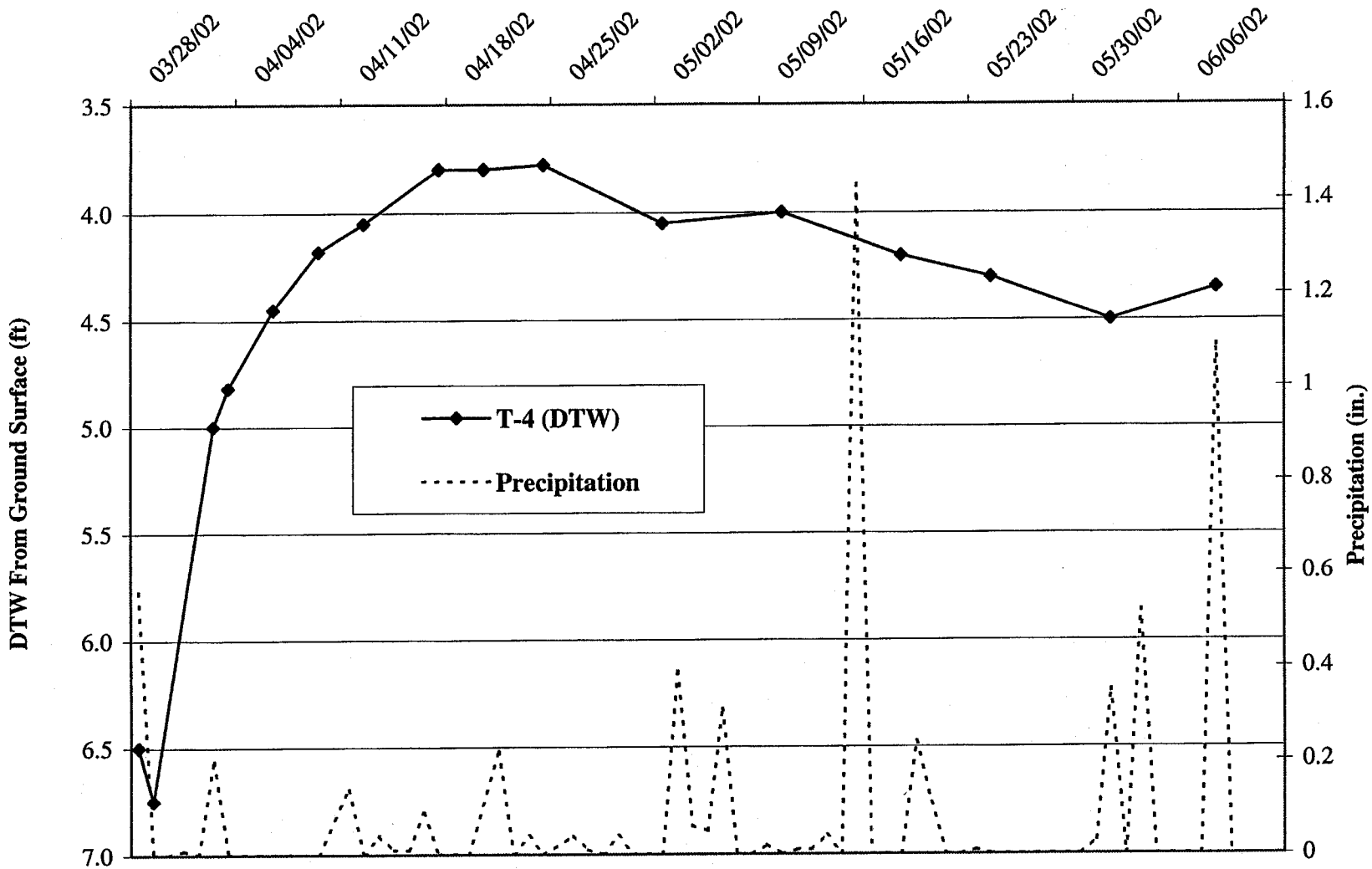
Test Pit Water Level and Precipitation Trends
T-4



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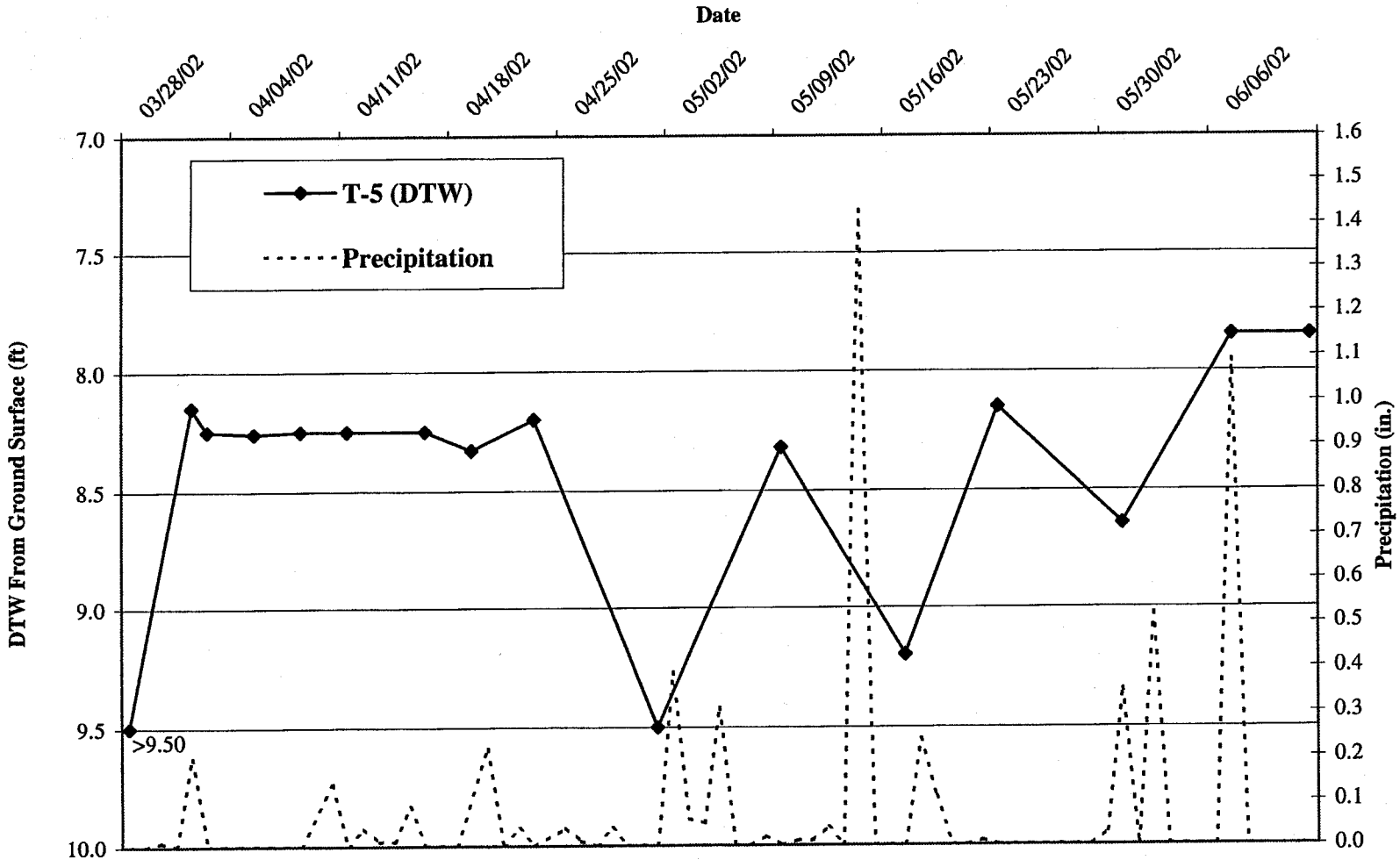
Test Pit Water Level and Precipitation Trends
T-5



Note:
> = DTW below bottom of test pit

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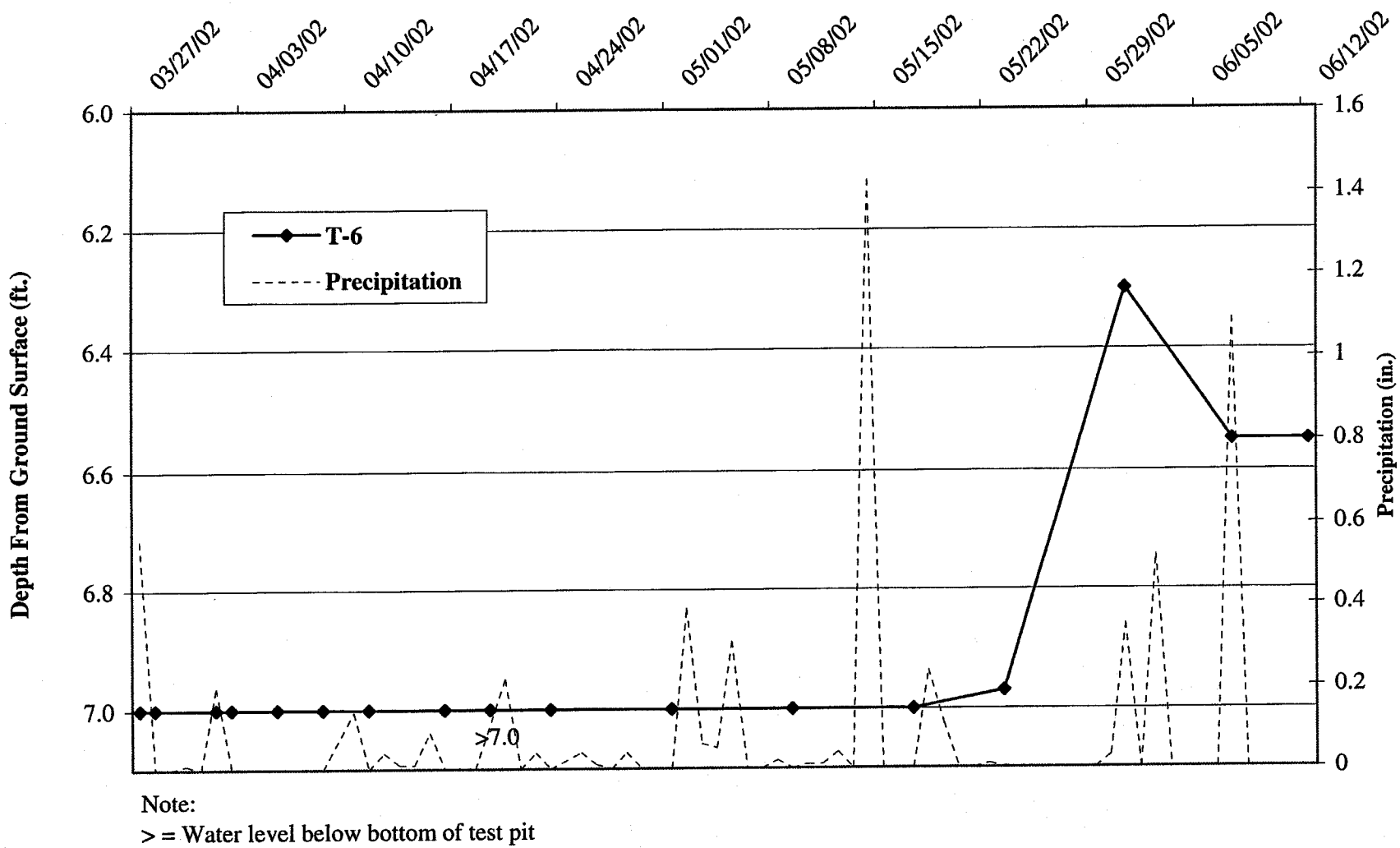
Test Pit Water Level and Precipitation Trends
T-6



Note:
> = Water level below bottom of test pit

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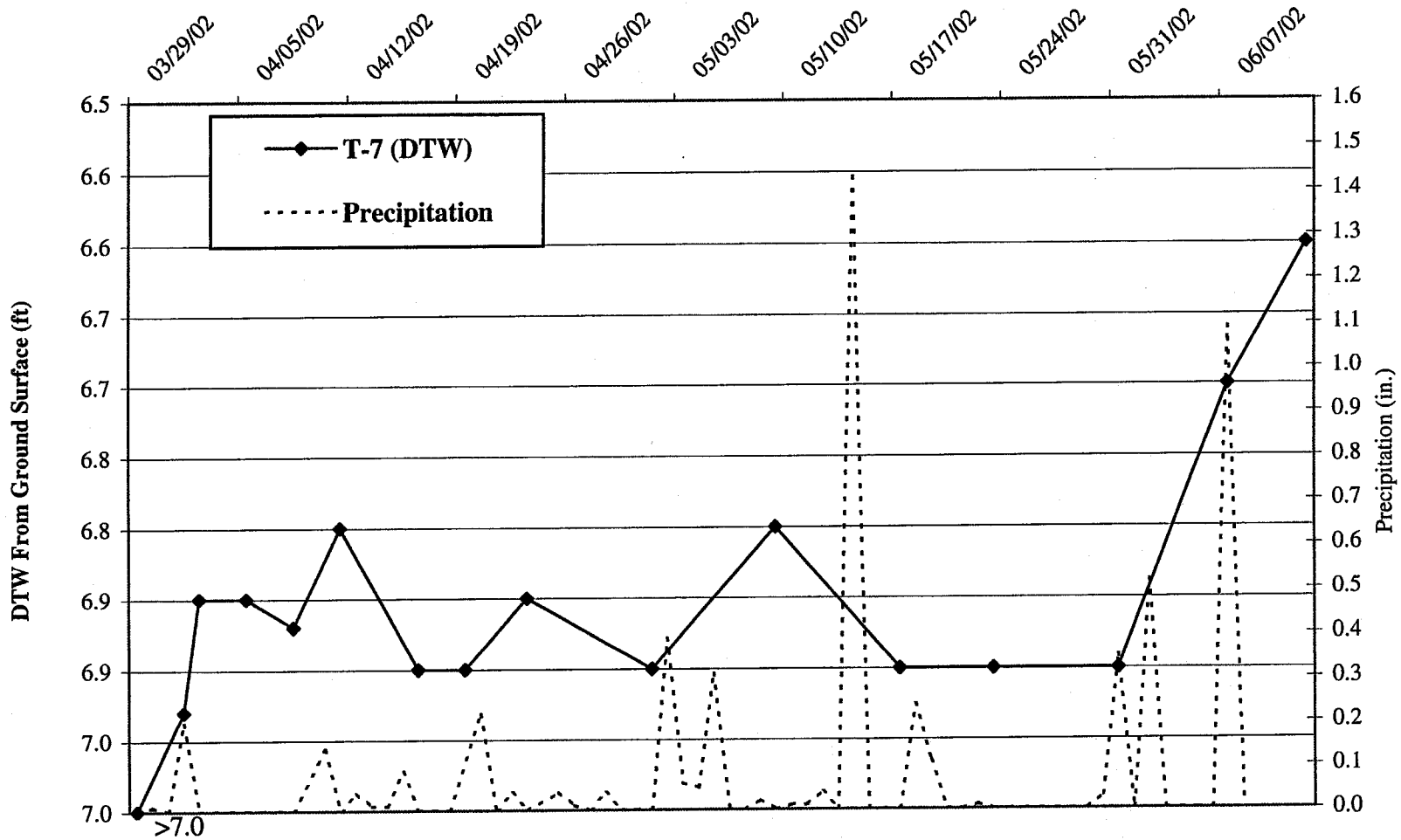
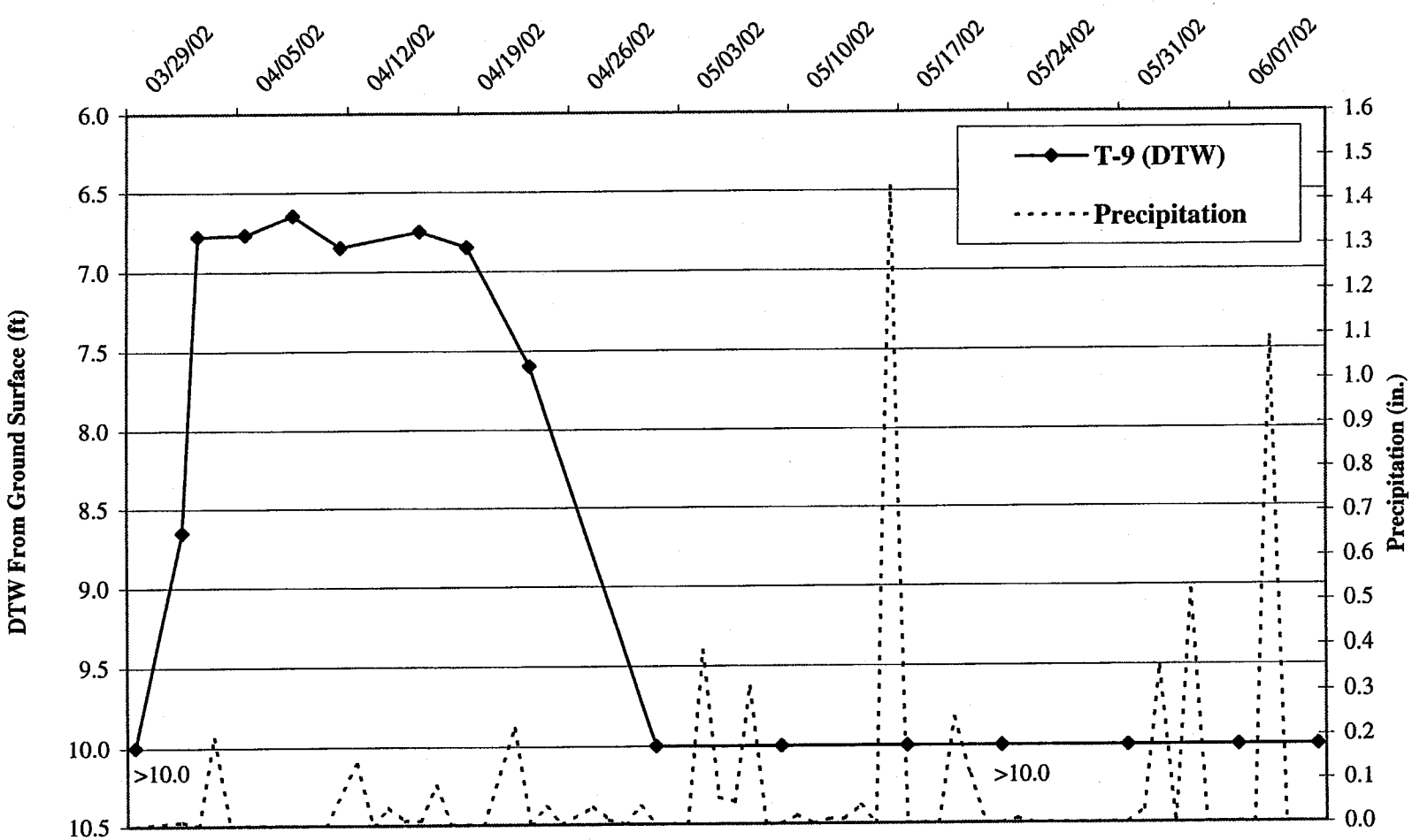
Test Pit Water Level and Precipitation Trends
T-7



Note:
> = DTW below bottom of test pit

Test Pit Water Level and Precipitation Trends
T-9



Notes:
1. > = DTW below bottom of test pit
2. Cave-in was noted on 05/09/02

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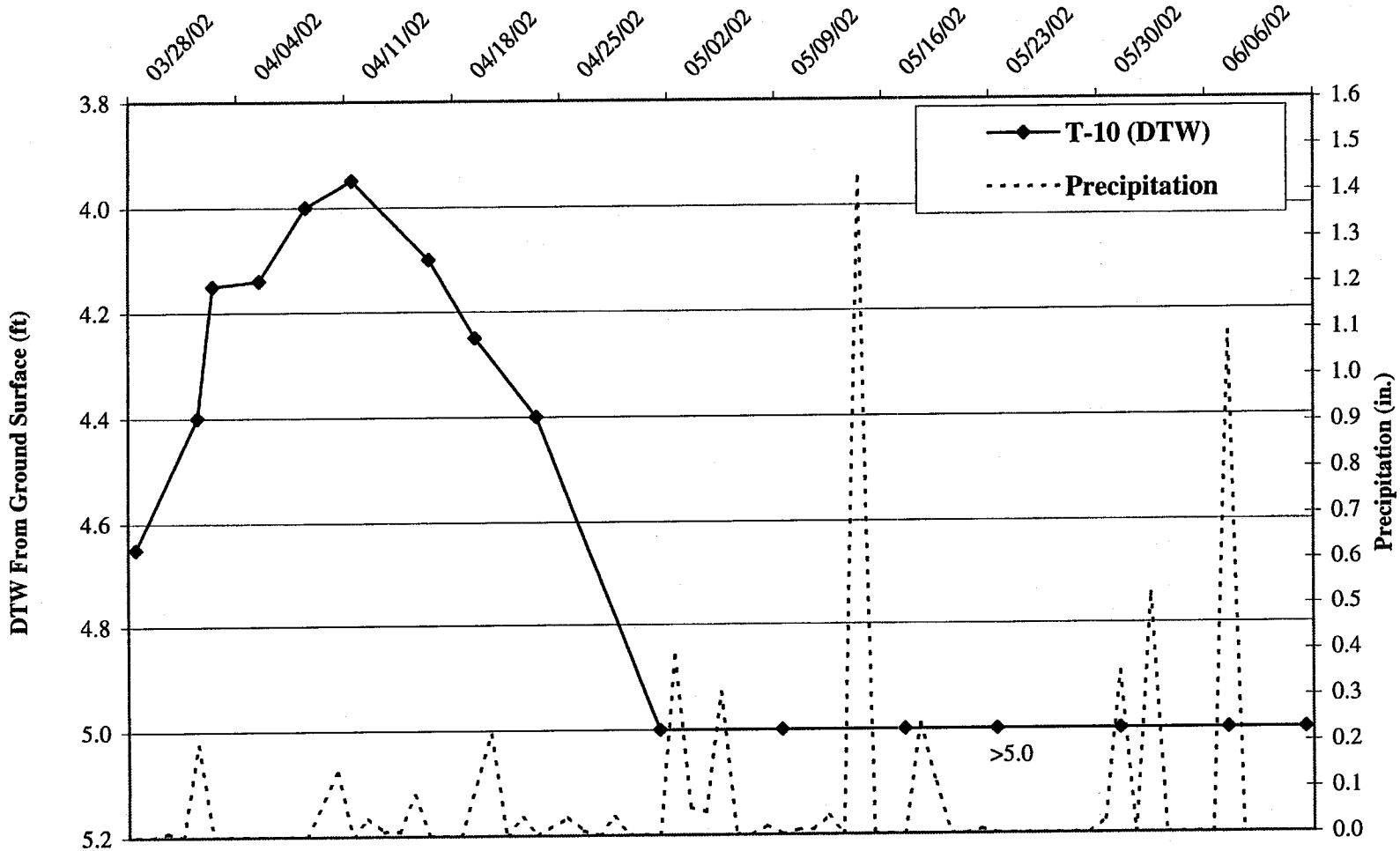
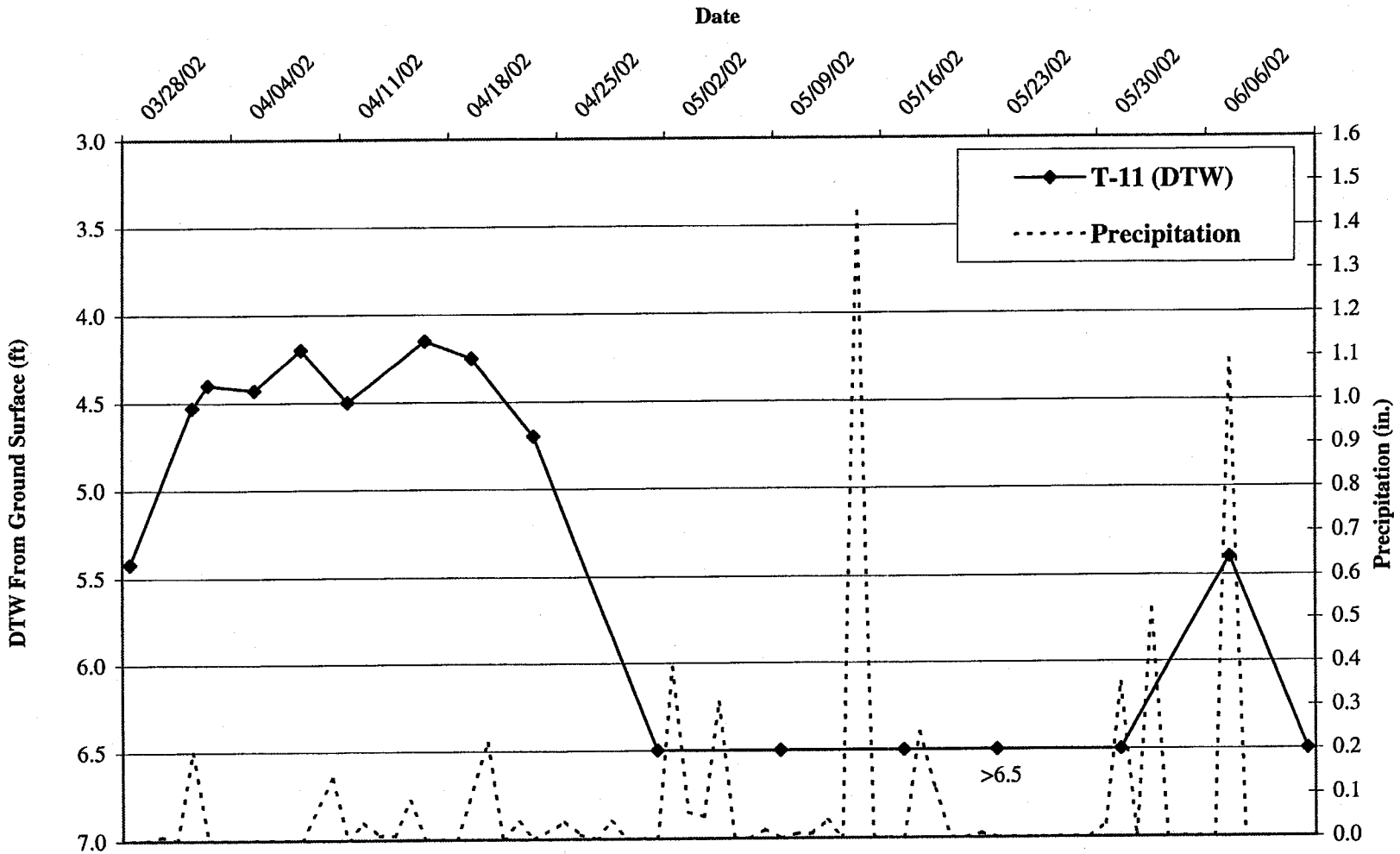
Test Pit Water Level and Precipitation Trends
T-10



Note:
> = DTW below bottom of test pit

Test Pit Water Level and Precipitation Trends
T-11



Note:
> = DTW below bottom of test pit

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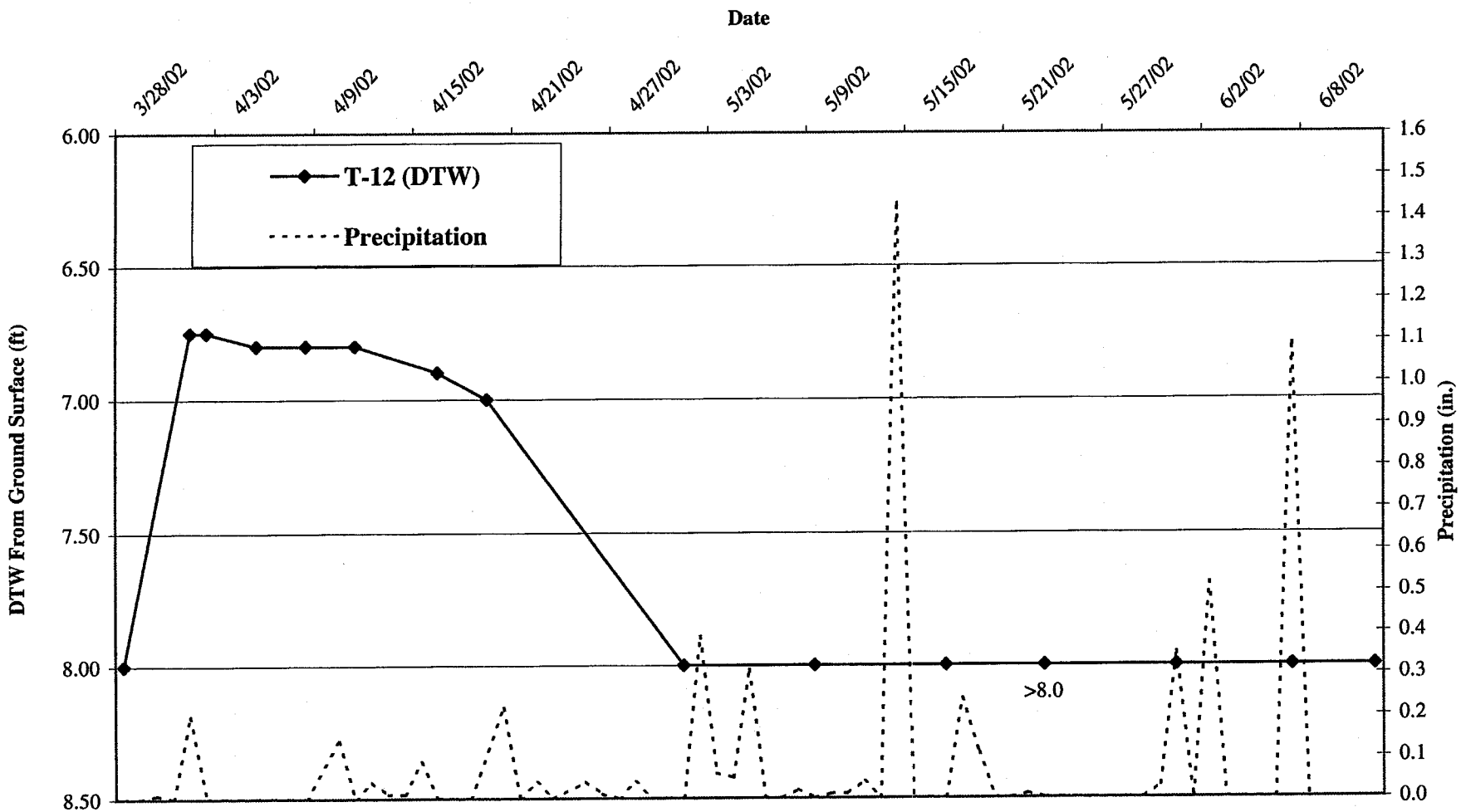
Joyce Engineering, Inc.
June 2002

Test Pit Water Level and Precipitation Trends
T-12



Note:
> = DTW below bottom of test pit

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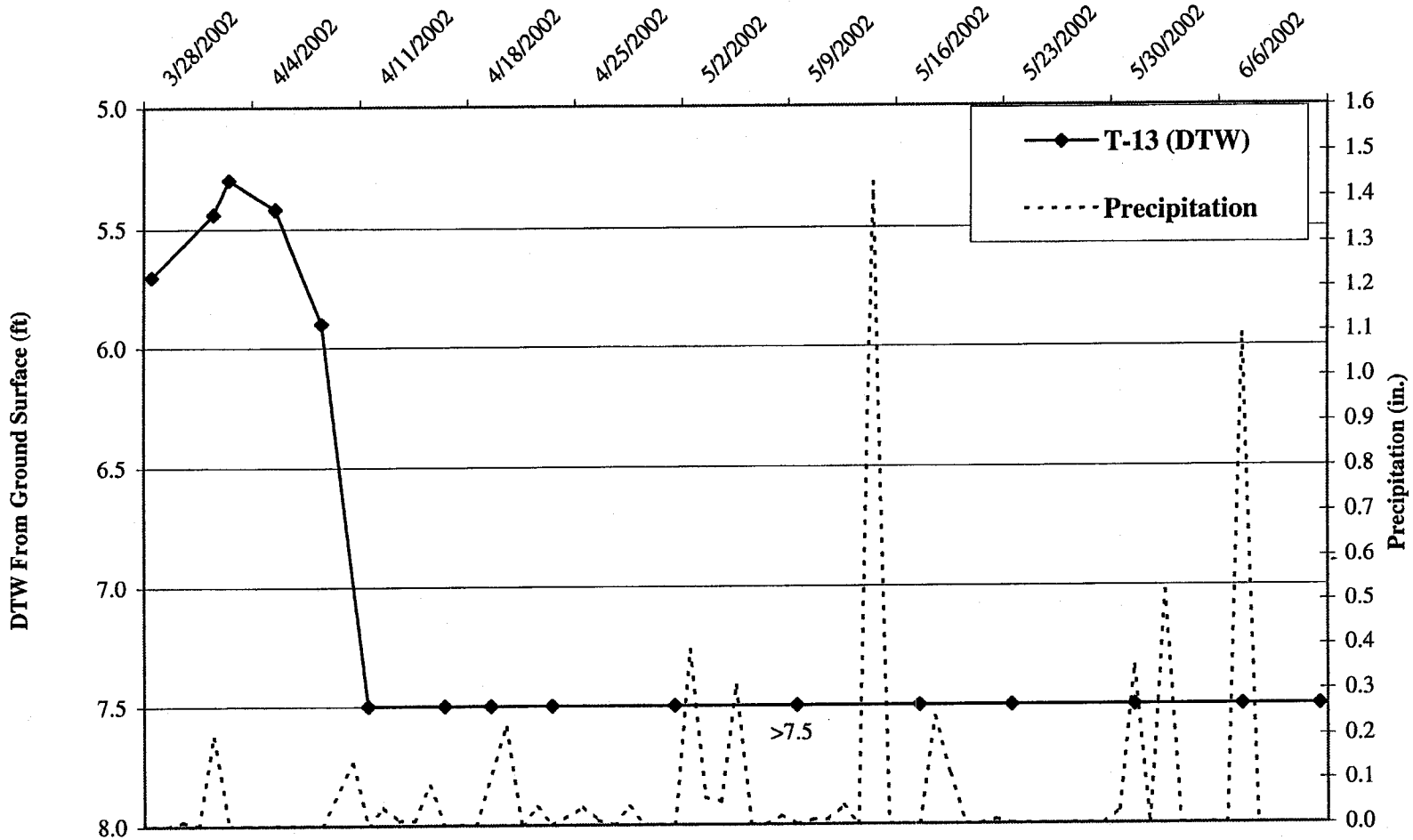
Test Pit Water Level and Precipitation Trends
T-13



Note:
> = DTW below bottom of test pit

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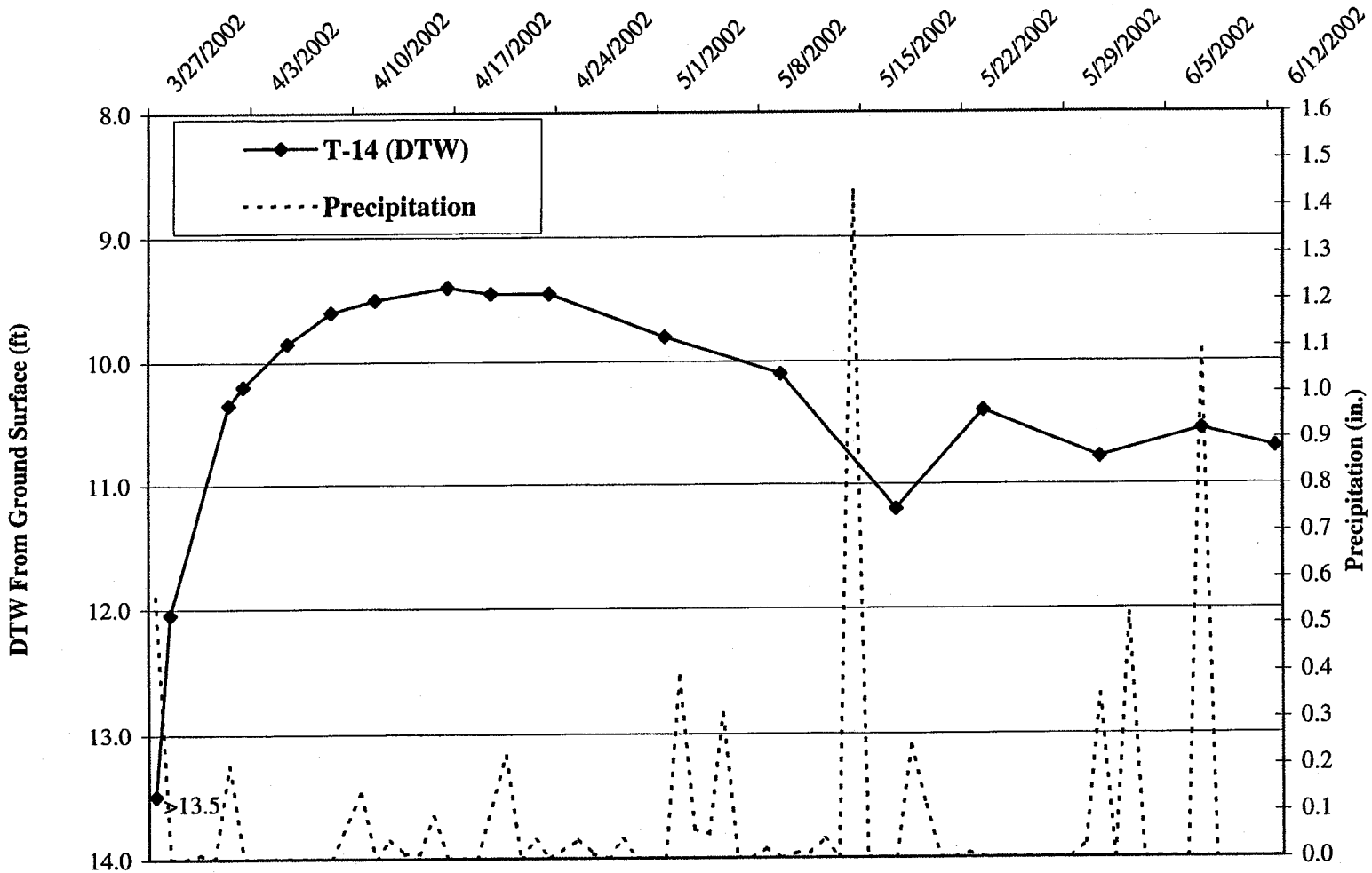
Test Pit Water Level and Precipitation Trends
T-14
Date

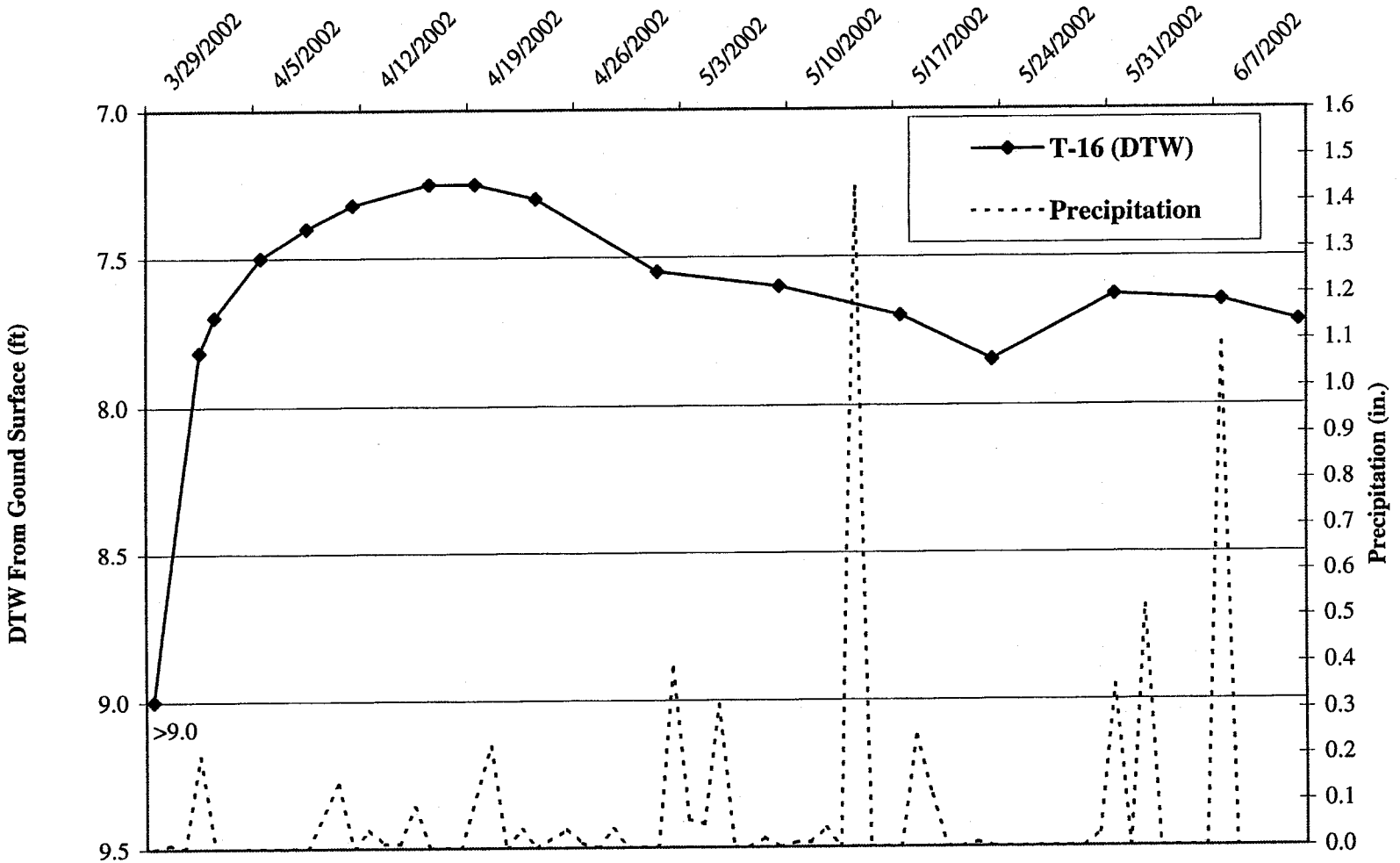


Note:
> = DTW below bottom of test pit

MRR of High Point, LLC
C D Site Application - Volume One-Section II
High Point, NC

Joyce Engineering, Inc.
June 2002

Test Pit Water Level and Precipitation Trends
T-16
Date

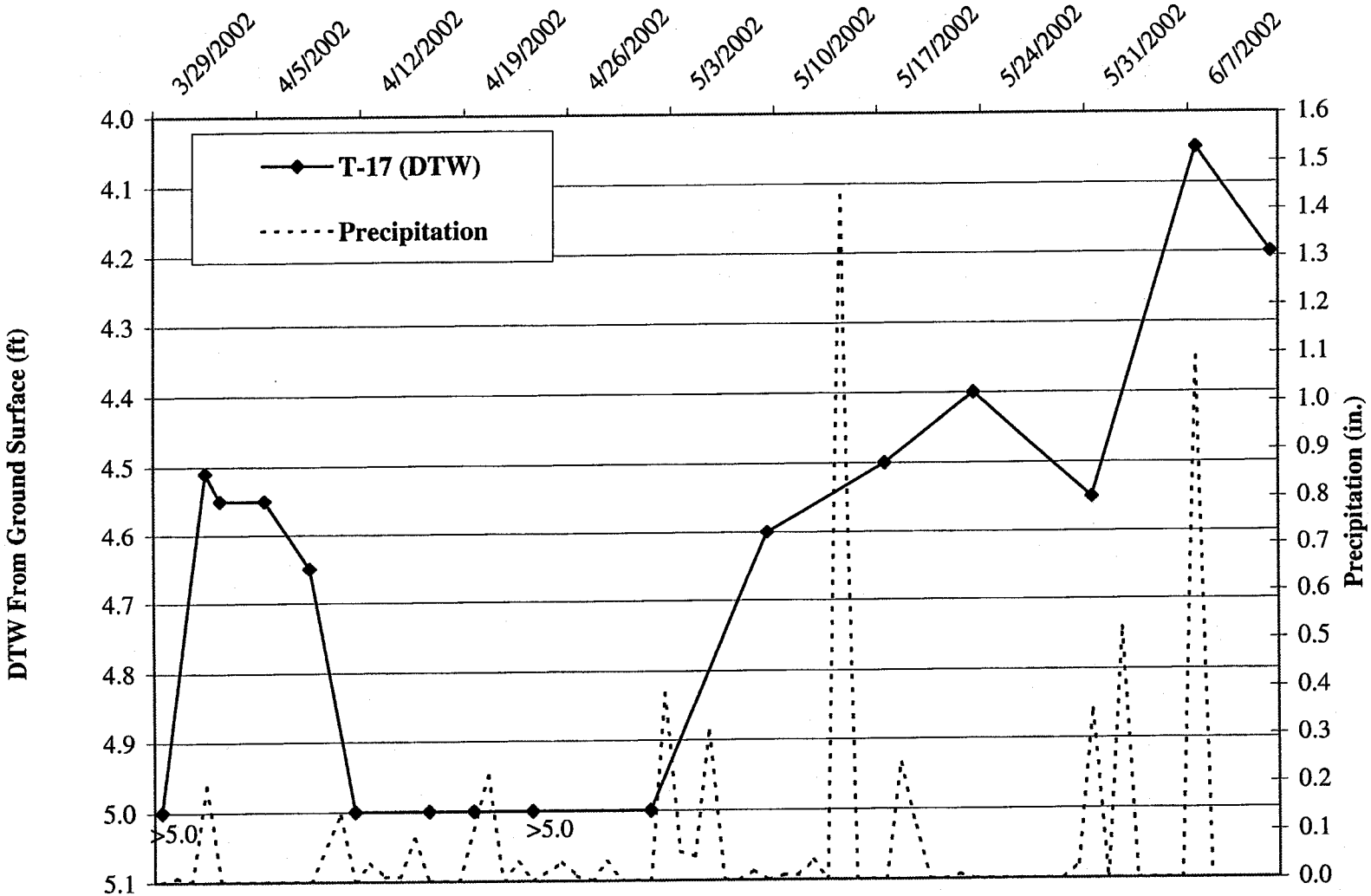


Note:
> = DTW below bottom of test pit

MRR of High Point, LLC
C D Site Application - Volume One-Section II
High Point, NC

Joyce Engineering, Inc.
June 2002

Test Pit Water Level and Precipitation Trends
T-17



MRR of High Point, LLC
C D Site Application - Volume One-Section II
High Point, NC

Joyce Engineering, Inc.
June 2002

APPENDIX 11

Seasonal High Water Level Justification

Drought cond.

APPENDIX 11
White Street Landfill
Greensboro, North Carolina

Monitoring Well		MW-15	MW-16	MW-17	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	MW-24	MW-25	MW-25d
Topographic Setting		HIGH	LOW	MID	MID	HIGH	MID	HIGH	HIGH	MID	HIGH	MID	MID
TOC Elevation (MSL)		794.81	758.02	755.05	742.70	740.70	787.87	743.32	744.43	744.25	752.52	746.47	746.19
Groundwater Elevation (MSL)	Mar-98	772.33	739.34	745.64	731.37	722.85	734.64	740.10	736.27	734.90	749.65	733.69	734.74
	Oct-98	768.75	736.33	742.11	730.94	724.42	732.42	734.96	731.62	729.45	745.95	734.07	735.15
	Mar-99	769.24	736.82	745.02	731.78	721.98	733.18	739.66	736.42	735.20	749.27	733.42	734.31
	Sep-99	767.95	737.10	745.42	731.70	721.56	733.46	737.37	734.98	733.32	747.74	734.44	734.14
	Mar-00	770.65	737.81	745.49	732.18	724.04	734.43	740.46	734.83	731.92	749.28	734.41	735.14
	Sep-00	770.77	738.06	745.51	732.17	723.13	734.09	739.26	734.13	731.02	747.87	733.87	734.98
	Mar-01	771.28	737.74	745.64	732.68	724.20	734.48	740.22	733.50	730.06	748.33	734.85	735.32
Mean Elevation		770.14	737.60	744.98	731.83	723.17	733.81	738.86	734.54	732.27	748.30	734.11	734.83
Max Difference From Mean		2.19	1.74	2.87	0.89	1.61	1.39	3.90	2.92	2.93	2.35	0.74	0.69

Average Max Difference From Mean	2.02
Max Maximum Difference from Mean	3.90

Average of Lows	1.7
Seasonal High Adjustment	2

Average of Mids	1.6
Seasonal High Adjustment	4

Average of Highs	2.6
Seasonal High Adjustment	6

Note:
1. MSL = above mean sea level

APPENDIX 11
Kersey Valley Landfill
High Point, North Carolina

Monitoring Well		MW-1	MW-2	MW-3A	MW-4	MW-5	MW-6A	MW-7D	MW-8A	MW-8B	MW-9
Topographic Setting		HIGH	MID	LOW	HIGH	MID	MID	MID	LOW	LOW	LOW
Screened Lithology		---	---	---	S	S/PWR/BR	---	---	PWR/BR	BR	S/PWR/BR
TOC Elevation (MSL)		833.37	812.59	749.50	830.30	793.30	784.62	783.97	760.69	760.91	785.64
Groundwater Elevation (MSL)	Mar-94	808.10	802.20	NI	814.70	776.60	---	---	755.70	755.40	768.10
	Oct-95	806.50	799.40	NI	811.10	776.20	772.20	---	755.10	755.00	766.40
	Mar-96	805.39	---	NI	811.81	774.43	771.54	---	753.15	753.02	765.40
	Sep-96	807.50	800.12	NI	---	773.78	---	---	753.99	753.68	---
	Apr-97	808.73	801.12	733.12	814.41	773.91	771.81	764.16	754.27	753.91	764.79
	Nov-97	806.45	797.73	732.00	---	773.04	770.38	763.49	751.85	752.72	763.12
	Jun-98	808.85	800.61	733.73	---	773.77	770.85	763.49	753.05	752.84	763.93
	Nov-98	---	---	---	---	772.95	---	763.03	752.10	752.14	764.25
	May-99	805.56	797.57	732.44	---	773.57	---	763.15	752.86	752.64	764.84
	Nov-99	804.58	796.27	732.15	---	773.09	---	763.25	752.76	752.69	764.83
	May-00	805.46	797.33	732.72	---	773.61	770.60	763.19	752.66	752.59	764.94
	Dec-00	803.31	795.14	---	---	---	770.16	---	752.47	---	---
	May-01	803.14	795.44	732.55	813.49	776.49	770.10	762.39	752.32	752.42	766.07
	Nov-01	801.53	793.97	731.61	813.49	---	768.61	762.36	751.47	752.13	765.74
	Jun-02	800.88	793.59	732.01	811.29	---	769.64	761.94	751.80	752.02	---
	Dec-02	801.58	794.44	732.52	811.31	---	770.40	762.76	752.67	752.08	765.82
Mean Elevation		805.17	797.50	732.49	812.70	774.29	770.57	763.02	753.01	753.02	765.25
Max Difference From Mean		4.29	4.71	1.25	2.00	2.31	1.96	1.14	2.69	2.38	2.85
Max Elevation		808.85	802.20	733.73	814.70	776.60	772.20	764.16	755.70	755.40	768.10
Difference Between Max and Jun-02		7.97	8.61	1.72	3.41	-	2.56	2.22	3.90	3.38	-

Average of Low Differences	3.00
Seasonal High Adjustment	3

Average of Mid Differences	4.46
Seasonal High Adjustment	5

Average of High Differences	5.69
Seasonal High Adjustment	6

Notes:
1. --- = no data
2. MSL = above mean sea level
3. NI = Well not yet installed
4. S = saprolite
5. PWR = partially weathered rock
6. BR = bedrock

APPENDIX 12

Proposed Monitoring Well Schematics

PROPOSED MONITORING WELL SCHEMATIC

JOYCE ENGINEERING, INC.

Project: MRR of High Point, LLC
High Point, North Carolina

Monitoring Well Number: MW-1

Distance (ft) from:

Ground Surface

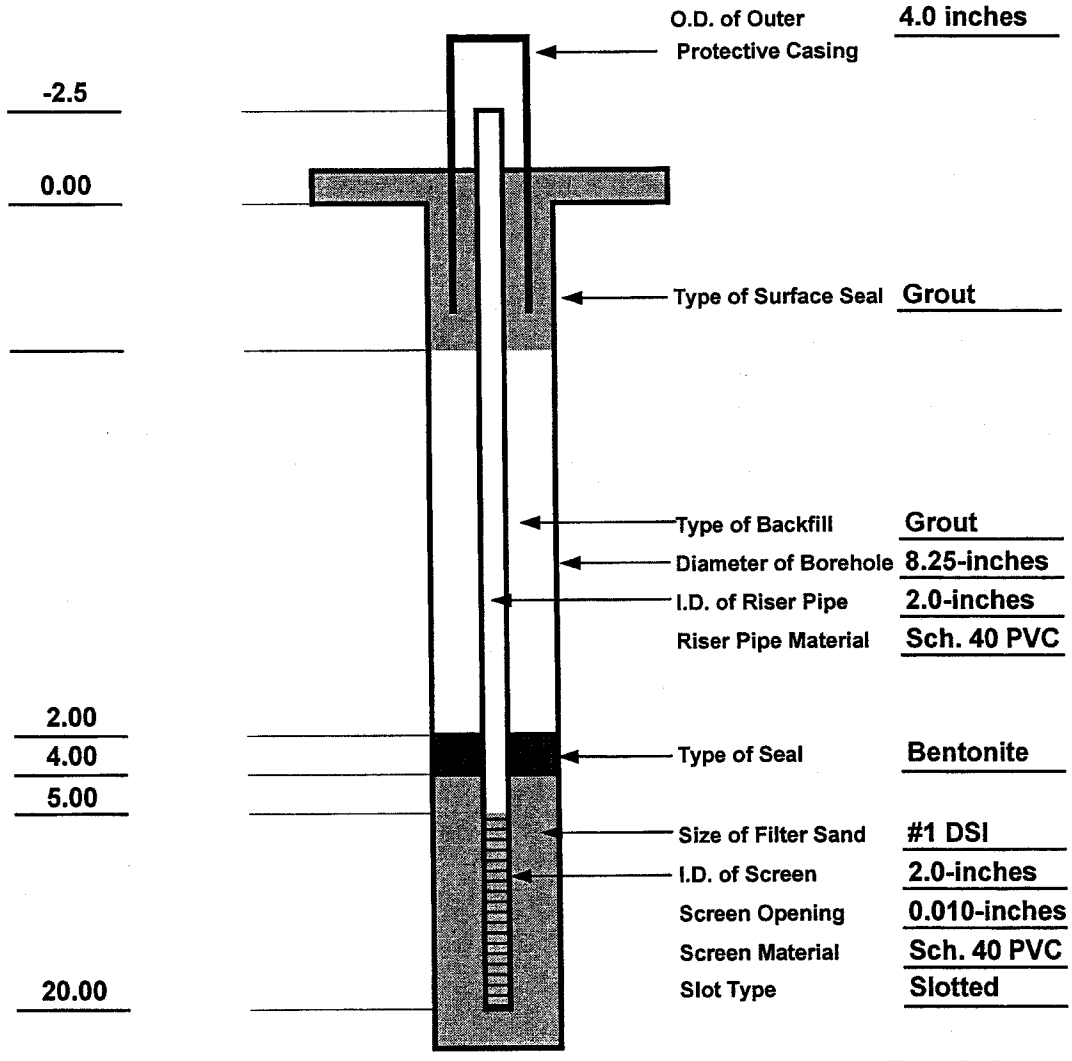


Diagram Not to Scale

NOTES: Schematic shows proposed well construction details. Actual construction details may vary slightly based on field conditions. The Solid Waste Section will be notified prior to any significant changes to the proposed details.

Prepared: June 2002

PROPOSED MONITORING WELL SCHEMATIC

JOYCE ENGINEERING, INC.

Project: MRR of High Point, LLC
High Point, North Carolina

Monitoring Well Number: MW-2

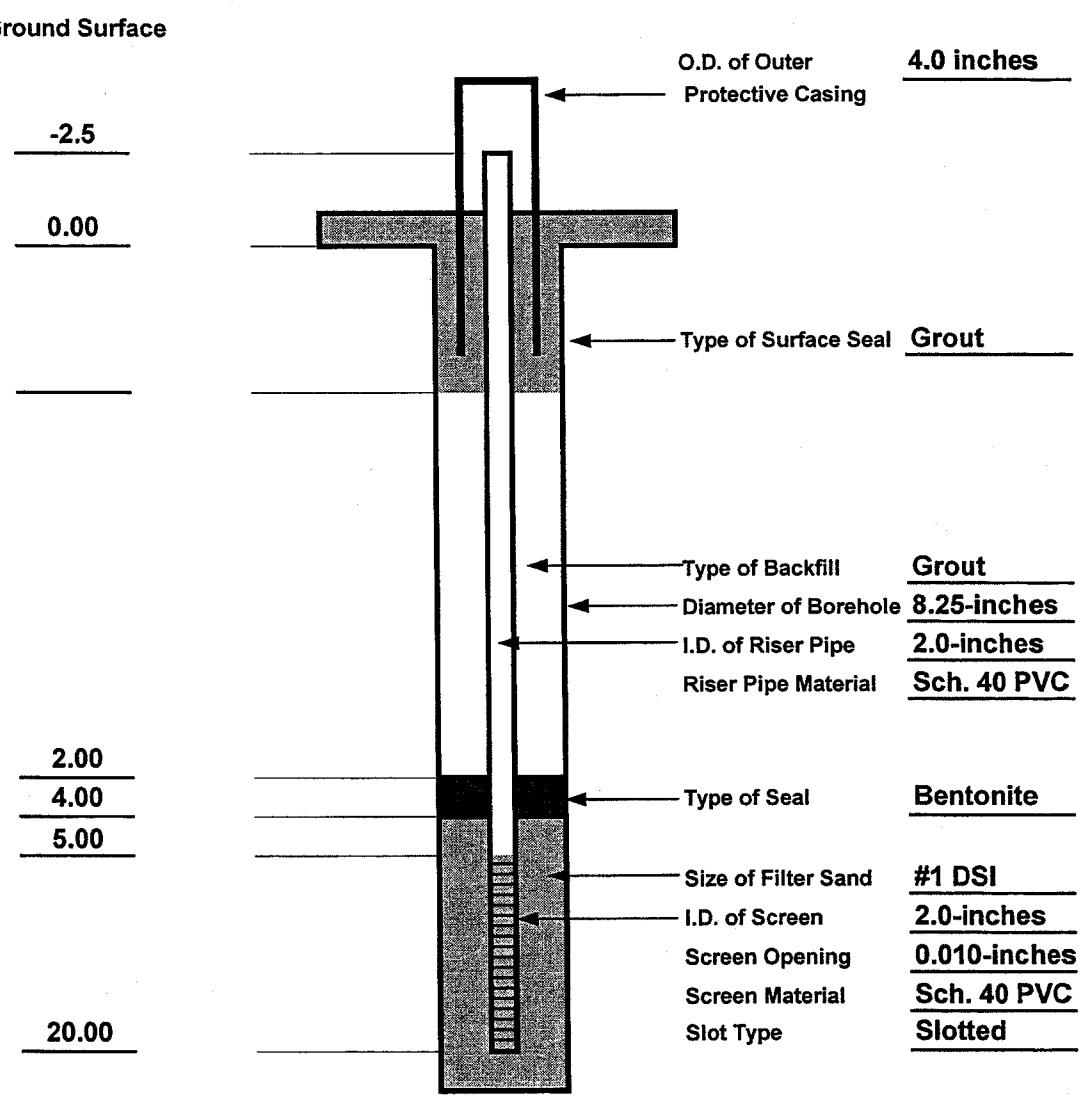


Diagram Not to Scale

NOTES: Schematic shows proposed well construction details. Actual construction details may vary slightly based on field conditions. The Solid Waste Section will be notified prior to any significant changes to the proposed details.

Prepared: June 2002

PROPOSED MONITORING WELL SCHEMATIC

JOYCE ENGINEERING, INC.

Project: MRR of High Point, LLC
High Point, North Carolina

Monitoring Well Number: MW-3

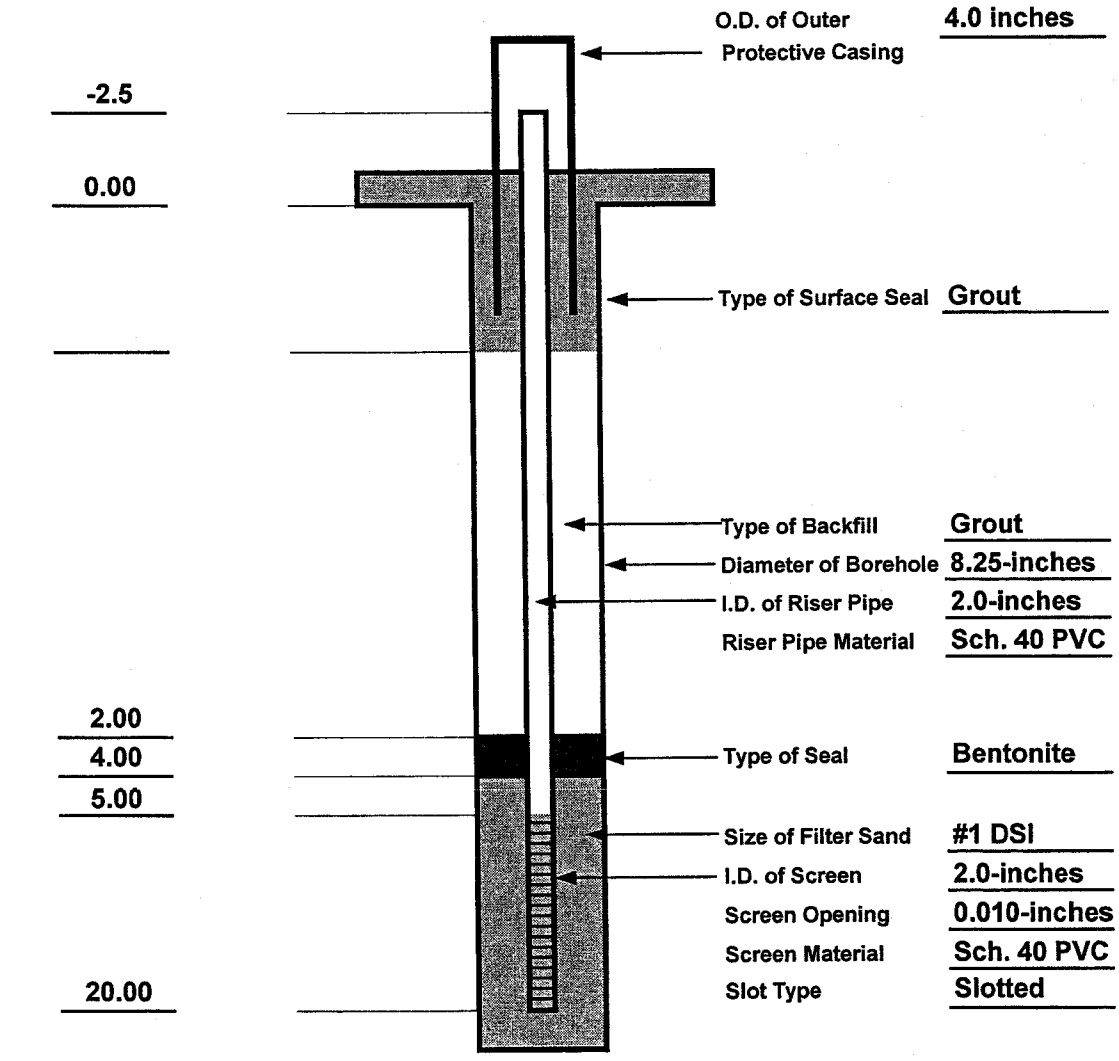


Diagram Not to Scale

NOTES: Schematic shows proposed well construction details. Actual construction details may vary slightly based on field conditions. The Solid Waste Section will be notified prior to any significant changes to the proposed details.

Prepared: June 2002

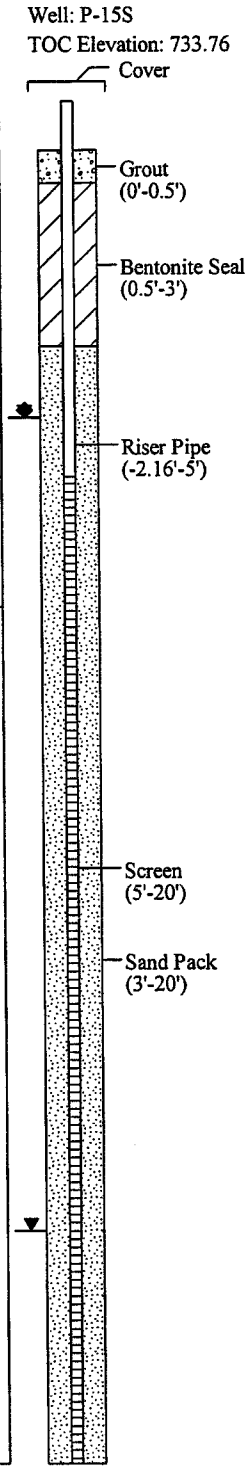
JOYCE ENGINEERING, INC.

LOG OF BORING MW-4S/P-15S

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/20/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/20/02	Northing Coordinate	: 801841.4130
Hole Diameter	: 6.25-inch	Easting Coordinate	: 1725570.0413
Drilling Method	: Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Cuttings, Shelby tube	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 731.60	USCS	DESCRIPTION
0	731	SM	SILTY SAND - tan, moist, loose, some alluvial sands?
2	729		
4	727		
6	725	PWR	PARTIALLY WEATHERED ROCK silty sand, tan/white, slightly moist *Auger refusal at 7 feet (based on P-15D)*
8	723	BR	BEDROCK - dry rock flour, light brown/gray
10	721		
12	719		
14	717		
16	715		
18	713		
20			Drilling terminated at 20 feet



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/20/02
Hole Diameter	: 6.25-inch
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.16-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 : No. 1 Portand grout

ANNULUS SEAL

Type : 3/8" Bentonite chips

PROTECTIVE CASING

Type : 4" X 4" Alum., locked

WELL PAD

Type : 3' X 3' X 6" concrete

1. Drilling was performed with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and borehole was progressed to approximately 20 feet.

2. Solid triangle represents water level at time of drilling at 18.65 feet below TOC. Open triangle represents 24-hour water level at 6.25 feet below TOC. Solid diamond represents 8-day water level at 6.26 feet below TOC.

3. Shelby tube was attempted from 5-7 feet. Approximatley 1 foot was recovered before tube began to bend. Not enough undisturbed sample for complete analysis.

4. Auger refusal was estimated to be approximately 7 feet based on data taken from P-15D.

5. Bedrock descriptions bsed on rock core data from P-15D, air hammer response, and cuttings.

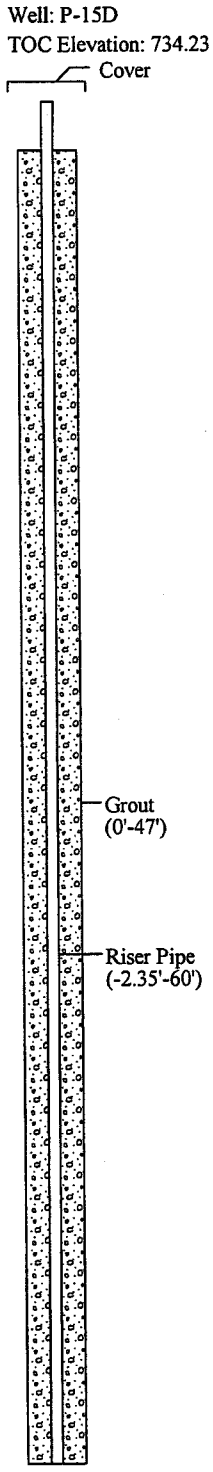
JOYCE ENGINEERING, INC.

LOG OF BORING MW-4D/P-15D

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/19/02	Northing Coordinate	: 801847.0387
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1725576.6237
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings, rock core	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 731.88	Blow Count	% Rec.	USCS	DESCRIPTION
0	731	1 1 1	75	SP	TOPSOIL - dark brown with organic matter SAND - tan, well sorted, slightly moist, soft, alluvial sands?
5	726	16 15 50/4	90	PWR	PARTIALLY WEATHERED ROCK silty sand, tan/white, moist, soft, faint granitic texture *Auger refusal at 7 feet*
10	721			BR	BEDROCK 7-13 foot core run: %REC = 46% %RQD = 38% biotite granite, with feldspar and quartz, medium-grained, slight preferential orientation in biotite, some quartz-rich veins and brittle zones, fractures from horizontal to ~ 30 degrees 13-17 foot core run: %REC = 98% %RQD = 66% as above Hard rock and dry, gray rock flour from 20-29 feet
15	716				
20	711				
25	706				
30	701				
35	696				
40					



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/19/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.35-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 : No. 1 Portand grout

ANNULUS SEAL

Type : 3/8" Bentonite chips

PROTECTIVE CASING

Type : 4" X 4" Alum., locked

WELL PAD

Type : 3' X 3' X 6" concrete

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 7 feet. Ten feet of rock core were obtained using an NQ wire-line rock coring device. Borehole was overdrilled with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and advanced to approximately 80 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 81.28 feet below TOC. Solid diamond represents 8-day water level at 70.16 feet below TOC and still rising.

3. Pentration rate during rock coring was approximately 1 ft/min. for the 7-13 foot run and approximately 4 in./min for the 13-17 foot run.

4. Bedrock descriptions based on rock core obtained from 7-17 feet, air hammer response and cuttings.

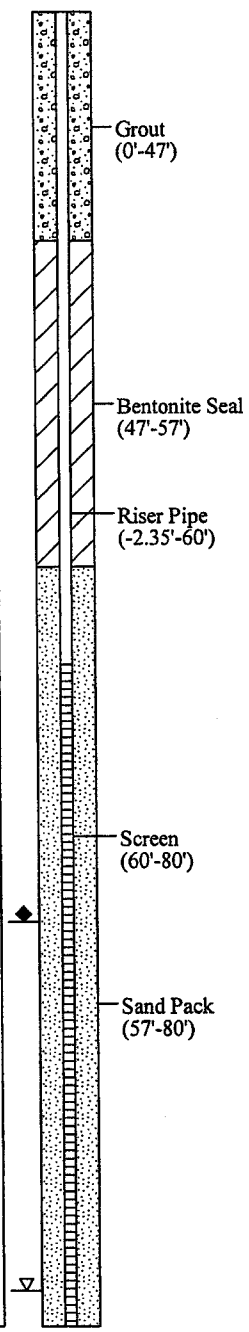
JOYCE ENGINEERING, INC

LOG OF BORING MW-4D/P-15D

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/19/02	Northing Coordinate	: 801847.0387
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1725576.6237
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings, rock core	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 731.88	Blow Count	% Rec.	USCS	DESCRIPTION
40	691				
45	686				
50	681				
55	676				
60	671			BR	
65	666				
70	661				
75	656				
80					Drilling terminated at approximately 80 feet



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/19/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.35-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 : No. 1 Portand grout

ANNULUS SEAL

Type : 3/8" Bentonite chips

PROTECTIVE CASING

Type : 4" X 4" Alum., locked

WELL PAD

Type : 3' X 3' X 6" concrete

1. Drilling performed with an Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 7 feet. Ten feet of rock core were obtained using an NQ wire-line rock coring device. Borehole was overdrilled with an Ingersol Rand T3W air rotary rig utilizing a 6-inch hammer and advanced to approximately 80 feet.

2. Well was dry at time of drilling. Open triangle represents 24-hour water level at 81.28 feet below TOC. Solid diamond represents 8-day water level at 70.16 feet below TOC and still rising.

3. Pentration rate during rock coring was approximately 1 ft/min. for the 7-13 foot run and approximately 4 in./min for the 13-17 foot run.

4. Bedrock descriptions based on rock core obtained from 7-17 feet, air hammer response and cuttings.

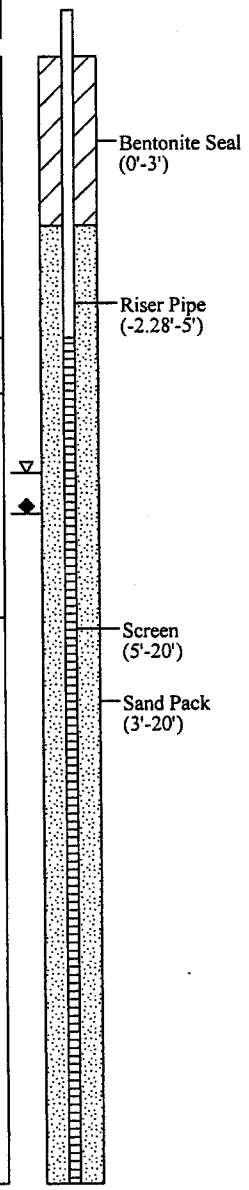
JOYCE ENGINEERING, INC.

LOG OF BORING MW-5/P-12

MRR of High Point, LLC
C&D Permit Application
High Point, NC
JEI Project No. 600.00, Task 04

Date Started	: 02/14/02	Drilling Company	: Bedford Well Drilling, Inc.
Date Completed	: 02/19/02	Northing Coordinate	: 801517.3101
Hole Diameter(s)	: 8.25/6.25-inch	Easting Coordinate	: 1726103.7012
Drilling Method(s)	: HSA/Air Rotary	Surveyed By	: Robert E. Wilson, Inc.
Sampling Method	: Split Spoons, cuttings	Logged By	: Rachel P. Kirkman, P.G.

Depth in Feet	Surf. Elev. 741.16	Blow Count	% Rec.	USCS	DESCRIPTION
0	741	1			TOPSOIL - dark brown with organic matter
		1	75		
		2		SM	SANDY SILT - dark brown, soft, slightly moist
5	736	12		SM	SILTY SAND - tan/brown, coarse-grained
		19	50		
		16		PWR	PARTIALLY WEATHERED ROCK silty sand, tan/brown/white, coarse-grained, granitic texture
					Auger refusal at 10 feet
10	731	50/1	0	BR	BEDROCK - Hard rock and light gray rock flour, slightly moist
					Very dry rock flour
15	726				
20					Drilling terminated at approximately 20 feet



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 02/19/02
Hole Diameter(s)	: 8.25/6.25-inch
Drilling Method	: Hollow Stem Augers
Company Rep.	: Kevin Kendrick
Drilling Method	: Air Rotary
Company Rep.	: Mike Monaghan

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 2.28-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 Acker Soil Max drilling rig utilizing 4.25-inch ID hollow stem augers to auger refusal at approximately 10 feet. Cave-in to approximately 7 feet occured. Borehole was advanced with an Ingersol Rand T3W utilizing a 6-inch hammer to approximately 20 feet.

2. Borehole was dry at time of drilling after the initial 10 feet were drilled on 02/15/02, the water level rose to 6.98 feet below ground surface. The water level rose to 2.50 feet below ground surface on 02/18/02 and to 2.45 feet below ground surface on 02/19/02, prior to advancing the borehole with air rotary methods.

3. After well construction, well was dry. Open triangle represents 24-hour water level at 9.70 feet below TOC. Solid diamond represents 8-day water level at 10.43 feet below TOC.

4. Bedrock descriptions based on air hammer response and cuttings.

JOYCE ENGINEERING, INC.

LOG OF BORING P-18/MW-6

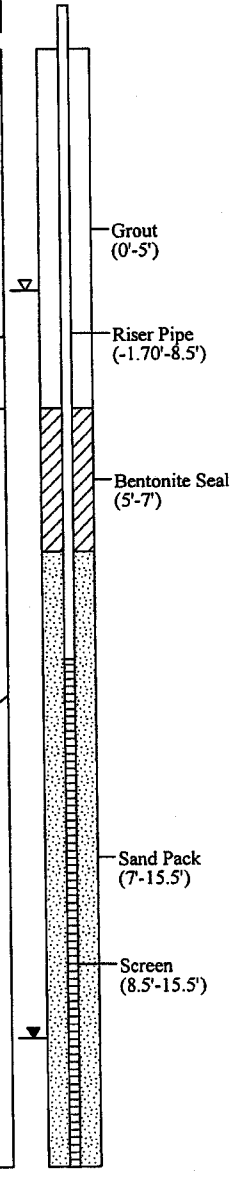
MRR of High Point
C&D Permit Application Response to Comments
High Point, NC

JEI Project No. 600.00, Task 06

Date Started	: 12/04/02	Drilling Company	: J&L Drilling, Inc.
Date Completed	: 12/17/02	Northing Coord.	: 801625.0677
Hole Diameter	: 8.25-inch, 6.25-inch	Easting Coord.	: 1725754.7189
Drilling Method	: HSA/Downhole Hammer	Survey By	: Fleming Engineering, Inc.
Sampling Method	: Split Spoons, Cuttings	Logged By	: David Y. Reedy

Depth in Feet	Surf. Elev. 733.53	Blow Count	% Rec.	USCS	DESCRIPTION
0	733	2	80%	SM	SILTY SAND - yellow fine to medium grained silty sand, quartz grains, moist
1		2			
		4			
2	732	5			
3	731				
4	730				
				CL	LEAN CLAY - orange sandy clay, moist
5	729				
		14	50%	PWR	PWR - white coarse grained silty sand with abundant iron staining, granitic texture, moist
6	728	21			
		27			
7	727	25			
8	726				
					Granitic rock fragments at end of split-spoon with quartz, feldspar, and biotite
9	725				*Auger refusal at 9 ft*
				BR	BEDROCK - granitic rock with quartz, feldspar, and biotite, gray damp cuttings, no dust
10	724	50/5	5%		Wet cuttings at 10 ft
11	723				
12	722				
13	721				
					Green cuttings at 13.5 ft that may represent metavolcanics, damp
14	720				
					White and gray granitic cuttings at 14.5 ft
15	719				
					Drilling terminated at approximately 15.5 ft
16	718				

Well: P-18
TOC Elev.: 735.23



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12/17/02
Hole Diameter(s)	: 8.25-inch/6.25-inch
Drilling Method	: Hollow Stem Augers
Drilling Method	: Downhole Hammer
Company Rep.	: Lee Charbonneau

WELL CASING

Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Threaded, flush-coupled
Approx. Csg. Stickup	: 1.70

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 CME 75 rig utilizing 6.25-inch ID hollow stem augers, and 6-inch downhole hammer. An external air compressor was used for downhole hammer drilling.

2. The drilling method consisted of advancing 6.25-inch ID hollow stem augers to auger refusal and then rock drilling with a 6-inch downhole hammer to the desired depth.

3. Solid triangle represent water level at time of drilling (15.43 feet below TOC). Open triangle represents water level 8 days after well construction (5.05 feet below TOC). Dry cuttings were observed with air rotary drilling from 9-10 feet.

APPENDIX 13

Analytical Requirements

SAMPLING AND ANALYSIS REQUIREMENTS
CONSTRUCTION AND DEMOLITION LANDFILLS
and CLOSED SANITARY LANDFILLS
N.C. SOLID WASTE SECTION

LAB CERTIFICATION REQUIREMENTS:

The Solid Waste Section now requires water quality sample analysis by a laboratory certified by the Division of Environmental Management for groundwater analysis (15A NCAC 2H .0800). The laboratories used for water quality analysis for Solid Waste Section facilities shall be certified under the Division of Environmental Management (DEM) Certification program for the approved methods and at the approved levels of certification.

SAMPLING ANALYTICAL METHODS AND REPORTING LIMITS:

Each parameter on the following constituent list shall be certified at the designated level and an appropriately certified method used for the sample analysis. The data shall be reported at the specified Practical Quantitation Limit (PQL).

Parameter	Certification by DEM	PQL in ppb
Arsenic	Metals, Group I - low level	10
Barium	Barium (20)	500
Cadmium	Metals, Group I - low level	1
Chromium	Metals, Group I - low level	10
Lead	Metals, Group I - low level	10
Mercury	Mercury (21)	1
Selenium	Metals, Group I - low level	20
Silver	Metals, Group II - low level	10

Volatile Organic Compounds

For the parameters and PQLs required for volatile organic compound analysis, refer to the next page of this attachment. For volatile organic analysis the laboratory shall be certified for an SW-846 GC/MS Method (8240 or 8260). The recommended method of analysis is EPA Method 8260.

SAMPLING AND ANALYSIS:

In addition to sampling for the constituents referenced above, all sampling should also include field testing of pH, temperature, and specific conductivity. EPA requires analysis for total metals. No filtering of samples is allowed. The 3030C preparation method for metals analysis is not allowed.

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VOLATILE ORGANIC COMPOUNDS

ORGANIC CONSTITUENT	PQL (UG/L)	ORGANIC CONSTITUENT	PQL (UG/L)
(16) ACETONE	100	(40) T-1,3-DICHLOROPROPENE	10
(17) ACRYLONITRILE	200	(41) ETHYLBENZENE	5
(18) BENZENE	5	(42) METHYL BUTYL KETONE	50
(19) BROMOCHLOROMETHANE	5	(43) METHYL BROMIDE	10
(20) BROMODICHLOROMETHANE	5	(44) METHYL CHLORIDE	10
(21) BROMOFORM	5	(45) METHYLENE BROMIDE	10
(22) CARBON DISULFIDE	100	(46) METHYLENE CHLORIDE	10
(23) CARBON TETRACHLORIDE	10	(47) MEK; 2-BUTANONE	100
(24) CHLOROBENZENE	5	(48) METHYL IODIDE	10
(25) CHLOROETHANE	10	(49) METHYL ISOBUTYL KETONE	100
(26) CHLOROFORM	5	(50) STYRENE	10
(27) CHLORODIBROMOMETHANE	5	(51) 1,1,1,2-TETRACHLOROETHANE	5
(28) DBCP	25	(52) 1,1,2,2-TETRACHLOROETHANE	5
(29) ETHYLENE DIBROMIDE	5	(53) TETRACHLOROETHYLENE	5
(30) O-DICHLOROBENZENE	5	(54) TOLUENE	5
(31) P-DICHLOROBENZENE	5	(55) 1,1,1,-TRICHLOROETHANE	5
(32) T-1,4-DICHLORO-2-BUTENE	100	(56) 1,1,2-TRICHLOROETHANE	5
(33) 1,1-DICHLOROETHANE	5	(57) TRICHLOROETHYLENE	5
(34) ETHYLENE DICHLORIDE	5	(58) CFC-11	5
(35) VINYLIDENE CHLORIDE	5	(59) 1,2,3-TRICHLOROPROPANE	15
(36) CIS-1,2-DICHLOROETHENE	5	(60) VINYL ACETATE	50
(37) T-1,2-DICHLOROETHENE	5	(61) VINYL CHLORIDE	10
(38) PROPYLENE DICHLORIDE	5	(62) XYLENES	5
(39) CIS-1,3-DICHLOROPROPENE	10		

ALSO KNOWN AS: (21)-TRIBROMOMETHANE, (25)-ETHYL CHLORIDE, (26)-TRICHLOROMETHANE, (27)-DIBROMOCHLOROMETHANE, (28)-1,2-DIBROMO-3-CHLOROPROPANE, (29)-1,2-DIBROMOETHANE, (30)-1,2-DICHLOROBENZENE, (31)-1,4-DICHLOROBENZENE, (33)-ETHYLIDENE CHLORIDE, (34)-1,2-DICHLOROETHANE, (35)-1,1-DICHLOROETHENE (ETHYLENE), (36)-CIS-1,2-DICHLOROETHYLENE, (37)-TRANS-1,2-DICHLOROETHYLENE, (38)-1,2-DICHLOROPROPANE, (42)-2-HEXANONE, (43)-BROMOMETHANE, (44)-CHLOROMETHANE, (45)-DIBROMOMETHANE, (46)-DICHLOROMETHANE, (47)-METHYL ETHYL KETONE, (48)-IODOMETHANE, (49)-4-METHYL-2-PENTANONE, (53)-TETRACHLOROETHENE, PERCHLOROETHYLENE, (55)-METHYLCHLOROFORM, (57)-TRICHLOROETHENE, (58)-TRICHLOROFLUOROMETHANE

3 TOTAL POROSITY

3.1 DEFINITION

The total porosity of a porous medium is the ratio of the pore volume to the total volume of a representative sample of the medium. Assuming that the soil system is composed of three phases -- solid, liquid (water), and gas (air) -- where V_s is the volume of the solid phase, V_l is the volume of the liquid phase, V_g is the volume of the gaseous phase, $V_p = V_l + V_g$ is the volume of the pores, and $V_t = V_s + V_l + V_g$ is the total volume of the sample, then the total porosity of the soil sample, p_t, is defined as follows:

$$p_t = \frac{V_p}{V_t} = \frac{V_l + V_g}{V_s + V_l + V_g} \quad (3.1)$$

Porosity is a dimensionless quantity and can be reported either as a decimal fraction or as a percentage. Table 3.1 lists representative total porosity ranges for various geologic materials. A more detailed list of representative porosity values (total and effective porosities) is provided in Table 3.2. In general, total porosity values for unconsolidated materials lie in the range of 0.25-0.7 (25%-70%). Coarse-textured soil materials such as gravel and sand tend to have a lower total porosity than fine-textured soils such as silts and clays. The total porosity in soils is not a constant quantity because the soil, particularly clayey soil, alternately swells, shrinks, compacts, and cracks.

TABLE 3.1 Range of Porosity Values

Soil Type	Porosity, p_t
Unconsolidated deposits	
Gravel	0.25 - 0.40
Sand	0.25 - 0.50
Silt	0.35 - 0.50
Clay	0.40 - 0.70
Rocks	
Fractured basalt	0.05 - 0.50
Karst limestone	0.05 - 0.50
Sandstone	0.05 - 0.30
Limestone, dolomite	0.00 - 0.20
Shale	0.00 - 0.10
Fractured crystalline rock	0.00 - 0.10
Dense crystalline rock	0.00 - 0.05
Source: Freeze and Cherry (1979).	

TABLE 3.2 Representative Porosity Values

Material	Total Porosity, p_t		Effective Porosity,[a] p_e	
	Range	Arithmetic Mean	Range	ArithmeticMean

Sedimentary material				
Sandstone (fine)	-[b]	-	0.02 - 0.40	0.21
Sandstone (medium)	0.14 - 0.49	0.34	0.12 - 0.41	0.27
Siltstone	0.21 - 0.41	0.35	0.01 - 0.33	0.12
Sand (fine)	0.25 - 0.53	0.43	0.01 - 0.46	0.33
Sand (medium)	-	-	0.16 - 0.46	0.32
Sand (coarse)	0.31 - 0.46	0.39	0.18 - 0.43	0.30
Gravel (fine)	0.25 - 0.38	0.34	0.13 - 0.40	0.28
Gravel (medium)	-	-	0.17 - 0.44	0.24
Gravel (coarse)	0.24 - 0.36	0.28	0.13 - 0.25	0.21
Silt	0.34 - 0.51	0.45	0.01 - 0.39	0.20
Clay	0.34 - 0.57	0.42	0.01 - 0.18	0.06
Limestone	0.07 - 0.56	0.30	~0 - 0.36	0.14
Wind-laid material				
Loess	-	-	0.14 - 0.22	0.18
Eolian sand	-	-	0.32 - 0.47	0.38
Tuff	-	-	0.02 - 0.47	0.21
Igneous rock				
Weathered granite	0.34 - 0.57	0.45	-	-
Weathered gabbro	0.42 - 0.45	0.43	-	-
Basalt	0.03 - 0.35	0.17	-	-
Metamorphic rock				
Schist	0.04 - 0.49	0.38	0.22 - 0.33	0.26

[a] Effective porosity is discussed in Section 4.

[b] A hyphen indicates that no data are available.

Source: McWorter and Sunada (1977).

3.2 MEASUREMENT METHODOLOGY

The standard method used on FUSRAP sites for determining the total porosity of soil materials is described in Appendix II of DOA (1970). Further discussion on this methodology is also presented in Danielson and Sutherland (1986).

On the basis of the definition of total porosity, a soil sample could be evaluated for total porosity by directly measuring the pore volume (V_p) and the total volume (V_t). The total volume is easily obtained by measuring the total volume of the sample. The pore volume can, in principle, be evaluated directly by measuring the volume of water needed to completely saturate the sample. In practice, however, it is always difficult to saturate the soil sample exactly and completely and, therefore, the total porosity of the sample is rarely evaluated by a direct method. Usually, the total porosity is evaluated indirectly by using the following expression (DOA 1970, Appendix II; Danielson and Sutherland 1986):

$$p_t = \left(1 - \frac{V_s}{V_t}\right) = \left(1 - \frac{\rho_b}{\rho_s}\right) , \qquad (3.2)$$

where p_t is given as a decimal fraction, V_s is the soil particle volume, V_t is the total volume, $_s$ is the solid phase (soil particle) density, and $_b$ is the dry bulk density of the sample. (Equation 3.2 can be obtained by rearranging Equation 2.3.) Under this approach, the values of $_s$ and $_b$ are evaluated by laboratory or in-situ measurements (Section 2.2) and are then used to calculate the total porosity p_t.

3.3 RESRAD DATA INPUT REQUIREMENTS

To use RESRAD, the user is required to define or use the default values of the total porosity of five materials: (1) cover material, (2) contaminated zone, (3) unsaturated zone, (4) saturated zone, and (5) building foundation material (i.e., concrete). In RESRAD, the total porosities are entered as decimal fractions rather than as percentages. RESRAD adopts the following values as defaults: $n = 0.4$ for the first four materials listed above and $n = 0.1$ for the building foundation (i.e., concrete). These default values are provided for generic use of the RESRAD code. For more accurate use of the code, site-specific data should be used.

If site-specific data are not available and the type of soil is known, Tables 3.1 and 3.2 can be used for estimating total porosity. However, if no information is available on the type of soils, then the values for total porosity should be experimentally determined according to the method presented in Section 3.2.

4 EFFECTIVE POROSITY

4.1 DEFINITION

The effective porosity, p_e, also called the kinematic porosity, of a porous medium is defined as the ratio of the part of the pore volume where the water can circulate to the total volume of a representative sample of the medium. In naturally porous systems such as subsurface soil, where the flow of water is caused by the composition of capillary, molecular, and gravitational forces, the effective porosity can be approximated by the specific yield, or drainage porosity, which is defined as the ratio of the volume of water drained by gravity from a saturated representative sample of the soil to the total volume of the sample.

The definition of effective (kinematic) porosity is linked to the concept of pore fluid displacement rather than to the percentage of the volume occupied by the pore spaces. The pore volume occupied by the pore fluid that can circulate through the porous medium is smaller than the total pore space, and, consequently, the effective porosity is always smaller than the total porosity. In a saturated soil system

composed of two phases (solid and liquid) where (1) V_s is the volume of the solid phase, (2) $V_w = (V_{iw} + V_{mw})$ is the volume of the liquid phase, (3) V_{iw} is the volume of immobile pores containing the water adsorbed onto the soil particle surfaces and the water in the dead-end pores, (4) V_{mw} is the volume of the mobile pores containing water that is free to move through the saturated system, and (5) $V_t = (V_s + V_{iw} + V_{mw})$ is the total volume, the effective porosity can be defined as follows:

$$p_e = \frac{V_{mw}}{V_t} = \frac{V_{mw}}{V_s + V_{mw} + V_{iw}} \quad . \qquad (4.1)$$

Another soil parameter related to the effective soil porosity is the field capacity, $_r$, also called specific retention, irreducible volumetric water content, or residual water content, which is defined as the ratio of the volume of water retained in the soil sample, after all downward gravity drainage has ceased, to the total volume of the sample. Considering the terms presented above for a saturated soil system, the total porosity p_t and the field capacity $_r$ can be expressed, respectively, as follows:

$$p_t = \frac{V_{mw} + V_{iw}}{V_t} \qquad \text{and} \qquad (4.2)$$

$$\theta_r = \frac{V_{iw}}{V_t} \quad . \qquad (4.3)$$

Therefore, the effective porosity is related to the total porosity and the field capacity according to the following expression:

$$p_e = p_t - \theta_r \quad . \qquad (4.4)$$

Several aspects of the soil system influence the value of its effective porosity: (1) the adhesive water on minerals, (2) the absorbed water in the clay-mineral lattice, (3) the existence of unconnected pores, and (4) the existence of dead-end pores. The adhesive water in the soil is that part of the water present in the soil that is attached to the surface of the soil grains through the forces of molecular attraction (Marsily 1988). The sum of the volumes of the adhesive and absorbed water plus the water that fills the unconnected and dead-end pores constitute the volume of the adsorbed water, V_{iw}, that is unable to move through the system.

A detailed list of representative porosity values (total porosity and effective porosity) is presented in Table 3.2.

4.2 MEASUREMENT METHODOLOGY

Determination of the effective porosity, p_e, of soils can be accomplished indirectly by measuring the total porosity, p_t, and the field capacity, $_r$, and then calculating p_e from Equation 4.4. The total porosity is obtained indirectly by measuring the soil densities according to the method described in Section 3.2. To determine the field capacity of the soils, the soil sample is first saturated with water and is then allowed to drain completely under the action of gravity until it gets to its irreducible saturation. The value of $_r$ can then be obtained according to the methods used for measuring volumetric water content (Section 6.2).

4.3 RESRAD DATA INPUT REQUIREMENTS

To use RESRAD, the user is required to define (or to use the default values) of the effective porosity of three distinct materials: (1) contaminated zone, (2) saturated zone, and (3) unsaturated zone. In

RESRAD, the effective porosity values are entered as decimal fractions rather than as percentages. As a default value, RESRAD adopts the value of $p_e = 0.2$ for all three materials. These default values are provided for generic use of the RESRAD code. For more accurate utilization of the model, site-specific data should be used.

If site-specific data are not available and the soil type is known, Table 3.2 can be used for estimating effective porosity. However, if no information is available on soil type, then the values of effective porosity should be experimentally determined according to the method presented in Section 4.2. Effective porosity values should not be greater than total porosity values. Total porosity is discussed in Section 3.