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JOHN'S RIVER WASTE MANAGEMENT FACILITY
PERMIT NO. 1203-CDLF-2014
C&D EXPANSION – PHASES 2A & 4

DESIGN HYDROGEOLOGIC REPORT

MAY 2016

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JOHN'S RIVER C&D LANDFILL – PERMIT NO. 12-03
DESIGN HYDROGEOLOGIC REPORT - PHASES 2A & 4

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Overview 1
1.2 Site Description 2
1.3 Previous Investigations 3
1.4 Current Site Operations 4

2.0 REGIONAL, LOCAL, AND SITE GEOLOGY 4
2.1 Regional Geologic Setting 4
2.2 Site Geology 5
2.3 Fracture Trace – Rose Diagrams 6
2.4 Diabase Dikes 7

3.0 SITE HYDROGEOLOGY 7
3.1 Surface Water Hydrology and Groundwater Discharge Features 8
3.2 Groundwater Hydrology and Flow Regime 8

4.0 PHASE 2A/4 9
4.1 Phase 2A/4 Description 9
4.2 Relevant Point of Compliance 9

5.0 FIELD OBSERVATIONS 10
5.1 Borings, Wells, and Piezometers 10
5.2 Soil/Rock Testing & Descriptions 11
5.2.1 Standard Penetration Tests 11
5.2.2 Soil Classifications and Laboratory Testing 11
5.2.3 Rock Cores and Descriptions 12
5.3 Aquifer Characterization 12
5.3.1 Aquifer Description 12
5.3.2 Infiltration Rates and Transmissivity 13
5.3.3 Hydraulic Conductivity 13
5.3.4 Aquifer Porosity and Permeability 14
5.4 Magnetometer Survey 14

6.0 WATER TABLE INFORMATION 15
6.1 Groundwater Elevations & Seasonal High Water Table Map 15
6.2 Estimation of Long-Term High Water Table 16
6.3 Natural and Man-made Activities Affecting Water Table 17

TABLE OF CONTENTS

7.0 MAPS AND CROSS SECTIONS 17
7.1 Site Topographic map 17
7.2 Seasonal High Water Table Map 17
7.3 Long-Term High Water Table Map 18
7.4 Bedrock Surface Map 18
7.5 Stratigraphic Cross Sections 18

8.0 GROUNDWATER FLOW REGIME 18
8.1 Horizontal Groundwater Gradients and Flow 18
8.2 Vertical Hydraulic Gradients 19

9.0 OTHER GEOLOGIC/HYDROGEOLOGIC CONSIDERATIONS 20
9.1 Surface Water and Wetlands 20
9.2 Groundwater Impacts from the Old Landfill 20

10.0 DESIGN OF PHASES 2A and 4 21
10.1 Vertical Separation 21
10.2 Foundation 22
10.3 Monitorability 22

11.0 REFERENCES 22

12.0 ACRONYMS 25

TABLE OF CONTENTS (continued)

TABLES:

Table 1	Boring and Well/Piezometer Construction Data
Table 2	Groundwater Elevation Data (1987-2016)
Table 3	Laboratory Soil Test Results
Table 4A	Rock Core Data (Whole Site)
Table 4B	Rock Core Data (PZ-42 details)
Table 5	Aquifer Slug Test Results
Table 6	Groundwater Gradients and Flow Velocities
Table 7	Vertical Hydraulic Gradients

GRAPHS:

Graph 1	Relative Elevation of Ground Surface, Bedrock, and Water Table
Graph 2A	Monthly Precipitation Data – Morganton, NC, 1931-2016
Graph 2B	Monthly Precipitation Data – Morganton, NC, 1991-2016

FIGURE:

Figure 1	Site Location on USGS Topographic Map

DRAWINGS:

Drawing HG-00	Existing Conditions
Drawing HG-01	Bedrock Surface Map
Drawing HG-02	Seasonal High Groundwater Table Map (February 2016)
Drawing HG-03	Long-Term High Water Table Map
Drawing HG-04	Proposed Base Grades and Cross-Section Location Map
Drawing HG-05	Cross-Sections A, B, & C

APPENDICES:

Appendix A	Boring/Construction Logs (PZ-40, PZ-41, PZ-42, & MW-30)
Appendix B	Geotechnical Laboratory Report (December 2015)
Appendix C	Slug Test Analyses (January 2016)
Appendix D	ACOE Notification of Jurisdictional Determination

1.0 INTRODUCTION

1.1 Overview

In accordance with the North Carolina Solid Waste Management Rules (NCSWMR) § .0538(b), Burke County is submitting this portion (Design Hydrogeologic Report) of the Application for a Permit to Construct Phases 2A and 4 of the construction and demolition (C&D) landfill at the John's River Waste Management Facility (a.k.a. - John's River Landfill) in Burke County, North Carolina (Permit 12-03). The purpose of this Design Hydrogeologic Report is to demonstrate compliance with the vertical separation and foundation standards set forth in Items (2) and (5) of § .0540 of the NCSWMR. This report includes results of hydrogeologic investigations to characterize the uppermost aquifer for the proposed phase of landfill construction in order to design an effective water quality monitoring system.

A Site Hydrogeologic Report for the John's River Landfill C&D expansion (dated December 2011) was submitted to the North Carolina Department of Environment and Natural Resources (NCDENR), now the Department of Environmental Quality (NCDEQ), Solid Waste Section (SWS) in September 2012 as part of the permit Application. A Design Hydrogeologic Report for Phase 1 of the C&D expansion (dated August 2012) was submitted also to the SWS in September 2012 as part of the permit application. Much of the data presented in this Design Hydrogeologic Report was originally presented in the Site Hydrogeologic Report or the Phase 1 Design Hydrogeologic Report; however, this report focuses on the area in and around the proposed footprints of the Phase 2A and Phase 4 waste cells.

The SWS issued Conditional Site Suitability Approval on February 28, 2014 for Phases 1A, 2A, 4, 5, 6, 7, and 8; however, Phases 1B, 2B, and 3 were not determined to be suitable due to groundwater contamination. A Permit to Construct for Phase 1A was issued in March 2014 and Burke County completed construction of Phase 1A of the C&D landfill expansion in July 2014. A Permit to Operate for Phase 1A was issued on August 14, 2014.

To provide clarity, select terms used in this report are defined below:

- SITE or PROPERTY - The terms "the site," "County property," or "landfill property" refer to the 318 acres that were permitted in 1987 and that compose the County-owned parcel of which the current facility is a part.

- FACILITY - The term "facility" refers to the 227 acres within the new facility boundary as proposed in the 2012 permit application.

- OLD LANDFILL - The term "old landfill" refers to the 28-acre footprint in the southwest corner of the landfill property that was used for municipal solid waste (MSW) disposal under the 1987 permit and was closed in 1998. This facility was used for disposal of construction and demolition (C&D) waste on top of the closed MSW landfill under the 1994 Transition Plan until September 2014.

- NEW LANDFILL / EXPANSION AREA - The terms "new landfill" or "expansion area" refers to the 37-acre footprint proposed for C&D waste disposal in the permit application submitted in 2012 and adjacent areas that will be involved in waste handling, compliance monitoring, or related activities associated with the new landfill.

- PHASE 1A - The term "Phase 1A" refers to the 2.5-acre waste disposal cell constructed in 2014 within the new landfill footprint.

- PHASE 2A/4 - The terms "Phase 2A and Phase 4" or "Phase 2A/4" refer to the next phases of the new landfill expansion, which is the subject of this study. Phase 2A and Phase 4 comprise a combined 6.1-acre waste disposal area proposed to be constructed within the new landfill footprint.

The site location is shown on a portion of the USGS topographic map for the area in Figure 1. Drawing HG-00 shows existing conditions of the entire facility, and shows the planned phasing of the expansion area. The SWS issued Conditional Site Suitability Approval on February 28, 2014 for Phases 1A, 2A, 4, 5, 6, 7, and 8; however, Phases 1B, 2B, and 3 were not determined to be suitable due to groundwater contamination attributed to landfill gas migration from the old landfill. Phases 5, 6, 7, and 8 are not planned to be constructed for at least 5-10 years, but will likely be constructed in the order: Phase 5 first, followed by Phase 8 and then Phase 6, and lastly Phase 7. In the meantime, if the groundwater contaminant plume between the old landfill and the expansion area recedes significantly, the County may petition for site suitability to be approved for Phases 1B, 2B, and 3. If this happens, it will likely change the phasing sequence. Design Hydrogeologic Reports, including installation of additional wells and piezometers, and Permit-to-Construct Applications will be required for each new phase.

The results of this investigation show that the bedrock elevations and long-term high water table can be reasonably determined based on the available data. The proposed Phase 2A/4 design meets all conditions for vertical separation from the long-term high water table and bedrock. An updated Water Quality Monitoring Plan for the facility, including proposed monitoring wells for Phases 2A and 4, will be submitted as a separate report. The proposed groundwater monitoring network will be effective in monitoring for a potential release from the waste disposal area downgradient of the proposed facility.

1.2 Site Description

The John's River Waste Management Facility is located in the north-central portion of Burke County, north of Morganton, North Carolina. The facility was permitted in 1987 and the old landfill began receiving waste in 1988. The site location is shown on a portion of the USGS Topographic Quadrangle Map for the area on Figure 1. The 318-acre landfill property is bounded by Lower Creek to the north and east, and the Catawba River to the south. The Catawba River forms Lake Rhodhiss southeast of the facility. Lake Rhodhiss is a long, narrow lake formed by the Rhodhiss Hydroelectric Dam located approximately 12 miles downstream of

the landfill property. The John's River flows into the Catawba River near the southwest corner of the landfill property.

Ground surface elevations range from approximately 990 feet at the river's edge to over 1,170 feet above mean sea level (AMSL). Topography is characterized by high hills transected by small streams and drainage features sloping down to the Catawba River. Natural slopes range from 5 to 25 degrees. The Catawba River 100-year flood boundary, which roughly corresponds to the 1,005-foot topographic contour, extends onto the landfill property.

Properties within 2,000 feet of the landfill boundary are mostly heavily wooded or are covered by surface water. All adjoining properties and properties within 2,000 feet of the facility are undeveloped except for two private residences to the north and northwest of the landfill. A Site Characterization Drawing, which included an inventory of all properties within 2,000 feet of the facility, was included in Appendix H-1 of the Site Hydrogeologic Report (JOYCE, 2011b).

There are no water supply wells or surface water intakes within 2,000 feet of the facility boundary. The residence to the north was reported to have had a private water-supply well at one time. Even if this well still exists, it is not considered to be a potential off-site receptor due to being up-gradient of the facility, greater than 4,000 feet from old or proposed waste disposal areas, and more than 3,500 feet from the proposed facility boundary.

All properties to the north and northwest, as well as the landfill facility buildings, are supplied with potable water by the Burke Caldwell Corporation. The Burke Caldwell Corporation operates four public supply wells located approximately 1.5 miles northwest of the facility and supplies public water to residential areas northwest of the facility. The City of Morganton and the Triple Community Water Corporation provide public water to areas south and southeast (respectively) of the facility on the other side of the Catawba River. There are three public water intakes on Lake Rhodhiss between the landfill facility and the dam. The Town of Valdese intake is located approximately five miles downstream of the facility boundary, and the Lenoir and Granite Falls intakes are approximately eight and ten miles downstream, respectively.

1.3 Previous Investigations

A Site Hydrogeologic Report for the John's River Landfill (dated August 2012) was submitted to DENR in September 2012 (JOYCE, 2011b) as part of the Permit Application. The Site Hydrogeologic Report summarized and included results from previous investigations, including original site investigations for the John's River Landfill (Municipal Engineering, 1986) as well as a Site Hydrogeologic Report (JOYCE, 1996a) and a Design Hydrogeologic Report (JOYCE, 1997) for a proposed MSW landfill on the property, which was permitted but never built. A Design Hydrogeologic Report for Phase 1 of the New Landfill (JOYCE, 2012) was also submitted in August 2012 as part of the Permit Application.

Much of the data presented in this Design Hydrogeologic Report were also presented in the Site Hydrogeologic Report and/or the Design Hydrgeologic Report for Phase 1; however, this report focuses on the area in and around the proposed footprint of the Phase 2A/4 waste cell, rather than the entire facility. To avoid redundancy and save paper, the data presented in appendices in the

Site Hydrogeologic Report and/or the Phase 1Design Hydrogeologic Report are not included as appendices in this report; rather, this report refers back to the earlier reports. These data include: a site characterization drawing, geologic maps, fracture trace analyses, boring logs, well/piezometer construction diagrams, laboratory reports for soil testing, aquifer slug test data, and magnetometer survey results. Tables summarizing these data, including data both within and outside of the compliance area for Phase 2A/4, are included in this report.

1.4 Current Site Operations

The old C&D waste disposal unit, which is on top of the closed unlined MSW unit, combined consists of 28 acres in the southwest corner of the landfill property. The old landfill began operations as a MSW landfill in April 1988, but was closed in January 1998 to comply with §.1627(c)(10)(A) of the NCSWMR governing MSW landfills not designed with a base liner and leachate collection system. Burke County has operated a permitted C&D disposal area on top of the closed portions of the MSW landfill since 1998 in accordance with the site's Transition Plan (JOYCE, 1994). The old C&D landfill reached its capacity in late 2014 and the County is planning for the landfill final closure in 2016. A MSW transfer facility is located in the eastern half of the property.

Burke County completed construction of Phase 1A of the C&D landfill expansion in July 2014, a Permit to Operate for Phase 1A was issued on August 14, 2014, and the new landfill began operation on September 1, 2014. The most recent survey was completed on April 5, 2015. During the interval from September 1, 2014, and the April 2015 survey, the County placed 3,696 tons of waste in the landfill, as well as an unquantified amount of cover soil, and consumed 6,780 cubic yards (cy) of airspace. As of April 2015 Phase 1A had 57,967 cy remaining for waste disposal and daily cover soil. Assuming a constant monthly tonnage of 516 tons/month, and compaction efficiency of 1,090 lbs/cy, the remaining life of the landfill beyond the last survey date is approximately 5.1 years (approximate full date of May 10, 2020).

The only known underground utility entering the site is a water supply line located under the northwest access road off of Duckworth Road that services the office, garage and recycling buildings. The garage and office are served by an on-site septic system for treatment of sanitary wastes. The drain lines run from the north side of the building toward a drain field located behind the recycling building. A short gas line extends from an above-ground tank on the eastern side of the office to the building. Electric power enters the site via overhead power lines, but runs underground from the power poles to the on-site buildings.

2.0 REGIONAL, LOCAL, AND SITE GEOLOGY

2.1 Regional Geologic Setting

The John's River Waste Management Facility is located in the Inner Piedmont Belt of the Piedmont Physiographic Province in western North Carolina. The Inner Piedmont Belt is separated from the Blue Ridge Belt to the northwest by the Brevard Fault Zone and the Kings Mountain Shear Zone. The Inner Piedmont Belt consists primarily of a high-grade sillimanite metamorphic facies zone that grades into a lower-grade kyanite facies zone along its

northwestern flank. The rocks are predominantly thinly layered mica schist and biotite gneiss interlayered with lesser amounts of amphibolite, calc-silicate rock, hornblende gneiss, quartzite, and in rare instances, marble (Goldsmith, et. al., 1988). Prior to regional metamorphism, the Inner Piedmont Belt rocks were probably mostly sedimentary (graywacke) with some intermediate volcanic flows and tuffs. A regional geologic map covering the proposed site area was provided in Appendix H-2 of the Site Hydrogeologic Report (JOYCE, 2011b).

The history of deformation and emplacement of igneous intrusives in the Inner Piedmont is complex. The rocks have been extensively folded, sheared, and faulted. Granite dikes and larger granite, granodiorite, and a few quartz diorite bodies have been emplaced along shear zones and discordances. A major lineament coincides with the course of the Catawba River in Caldwell, Burke, and Alexander Counties, but no offset has been documented.

Sumsion and Laney (1967) studied the Morganton area geology in detail and mapped the site area as granitic gneiss. Their geologic map was included in Appendix H-2 of the Site Hydrogeologic Report (JOYCE, 2011b). These investigators state that the mapping unit is often intermixed and interlayered with biotite-muscovite schist, similar to that described during the site investigations. Additional observations made by the authors, which are pertinent to this investigation include their observations on the geologic structure of the area. The limited and highly weathered site outcrops precluded any detailed on-site study of fractures, joints, and/or faults which may be present; however, Sumsion and Laney provide the following description of structural features in and around the Morganton area:

> *... Due to the excessive mantle of saprolite, faults and joints are not readily apparent except where exposed in railroad cuts, road cuts, quarries, or similar excavations. Few such exposures fail to show a number of faults, shear zones, and joints. However, these linear structural features are generally not traceable for any great distances. Faults are very common. They are apparently of small displacement and not of regional extent. Faults generally strike northeastward and are vertical or dip at steep angles southeastward. Faults striking northwestward, though present, are less common. The predominant joint systems strike about N 60E E and N 40E W, and are vertical or dip steeply southeastward and southwestward. Less prominent joint systems trending nearly north and nearly east occur locally....*

2.2 Site Geology

The John's River Waste Management Facility is in close proximity to the Brevard Shear Zone, and is underlain by highly metamorphosed and complexly structured rocks. According to Goldsmith, et al. (1988) and as illustrated on the Charlotte 2E sheet geologic map (Appendix H-2 of the Site Hydrogeologic Report (JOYCE, 2011b)), the site is underlain by gneisses and schists of various compositions, calc-silicates, and felsic metavolcanics, all grouped together in one mapping unit. Less than one mile to the northwest, the bedrock is likely to be foliated-to-massive migmatitic granitic gneiss with biotite gneiss and amphibolite. Approximately two miles to the east of the site is a small area that has been mapped as metamorphic granitic rock. A

major diabase dike system oriented northwest-southeast has been mapped over a distance of more than 40 miles and passes less than one mile to the northeast of the site.

The dominant rock type as seen in outcrops, float, boulders, and rock cores located on the site is granitic (quartz diorite composition) gneiss, often interlayered with biotite-muscovite schist. No calc-silicates or metavolcanics have been identified on the site. The limited outcrop exposures suggest that the site lithologies are complexly folded with attitudes varying from vertical to horizontal in any given outcrop. The structures within limited outcrops indicate that these rocks are complexly-folded, with attitudes that vary from vertical to horizontal in most outcrops.

An abundance of rounded sand, gravel, cobble, and boulder-sized alluvial deposits are exposed along the banks of the Catawba River, which borders the site. The greatest accumulation of these deposits is along the southwestern site boundary near the existing landfill location. These river deposits are 40 feet or more above the current river elevation and have been described as ancient river terrace deposits; however, the majority of these deposits are thought to be remnants or spoils from an early twentieth century river dredging operation which was located along the banks of the Catawba River. Concrete foundation pilings from this operation are still visible in the site area, along the river's edge. This would explain why many of the river deposits are so high above the current river elevation.

The site regolith is typical of the inner piedmont and consists mostly of silty sand, clayey sand, and sandy silt. The regolith at the site ranges from 19 to at least 120 feet thick. No clear correlation exists between topographic expression and this depth, as knolls and hollows across the site exhibit highly variable thicknesses of regolith. The depths to bedrock (thickness of regolith) based on auger refusal encountered during the historic site studies and recent investigations are included in Table 1.

Depth to bedrock appears fairly consistent in the Phase 2A footprint, with auger refusal in PZ-32 and MW-22D at 49.5 feet and 45.5 feet, respectively. Depth to bedrock is more variable in the Phase 4 footprint, with auger refusal ranging from only 25 feet below ground surface at PZ-40 to greater than 60 feet at PZ-41. Auger refusal was at 30 feet in PZ-42 and greater than 40 feet in MW-1. (Auger refusal was not reached at PZ-41 or MW-1.) This variability is even more significant considering that PZ-40 and PZ-41 are only about 120 feet apart and at similar elevations. Furthermore, the rock encountered in PZ-40 was very competent with no apparent fractures to a depth of 62 feet, based on the fact that PZ-40 was dry, even though the water levels in PZ-41 and PZ-42 were approximately 45 and 30 feet below ground surface, respectively. This indicates that there is a pinnacle of very competent rock beneath the northern end of Phase 4.

2.3 Fracture Trace – Rose Diagrams

Fracture trace analyses were performed for the site area, revealing only limited evidence of preferential fracture trends. Lineament data were collected using the USGS 1:24,000 scale topographic maps of the area (Morganton North, NC, and Drexel, NC quadrangles). The following three radii of investigation were chosen: the roughly circular site boundary, 2,000 feet from center of the site, and two miles from the center of the site. Results, displayed in rose diagram format, are shown in Figures VII-3, VII-4, and VII-5, respectively, from the 1996 Site

Hydrogeologic Report (JOYCE, 1996a), which were presented in Appendix H-3 of the Site Hydrogeologic Report (JOYCE, 2011b). The lineations used for this analysis were displayed on Figure VII-6 in Appendix H-3 of the Site Hydrogeologic Report (JOYCE, 2011b). The results suggest slight preferential lineaments in the north-south direction, and in the northwest-southeast direction.

Regarding preferential fracture orientations, one additional observation is noteworthy. Figure VII-7 in Appendix H-3 of the Site Hydrogeologic Report (JOYCE, 2011b) presented a map of the Morganton area showing major drainage systems. Two prominent lineations are readily apparent near the site area. The first trends approximately N 55º E and is indicated by segments of the John's and Yadkin Rivers, and other smaller segments in the area. These lineations occur just north and northeast of the site. The second lineation occurs west and northwest of the site and is recognized by portions of the John's River near its intersection with the Catawba River, and the river (Upper Creek) which parallels that portion of the John's River to the west. This lineation trends approximately N 40º W and appears to be consistent with one of the predominant joint systems recognized by Sumsion and Laney (1967).

Strikes and dips of jointing and foliation from the limited site outcrops are highly variable across the site and show little correlation with the recognized attitudes presented above. One of the best exposures of rock on site occurs approximately 175 feet north of MW-13. Two predominant sets of joints were identified in this outcrop area: one with an average strike of N 5º W and average dip of 80º E, and one near-vertical joint set trending N 78º W. These joint sets do not appear to have a correlation with the drainage lineation which underlies the area. Foliations of the outcrops in this area have a strike which averages approximately N 40º W with highly variable dips to the east.

2.4 Diabase Dikes

A major diabase dike trending approximately N 32º W has been mapped near the site approximately 3,000 feet from the eastern site boundary (Appendix H-2 of the Site Hydrogeologic Report (JOYCE, 2011b)). This dike was identified in the field by visual observation of float and subsequently by magnetometer. Field reconnaissance indicates that the dike is about 100 to 150 feet wide. A magnetometer survey conducted at the John’s River site in 1995 found no evidence of significant diabase dikes beneath the subject property.

3.0 SITE HYDROGEOLOGY

The following section discusses the hydrogeological aspects of the site and the complex details associated with this Piedmont terrain. A significant amount of hydrogeologic investigation was performed on the subject area during the initial permitting which took place in 1985-1986, and during permitting of the expansion area for an MSW landfill in 1995-1997. Much of this information is either included or referenced in the following discussions.

3.1 Surface Water Hydrology and Groundwater Discharge Features

The landfill property is located adjacent to the Catawba River (Lake Rhodhiss) between the confluences of two perennial streams, John's River and Lower Creek The upper reaches of Lake Rhodhiss (i.e., where the river becomes the lake) are approximately adjacent to the landfill property. The Catawba River, John's River, and Lower Creek are all groundwater discharge features. There are also four intermittent streams (creeks) which flow into the Catawba River between the John's River and Lower Creek. These streams may be groundwater discharge features, at least at some times of the year. The locations of these streams are shown on Drawing HG-00. Stream 1 is located along the western property boundary. Stream 2 starts in the central part of the proposed expansion landfill footprint near PZ-16S&D and flows toward MW-14. Stream 3 starts in the eastern end of the footprint and flows toward PZ-7. Stream 4 is located farther east, well outside of the footprint, near MW-2 and PZ-6. A fifth drainage feature is located across the access road north of the proposed expansion area near MW-6. It drains through a culvert, which runs from southeast to northwest under the shooting range area, and it discharges into a drainage that connects with Lower Creek.

Surface runoff from the landfill property flows either to the Catawba River (either directly or by way of one of the four intermittent streams) or to Lower Creek, which flows into the Catawba River. The majority of the existing landfill area drains directly into the Catawba River; however, a small portion of it drains into Stream 1 and then to the Catawba River. The entire footprint proposed for waste disposal in the expansion area drains directly into the Catawba River either directly or through Streams 2 or 3.

3.2 Groundwater Hydrology and Flow Regime

> *"The Piedmont ground-water system is deceptively simple in the broad view and exceedingly complex in detail. In the broad view, it is a simple two-part system consisting of regolith, composed of a granular layer of soil and saprolite and thin, discontinuous alluvial deposits, overlying fractured, crystalline bedrock. Hydraulically, the regolith functions as the reservoir of the system and the bedrock fractures function as pipelines that transmit water from the regolith to natural discharge areas."*
> (Ralph Heath, 1989)

The above quote is an accurate description of the groundwater system underlying the John's River Waste Management Facility and is the basis for the site conceptual model for groundwater at the site.

The regolith at the site ranges from 19 to at least 120 feet thick. No strong correlation exists between topographic expression and depth to bedrock. Both knolls and hollows across the site exhibit highly variable thicknesses of regolith. The depths to bedrock (thickness of regolith) as encountered during the historic site studies and recent investigations are included in Table 1.

Table 2 summarizes recent and historical groundwater elevation data from the site collected from all current and previously-existing monitoring wells and piezometers. The most complete water level data sets for the site were from May 16-17, 2011 and January 11, 2016. Based on the

groundwater level measured in May 2011 and January 2016, groundwater was above the bedrock surface in 88% of the wells and piezometers on the site. For wells and piezometers where depth to bedrock is known, the static water table ranged from greater than 60 feet above bedrock to almost 40 feet below bedrock, with the average height of the water table being approximately 9 feet above bedrock. If the height of the water table above the bottom of the well for those wells that did not penetrate to bedrock is included in our calculations, the average height of the water table above bedrock is closer to 12 feet. The majority of wells and piezometers where the water table was below the bedrock surface were on high ridges. Graph 1 shows the relative elevations of the ground surface, the bedrock surface, the January 2016 static water table, the long-term high water table, and the total well depth, for all of the wells and piezometers on the site, sorted according to ground surface elevation. (See Section 6.0 for more details on the water table data.)

The fact that the water table is well above the bedrock surface beneath most of the site indicates that groundwater flow through the regolith and saprolite is going to dominate the groundwater flow regime, especially in the low-lying areas near the groundwater discharge features. Groundwater flow through the fractured bedrock will be a minor contributor to the overall groundwater system except beneath the high ridges.

4.0 PHASE 2A/4

4.1 Phase 2A/4 Description

Phases 2A and 4 together comprise the second 5-year phase of the C&D Landfill Expansion at the John's River Waste Management Facility. The Phase 2A waste disposal cell covers 2.1 acres of the proposed landfill expansion footprint. Phase 4 waste disposal cell covers 4.0 acres of the proposed landfill expansion footprint. Drawing HG-00 shows the limits of Phases 2A and 4 relative to the expansion area and the facility.

Phase 2A permitted capacity is 133,909 cy and Phase 4 permitted capacity is 446,648 cy, making a combined capacity of 580,557 cy. The annual air space consumption for the landfill is expected to be approximately 36,000 cy; therefore, the 5-year phase will require 180,000 cy of airspace for waste disposal. The proposed 6.1-acre cell will be sufficient to meet this need.

4.2 Relevant Point of Compliance

NCSWMR § .0544(b).(1).(B) requires the Relevant Point of Compliance be established around a proposed landfill that is no greater than 250 feet from the proposed edge of waste and no less than 50 feet from the facility property boundary. The facility property boundary is far more than 300 feet from the proposed edge of waste in all directions, so the property boundary will not influence placement of the relevant point of compliance. The Relevant Point of Compliance for Phase 2A/4 will be 250 feet from the Phase 2A/4 edge of waste. The location of the Relevant Point of Compliance is shown on Drawings HG-01 through HG-03. The area within the Relative Point of Compliance boundary will be referred to as the Phase 2A/4 Compliance Area.

5.0 FIELD OBSERVATIONS

5.1 Borings, Wells, and Piezometers

For this report, three additional piezometers and one additional monitoring well were installed on December 16-18, 2015. Piezometers PZ-40, PZ-41, and PZ-42 were installed within the Phase 4 footprint and monitoring well MW-30 was installed east of Phase 4. Boring logs and well construction diagrams for PZ-40, PZ-41, PZ-42, and MW-30 are included in Appendix A of this report, and the construction details are included in Table 1.

Of the 98 borings on the landfill property, 3 lie within the 2.1-acre footprint of Phase 2A and 5 lie within the 4.0-acre footprint of Phase 4. An additional 12 borings lie within or very near the Phase 2A/4 compliance area. These borings are summarized below.

Borings, Wells, and Piezometers within the Phase 2A/4 Footprint & Compliance Area

ID	Date Installed	GW (Ft.-TOC)	AR (BR) (Ft.-BGS)	TD (Ft.-BGS)	Top Screen (Ft.-BGS)	Bottom Screen (Ft.-BGS)	Lithology of Screened Interval
PHASE 2A	**FOOTPRINT**						
MW-22S (PZ-22S)	June 1996	16.35	bne	25	10	25	Saprolite
MW-22D (PZ-22D)	June 1996	15.36	45.5	45	40	45	Saprolite/PWR
PZ-32 (abd.)	May 2011	35.49	49.5	65	29	49	Saprolite
PHASE 4	**FOOTPRINT**						
MW-1	Sept 1987	31.48	bne	40	18.5	28.5	Saprolite
PZ-20 (nle)	June 1996	62.20	bne	45	30	45	Saprolite
PZ-40	18-Dec-2015	64.10	25	62	32	62	Bedrock
PZ-41	16-Dec-2015	47.26	bne	60	40	60	Saprolite
PZ-42	17-Dec-2015	31.11	30	54	34	54	Bedrock
COMPLIANCE	**AREA**						
PZ-8S	May 1995	47.29	bne	55	40	55	Saprolite
PZ-8D	June 1996	47.44	74	89.5	84.5	89.5	Bedrock
PZ-15 (nle)	June 1996	dna	bne	30	13	30	Saprolite
PZ-16S	June 1996	9.35	bne	20	3	20	Saprolite
PZ-16D	June 1996	3.31	53	68	63	68	Bedrock
PZ-19	June 1996	27.98	bne	30	15	30	Saprolite
PZ-30S	May 2011	40.91	bne	52	37	52	Transition Zone
PZ-30D	May 2011	41.14	47	82	67	82	Bedrock
PZ-33 (abd.)	May 2011	46.48	52	62	40	60	Transition Zone
PZ-35	May 2011	21.69	57.5	57.5	15	35	Saprolite
MW-20 (PZ-4)*	May 1995	62.13	67	67	52	67	Saprolite
MW-30**	16-Dec-2015	31.65	bne	50	35	50	Saprolite

GW = Depth to groundwater (May 2011). AR (BR) = Auger Refusal (Bedrock). TD = Total drilled depth of boring.
Ft-BGS = Feet below ground surface. Ft-TOC = Feet below top of well casing
abd = abandoned. nle = no long existent. bne = bedrock (auger refusal) not encountered. dna = data not available.
* MW-20 is ~240 ft. from the original Phase 2A boundary, but is ~285 ft. from the revised boundary.
** MW-30 is ~255 ft. from the Phase 4 boundary.

From the initial site studies through the most recent investigation, there have been a total 98 borings advanced within the landfill property, 70 of which were converted to wells or piezometers. A few of these wells/piezometers have either been abandoned or inadvertently destroyed, but most are still in existence. The 70 wells and/or piezometers include 8 nested pairs (i.e., two wells immediately next to each other but screened at different depths). A total of 44 of the 98 borings were advanced to auger refusal, which is interpreted as the top of competent bedrock, and 29 of the borings were advanced deeper into bedrock either by rock-coring or air-rotary drilling or both. Table 1 summarizes the boring and well/piezometer construction data and status for all 98 borings. The locations of the borings, wells, and piezometers are shown on Drawing HG-01. Boring logs and well construction diagrams for borings, wells, and piezometers installed prior to 2012 were included in Appendix H-4 of the Site Hydrogeologic Report (JOYCE, 2011b).

5.2 Soil/Rock Testing & Descriptions

5.2.1 Standard Penetration Tests

Split-spoon soil samples with standard penetration tests (SPTs) were obtained during drilling of most of the borings on the site, typically at 5-foot intervals down to auger refusal. Each split spoon was two feet long and SPT blow counts were recorded for four six-inch intervals for each sample. The SPT blow counts for each boring are recorded on the boring logs in Appendix H-4 of the Site Hydrogeologic Report (JOYCE, 2011b), or for recent borings, in Appendix A of this report.

5.2.2 Soil Classifications and Laboratory Testing

Split-spoon soil samples and cuttings were described in the field by a professional geologist during drilling of most of the borings on the site using the Unified Soil Classification System (USCS). The descriptions are included on the boring logs included in Appendix H-4 of the Site Hydrogeologic Report (JOYCE, 2011b) , or for recent borings, in Appendix A of this report. In addition to split-spoon samples, undisturbed soil samples were collected using 3-inch diameter, 2-foot long Shelby tubes from selected borings.

Portions of soil samples from several borings were sent to a laboratory for particle-size analysis to determine the percentage of fine-grained (silt and clay) materials in the soil. These samples ranged from 25.3% to 83.4% fine-grained material. In addition, the samples were analyzed for Atterberg Limits, and some samples were analyzed for porosity. These data are summarized in Table 3.

Undisturbed (Shelby tube) soil samples were collected from PZ-30S, PZ-31, PZ-32, PZ-37, and PZ-38 in May 2011; and undisturbed samples were collected from PZ-41 and PZ-42 in December 2015. The undisturbed samples were analyzed using detailed sieve and hydrometer analysis to determine the percentages of gravel, sand, silt, and clay in order to classify the soil using the United States Department of Agriculture (USDA) soil classification system. These samples were also analyzed for water content, specific gravity, and porosity. In addition, samples from PZ-30S, PZ-32, and PZ-42 were analyzed for permeability, and a tri-axial shear test was performed on a sample from PZ-30S. All of the data from these tests are summarized in

Table 3. The complete laboratory reports for the May 2011 samples were included in Appendix H-6 of the Site Hydrogeologic Report (JOYCE, 2011b). The complete laboratory reports for the December 2015 samples are included in Appendix B of this report.

NCSWMR §.0540.(2).(b) specifies that the foundation soils comprising the upper two feet of the subgrade contain only USCS soil types SC, SM, ML, CL, MH, or CH. All soil samples obtained from the site (including both split-spoon samples and Shelby-tube samples) met these criteria. Most of the site soils, including those from the Phase 2A/4 area, were classified as silty sands, silt, or clayey silt (SM) under the USCS, and sandy loams under the USDA system.

Soil porosity ranged from 0.32 to 0.57 (32% - 57%), with an average of 0.44 (44%). Soil permeability ranged from 1.1×10^{-5} cm/sec to 1.4×10^{-3} cm/sec, with an average of 3.7×10^{-4} cm/sec. The sample from PZ-32 (in Phase 2A) had a porosity of 49% and a permeability of 1.4×10^{-3} cm/sec. The sample from PZ-42 (in Phase 4) had a porosity of 44% and a permeability of 6.2×10^{-5} cm/sec. These values are typical for saprolitic soils in the North Carolina Piedmont region.

5.2.3 Rock Cores and Descriptions

Rock cores were obtained from borings B-8, B-9, B-11, PZ-2D, PZ-8D, PZ-9D, PZ-16D, MW-15D, PZ-30D, PZ-32, PZ-38, and PZ-42. One of the rock cores (PZ-32) was within the footprint of the Phase 2A waste cell, and one (PZ-42) was within the Phase 4 footprint. Length of core runs for the borings ranged from 3.5 feet to 40 feet, with most cores 15 feet or longer. Cores generally began at or just below auger refusal. Core recovery values ranged from 62% to 100%. Rock quality designations (RQD's) for recovered cores ranged from 21% to 95%. The average RQD for all rock cores was 57%. Descriptions, recovery values, and RQD's for all the cores are summarized in Table 4A. A more detailed core description for PZ-42 is included in Table 4B.

The primary rock type encountered in the rock cores was granitic gneiss, sometimes interlayered with biotite schist. The rock is generally massive to slightly foliated, and composed of inequigranular quartz, feldspar, and biotite. Fractures are generally horizontal or sub-horizontal, with dips up to 30º. While there were abundant joints and fractures, fractures that were clearly water-bearing as evidenced by weathering, silt intrusion, and iron-staining varied in abundance across the site. For example, in the 15 feet of core obtained from boring PZ-32, there were 15 fractures that showed at least some evidence of water flow; however, the 19.5 feet of core obtained from boring PZ-42 had only four such fractures. The average vertical distance between water-bearing fractures in the upper 15-23 feet of bedrock was 2.4 feet, but the frequency decreased with depth. This indicates an extensive fracture network that is likely to be well-connected and conducive to predictable, consistent groundwater flow patterns.

5.3 Aquifer Characterization

5.3.1 Aquifer Description

The aquifer beneath the site can be described as an unconfined aquifer consisting of a layer of soil/regolith derived from the weathering of metamorphic bedrock, which grades downward to

saprolite, weathered bedrock, and finally to competent but highly fractured metamorphic bedrock. The transitions in this sequence are often gradational and difficult to identify precisely. Near the Catawba River, there is a mantle of coarse alluvial deposits on top of the regolith. The entire sequence appears to be well connected with no aquitards or structures to separate or interfere with flow of groundwater through the aquifer; however, the hydraulic conductivity generally decreases with depth, so the groundwater regime is expected to be dominated by flow within the regolith and saprolite zones.

Except beneath the highest ridges, the water table is generally encountered within the regolith or saprolite zones, or in the alluvial deposits in the Catawba River floodplain. The average thickness of the saturated aquifer above the competent bedrock surface (defined by auger-refusal) is roughly 9-12 feet. It is believed that the majority of groundwater flow will occur within the regolith/saprolite zone, with bedrock fractures acting mostly to funnel groundwater from the recharge areas along the high ridges to the regolith/saprolite zone at lower elevations.

5.3.2 Infiltration Rates and Transmissivity

In 1985 and 1986, extensive testing was performed to determine the hydrological characteristics of the site soil (Municipal Engineering, 1986). Detailed results of this study were provided in Appendix H-5 of the Site Hydrogeologic Report. A partial summary of the 1985-1986 test results is given below:

- Surface infiltration rates across the site were measured using double-ring infiltrometers, and the wide range of resulting infiltration rate values suggested that the surface soils across the site were heterogeneous;
- Constant-head permeability tests were conducted on eight samples obtained from seven backhoe pits located in different areas on site, and vertical saturated permeability results ranged from 4.8×10^{-4} to 1.6×10^{-6} cm/sec;
- Approximately 24 auger-stem infiltration tests were performed in borings constructed during the investigation. The infiltration rates ranged from 1.3×10^{-3} to 9.7×10^{-7} cm/sec; and
- A three-well aquifer pump test was performed in the south-central portion of the site to measure the transmissivity of the water table aquifer, and a transmissivity of 10,153 gallons per day per foot (gpd/ft) was determined.

5.3.3 Hydraulic Conductivity

Slug tests were conducted on several piezometers and monitoring wells between 1994 and 2016 in order to determine the hydraulic conductivity (***K***) of the aquifer materials. Most of the piezometers and wells were screened within the saprolite zone; however, a few were screened in bedrock or in the transition zone between saprolite and bedrock. The results of all the slug tests are summarized in Table 5. The detailed data and analyses for slug tests conducted prior to 2012 were included in Appendix H-7 of the Site Hydrogeologic Report (JOYCE, 2011b). The detailed data and analyses for slug tests conducted in January 2016 are included in Appendix C of this report. For the Phase 2A/4 cells, slug tests were conducted on PZ-32, PZ-41, and PZ-42, and the results are summarized below:

Phase 2A/4 Slug Test Results

Well / PZ	Date	Lithology	Hydraulic Conductivity *K* (cm/sec)		Hydraulic Conductivity *K* (ft/day)	
			Falling	Rising	Falling	Rising
PZ-32	5/18/2011	Saprolite	7.00E-05	4.65E-05	1.99E-01	1.32E-01
PZ-41	1/12/2016	Saprolite	7.23E-05	9.01E-05	2.05E-01	2.56E-01
PZ-42	1/12/2016	Bedrock	5.96E-05	1.23E-04	1.69E-01	3.48E-01
Average for Phase 2A/4:			7.69E-05		2.18E-01	
Average for Saprolite:			6.98E-05		1.98E-01	
Average for Bedrock:			9.11E-05		2.58E-01	

For the entire facility, the arithmetic mean ***K*** of the fractured bedrock was 3.24 feet/day, the arithmetic mean ***K*** of the saprolite was 3.28 feet/day, and the arithmetic mean ***K*** of the transition zone was 0.36 feet/day (see Table 5).

5.3.4 Aquifer Porosity and Permeability

The porosity of the saprolite based on laboratory testing of 14 undisturbed (Shelby tube) samples ranged from 32% to 57%, with an average porosity of 44%. Five of the 14 samples were from within the Phase 2A/4 footprint, and the average porosity for these samples was 46%. These data are presented in Table 3. Effective porosity is assumed to be slightly less than the average laboratory porosity for site soil samples, so an effective porosity of n_e = 40% (0.40) is assumed for the saprolite portion of the aquifer. In contrast, the fractured bedrock is likely characterized by very low porosity, virtually all of which is attributable to joints and fractures. An effective porosity of n_e = 10% (0.10) is assumed for the bedrock portion of the aquifer. The transition zone is likely to have a lower porosity than the saprolite but not as low as bedrock. An effective porosity of n_e = 30% (0.30) is assumed for the transition zone.

Permeabilities were also tested for five samples from the site, two of which were in the Phase 2A/4 footprint. The results ranged from 6.2E-05 to 1.4E-03 cm/sec. The average permeability for the site was 3.7E-04 cm/sec (1.0 ft/day), and the average permeability for Phase2A/4 was 6.1E-04 cm/sec (1.7 ft/day). These data are presented in Table 3. Because all flow in the bedrock is through fractures, and the fact that the frequency and characteristics of water-bearing fractures is variable, the permeability of the fractured bedrock cannot be easily predicted or measured.

5.4 Magnetometer Survey

A major diabase dike trending approximately N-32º-W has been mapped near the site approximately 3,000 feet from the eastern site boundary. This dike was initially identified in the field by visual observation of float and subsequently by magnetometer. Field reconnaissance indicates that the dike is about 100 to 150 feet wide.

Local anomalies in the Earth's magnetic field can be produced by the distribution of different rock types in the subsurface. Ferrous metal objects or deposits of magnetic minerals such as magnetite can sustain significant remnant (permanent) magnetization and produce strong

magnetic anomalies. Magnetic anomalies can also be produced near contacts between different rock types with very different magnetic susceptibilities. The magnetic susceptibility of any rock is dependent on its mineralogy. Rocks with abundant mafic minerals have greater magnetic susceptibility than rocks with predominantly felsic minerals.

Diabase has a very high magnetic susceptibility compared to the typical granitic country rock in this area, so a diabase dike would be expected to produce a strong magnetic anomaly. This is supported by the fact that the offsite dike previously described exhibited a very strong magnetic anomaly. Given that this dike traverses very similar country rock to that present within the site, and that any splay off of the parent dike would be expected to be of similar mineralogy, a splay of significant size under the site property should also produce a magnetic anomaly.

In order to check for the presence of diabase intrusives within the John's River property boundary, a magnetometer survey was performed in 1995 around the site perimeter and on selected traverses within the site. The survey was performed using a Geometrics G-858 magnetometer with an internal data logger. Eight geophysical traverses were conducted on site. The locations of these traverses are shown on Drawing No. 02 from the 1996 Site Hydrogeologic Report (JOYCE, 1996a) (included in Appendix H-8 of the Site Hydrogeologic Report). Figures VII-8 through VII-15 in Appendix H-8 of the Site Hydrogeologic Report graphically display the magnetic field strength, in gammas, from the start of each line (SOL) to the end of each traverse line (EOL). No horizontal scale is implied for the graphical displays, and the dashed line shown on each figure represents a traverse which was run normal to the northwest trending offsite dike. This line is plotted on each figure in order to show the expected signature and anomaly associated with a diabase intrusive. Several anomalies were noted in the field (for example when the traverse crossed a metal culvert or passed near a disposal dumpster) and are annotated with their probable source on the associated figures. The large anomalies on Line 2 are related to buried waste in the current landfill. Some isolated, narrow anomalies are probably associated with unidentified buried metal objects. For some of these anomalies, side traverses were run in the field to confirm that the anomalies were isolated and non-linear.

The results of the magnetometer survey showed no evidence of significant diabase dikes within the property boundary. Also, no diabase has been observed on the site either in float, outcrops, or rock cores. We conclude that diabase dikes are not likely to be present, or if they are, they are probably too small to create any significant difficulties in predicting or monitoring groundwater flow beneath the site.

6.0 WATER TABLE INFORMATION

6.1 Groundwater Elevations & Seasonal High Water Table Map

Table 2 summarizes recent and historical groundwater elevation data from the site collected from all current and previously-existing monitoring wells and piezometers. Groundwater elevation data are available for some of the earliest wells starting in September 1987. Semiannual groundwater elevation data are available for most of the current compliance monitoring wells from July 1995 through May 2016.

The most complete water level data sets for the site were from May 16-17, 2011, and January 11, 2016. During these two events, water levels were measured for nearly every monitoring well and piezometer in existence and accessible on the site. The most recent water level measurements were from February 19, 2016, which included all existing wells and piezometers in the vicinity of the new landfill as shown on Drawing HG-02.

Drawing HG-02 depicts the groundwater potentiometric surface based on the February 19, 2016 data. This map includes a flow path illustrating the direction of groundwater flow across the Phase 2A/4 area, inferred from the groundwater potentiometric surface contours. This flow path was used to calculate the horizontal gradient and flow velocities in Section 8.01 of this report.

6.2 Estimation of Long-Term High Water Table

Graph 2A shows the monthly precipitation data for Morganton, North Carolina from 1931 through the January 2016 based on data downloaded from the NOAA National Centers for Environmental Information (NCEI) website (NOAA, 2016). Graph 2B shows only the last 25 years of that data, to allow easier visualization of details. The graphs also show quarterly and annual averages of the monthly precipitation data. The highest quarterly precipitation in the last 80 years was in the third quarter of 1945; however, the second and third highest quarterly precipitation amounts were more recent, occurring in fourth quarter of 2015 and the second quarter of 2013, respectively. The highest monthly precipitation of 14.76 inches was recorded in September 1945, and the second highest monthly precipitation of 14.48 inches was recorded in July 2013. Anomalously high rainfalls may be related to a hurricane or tropical storm that passed through the area; however, large storm events do not generally affect the water table as much as long periods of moderate rainfall. The highest quarterly precipitation that did not involve a hurricane or tropical storm event was in the fourth quarter of 2015.

To determine the highest water table to be expected over the life of the proposed landfill, we determined the highest water table ever measured at each well and calculated the difference between the highest water level and the water level measured on May 16-17, 2011. Upon examining these data, it appeared that the largest differences were for wells/piezometers located at high elevations, and that there was much less variation in water levels for wells/piezometers in the lowest elevations. We calculated adjustment factors based on the average difference between the maximum observed groundwater elevations and the May 2011 groundwater elevations for three topographic elevation ranges, as summarized below.

Topographic Elevation of Ground Surface at Well/Piezometer Locations (Feet-AMSL)	< 1025	>1025 & <1075	> 1075
Adjustment Factor (AF): Average of [Max-Observed minus May 2011 Groundwater Elevations] (Feet)	+ 0.74	+ 2.86	+ 4.15

We then determined a calculated maximum groundwater elevation for each well by adding the appropriate adjustment factor to the May 2011 groundwater elevation. Since the calculated maximum was lower than some of the observed maximum elevations, we set the long-term high water table elevation for each well equal to whichever was greater. For two of the piezometers,

the calculated maximum was higher than the ground surface elevation, in which case the long-term high water table was set equal to the ground surface elevation. For wells or piezometers that did not exist or were not measured in May 2011 but were measured in January 2016, we took the average difference between the long-term high groundwater elevations and the January 2016 groundwater elevations for the wells with both and we added it to the January 2016 groundwater elevation in the wells without May 2011 data. For wells or piezometers that did not exist or were not measured in May 2011 or January 2016, we used the highest historical groundwater elevation measured in that well. Also, if the highest historically observed water level in a well was higher than the calculated maximum, the highest observed was used.

Table 2 summarizes all historical groundwater elevations for all wells and piezometers at the site. Table 2 also includes the observed maximum high groundwater elevations and the long-term high water table elevations for each well/piezometer as described above. These data were used to create the Long-Term High Water Table Map presented as Drawing HG-03.

6.3 Natural and Man-made Activities Affecting Water Table

No unusual natural events (landslides, earthquakes, tropical storms) have been observed on the site in or in the region that might significantly affect the water table beneath the site. The existing landfill has the potential to impact the water table, since it changes the topography of the site and may retain water for a period of time. The normal effect of an unlined landfill is to slightly raise the water table, and in some cases, cause mounding. Observed mounding of the water table in the vicinity of the existing landfill is minimal, and there is no indication that the presence of the landfill has significantly altered normal groundwater flow paths. This is likely due to the close proximity of the landfill to the Catawba River, which exerts a strong enough influence on the groundwater flow regime to overwhelm any potential influence due to the existence of the landfill.

7.0 MAPS AND CROSS SECTIONS

7.1 Site Topographic map

Figure 1 includes a portion of the USGS 7.5-minute quadrangle topographic map for the site with the property boundary annotated. More detailed site topography based on recent surveys of the site is included on Drawings HG-00 through HG-04.

7.2 Seasonal High Water Table Map

The Seasonal High Water Table Map for the Phase 1 area is presented as Drawing HG-02, and is based on the instantaneous water level data collected on February 19, 2016 (see Section 6.01 and Table 2).

7.3 Long-Term High Water Table Map

The Long-Term High Water Table Map for the Phase 1 area is presented as Drawing HG-03, and is based on the estimated long-term high water table elevations presented in Table 2, as discussed in Section 6.02.

7.4 Bedrock Surface Map

The elevation of the bedrock surface at the site was inferred from the depth of auger refusal at the 43 borings on the site for which auger refusal was reached. These data were supplemented with total drilling depth data for 54 borings that did not reach auger refusal, and which therefore provided a maximum possible elevation of bedrock at that location. In general, auger refusal corresponded to SPT blow counts of 50 blows/0.2 feet or greater. The majority of the boring locations were surveyed by a licensed land surveyor to a horizontal accuracy of ±0.1 feet horizontal and ±0.01 feet vertical, relative to mean sea level. A few of the older piezometers had the top of casing (TOC) surveyed, but depth to auger refusal was measured from the ground surface, so the ground surface elevation was estimated by subtracting the height of the TOC above ground. One of the oldest borings apparently was not surveyed, so the elevation was estimated from the topographic map. The survey and depth to bedrock data are summarized in Table 1. A Bedrock Surface Map for the Phase 1 Area based on these data is presented as Drawing HG-01.

7.5 Stratigraphic Cross Sections

Drawing HG-04 shows the locations of three stratigraphic cross sections, A-A, B-B, and C-C, and Drawing HG-05 shows the cross sections. The cross sections show the proposed base grade, as well as the existing ground surface, bedrock surface, long-term high water table, and the inferred groundwater flow directions. The seasonal high water table is not shown because it is nearly coincident with the long-term high water table beneath most of Phases 2A and 4. The locations and screened intervals of piezometers and wells and depths of associated rock cores and Shelby-tube samples are depicted on the cross sections.

8.0 GROUNDWATER FLOW REGIME

8.1 Horizontal Groundwater Gradients and Flow

The linear groundwater flow velocity beneath the Phase 2A/4 area can be calculated by the modified Darcy equation $\boldsymbol{V = Ki/n_e}$, where $\boldsymbol{K}$ is the hydraulic conductivity, $\boldsymbol{i}$ is the hydraulic gradient, and $\boldsymbol{n_e}$ is the effective porosity. Drawing HG-02 shows an instantaneous groundwater potentiometric map for the Phase 1 area based on water levels measured in February 2016. Three groundwater flow paths ($\boldsymbol{i_1}$- $\boldsymbol{i_3}$) across the Phase 2A/4 area based on the February 2016 groundwater contours is shown on Drawing HG-02. The hydrologic gradient along these flow paths range from .033 to .054 feet/foot. The calculations of groundwater flow velocity are based on the parameters for hydraulic conductivity and effective porosity discussed in Sections 5.03.03 and 5.03.04 of this report, respectively, for the various portions of the uppermost aquifer beneath Phases 2A and 4. These calculations are presented in Table 6.

The hydraulic conductivities of the bedrock and saprolite portions of the aquifer are similar; however, the effective porosity of the bedrock is expected to be much lower, resulting in a higher flow velocity. The calculated average flow velocity for the saprolite is 0.33 feet/year, and for the bedrock it is 1.31 feet/year. The lowest hydraulic conductivity and the slowest groundwater flow velocities are found in the transitions zone, where the calculated flow velocity is only 0.05 feet/year; however, the transition zone is fairly thin relative to the rest of the aquifer, and is not expected to influence the over-all flow rate significantly. The estimated over-all groundwater flow rate beneath Phases 2A and 4 is 0.5 feet/year.

8.2 Vertical Hydraulic Gradients

Determination of a vertical hydraulic gradient requires two wells or piezometers immediately adjacent to each other that are screened at different depths. Vertical gradients are calculated by dividing the difference in water table potentiometric elevations by the difference in depth or elevation of the two screened intervals. The gradients are calculated so that a negative gradient indicates upward groundwater flow and a positive gradient indicates downward flow. Typically, positive vertical hydraulic gradients are expected in groundwater recharge areas and negative gradients are expected near groundwater discharge features.

There are eight pairs of wells and piezometers at this site with shallow and deep-screened intervals that can be used to determine vertical hydraulic gradients: MW-15S&D, MW-16S&D, MW-22S&D, PZ-2S&D, PZ-8S&D, PZ-9S&D, PZ-16S&D, and PZ-30S&D. Of these, MW-22S&D are within the footprint of the Phase 2A waste unit and PZ-8S&D and PZ-16S&D are within the compliance area downgradient of Phase 4. Table 7 presents all of the data used to calculate the average vertical gradient for each well pair. It includes all historical groundwater measurements where there is water level data for both wells in each pair.

A positive vertical gradient represents downward flow; thus, the aquifer is potentially recharging. A negative vertical gradient represents upward flow, indicating that the aquifer is potentially discharging. The strongest negative (upward) vertical gradient is found in MW-16S&D, which are located near the floodplain of the Catawba River, a major discharge feature. PZ-16S&D, which are located near the head of a small creek, also have a negative vertical gradient, indicating that the creek is also a discharge feature. MW-15S&D and PZ-9S&D also have weak negative vertical gradients. The strongest positive (downward) gradient is found in PZ-2S&D, which is near the top of a high ridge that would be expected to be a recharge area. MW-22S&D, PZ-8S&D, and PZ-30S&D all have weak positive vertical gradients. These data strongly support the site conceptual model for groundwater flow beneath this site, which assumes that groundwater flows from recharge areas at the higher elevations to discharge features at the lower elevations, and these data indicate that Phases 2A and 4 are primarily in a groundwater recharge area.

9.0 OTHER GEOLOGIC/HYDROGEOLOGIC CONSIDERATIONS

9.1 Surface Water and Wetlands

The western end of Lake Rhodhiss is located south of the landfill property. Lake Rhodhiss is a long, narrow lake that is formed by the Rhodhiss Hydroelectric Dam on the Catawba River, located approximately 12 miles downstream (east) of the landfill property. The Catawba River flowing from the west and John's River flowing from the northwest, converge just west of Lake Rhodhiss. To the east and northeast of the property, Lower Creek flows south to Lake Rhodhiss. The Catawba River, John's River, and Lower Creek are all classified WS-4, CA (Water Supply Watershed, Critical Area). The 100-year flood boundary, which roughly corresponds to the 1,005-foot topographic contour, extends onto the southern edge of the landfill property and is shown on Drawing HG-00. The proposed landfill expansion waste footprint does not extend into the 100-year floodplain.

Four unnamed tributaries of the Catawba River extend north into the facility property and are shown on Drawing HG-00. Stream S1 forms the western property line. Stream S2 is located east of the old landfill waste unit. The head of Stream S2 is located approximately 100 feet south of the Phases 2A/4 edge of waste and Stream S2 will not be impacted by Phases 2A/4 construction. Stream S3 is approximately 1,000 feet to the east of S2. The head of Stream S2 is located approximately 500 feet east of the Phase 4 edge of waste and Stream S3 will not be impacted by Phases 2A/4 construction. Stream S4 is located on the eastern portion of the property and will not be affected by the landfill expansion.

JOYCE conducted a wetlands investigation in August 2010 to determine whether any wetlands exist within the proposed waste footprint, the results of which were included in the December 2011 Site Plan Application (JOYCE, 2011b). Three wetland areas were identified and are shown on Drawing HG-00 as W1, W2 and W3. Wetland W1 is the closest to the proposed expansion area; however, its northernmost extent is more than 650 feet south of the Phases2A/4 edge of waste. None of the wetlands will be impacted by Phases 2A/4 construction. In September 2015, JOYCE conducted a follow-up wetlands investigation focused on Phases 2A and 4 which confirmed that there have been no significant changes to the wetlands, and we submitted the results to the Army Corps of Engineers (ACOE). The ACOE issued a Notification of Jurisdictional Determination (NOJD) dated October 29, 2019. The NOJD found that "there are no waters of the U.S., to include wetlands, present on the above-described project area [Phases 2A/4] which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344)." The ACOE NOJD is included in Appendix D.

9.2 Groundwater Impacts from the Old Landfill

The adjacent old landfill is a closed, unlined MSW landfill with a closed C&D landfill located on top of it. Impacts to groundwater have been observed around the old landfill area. The constituents of concern (COCs) include all constituents that have had detections above their respective NC2L standards in recent monitoring events. These include:

- Benzene;
- 1,4-Dichlorobenzene;

- Methylene chloride;
- Tetrachloroethylene (PCE);
- Trichloroethylene (TCE);
- 1,1-Dichloroethane;
- 1,2-Dichloroethane;
- Vinyl chloride.
- alpha-BHC
- beta- BHC

The old landfill is in Assessment Monitoring and Corrective Action. A Corrective Action Plan (CAP) was submitted to the SWS in June 2008 (JOYCE, 2008) and was approved by the SWS in a letter dated January 29, 2009. The selected remedies presented in the CAP include Monitored Natural Attenuation (MNA) and phytoremediation. The CAP was amended in August 2013 (JOYCE, 2013) to add control of landfill gas as a remedy for the area between the old landfill and the C&D expansion area. Corrective Action Evaluation Reports (CAER) have been submitted to the SWS in May 2011 (JOYCE, 2011a) and April 2016 (JOYCE, 2016).

Although the new C&D landfill is generally upgradient of the old landfill, the groundwater contaminant plume from the old landfill extends beneath the originally proposed Phases 1B, 2B, and 3 of the new landfill. It is believed that the groundwater impacts in this area are largely due to cross-media partitioning from migrating landfill gas. The presence of the plume led the SWS to find these Phases 1B, 2B, and 3 unsuitable in their February 2014 Conditional Site Suitability Approval. The facility is currently sampling several of the piezometers in this area for the facility's COCs semiannually to monitor this portion of the plume. There is no evidence that the plume extends beneath any portion of Phases 2A or 4.

10.0 DESIGN OF PHASES 2A and 4

10.1 Vertical Separation

One purpose of this Design Hydrogeologic Report is to demonstrate compliance with the vertical separation standards set forth in Item (2) of § .0540 of the NCSWMR. Item (2)(a) states that the C&D landfill unit must be constructed so that the post-settlement bottom of waste is at least 4 feet above the high water table and bedrock. Drawing HG-04 shows proposed base grades for Phases 2A and 4 as well as the long-term high water table contours and bedrock contours. Drawing HG-05 shows cross sections through the Phase 2A/4 area showing the proposed base grades relative to the long-term high water table and the bedrock.

Beneath most of Phases 2A and 4, the groundwater is shallower than the bedrock, so the long-term high groundwater table will control the minimum elevations of the base grades. There is a small area beneath the northern end of Phase 4 where bedrock is higher than groundwater, so the bedrock will control the minimum elevations of the base grades in this area. The base grades will be designed to provide the minimum four feet of separation above both the bedrock and the long-term high water table.

10.2 Foundation

Another purpose of this Design Hydrogeologic Report is to demonstrate compliance with the foundation standards set forth in Items (2) and (5) of § .0540 of the NCSWMR. Item (2)(b) specifies that the foundation soils comprising the upper two feet of the subgrade contain only USCS soil types SC, SM, ML, CL, MH, or CH. Since the proposed base grades are generally at or below the existing ground surface but above the bedrock, the foundation soils under most of the Phases 2A and 4 waste units will be the in-situ native soil. All soil samples obtained from the site (including both split-spoon samples and Shelby-tube samples) met these criteria (see Section 5.02.02 of this report). All of the soil samples from the Phase 2A/4 footprints and compliance area were classified SM under the USCS.

Item (5)(a) requires that the subgrade be inspected by a qualified geologist or engineer when excavation is complete. Item (5)(b) requires that the DENR be notified at least 24 hours before the inspection. A licensed geologist or engineer will inspect the subgrade in accordance with these requirements. Soil samples from the constructed base of the Phase 2A/4 waste units will be taken at a frequency of 1/acre and analyzed per the USCS to verify that only the following soil types are present in the upper two feet: SC, SM, ML, CL, MH, or CH. A land surveyor licensed in North Carolina will verify that the dimensions and elevations of the subgrade are in accordance with the approved plans.

10.3 Monitorability

Review of the hydrogeologic data available for this site indicates groundwater beneath the site can be monitored effectively for any potential release of contaminants from the landfill into the groundwater of the site. Groundwater flow is dominated by the saprolite portion of the aquifer, and the characteristics of both the saprolite and the fractured bedrock support the conclusion that groundwater flow will be predictable and consistent across the site. No geologic features have been observed which might interfere with groundwater flow or with monitoring of the groundwater. An updated Water Quality Monitoring Plan (WQMP), including proposed monitoring wells for the Phase 2A/4 area, will be presented as a separate report concurrently with this report. The compliance monitoring well networks for all future phases (e.g., Phases 5, 6, 7, & 8) will be proposed in a revised WQMP to be submitted with the Design Hydrogeologic Report for each phase.

11.0 REFERENCES

The following references were used in or considered pertinent to the development of this Site Hydrogeological Report, but may or may not be cited in the text.

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

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

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

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

Goldsmith, Richard, Daniel J. Milton, and J. Wright Horton, Jr.. 1988. *Geologic map of the Charlotte 1 degree x 2 degree Quadrangle, North Carolina and South Carolina.* US Geological Survey Map I-1251-E. US Geological Survey: Reston, VA.

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

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

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

Joyce Engineering, Inc. (JOYCE), 1994. *Transition Plan, Johns River Waste Management Facility*. April.

JOYCE, 1996a. *Site Hydrogeologic Report, Johns River Waste Management Facility*. October.

JOYCE, 1996b. *Water Quality Monitoring Plan, Johns River Waste Management Facility*. September.

JOYCE, 1997. *Design Hydrogeologic Report, Phase 1, Johns River Waste Management Facility*. January.

JOYCE, 1998. *Water Quality Assessment Plan, Johns River Waste Management Facility*. May.

JOYCE, 2000. *Water Quality Assessment Report, Johns River Waste Management Facility*. January.

JOYCE, 2004. *Update on Groundwater Assessment Activities, Johns River Waste Management Facility*. October.

JOYCE, 2005a. *Assessment of Corrective Measures Report, Johns River Waste Management Facility*. February.

JOYCE, 2005b. *Quantitative Risk Assessment, Johns River Waste Management Facility*. February.

JOYCE, 2008. *Corrective Action Plan, Johns River Waste Management Facility*. June.

JOYCE, 2011a. *Second Semiannual Groundwater Monitoring Report of 2010 and Corrective Action Evaluation Report, Johns River Waste Management Facility*. May.

JOYCE, 2011b. *Johns River Waste Management Facility C&D Landfill Expansion - Volume 1: Site Plan Application, Section II: Site Hydrogeologic Report,* December.

JOYCE, 2012. *Johns River Waste Management Facility C&D Landfill Expansion – Phase 1 Design Hydrogeologic Report,* August.

JOYCE, 2013. *Addendum to the Corrective Action Plan, Johns River Waste Management Facility*. August.

JOYCE, 2016. *Corrective Action Evaluation Report, Johns River Waste Management Facility*, April.

Municipal Engineering Services Co., P.A., 1986, *Burke County Site Plan*; Prepared by Municipal Engineering, P.A., Garner, North Carolina, for Burke County. July.

National Oceanic and Atmospheric Association (NOAA), 2016. Monthly Summaries of the Global Historical Climatology Network - Daily (GHCN-D). Station: GHCND:USC00315838 - MORGANTON, NC US. NOAA National Climatic Data Center. Accessed February 8.

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

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

North Carolina Department of Environment and Natural Resources (NC-DENR), 2011. *North Carolina Solid Waste Management Rules*. 15 NCAC 13B. With updates and changes through April.

Parker, B.L. et al. 1994. 1) *A conceptual understanding of contaminant migration in fractured media*, 2) *Calculations and real data: fractured media*. In: Dissolved Organic Contaminants in Groundwater Short Course [unpublished short course notes and

published references contained therein]. Waterloo Centre for Groundwater Research, Univ. Of Waterloo, Ontario. May.

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

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

Sumsion, C.T., and Laney, R.L., 1967, *Geology and Ground-water Resources of the Morganton area North Carolina.* N.C. Department of Water Resources, Ground Water Bulletin No. 12, 119 p.

USEPA, 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance*. EPA 530/R-09-007. March.

12.0 ACRONYMS

Following is a list of common acronyms that may be used in the text, tables, graphs, drawings, or appendices of this report.

ACM	Assessment of Corrective Measures (Report)
ACOE	United States Army Corps of Engineers
AMSL	Above Mean Sea Level
AOC	Area of Concern
BGS	Below Ground Surface
C&D	Construction and Demolition Waste
CAP	Corrective Action Plan (Report)
CAER	Corrective Action Evaluation Report (Report)
CAMP	Corrective Action Monitoring Plan (Report)
CAS	Chemical Abstracts Service
CFR	Code of Federal Regulations
CPVC	Chlorinated Poly Vinyl Chloride
COC	Contaminant of Concern (for corrective action)
COC	Chain of Custody (for sampling and lab reports)
DCA	Dichloroethane
DCB	Dichlorobenzene
DCE	Dichloroethylene (or Dichloroethene)
DL	Detection Limit (for laboratory data)
DO	Dissolved Oxygen
EPA	United States Environmental Protection Agency (or USEPA)
GPS	Groundwater Protection Standards
JOYCE	Joyce Engineering, Inc.
LFG	Landfill Gas
MNA	Monitored Natural Attenuation
C&D	Municipal Solid Waste

MW	Monitoring Well
NC-2B	North Carolina Surface Water Standards found in 15A NCAC 2B
NC-2L	North Carolina Groundwater Standards found in 15A NCAC 2L.0202
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources (now the NCDEQ)
NCDEQ	North Carolina Department of Environmental Quality (formerly the NCDENR)
NCGS	North Carolina Geological Survey
NCSWMR	North Carolina Solid Waste Management Regulations (15A NCAC 13B.1600)
ND	Not Detected (for laboratory data)
NES	Nature and Extent Study (Report)
NOJD	Notice of Jurisdictional Determination (from ACOE)
O&M	Operations and Maintenance
PCE	Perchloroethylene (or Perchloroethene, Tetrachloroethylene, Tetrachloroethene)
QL	Quantitation Limit (for laboratory data)
QRA	Quantitative Risk Assessment (Report)
RL	Reporting Limit (for laboratory data)
RQD	Rock Quality Designation
SPT	Standard Penetration Test
SWQS	Surface Water Quality Standards
SWS	Solid Waste Section (of NCDEQ-Division of Waste Management)
SWSL	North Carolina Solid Waste Section Reporting Limits
TCA	Trichloroethane
TCE	Trichloroethylene (or Trichloroethene)
TOC	Top of Casing (of a well)
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency (or EPA)
USDA	United States Department of Agriculture
USGS	United States Geological Survey
VOC	Volatile Organic Compound
VC	Vinyl Chloride
WQMP	Water Quality Monitoring Plan (Report)

TABLES

Table 1	Boring and Well/Piezometer Construction Data
Table 2	Groundwater Elevation Data (1987-2016)
Table 3	Laboratory Soil Test Results
Table 4A	Rock Core Data (Whole Site)
Table 4B	Rock Core Data (PZ-42 details)
Table 5	Aquifer Slug Test Results
Table 6	Groundwater Gradients and Flow Velocities
Table 7	Vertical Hydraulic Gradients

TABLE 1: Boring and Well/Piezometer Construction Data

ID (Former ID)	**GS Elevation** (Ft-AMSL)	**TOC Elevation** (Ft-AMSL)	**Date Installed**	**GW** (Ft.-TOC)	**GW** (Ft.-AMSL)	**AR (BR)** (Ft.-BGS)	**AR (BR)** (Ft.-AMSL)	**TD** (Ft.-BGS)	**TD** (Ft.-AMSL)	**Top Screen** (Ft.-BGS)	**Bottom Screen** (Ft.-BGS)	**Stick-up** (Ft.-BGS)	**Lithology of Screened Interval**	**Comments**
B-1 (P4)	1121.46	na	Jan-Feb 1986	na	na	bne	<1067	54.5	1067.0	na	na	na	na	Exploratory Boring
B-2 (P11)	1075.69	na	Jan-Feb 1986	na	na	bne	<1016	60	1015.7	na	na	na	na	Exploratory Boring
B-3 (V11)	1098.61	na	Jan-Feb 1986	na	na	40.5	1058.1	70	1028.6	na	na	na	na	Exploratory Boring
B-4 (P5)	1043.62	na	Jan-Feb 1986	na	na	bne	<995	49	994.6	na	na	na	na	Exploratory Boring
B-5 (XI)	1044.09	na	Jan-Feb 1986	na	na	bne	<987	57.5	986.6	na	na	na	na	Exploratory Boring
B-6 (P6)	1040.92	na	Jan-Feb 1986	na	na	bne	<997	44	996.9	na	na	na	na	Exploratory Boring
B-7 (IV)	1082.00	na	Jan-Feb 1986	na	na	54.5	1027.5	54.5	1027.5	na	na	na	na	Exploratory Boring
B-8 (I)	1145.75	na	Jan-Feb 1986	na	na	53.5	1092.3	53.5	1092.3	na	na	na	na	Exploratory Boring
B-9 (VI)	1121.58	na	Jan-Feb 1986	na	na	bne	<1062	59.5	1062.1	na	na	na	na	Exploratory Boring
B-10 (VIII)	1080.29	na	Jan-Feb 1986	na	na	40	1040.3	44	1036.3	na	na	na	na	Exploratory Boring
B-11 (P2)	1085.16	na	Jan-Feb 1986	na	na	33	1052.2	33	1052.2	na	na	na	na	Exploratory Boring
B-12 (P13)	1151.41	na	Jan-Feb 1986	na	na	bne	<1101	50	1101.4	na	na	na	na	Exploratory Boring
B-13 (P8)	1063.15	na	Jan-Feb 1986	na	na	25	1038.2	25	1038.2	na	na	na	na	Exploratory Boring
B-14 (P7)	1084.45	na	Jan-Feb 1986	na	na	bne	<1035	49	1035.5	na	na	na	na	Exploratory Boring
B-15 (XII)	1043.16	na	Jan-Feb 1986	na	na	49	994.2	50	993.2	na	na	na	na	Exploratory Boring
B-16 (V)	1070.90	na	Jan-Feb 1986	na	na	55.5	1015.4	55.5	1015.4	na	na	na	na	Exploratory Boring
B-17 (II/P12)	1135.00	na	Jan-Feb 1986	na	na	48.5	1086.5	48.5	1086.5	na	na	na	na	Exploratory Boring
B-18 (XIII)	1107.00	na	Jan-Feb 1986	na	na	51	1056.0	54.5	1052.5	na	na	na	na	Exploratory Boring
B-19 (IX)	1056.30	na	Jan-Feb 1986	na	na	61	995.3	65	991.3	na	na	na	na	Exploratory Boring
B-20 (P9/P9A)	1030.68	na	Jan-Feb 1986	na	na	8	1022.7	8	1022.7	na	na	na	na	Exploratory Boring
B-21 (P3)	1055.00	na	Jan-Feb 1986	na	na	bne	<1014	41	1014.0	na	na	na	na	Exploratory Boring
B-22 (III)	1107.00	na	Jan-Feb 1986	na	na	bne	<1063	44.5	1062.5	na	na	na	na	Exploratory Boring
B-23 (P14)	1058.00	na	Jan-Feb 1986	na	na	bne	<1009	49	1009.0	na	na	na	na	Exploratory Boring
B-24 (P10)	1060.58	na	Jan-Feb 1986	na	na	bne	<1001	60	1000.6	na	na	na	na	Exploratory Boring
B-25 (X)	1037.97	na	Jan-Feb 1986	na	na	60.97	977.0	60.97	977.0	na	na	na	na	Exploratory Boring
B-26 (P1)	1030.00	na	Jan-Feb 1986	na	na	56	974.0	70	960.0	na	na	na	na	Exploratory Boring
MW-1 (W-1)	1052.48	1054.98	Sept 1987	31.48	1023.50	bne	< 1012	40	1012.5	18.5	28.5	2.50	Saprolite	
MW-2 (W-5)	1012.00	1014.50	Sept 1987	15.83	998.67	bne	< 988	24.5	987.5	14.5	24.5	2.50	Saprolite	
MW-3 (W-4A)	1025.00	1027.50	Sept 1987	43.95	983.55	bne	< 966	59.5	965.5	49.5	59.5	2.50	Saprolite	
MW-4 (W-2)	1016.00	1018.00	Sept 1987	25.20	992.80	bne	< 986	30.5	985.5	18.5	30.5	2.00	Saprolite	
MW-5 (W-3)	1032.00	1034.00	Sept 1987	49.55	984.45	bne	< 979	53	979.0	43	53	2.00	Saprolite	
MW-6 (W-8)	1000.00	1002.50	Sept 1987	na	na	bne	< 983	17	983.0	7	17	2.50	Saprolite	Abandoned 10/94
MW-7 (W-7)	1050.00	1052.50	Sept 1987	na	na	29.5	1020.5	39.5	1010.5	29.5	39.5	2.50	Bedrock	
MW-8	1070.70	1072.55	Sept 1987	31.14	1041.41	bne	< 1031	40	1030.7	27.5	37.5	1.85	Saprolite	
MW-9	1144.34	1145.97	Sept 1994	na	na	25	1119.3	73	1071.3	51	66	1.63	Bedrock	Abandoned 07/06
MW-10	1009.80	1012.23	Sept 1994	12.05	1000.18	bne	< 987	23	986.8	8	23	2.43	Saprolite	Compliance Well
MW-11	1026.63	1028.58	Sept 1994	33.53	995.05	bne	< 984	43	983.6	28	43	1.95	Saprolite	Compliance Well
MW-12	1032.57	1034.22	Sept 1994	38.90	995.32	19	1013.6	51.5	981.1	37	51.5	1.65	Bedrock	Compliance Well
MW-13	1057.07	1059.40	Sept 1994	49.35	1010.05	bne	< 999	58	999.1	43	58	2.33	Saprolite	Compliance Well
MW-14	1014.76	1017.96	June 1996	8.87	1009.09	bne	< 993	21.5	993.3	5	20	3.20	Saprolite	Compliance Well
MW-15S	1066.88	1069.04	June 1996	42.40	1026.64	bne	< 1013	54	1012.9	39	54	2.16	Saprolite	Compliance Well
MW-15D	1066.67	1069.06	June 1996	41.87	1027.19	100	966.7	118.5	948.2	109	119	2.39	Bedrock	Compliance Well
MW-16S	1005.67	1007.67	June 1996	13.60	994.07	20	985.7	20	985.7	5	20	2.00	Saprolite	Compliance Well
MW-16D	1005.67	1007.87	June 1996	12.65	995.22	20	985.7	120	885.7	78	88	2.20	Bedrock	Compliance Well
MW-17	1119.73	1121.77	June 1996	40.15	1081.62	45	1074.7	52	1067.7	37	52	2.04	Transiton Zone	Background Well
MW-18	995.67	998.49	April 2009	5.45	993.04	bne	< 984	12	983.7	7	12	2.82	Alluvium	Sentinel Well
MW-19	996.99	999.95	April 2009	7.04	992.91	bne	< 984	13	984.0	8	13	2.96	Alluvium	Sentinel Well
MW-20 (PZ-4)	1114.74	1115.04	May 1995	62.20	1052.84	67	1047.7	67	1047.7	52	67	0.30	Saprolite	New Background Well
MW-21 (PZ-1)	1097.00	1099.86	May 1995	35.15	1064.71	bne	< 1052	45	1052.0	30	45	2.86	Saprolite	
MW-22S (PZ-22S)	1058.57	1061.20	June 1996	16.95	1044.25	bne	< 1034	25	1033.6	10	25	2.63	Saprolite	
MW-22D (PZ-22D)	1057.90	1060.13	June 1996	15.98	1044.15	45.5	1012.4	45	1012.9	40	45	2.23	Saprolite/PWR	
MW-30	1052.46	1054.35	16-Dec-2015	31.65	1022.70	bne	< 1002.5	50	1002.5	35	50	1.89	Saprolite	
MW-36 (PZ-36)	1096.52	1099.52	May 2011	30.60	1068.92	25	1071.5	43	1053.5	28	43	3.00	Bedrock	
MW-38 (PZ-38)	1081.63	1084.76	May 2011	40.28	1044.48	30	1051.6	71	1010.6	40-50	60-70	3.13	Bedrock	#See note on screen below.

TABLE 1: Boring and Well/Piezometer Construction Data

ID (Former ID)	GS Elevation (Ft-AMSL)	TOC Elevation (Ft-AMSL)	Date Installed	GW (Ft.-TOC)	GW (Ft.-AMSL)	AR (BR) (Ft.-BGS)	AR (BR) (Ft.-AMSL)	TD (Ft.-BGS)	TD (Ft.-AMSL)	Top Screen (Ft.-BGS)	Bottom Screen (Ft.-BGS)	Stick-up (Ft.-BGS)	Lithology of Screened Interval	Comments
PZ-2S	1152.60	1154.74	May 1995	na	na	80	1072.6	80	1072.6	65	80	2.14	Saprolite	NLE
PZ-2D	1152.40	1154.53	May 1995	na	na	77	1075.4	117	1035.4	102	117	2.13	Bedrock	NLE
PZ-3	1040.51	1043.01	May 1995	na	na	bne	< 1027	14	1026.5	4	14	2.50	Saprolite	NLE
PZ-5	1095.10	1097.23	May 1995	58.80	1038.43	bne	< 1030	65	1030.1	50	65	2.13	Saprolite	
PZ-6	1019.90	1021.91	May 1995	na	na	bne	< 987	33	986.9	18	33	2.01	Saprolite	Damaged, but still existent.
PZ-7	1014.60	1016.48	May 1995	21.06	995.42	bne	< 987	28	986.6	13	28	1.88	Saprolite	
PZ-8S	1066.60	1069.04	May 1995	47.29	1021.75	bne	< 1011	55	1011.6	40	55	2.44	Saprolite	
PZ-8D	1066.13	1068.15	June 1996	47.44	1020.71	74	992.1	89.5	976.6	84.5	89.5	2.02	Bedrock	
PZ-9S	1022.66	1025.16	May 1995	21.30	1003.86	bne	< 995	28	994.7	13	28	2.50	Saprolite	
PZ-9D	1023.50	1025.96	May 1995	17.21	1008.75	47	976.5	67	956.5	52	67	2.46	Bedrock	
PZ-10	1125.30	na	May 1995	na	na	51	1074.3	51	1074.3	na	na	na	na	Boring only
PZ-11	1162.50	na	May 1995	na	na	43.5	1119.0	43.5	1119.0	na	na	na	na	Boring only
PZ-12	1022.55	1025.64	June 1996	7.81	1017.83	bne	< 1011	12	1010.6	5	12	3.09	Saprolite	
PZ-13	1014.49	1018.35	June 1996	8.84	1009.51	bne	< 1008	6.5	1008.0	1.5	6.5	3.86	Saprolite	
PZ-14	1018.31	1019.34	June 1996	7.11	1012.23	bne	< 1009	9.5	1008.8	2.5	9.5	1.03	Saprolite	
PZ-15	1067.45	1069.62	June 1996	na	na	bne	< 1037	30	1037.5	13	30	2.17	Saprolite	NLE
PZ-16S	1037.66	1040.23	June 1996	9.35	1030.88	bne	< 1018	20	1017.7	3	20	2.57	Saprolite	
PZ-16D	1037.77	1040.18	June 1996	3.31	1036.87	53	984.8	68	969.8	63	68	2.41	Bedrock	
PZ-17	1049.01	1050.95	June 1996	35.29	1015.66	bne	<1014	35	1014.0	20	35	1.94	Saprolite	
PZ-18	1054.11	1056.68	June 1996	na	na	bne	< 999	55	999.1	40	55	2.57	Saprolite	NLE
PZ-19	1046.67	1049.17	June 1996	27.98	1021.19	bne	< 1017	30	1016.7	15	30	2.50	Saprolite	
PZ-20	1074.59	1075.88	June 1996	na	na	bne	< 1030	45	1029.6	30	45	1.29	Saprolite	
PZ-21	1065.07	1067.65	June 1996	55.65	1012.00	bne	< 1000	65	1000.1	50	65	2.58	Saprolite	
PZ-23	1057.52	1059.96	June 1996	25.02	1034.94	bne	< 1013	45	1012.5	30	45	2.44	Saprolite	
PZ-24	1165.53	1168.28	June 1996	90.03	1078.25	47.5	1118.0	109	1056.5	54	109	2.75	Bedrock	
PZ-25	1127.45	1130.14	June 1996	68.76	1061.38	51	1076.5	79	1048.5	64	79	2.69	Bedrock	
PZ-26	1122.00	1124.44	June 1996	74.72	1049.72	64	1058.0	84	1038.0	69	84	2.44	Bedrock	
PZ-27	1018.34	1020.84	Dec. 1996	Dry	Dry	na	na	~7.25	~1011	na	~7.25	na	na	No Log or Records
PZ-30S	1085.67	1088.92	May 2011	39.93	1048.99	bne	< 1034	52	1033.7	37	52	3.25	Transition Zone	
PZ-30D	1085.73	1088.48	May 2011	40.71	1047.77	47	1038.7	82	1003.7	67	82	2.75	Bedrock	
PZ-31	1086.69	1089.81	May 2011	27.44	1062.37	35	1051.7	41	1045.7	25	40	3.13	Transition Zone	
PZ-32	1080.12	1083.12	May 2011	35.49	1047.63	49.5	1030.6	65	1015.1	29	49	3.00	Saprolite	Abandonded 3/5/2014
PZ-33	1095.96	1098.96	May 2011	46.48	1052.48	52	1044.0	62	1034.0	40	60	3.00	Transition Zone	Abandonded 3/5/2014
PZ-34	1082.46	1085.46	May 2011	35.29	1050.17	bne	< 1019	63	1019.5	27	47	3.00	Saprolite	
PZ-35	1060.64	1063.39	May 2011	20.30	1043.09	57.5	1003.1	57.5	1003.1	15	35	2.75	Saprolite	
PZ-37	1117.93	1120.77	May 2011	57.08	1063.69	25	1092.9	80	1037.9	60	80	2.83	Bedrock	Abandonded 3/6/2014
PZ-40	1074.92	1076.82	18-Dec-2015	Dry	Dry	25	1049.9	62	1012.9	32	62	1.90	Bedrock	
PZ-41	1074.35	1076.43	16-Dec-2015	47.26	1029.17	bne	< 1014.4	60	1014.4	40	60	2.08	Saprolite	
PZ-42	1066.60	1068.04	17-Dec-2015	31.11	1036.93	30	1036.6	54	1012.6	34	54	1.44	Bedrock	
T-1	1012.31	1014.77	March 1999	3.01	1011.76	bne	< 1009	3	1009.3	1	3	2.46	Alluvium	
T-2	1005.47	1007.85	March 1999	4.03	1003.82	bne	< 1002	3	1002.5	1	3	2.38	Alluvium	
T-3	999.93	1001.84	March 1999	9.23	992.61	bne	< 980	20	979.9	5	20	1.91	Alluvium/Saprolite	
T-4	1002.26	1004.08	March 1999	15.13	988.95	bne	< 977	25	977.3	10	25	1.82	Alluvium/Saprolite	
T-5	1001.01	1003.30	March 1999	11.45	991.85	bne	< 981	20	981.0	5	20	2.29	Alluvium	

Notes:
GS = Ground Surface.
TOC = Top of Casing.
TD = Total drilled depth of boring.
GW = Groundwater Level (Red - Measured on 1/11/2016; Blue - Measured 5/16-17/2011) .
na = Data not available, or not applicable.
AR (BR) = Auger Refusal (Interpreted as Bedrock Surface).
bne = bedrock (auger refusal) not encountered above TD.
Ft.-BGS = Feet below ground surface
Ft.-AMSL = Feet above mean sea level.
NLE = No Longer Existent. (Not found in recent investigations, presumed destroyed.)
# MW-38 has two screen sections (40-50' & 60-70') with solid riser between, but sandpack covered whole interval (38-70').

GS Elevation estimated from topographic map.
GS Elevation determined by subtracting TOC-stickup from surveyed TOC elevation.
GS & TOC Elevations appear inconsistent with topography, data not used for maps.

Wells & piezometers outside of the proposed new facility boundary.
TOC Elevation determined by surveyor by adding measured TOC-stickup to surveyed GS elevation.

TABLE 2: GROUNDWATER ELEVATION DATA (1987 - 2016)

Well / Piezometer ID (Former ID)	GS Elevation (Ft-AMSL)	TOC Elevation (Ft-AMSL)	STATIC GROUNDWATER ELEVATIONS (feet, mean sea level)																				
			09/10/87	11/23/87	12/21/88	02/05/90	11/11/91	11/11/92	05/19/93	11/16/93	07/20/95	09/01/95	10/13/95	04/18/96	06/18/96	12/04/96	05/01/97	11/01/97	05/01/98	11/01/98	04/07/99	05/01/99	10/18/99
MW-1 (W-1)	1052.48	1054.98	--	1028.98	1027.48	(1044.98)*	1032.24	1031.0	1037.0	1033.0	1034.19	1033.64	1034.76	1036.63	1035.65	--	--	--	--	--	--	--	--
MW-2 (W-5)	1012.00	1014.5	998.0	992.5	997.0	999.5	998.5	998.5	1000.5	999.0	999.2	998.8	999.3	999.7	999.2	--	--	--	--	--	--	--	--
MW-3 (W-4A)	1025.00	1027.5	--	983.5	982.0	983.5	985.3	984.5	987.5	985.5	--	--	--	985.6	985.5	--	--	--	--	--	--	--	--
MW-4 (W-2)	1016.00	1018	--	992	992	994	992	993	994	993	--	--	--	993	993	993	--	--	--	--	--	--	--
MW-5 (W-3)	1032.00	1034	--	985	984	986	985	985	989	985	--	--	--	987	986	--	--	--	--	--	--	--	--
MW-6 (W-8)	1000.00	1002.5	991.5	989.5	991.5	992.5	991.8	993.0	998.5	997.5	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab
MW-7 (W-7)	1050.00	1052.5	1019.2	1016.5	1016.5	(1042.5)*	1018.0	1017.5	1020.0	1018.0	--	1018.8	--	1019.5	1019.1	--	--	--	--	--	--	--	--
MW-8	1070.70	1072.55	--	1038.55	1038.55	(1064.55)*	1040.35	1039.6	1041.55	1040.6	1040.88	1040.80	1041.16	1041.08	1040.78	--	--	--	--	--	--	--	--
MW-9	1144.34	1145.97	ni	ni	ni	ni	ni	ni	ni	ni	1089.48	1090.60	1090.32	1090.66	1089.40	1087.28	1087.07	1091.49	1090.97	1086.65	1086.35	1087.70	1085.87
MW-10	1009.80	1012.23	ni	ni	ni	ni	ni	ni	ni	ni	998.40	997.73	998.75	998.78	998.41	--	998.66	999.00	999.08	998.66	998.19	998.98	998.84
MW-11	1026.63	1028.58	ni	ni	ni	ni	ni	ni	ni	ni	994.13	993.10	994.38	993.30	992.80	--	993.04	993.58	993.58	992.83	992.73	(1003.35)*	992.86
MW-12	1032.57	1034.22	ni	ni	ni	ni	ni	ni	ni	ni	993.65	993.54	994.32	993.84	994.50	994.66	993.54	993.98	994.52	993.42	993.12	993.78	993.43
MW-13	1057.07	1059.40	ni	ni	ni	ni	ni	ni	ni	ni	1009.67	1008.88	1009.46	1010.40	1010.03	1009.17	1009.52	1010.40	1011.57	1010.01	1009.40	1010.54	1009.65
MW-14	1014.76	1017.96	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1007.01	1007.14	--	--	--	--	--	--	--
MW-15S	1066.88	1069.04	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1022.70	1021.30	--	--	--	--	1023.26	--	--
MW-15D	1066.67	1069.06	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1023.38	1021.80	--	--	--	--	1023.40	--	--
MW-16S	1005.67	1007.67	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	--	--	--	--	--	--	--	--	992.15
MW-16D	1005.67	1007.87	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	--	--	--	--	--	--	--	--	993.94
MW-17	1119.73	1121.77	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	--	--	--	--	--	--	--	--	1079.43
MW-18	995.67	998.49	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
MW-19	996.99	999.95	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
MW-20 (PZ-4)	1114.74	1115.04	ni	ni	ni	ni	ni	ni	ni	ni	1057.66	1057.55	1056.98	1058.70	1058.62	--	--	--	--	--	--	--	--
MW-21 (PZ-1)	1090.00	1099.86	ni	ni	ni	ni	ni	ni	ni	ni	1062.37	1061.86	1063.31	1064.90	1063.87	--	--	--	--	--	--	--	--
MW-22S (PZ-22S)	1058.57	1061.20	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1049.88	1046.75	--	--	--	--	--	--	--
MW-22D (PZ-22D)	1057.90	1060.13	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1049.88	1046.74	--	--	--	--	--	--	--
MW-30	1052.46	1054.35	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
MW-36 (PZ-36)	1096.52	1099.52	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
MW-38 (PZ-38)	1081.63	1084.76	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-2S	1152.60	1154.74	ni	ni	ni	ni	ni	ni	ni	ni	1083.47	1083.11	1084.48	1084.63	1083.53	--	--	--	--	--	--	--	--
PZ-2D	1152.40	1154.53	ni	ni	ni	ni	ni	ni	ni	ni	1075.52	1076.24	1076.51	1076.38	1077.28	--	--	--	--	--	--	--	--
PZ-3	1040.51	1043.01	ni	ni	ni	ni	ni	ni	ni	ni	1034.11	1033.83	1035.06	1034.68	1034.20	--	--	--	--	--	--	--	--
PZ-5	1095.10	1097.23	ni	ni	ni	ni	ni	ni	ni	ni	1039.36	1039.48	1039.66	1040.55	1040.90	1040.18	--	--	--	--	--	--	--
PZ-6	1019.90	1021.91	ni	ni	ni	ni	ni	ni	ni	ni	996.89	996.52	997.14	997.24	996.95	--	--	--	--	--	--	--	--
PZ-7	1014.60	1016.48	ni	ni	ni	ni	ni	ni	ni	ni	995.98	995.71	996.77	996.17	995.94	996.67	--	--	--	--	--	--	--
PZ-8S	1066.60	1069.04	ni	ni	ni	ni	ni	ni	ni	ni	1023.11	1023.13	1023.18	1024.50	1024.94	1023.01	--	--	--	--	--	--	--
PZ-8D	1066.13	1068.15	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1022.88	1021.93	--	--	--	--	--	--	--
PZ-9S	1022.66	1025.16	ni	ni	ni	ni	ni	ni	ni	ni	1005.81	1005.51	1005.95	1006.53	1006.19	--	--	--	--	--	--	--	--
PZ-9D	1023.50	1025.96	ni	ni	ni	ni	ni	ni	ni	ni	1006.61	1006.51	1006.99	1008.35	1007.09	1007.28	--	--	--	--	--	--	--
PZ-12	1022.55	1025.64	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1017.92	1017.91	--	--	--	--	--	--	--
PZ-13	1014.49	1018.35	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1009.85	1009.98	--	--	--	--	--	--	--
PZ-14	1018.31	1019.34	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1011.00	1011.64	--	--	--	--	--	--	--
PZ-15	1067.45	1069.62	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1048.76	1045.68	--	--	--	--	--	--	--
PZ-16S	1037.66	1040.23	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1031.68	1030.96	--	--	--	--	--	--	--
PZ-16D	1037.77	1040.18	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1037.48	1036.17	--	--	--	--	--	--	--
PZ-17	1049.01	1050.95	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1016.57	1015.30	--	--	--	--	--	--	--
PZ-18	1054.11	1056.68	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1008.96	1008.80	--	--	--	--	--	--	--
PZ-19	1046.67	1049.17	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1023.01	1021.57	--	--	--	--	--	--	--
PZ-20	1074.59	1075.88	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1036.98	1032.76	--	--	--	--	--	--	--
PZ-21	1065.07	1067.65	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1014.78	1013.84	--	--	--	--	--	--	--
PZ-23	1057.52	1059.96	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1031.08	1029.72	--	--	--	--	--	--	--
PZ-24	1165.53	1168.28	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	DRY	--	--	--	--	--	--	--	--
PZ-25	1127.45	1130.14	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1061.96	--	--	--	--	--	--	--	--
PZ-26	1122.00	1124.44	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1051.04	--	--	--	--	--	--	--	--
PZ-27	1018.34	1020.84	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1012.61	--	--	--	--	--	--	--
PZ-30S	1085.67	1088.92	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-30D	1085.73	1088.48	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-31	1086.69	1089.81	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-32	1080.12	1083.12	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-33	1095.96	1098.96	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-34	1082.46	1085.46	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-35	1060.64	1063.39	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-37	1117.93	1120.77	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-40	1074.92	1076.82	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-41	1074.35	1076. 43	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-42	1066.60	1068.04	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
T-1	1012.31	1014.77	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	--	--	--
T-2	1005.47	1007.85	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	--	--	--
T-3	999.93	1001.84	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	--	--	--
T-4	1002.26	1004.08	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	--	--	--
T-5	1001.01	1003.30	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	--	--	--

Notes: GS = Ground Surface TOC = Top of Well Casing

( )* Anomalous elevation; possible measurement or transcription error - not used.

Gray shading indicates maximum groundwater elevation measured in that well.

-- not measured on that date ni = not yet installed ab = abandoned nle = no longer existant Dry = Insufficent waer in well/piezometer.

TABLE 2: GROUNDWATER ELEVATION DATA (1987 - 2016)

Well / Piezometer ID (Former ID)	GS Elevation (Ft-AMSL)	TOC Elevation (Ft-AMSL)	STATIC GROUNDWATER ELEVATIONS (feet, mean sea level)																			
			05/01/00	11/01/00	05/03/01	11/07/01	05/22/02	11/02/02	HQR 05/03/03	11/03/03	05/06/04	11/10/04	05/05/05	11/02/05	05/25/06	11/01/06	05/30/07	11/28/07	5/59/08	11/06/08	06/02/09	11/16/09
MW-1 (W-1)	1052.48	1054.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-2 (W-5)	1012.00	1014.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3 (W-4A)	1025.00	1027.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4 (W-2)	1016.00	1018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-5 (W-3)	1032.00	1034	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-6 (W-8)	1000.00	1002.5	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab
MW-7 (W-7)	1050.00	1052.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	1070.70	1072.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-9	1144.34	1145.97	1085.09	1085.22	1085.76	1085.84	1086.29	1085.19	1094.25	1089.49	1086.81	1085.92	1087.82	--	--	ab	ab	ab	ab	ab	ab	ab
MW-10	1009.80	1012.23	999.38	998.60	997.85	998.43	998.58	999.04	999.53	999.43	999.22	999.26	999.01	998.91	998.79	999.35	998.89	998.02	998.64	998.83	1000.63	999.60
MW-11	1026.63	1028.58	993.71	992.21	992.75	992.22	993.83	993.63	994.16	993.78	993.25	993.58	993.17	992.76	992.89	993.42	992.65	989.46	992.50	993.36	994.17	994.43
MW-12	1032.57	1034.22	994.01	992.46	993.41	992.90	993.48	993.93	994.96	994.67	993.85	993.72	993.87	993.50	993.52	994.02	993.42	990.52	993.22	993.78	994.86	994.98
MW-13	1057.07	1059.40	1009.75	1008.89	1009.62	1008.79	1009.50	1009.24	1012.95	1011.60	1011.40	1010.78	1011.26	1010.59	1010.48	1010.58	1010.80	1009.01	1010.02	1009.10	1011.20	1010.43
MW-14	1014.76	1017.96	--	--	--	--	--	--	--	1008.06	1007.96	--	--	--	--	1008.46	--	--	--	--	--	--
MW-15S	1066.88	1069.04	--	--	--	--	1021.94	1021.25	--	1027.08	1025.71	--	--	--	--	1023.28	--	--	--	--	--	--
MW-15D	1066.67	1069.06	--	--	--	--	1022.30	1021.59	--	1028.29	1026.59	--	--	--	--	--	--	--	--	--	--	--
MW-16S	1005.67	1007.67	992.59	991.07	992.07	991.36	992.02	992.66	993.03	992.84	992.18	992.57	992.30	991.92	991.97	992.59	991.84	988.84	991.74	992.42	993.89	993.53
MW-16D	1005.67	1007.87	994.09	992.62	993.59	992.84	993.47	993.60	994.22	994.19	993.87	993.67	993.72	993.19	993.42	993.73	993.47	990.30	993.13	993.67	994.70	(1004.56)*
MW-17	1119.73	1121.77	1076.55	1076.60	1077.06	1079.07	1080.36	1079.71	1092.35	1087.02	1082.54	1080.38	1083.35	1082.66	1081.13	1081.19	1083.42	1077.85	1078.52	1078.77	1083.33	1082.29
MW-18	995.67	998.49	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	993.48	994.28
MW-19	996.99	999.95	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	994.75	993.69
MW-20 (PZ-4)	1114.74	1115.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-21 (PZ-1)	1090.00	1099.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-22S (PZ-22S)	1058.57	1061.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-22D (PZ-22D)	1057.90	1060.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-30	1052.46	1054.35	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
MW-36 (PZ-36)	1096.52	1099.52	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
MW-38 (PZ-38)	1081.63	1084.76	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-2S	1152.60	1154.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-2D	1152.40	1154.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-3	1040.51	1043.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-5	1095.10	1097.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-6	1019.90	1021.91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-7	1014.60	1016.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-8S	1066.60	1069.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-8D	1066.13	1068.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-9S	1022.66	1025.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-9D	1023.50	1025.96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-12	1022.55	1025.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-13	1014.49	1018.35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-14	1018.31	1019.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-15	1067.45	1069.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-16S	1037.66	1040.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-16D	1037.77	1040.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-17	1049.01	1050.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-18	1054.11	1056.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-19	1046.67	1049.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-20	1074.59	1075.88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-21	1065.07	1067.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-23	1057.52	1059.96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-24	1165.53	1168.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-25	1127.45	1130.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-26	1122.00	1124.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-27	1018.34	1020.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PZ-30S	1085.67	1088.92	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-30D	1085.73	1088.48	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-31	1086.69	1089.81	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-32	1080.12	1083.12	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-33	1095.96	1098.96	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-34	1082.46	1085.46	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-35	1060.64	1063.39	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-37	1117.93	1120.77	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-40	1074.92	1076.82	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-41	1074.35	1076.43	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
PZ-42	1066.60	1068.04	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni
T-1	1012.31	1014.77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T-2	1005.47	1007.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T-3	999.93	1001.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T-4	1002.26	1004.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T-5	1001.01	1003.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

HQR = High Quarterly Rainfall (> 21")

TABLE 2: GROUNDWATER ELEVATION DATA (1987 - 2016)

Well / Piezometer ID (Former ID)	GS Elevation (Ft-AMSL)	TOC Elevation (Ft-AMSL)	STATIC GROUNDWATER ELEVATIONS (feet, mean sea level)																			Well / Piezometer ID (Former ID)
			06/15/10	08/17/10	11/30/10	05/16/11	06/01/11	12/20/11	05/30/12	12/11/12	HQR 06/11/13	10/28/13	05/06/14	10/21/14	05/21/15	HQR 12/08/15	01/11/16	02/19/16	05/04/16	OBSERVED MAXIMUM	LONG-TERM MAXIMUM	
MW-1 (W-1)	1052.48	1054.98	--	1033.53		1031.32	--	--	--	--	--	--	--	--	--	--	1023.50	1032.01	1033.23	1036.98	1036.98	MW-1 (W-1)
MW-2 (W-5)	1012.00	1014.5	--	998.52		998.67	--	--	--	--	--	--	--	--	--	--	--	--	--	1000.50	1000.50	MW-2 (W-5)
MW-3 (W-4A)	1025.00	1027.5	--	985.30		983.55	--	--	--	--	--	--	--	--	--	--	--	--	--	987.50	987.50	MW-3 (W-4A)
MW-4 (W-2)	1016.00	1018	--	992.74		992.80	--	--	--	--	--	--	--	--	--	--	--	--	--	994.00	994.00	MW-4 (W-2)
MW-5 (W-3)	1032.00	1034	--	984.97		984.45	--	--	--	--	--	--	--	--	--	--	--	--	--	989.00	989.00	MW-5 (W-3)
MW-6 (W-8)	1000.00	1002.5	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	998.50	998.50	MW-6 (W-8)
MW-7 (W-7)	1050.00	1052.5	--	1018.70		1017.41	--	--	--	--	--	--	--	--	--	--	--	--	--	1020.00	1020.27	MW-7 (W-7)
MW-8	1070.70	1072.55	--	1040.97	NM	1040.40	--	--	--	--	--	--	--	--	--	--	1041.41	1041.69	--	1041.69	1043.26	MW-8
MW-9	1144.34	1145.97	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	ab	1094.25	1094.25	MW-9
MW-10	1009.80	1012.23	999.09	998.79	999.24	999.28	999.22	999.27	1000.32	999.04	1001.25	999.42	999.71	999.49	999.22	999.49	1000.18	--	998.98	1001.25	1001.25	MW-10
MW-11	1026.63	1028.58	992.90	992.74	993.14	993.28	993.36	993.66	993.37	992.94	996.39	993.13	990.63	993.93	993.03	992.25	995.05	--	993.73	996.39	996.39	MW-11
MW-12	1032.57	1034.22	993.71	993.52	993.56	993.88	993.92	994.00	993.93	993.46	996.60	993.80	994.22	994.27	993.62	993.42	995.32	--	993.22	996.60	996.74	MW-12
MW-13	1057.07	1059.40	1011.32	1010.67	1010.25	1010.68	1010.62	1009.56	1009.52	1009.52	1011.00	1010.68	1010.84	1009.98	1010.18	1009.64	1010.05	--	1009.66	1012.95	1013.54	MW-13
MW-14	1014.76	1017.96	--	1008.41	NM	1008.63	--	--	--	--	--	--	--	--	--	--	1009.09	--	--	1009.09	1009.37	MW-14
MW-15S	1066.88	1069.04	--	1024.61	NM	1024.54	--	--	--	--	--	--	1025.74	1024.64	1025.17	1025.19	1026.64	1027.55	1026.24	1027.55	1027.55	MW-15S
MW-15D	1066.67	1069.06	--	1025.29	NM	1025.09	--	--	--	--	--	--	--	--	--	--	1027.19	1027.95	--	1028.29	1028.29	MW-15D
MW-16S	1005.67	1007.67	992.10	992.15	992.25	991.60	992.48	992.67	992.46	992.05	995.47	992.55	992.73	992.97	992.11	994.47	994.07	--	992.97	995.47	995.47	MW-16S
MW-16D	1005.67	1007.87	993.56	993.57	992.90	992.39	993.74	993.88	993.76	993.43	996.51	993.72	994.02	994.40	993.36	995.17	995.22	--	992.42	996.51	996.51	MW-16D
MW-17	1119.73	1121.77	1084.81	1082.46	1079.76	1080.38	1080.66	1077.47	--	--	--	--	--	--	--	--	1081.62	1090.80	--	1092.35	1092.35	MW-17
MW-18	995.67	998.49	992.67	992.73	992.14	993.04	992.98	--	993.09	--	--	993.63	993.31	--	992.54	--	--	--	992.74	994.28	994.28	MW-18
MW-19	996.99	999.95	992.60	992.70	992.13	992.91	992.81	--	993.15	--	--	992.95	993.17	--	992.60	--	--	--	993.45	994.75	994.75	MW-19
MW-20 (PZ-4)	1114.74	1115.04	--	1058.17	1056.10	1053.91	1053.93	1052.27	1052.63	1053.51	1055.80	1060.44	1058.24	1056.42	1053.69	1051.65	1052.84	1055.29	1056.81	1060.44	1060.44	MW-20 (PZ-4)
MW-21 (PZ-1)	1090.00	1099.86	--	1062.28	--	1058.86	--	--	--	--	--	--	1066.06	1063.48	1062.18	1061.71	1064.71	1066.04	1065.36	1066.06	1066.06	MW-21 (PZ-1)
MW-22S (PZ-22S)	1058.57	1061.20	--	1047.97	--	1044.85	--	--	--	--	--	--	1048.70	1045.76	1043.65	1042.60	1044.25	1045.24	1045.81	1049.88	1049.88	MW-22S (PZ-22S)
MW-22D (PZ-22D)	1057.90	1060.13	--	1047.81	--	1044.77	--	--	--	--	--	--	--	--	--	--	1044.15	1045.24	--	1049.88	1049.88	MW-22D (PZ-22D)
MW-30	1052.46	1054.35	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1022.70	1023.47	1029.14	1029.14	1029.14	MW-30
MW-36 (PZ-36)	1096.52	1099.52	ni	ni	ni	1067.82	--	--	--	--	--	--	1069.17	1066.52	1066.03	1066.72	1068.92	1071.42	1071.22	1071.42	1071.97	PZ-36
MW-38 (PZ-38)	1081.63	1084.76	ni	ni	ni	1045.15	--	--	--	--	--	--	1042.18	1045.18	1044.68	1046.24	1044.48	1044.49	1044.91	1046.24	1049.30	MW-38 (PZ-38)
PZ-2S	1152.60	1154.74	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	1084.63	1084.63	PZ-2S
PZ-2D	1152.40	1154.53	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	1077.28	1077.28	PZ-2D
PZ-3	1040.51	1043.01	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	1035.06	1035.06	PZ-3
PZ-5	1095.10	1097.23	--	1040.03	--	1038.43	--	--	--	--	--	--	--	--	--	--	--	1037.46	--	1040.90	1042.58	PZ-5
PZ-6	1019.90	1021.91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	997.24	997.24	PZ-6
PZ-7	1014.60	1016.48	--	995.58	--	995.42	--	--	--	--	--	--	--	--	--	--	--	997.27	--	997.27	997.27	PZ-7
PZ-8S	1066.60	1069.04	--	1024.14	--	1021.75	--	--	--	--	--	--	--	--	--	--	--	1021.39	--	1024.94	1024.94	PZ-8S
PZ-8D	1066.13	1068.15	--	1023.15	--	1020.71	--	--	--	--	--	--	--	--	--	--	--	1020.24	--	1023.15	1023.57	PZ-8D
PZ-9S	1022.66	1025.16	--	1007.19	--	1007.29	--	--	--	--	--	--	--	--	--	--	1003.86	--	--	1007.29	1008.03	PZ-9S
PZ-9D	1023.50	1025.96	--	1007.97	--	1008.55	--	--	--	--	--	--	--	--	--	--	1008.75	--	--	1008.75	1009.29	PZ-9D
PZ-12	1022.55	1025.64	--	1017.90	--	1017.71	--	--	--	--	--	--	1018.14	1017.68	1017.60	1017.69	1017.83	1017.93	1017.94	1018.14	1018.45	PZ-12
PZ-13	1014.49	1018.35	--	1010.77	--	1010.92	--	--	--	--	--	--	--	--	--	--	1009.51	--	--	1010.92	1011.66	PZ-13
PZ-14	1018.31	1019.34	--	1011.41	--	1011.65	--	--	--	--	--	--	--	--	--	--	1012.23	--	--	1012.23	1012.39	PZ-14
PZ-15	1067.45	1069.62	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	1048.76	1048.76	PZ-15
PZ-16S	1037.66	1040.23	--	1030.72	--	1030.00	--	--	--	--	--	--	--	--	--	--	1030.88	1031.36	--	1031.68	1032.86	PZ-16S
PZ-16D	1037.77	1040.18	--	1036.73	--	1035.82	--	--	--	--	--	--	--	--	--	--	1036.87	1037.18	--	1037.48	1037.77	PZ-16D
PZ-17	1049.01	1050.95	--	1016.91	--	1015.66	--	--	--	--	--	--	--	--	--	--	--	1016.03	--	1016.91	1018.52	PZ-17
PZ-18	1054.11	1056.68	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	nle	1008.96	1008.96	PZ-18
PZ-19	1046.67	1049.17	--	1022.72	--	1021.19	--	--	--	--	--	--	--	--	--	--	--	1021.35		1023.01	1024.05	PZ-19
PZ-20	1074.59	1075.88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1036.98	1036.98	PZ-20
PZ-21	1065.07	1067.65	--	1015.14	--	1012.98	--	--	--	--	--	--	--	--	--	--	1012.00	1012.46	--	1015.14	1015.84	PZ-21
PZ-23	1057.52	1059.96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1034.94	1034.60	--	1034.94	1037.99	PZ-23
PZ-24	1165.53	1168.28	--	1080.13	--	1078.25	--	--	--	--	--	--	--	--	--	--	--	--	--	1080.13	1082.40	PZ-24
PZ-25	1127.45	1130.14	--	1061.84	--	1061.38	--	--	--	--	--	--	--	--	--	--	--	--	--	1061.96	1065.53	PZ-25
PZ-26	1122.00	1124.44	--	1050.98	--	1049.72	--	--	--	--	--	--	--	--	--	--	--	--	--	1051.04	1053.87	PZ-26
PZ-27	1018.34	1020.84	--	--	--	1012.02	--	--	--	--	--	--	--	--	--	--	Dry	--	--	1012.61	1012.76	PZ-27
PZ-30S	1085.67	1088.92	ni	ni	ni	1048.01	--	--	--	--	--	--	1041.92	1048.92	1047.22	1045.57	1048.99	1050.75	1047.47	1050.75	1052.16	PZ-30S
PZ-30D	1085.73	1088.48	ni	ni	ni	1047.34	--	--	--	--	--	--	--	--	--	--	1047.77	1049.21	--	1049.21	1051.49	PZ-30D
PZ-31	1086.69	1089.81	ni	ni	ni	1061.39	--	--	--	--	--	--	1064.14	1061.04	1060.17	1058.70	1062.37	1064.30	1056.31	1064.30	1065.54	PZ-31
PZ-32	1080.12	1083.12	ni	ni	ni	1047.63	--	--	--	--	--	--	ab	ab	ab	ab	ab	ab	ab	1047.63	1051.78	PZ-32
PZ-33	1095.96	1098.96	ni	ni	ni	1052.48	--	--	--	--	--	--	ab	ab	ab	ab	ab	ab	ab	1052.48	1056.63	PZ-33
PZ-34	1082.46	1085.46	ni	ni	ni	1050.17	--	--	--	--	--	--	--	--	--	--	--	--	--	1050.17	1054.32	PZ-34
PZ-35	1060.64	1063.39	ni	ni	ni	1041.70	--	--	--	--	--	--	--	--	--	--	1043.09	1043.74	--	1043.74	1044.56	PZ-35
PZ-37	1117.93	1120.77	ni	ni	ni	1063.69	--	--	--	--	--	--	ab	ab	ab	ab	ab	ab	ab	1063.69	1067.84	PZ-37
PZ-40	1074.92	1076.82	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	Dry	1036.73	1048.19	1048.19	1048.19	PZ-40
PZ-41	1074.35	1076.43	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1029.17	1031.99	1034.73	1034.73	1034.73	PZ-41
PZ-42	1066.60	1068.04	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	ni	1036.93	1047.14	1039.78	1047.14	1047.14	PZ-42
T-1	1012.31	1014.77	--	--	--	1011.76	--	--	--	--	--	--	--	--	--	--	--	--	--	1011.76	1012.31	T-1
T-2	1005.47	1007.85	--	--	--	1003.82	--	--	--	--	--	--	--	--	--	--	--	--	--	1003.82	1004.56	T-2
T-3	999.93	1001.84	--	--	--	992.61	--	--	--	--	--	--	--	--	--	--	--	--	--	992.61	993.35	T-3
T-4	1002.26	1004.08	--	--	--	988.95	--	--	--	--	--	--	--	--	--	--	--	--	--	988.95	989.69	T-4
T-5	1001.01	1003.30	--	--	--	991.85	--	--	--	--	--	--	--	--	--	--	--	--	--	991.85	992.59	T-5

The Long-Term Maximum Elevation (L-T Max) is the highest of the Observed Maximum Elevation (Obs Max) or the Calculated Maximum Elevation, unless they are higher than ground surface (GS), in which case the LT-Max is set equal to the ground surfce elevation.

Pink indicates the LT-Max = the Obs Max. (when this is higher than the calculated max.)

Green indicates Long-Term Maximum based on Calculated Max. Calculated Max = 5/16/11 value plus adjustment factor (AF). AF based on average difference between observed Max value and 5/16/11 value for each range of GS Elevations, as shown to the right.

GS Elevation	AF
< 1025' AMSL :	0.74
1025-1075 ' AMSL :	2.86
> 1075' AMSL :	4.15

Blue Indicates LT Max = GS

Lavender is for wells/piezometers with WL data for 1/11/16 but not 5/16/11. For these, the LT Max is equal to the 1/11/16 WL plus the average difference between the LT Max and the 1/11/16 WL for other wells. The average difference was 3.05 ft.

TABLE 3: Laboratory Soil Test Results

Boring ID	Sample Depth (feet-BGS)	Sample Date	Sample Type	Soil Color	USCS Description	USCS Symbol	Water Content (%)	Specific Gravity	Sieve/Hydrometer Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	USDA Classification	Atterberg Limits: Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Permeability (cm/sec)	Porosity (n)
Pit 1	3	Mar 1986	B		Sandy,Silty Clay	CH					64.0			57	21	36		
Pit 1	6.5	Mar 1986	B		Sandy Silt	ML								43	34	9		
Pit 3	3	Mar 1986	B		Silty Clay	SC					43.0			31	20	11		
Pit X		Mar 1986	B		Sandy Clay Silt	MH					67.0			57	36	20		
Pit 4	2	Mar 1986	B		Sandy Clay Silt	MH					76.0			73	43	30		
Pit 6		Mar 1986	B		Sandy Silt	ML					72.0			44	28	15		
Pit 7		Mar 1986	B		Sandy Silt	ML					62.8			46	29	17		
B-6		1986			Sandy Clay Silt	MH								56	37	19		
MW-21 (PZ-1)	0.5-2	Sept 1995	SS	Redish Brown	Sandy Silt	ML					53.9			42	28	14		
MW-21 (PZ-1)	38.5-40	Sept 1995	SS	Redish Brown	Silty Sand	SM					38.9			35	29	6		
PZ-3	0.5-2	Sept 1995	SS	Redish Brown	Silty Clayey Sand	SC					45.1			34	21	13		
PZ-4	43.5-45	Sept 1995	SS	Brown, Tan, Black	Silty Sand	SM					25.3					NP		
PZ-5	0.5-2	Sept 1995	SS	Redish Brown	Sandy Silty Clay	MH-CH					81.3			88	38	50		
PZ-6	0.5-2	Sept 1995	SS	Redish Brown	Silty Sandy Clay	CH					69.5			58	27	31		
PZ-7	0.5-2	Sept 1995	SS	Redish Brown	Clayey Sandy Silt	MH-CH					61.4			58	47	11		
PZ-8	0.5-2	Sept 1995	SS	Redish Brown	Silty Sandy Clay	CH					71.7			52	27	25		
PZ-8	0.0-2	Sept 1995	B	Redish Brown	Sandy Clay	CH	25.4										1.66E-04	
PZ-9D	23-25	Sept 1995	UD	Brown & Tan	Silty Sand	SM					32.7					NP		0.40
PZ-10	8.5-10	Sept 1995	SS	Redish Brown	Sandy Clayey Silt	MH					83.4			54	39	15		
PZ-10	8-18	Sept 1995	B	Redish Brown	Sandy Clayey Silt	MH	25.1										1.10E-05	
MW-15S	1.5-3.5	Aug 1996	UD	Tan-Brown	Clayey Silty Sand	SM	14.3	2.66						40	30	10		0.32
PZ-30S	6-8	May 2011	UD	Brown	Silty Sand	SM	17.6	2.70	31.2	49.2	17.7	1.9	Loamy Sand	38	35	3		0.43
PZ-30S	15-17	May 2011	UD	Red Brown	Silty Sand	SM	31.7	2.80	25.0	43.8	25.8	5.4	Sandy Loam	59	51	8	2.0E-04	0.50
PZ-31	3-5	May 2011	UD	Pink	Silty Sand	SM	17.4	2.68	14.9	65.5	17.7	1.9	Loamy Sand	39	35	4		0.38
PZ-31	13-15	May 2011	UD	Pink	Silty Sand	SM	15.9	2.71	42.0	41.2	14.2	2.6	Sandy Loam	47	41	6		0.36
PZ-32	3-5	May 2011	UD	Redish Brown	Silty Sand	SM	25.7	2.75	5.1	49.0	14.5	31.4	Sandy Clay Loam	61	35	26		0.44
PZ-32	13-15	May 2011	UD	Redish Brown	Silty Sand	SM	23.3	2.75	12.0	73.7	14.1	0.2	Loamy Sand	44	40	4	1.4E-03	0.49
PZ-37	15-17	May 2011	UD	Brown	Silt	SM	11.3	2.84	47.7	32.4	15.4	4.5	Sandy Loam	48	36	12		0.46
MW-38 (PZ-38)	3-5	May 2011	UD	Brown	Clayey Silt	SM	14.3	2.62	8.7	52.4	26.6	12.3	Sandy Loam	52	35	17		0.37
MW-38 (PZ-38)	15-17	May 2011	UD	Brown	Silt	SM	15.8	2.85	18.7	50.9	24.2	6.2	Sandy Loam	38	31	7		0.57
PZ-41	7-9	Dec 2015	UD	Red	Silty Sand	SM	21.3	2.68	0.2	85.7	14.4		Loamy Sand		Non-Plastic			0.48
PZ-42	5-7	Dec 2015	UD	Red	Silty Sand	SM	19.9	2.72	22.3	60.5	15.0	2.1	Loamy Sand		Non-Plastic		6.2E-05	0.51
PZ-42	8-10	Dec 2015	UD	Red	Silty Sand	SM	18.0	2.59	4.3	87.4	8.3		Loamy Sand		Non-Plastic			0.42
																AVERAGE :	**3.7E-04**	**0.44**
																Average for Phase 2A/4 Samples:	**4.9E-04**	**0.39**

SS = Split-Spoon Sample
UD = Undisturbed Sample (Shelby Tube)
B = Bulk Sample

Highlighted Results from within the Phase 2A/4 footprint.

For Pre-2011 Samples:
Gravel = > #4 sieve
Sand = < #4 sieve, > #200 sieve
Silt & Clay = < #200 sieve

For 2011 & 2015 Samples:
Gravel = > 2.0 mm
Sand = < 2.0 mm, > 0.05 mm
Silt = < 0.05 mm, > 0.002 mm
Clay = < 0.002 mm

Triaxcial Shear Test Results			
Boring	**Depth** (Ft)	**Effective Angle of Friction (F)**	**Effective Cohesion (C)**
PZ-30S	15-17	33.64	1.53

TABLE 4A: Rock Core Data (Whole Site)

Boring ID	Date	Depth (ft.)	Core Length (ft.)	Recovery (%)	RQD (%)	Rock Type / Description / Comments
PZ-2D	May 1995	77.0-87.0	10.0	62%	21%	Gray & white mica gneiss with minor layers of mica schist.
		87.0-97.0	10.0	88%	31%	
		97.0-107.0	10.0	96%	46%	
		107.0-117.0	10.0	94%	60%	
PZ-8D	June 1996	74.5-79.5	5.0	96%	72%	Augen gneiss - biotite, feldspar, & quartz; massive; horizontal fractures.
		79.5-84.5	5.0	95%	32%	
		84.5-89.5	5.0	100%	45%	
PZ-9D	May 1995	47.0-57.0	10.0	79%	31%	Gray quartz-diorite gneiss with layers of mica schist.
		57.0-67.0	10.0	84%	62%	
PZ-16D	June 1996	53.0-58.0	5.0	75%	49%	Gneiss - inequigranular; biotite, feldspar, & quartz; massive; fractures 30º from horizontal & horizontal.
		58.0-63.0	5.0	95%	47%	
		63.0-68.0	5.0	90%	58%	
MW-15D	June 1996	104.5-106.5	2.0	96%	93%	Gneiss - inequiangular, biotite, quartz, fedspar, & garnet; slightly foliated & massive; fractured @ 20º-30º from horizontal.
		106.5-111.5	5.0	98%	48%	
		111.5-113.5	2.0	91%	37%	
		113.5-118.5	5.0	95%	92%	
B-8	Jan-Feb 1986	40.5-44.5	4.0	88%	NA	Granitic Gneiss
B-9	Jan-Feb 1987	61.0-65.0	4.0	88%	NA	Granitic Gneiss
B-11	Jan-Feb 1988	48.5-52.0	3.5	100%	NA	Granitic Gneiss
PZ-30D	May 2011	47-50	3.0	76%	37%	Inequigranular quartz, feldspar, mica gneiss; some minor biotite schist layers; weathered.
		50-55	5.0	92%	80%	Inequigranular quartz, feldspar, mica gneiss; some minor biotite schist layers; some foliation.
		55-60	5.0	89%	58%	Foliated quartz, feldspar, mica gneiss; some augen structures.
		60-65	5.0	87%	74%	Massive quartz, feldspar, mica gneiss; some foliation.
		65-70	5.0	72%	32%	Massive quartz, feldspar, mica gneiss; some foliation.
						WBF's @ 47.5', 50.5', 55.0', & 68.0-69.0'
PZ-32	May 2011	50-55	5.0	98%	48%	Foliated to massive quartz, feldspar, mica gneiss.
		55-60	5.0	93%	56%	Foliated to massive quartz, feldspar, mica gneiss.
		60-65	5.0	83%	42%	Foliated to massive quartz, feldspar, mica gneiss; more weathered than above.
						WBF's @ 50.5', 51.5', 53.0', 55.0', 56.0', 57.0', 59.0', 59.5', 60.0', 61.0', 62.0-63.0', 63.5', 64.0', 64.5', & 65.0'
PZ-38	May 2011	30-35	5.0	95%	69%	Inequigranular quartz, feldspar, mica gneiss; some minor biotite schist layers; foliated; weathered.
		35-40	5.0	100%	95%	Foliated quartz, feldspar, mica gneiss; some augen structures.
		40-45	5.0	93%	62%	Foliated quartz, feldspar, mica gneiss; some augen structures.
						WBF's @ 30.0', 34.0-34.5' & 40.0'
PZ-42	Dec. 2015	35-40	4.5	85%	64%	Pink to gray-white granite gneiss with biotite banding, fractures near horizontal, increasing with depth to 45º
		40-45	4.5	77%	65%	Gray-white granite gneiss with biotite banding, fractures at 45º
		45-50	4.5	100%	94%	Gray-white granite gneiss with biotite banding, fractures at 45º
		50-54.5	4.5	96%	60%	Gray-white granite gneiss with biotite banding, fractures at 45º
						WBF's @ 37.0', 38.5-39.0', 41.0', & 44.5'
			Average:	**90%**	**57%**	

Recovery = Total Length Recovered / Core Length.
RQD = Rock Quality Designation = Total length of pieces > 4 in. long / Core Length.
WBF's = Water Bearing Fractures. NA = Data not available.

TABLE 4B: Rock Core Data (PZ-42 Details)

Boring	Date	Depth (ft.)	Core Length (ft.)	Total Recovery (in.)	Recovery (4 in. or greater)	RQD (%)	Rock Description
PZ-42	12/16/2015	35 - 40	5	51	4	7%	Top six inches mica schist then grading to Gray-white granite gneiss with biotite banding, fractures near horizontal.
					4	7%	
					5.5	9%	
					4	7%	
					7.5	13%	Grading to pink orthoclase feldspar, corase grained granitic rock. WBF @ 37.0'
					5.5	9%	
					4	7%	Gray-white granite gneiss with biotite banding, fractures near horizontal and with depth increasing to 45º. Major WBF @ 38.5-39.0'
					4	7%	
					38.5	**64%**	
PZ-42	12/16/2015	40 - 45	5	46	4	7%	Gray-white granite gneiss with biotite banding, fractures at 45º. Weak WBFs @ 41.0' & 44.5'.
					6	10%	
					6	10%	
					4	7%	
					8	13%	
					6	10%	
					5	8%	
					39	**65%**	
PZ-42	12/16/2015	45 - 50	5	60	9	15%	Gray-white granite gneiss with biotite banding, fractures at 45º. No WBF.
					4	7%	
					4	7%	
					16	27%	
					13.5	23%	
					10	17%	
					56.5	**94%**	
PZ-42	12/16/2015	50 - 54.5	5	52	7	13%	Gray-white granite gneiss with biotite banding, fractures at 45º. No WBF.
					8	15%	
					7	13%	
					6	11%	
					4.5	8%	
					32.5	**60%**	
PZ-42 (Total)	12/16/2015	35 - 54.5	20	209	**166.5**	**71%**	

Recovery = Length recovered / core length.

RQD = Rock Quality Designation; total length of pieces 4 in. long or greater / core length.

WBF = Water-bearing fracture.

TABLE 5: Aquifer Slug Test Results

Well / PZ	Date	Lithology	Screened Interval (feet-BGS)	Depth to Water (feet-TOC)	Aquifer Thickness (feet)	Effective Radius (inches)	Method	Hydraulic Conductivity *K* (cm/sec) Falling	Hydraulic Conductivity *K* (cm/sec) Rising	Hydraulic Conductivity *K* (ft/day) Falling	Hydraulic Conductivity *K* (ft/day) Rising
MW-1	Sept. 1994	Saprolite	18.5-28.5		30	5.25	B&R	3.65E-03	---	1.03E+01	---
MW-8	Sept. 1994	Bedrock	27.5-37.5		30	5.25	B&R	9.77E-03	---	2.77E+01	---
MW-9	Sept. 1994	Saprolite	51-66		30	5.25	B&R	6.01E-03	---	1.70E+01	---
MW-10	Sept. 1994	Saprolite	8-23		30	5.25	B&R	2.77E-03	---	7.85E+00	---
MW-11	Sept. 1994	Bedrock	26-43		30	5.25	B&R	3.34E-03	---	9.47E+00	---
MW-12	Sept. 1994	Saprolite	18.5-28.5		30	5.25	B&R	4.67E-03	---	1.32E+01	---
MW-13	Sept. 1994	Saprolite	41.5-58		30	4.8	B&R	3.48E-03	---	9.86E+00	---
PZ-2S	8/9/1995	Transition Zone	65-80	71.0	30	1.73	B&R	2.37E-04	2.17E-04	6.72E-01	6.15E-01
PZ-5	8/9/1995	Saprolite	50-65	57.8	30	1.73	B&R	1.74E-04	2.09E-04	4.93E-01	5.92E-01
PZ-8S	8/9/1995	Saprolite	40-55	45.9	30	1.73	B&R	3.79E-04	6.43E-04	1.07E+00	1.82E+00
PZ-8D	6/18/1996	Bedrock	84-89	84.0	20	1.73	B&R	3.96E-05	---	1.12E-01	---
PZ-9S	8/9/1995	Saprolite	13-28	19.5	30	1.73	B&R	2.84E-04	7.33E-04	8.05E-01	2.08E+00
PZ-18	6/18/1996	Saprolite	40-55	46.5	30	1.73	B&R	1.33E-03	1.77E-03	3.77E+00	5.02E+00
PZ-20	6/18/1996	Saprolite	30-45	38.9	30	1.73	B&R	2.22E-04	4.79E-04	6.29E-01	1.36E+00
PZ-21	6/18/1996	Saprolite	50-65	52.8	30	1.73	B&R	4.16E-04	9.85E-04	1.18E+00	2.79E+00
MW-16S	4/6/1999	Saprolite	5-20	16.23	10	4.125	B&R	5.42E-05	4.22E-05	1.54E-01	1.20E-01
MW-16D	4/6/1999	Bedrock	78-88	14.62	40	3.00	B&R	4.66E-05	8.75E-05	1.32E-01	2.48E-01
MW-17	4/6/1999	Bedrock	37-52	42.12	40	3.00	B&R	3.71E-05	1.69E-05	1.05E-01	4.79E-02
PZ-30S	5/18/2011	Transition Zone	37-52	40.91	20	3.00	B&R	1.37E-05	3.43E-05	3.88E-02	9.73E-02
PZ-30D	5/18/2011	Bedrock	67-82	41.14	50	3.00	B&R	1.66E-06	---	4.72E-03	---
PZ-32	5/18/2011	Saprolite	29-49	35.49	20	3.00	B&R	7.00E-05	4.65E-05	1.99E-01	1.32E-01
PZ-35	5/18/2011	Saprolite	15-35	21.69	20	3.00	B&R	2.15E-04	1.25E-04	6.11E-01	3.55E-01
PZ-36	5/18/2011	Bedrock	28-43	31.7	20	3.00	B&R	2.98E-05	1.68E-04	8.46E-02	4.77E-01
PZ-41	1/12/2016	Saprolite	40-60	47.26	30	3.00	B&R	7.23E-05	9.01E-05	2.05E-01	2.56E-01
PZ-42	1/12/2016	Bedrock	34-54	31.11	30	3.00	B&R	5.96E-05	1.23E-04	1.69E-01	3.48E-01

Arithmetic Means in feet per day (ft/day):

AVERAGE K (Saprolite):	3.28E+00			AVERAGE K (Falling & Rising):			4.24E+00	1.02E+00
AVERAGE K (Bedrock):	3.24E+00	AVERAGE K (Transition):	3.56E-01	AVERAGE K (Over-all):			2.98E+00	

Arithmetic Means in centimeters per second (cm/sec):

AVERAGE K (Saprolite):	1.16E-03			AVERAGE K (Falling & Rising):	1.49E-03	3.61E-04		
AVERAGE K (Bedrock):	1.14E-03	AVERAGE K (Transition):	1.26E-04	AVERAGE K (Over-all):	1.05E-03			

NOTES: ***K*** = Hydraulic Conductivity. --- = Data not collected. B&R = Bower & Rice Method.
BGS = Below Ground Surface. TOC = From Top of Well Casing. Highlighted slug tests are within the Phase 2A or 4 footprints.

TABLE 6: Groundwater Gradients and Flow Velocities

PORTION OF AQUIFER	GRADIENT CALCULATION SEGMENT	FLOW LINE LENGTH (feet)	BEGIN GW ELEV. (feet)	END GW ELEV. (feet)	HORIZ. GRADIENT i (ft/ft)	HYDRAULIC CONDUCT. K (ft/day)	EFFECT. POROSITY n_e	LINEAR VELOCITY V (ft/year)
Saprolite	i_1	741	1070	1030	0.0540	3.279	0.40	0.443
	i_2	904	1060	1030	0.0332	3.279	0.40	0.272
	i_3	874	1050	1020	0.0343	3.279	0.40	0.281
				AVERAGE:	**0.0405**		**AVERAGE:**	**0.332**
Transition	i_1	741	1070	1030	0.0540	0.3558	0.30	0.064
	i_2	904	1060	1030	0.0332	0.3558	0.30	0.039
	i_3	874	1050	1020	0.0343	0.3558	0.30	0.041
				AVERAGE:	**0.0405**		**AVERAGE:**	**0.048**
Bedrock	i_1	741	1070	1030	0.0540	3.241	0.10	1.750
	i_2	904	1060	1030	0.0332	3.241	0.10	1.076
	i_3	874	1050	1020	0.0343	3.241	0.10	1.112
				AVERAGE:	**0.0405**		**AVERAGE:**	**1.313**
Over-all	i_1	741	1070	1030	0.0540	2.983	0.25	0.644
	i_2	904	1060	1030	0.0332	2.983	0.25	0.396
	i_3	874	1050	1020	0.0343	2.983	0.25	0.410
				AVERAGE:	**0.0405**		**AVERAGE:**	**0.483**

Notes:

Hydraulic conductivity (K) is based on the arithmetic means of K from individual slug tests in saprolite wells at the facility (see Table 5).

Effective Porosity (n_e = 0.40) for saprolite is assummed to be slightly less than the average laboratory porosity for site soil samples (saprolite) = 44% (0.44) (see Table 3).

Effective Porosities for bedrock, the transition zone, and over-all are estimated based on typical values for the North Carolina Piedmont.

Gradient segments are based on the February 2016 groundwater potentiometric surface map (see Drawing HG-02).

$V = Ki/n_e$; assumes homogeneous isotropic porous aquifer.

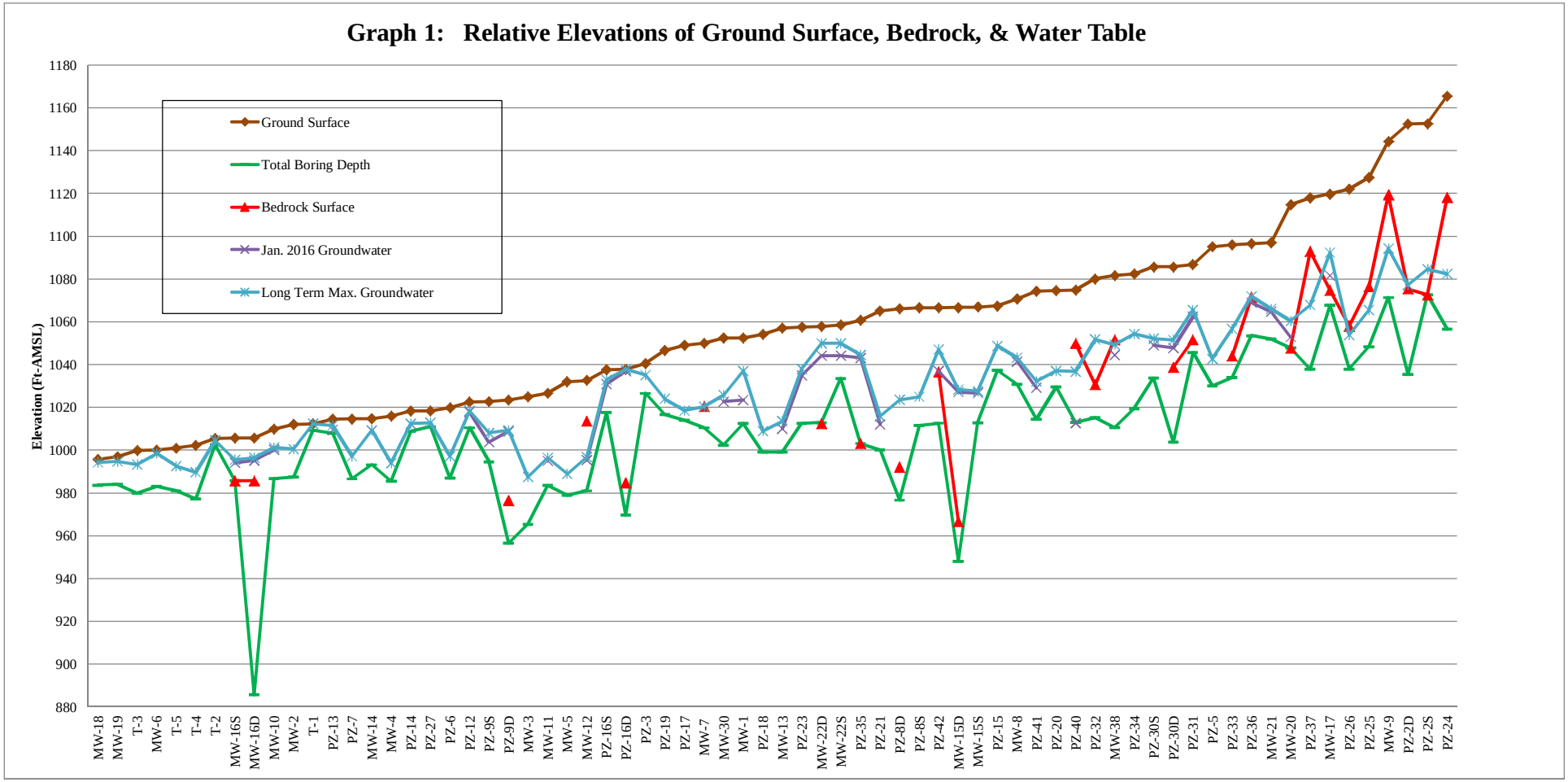
TABLE 7: Vertical Hydraulic Gradients

Well / Piezometer Pair	GS Elevation (Ft-AMSL)	TOC Elevation (Ft-AMSL)	Screen Top (Ft.-BGS)	Screen Bottom (Ft.-BGS)	Screen Midpoint (Ft.-BGS)	Vertical Distance (Feet)	Groundwater Elevation Observations & Calculated Vertical Gradients												Summary
Date							06/18/96	12/04/96	04/07/99	05/22/02	11/02/02	11/03/03	05/06/04	08/17/10	05/16/11	1/11/2016	2/19/2016		**Avg. Vert. Grad.**
MW-15S	1066.88	1069.04	39	54	46.5	67.5	1022.70	1021.30	1023.26	1021.94	1021.25	1027.08	1025.71	1024.61	1024.54	1026.64	1027.55		**MW-15S**
MW-15D	1066.67	1069.06	109	119	114		1023.38	1021.80	1023.40	1022.30	1021.59	1028.29	1026.59	1025.29	1025.09	1027.188	1027.95		**MW-15D**
Vertical Gradient							**-0.0100**	**-0.0074**	**-0.0021**	**-0.0053**	**-0.0050**	**-0.0179**	**-0.0130**	**-0.0101**	**-0.0081**	**-0.0081**	**-0.0059**		**-0.0085**
Date							10/18/99	05/01/00	11/01/00	05/03/01	11/07/01	05/22/02	11/02/02	05/03/03	11/03/03	05/06/04	11/10/04	05/05/05	**Avg. Vert. Grad.**
MW-16S	1005.67	1007.67	5	20	12.5	70.5	992.15	992.59	991.07	992.07	991.36	992.02	992.66	993.03	992.84	992.18	992.57	992.30	
MW-16D	1005.67	1007.87	78	88	83		993.94	994.09	992.62	993.59	992.84	993.47	993.60	994.22	994.19	993.87	993.67	993.72	
Vertical Gradient							**-0.0254**	**-0.0213**	**-0.0220**	**-0.0216**	**-0.0210**	**-0.0206**	**-0.0133**	**-0.0169**	**-0.0191**	**-0.0240**	**-0.0156**	**-0.0201**	
Date							11/02/05	05/25/06	11/01/06	05/30/07	11/28/07	5/59/08	11/06/08	06/02/09	11/16/09	06/15/10	08/17/10	11/30/10	
MW-16S	1005.67	1007.67	5	20	12.5	70.5	991.92	991.97	992.59	991.84	988.84	991.74	992.42	993.89	993.53	992.10	992.15	992.25	
MW-16D	1005.67	1007.87	78	88	83		993.19	993.42	993.73	993.47	990.30	993.13	993.67	994.70	1004.56	993.56	993.57	992.90	
Vertical Gradient							**-0.0180**	**-0.0206**	**-0.0162**	**-0.0231**	**-0.0207**	**-0.0197**	**-0.0177**	**-0.0115**	**-0.1565**	**-0.0207**	**-0.0201**	**-0.0092**	
Date							05/16/11	06/01/11	12/20/11	05/30/12	12/11/12	06/11/13	10/28/13	05/06/14	10/21/14	05/21/15	12/08/15	01/11/16	
MW-16S	1005.67	1007.67	5	20	12.5	70.5	991.60	992.48	992.67	992.46	992.05	995.47	992.55	992.73	992.97	992.11	994.47	994.07	**MW-16S**
MW-16D	1005.67	1007.87	78	88	83		992.39	993.74	993.88	993.76	993.43	996.51	993.72	994.02	994.40	993.36	995.17	995.22	**MW-16D**
Vertical Gradient							**-0.0112**	**-0.0179**	**-0.0172**	**-0.0184**	**-0.0196**	**-0.0148**	**-0.0166**	**-0.0183**	**-0.0203**	**-0.0177**	**-0.0099**	**-0.0163**	**-0.0220**
Date							06/18/96	12/04/96	08/17/10	05/16/11	01/11/16	2/19/2016							**Avg. Vert. Grad.**
MW-22S	1058.57	1061.20	10	25	17.5	25	1049.88	1046.75	1047.97	1044.85	1044.249	1045.24							**MW-22S**
MW-22D	1057.90	1060.13	40	45	42.5		1049.88	1046.74	1047.81	1044.77	1044.154	1045.24							**MW-22D**
Vertical Gradient							**-0.0002**	**0.0002**	**0.0064**	**0.0030**	**0.0038**	**0.0000**							**0.0022**
Date							07/20/95	09/01/95	10/13/95	04/18/96	06/18/96								**Avg. Vert. Grad.**
PZ-2S	1152.60	1154.74	65	80	72.5	37	1083.47	1083.11	1084.48	1084.63	1083.53								**PZ-2S**
PZ-2D	1152.40	1154.53	102	117	109.5		1075.52	1076.24	1076.51	1076.38	1077.28								**PZ-2D**
Vertical Gradient							**0.2149**	**0.1857**	**0.2154**	**0.2230**	**0.1689**								**0.2016**
Date							06/18/96	12/04/96	08/17/10	05/16/11	2/19/2016								**Avg. Vert. Grad.**
PZ-8S	1066.60	1069.04	40	55	47.5	39.5	1024.94	1023.01	1024.14	1021.75	1021.393								**PZ-8S**
PZ-8D	1066.13	1068.15	84.5	89.5	87		1022.88	1021.93	1023.15	1020.71	1020.24								**PZ-8D**
Vertical Gradient							**0.0522**	**0.0274**	**0.0251**	**0.0264**	**0.0292**								**0.0320**
Date							07/20/95	09/01/95	10/13/95	04/18/96	06/18/96	08/17/10	05/16/11	01/11/16					**Avg. Vert. Grad.**
PZ-9S	1022.66	1025.16	13	28	20.5	39	1005.81	1005.51	1005.95	1006.53	1006.19	1007.19	1007.29	1003.86					**PZ-9S**
PZ-9D	1023.50	1025.96	52	67	59.5		1006.61	1006.51	1006.99	1008.35	1007.09	1007.97	1008.55	1008.75					**PZ-9D**
Vertical Gradient							**-0.0205**	**-0.0256**	**-0.0267**	**-0.0467**	**-0.0231**	**-0.0200**	**-0.0323**	**-0.1254**					**-0.0400**
Date							06/18/96	12/04/96	08/17/10	05/16/11	01/11/16	2/19/2016							**Avg. Vert. Grad.**
PZ-16S	1037.66	1040.23	3	20	11.5	54	1031.68	1030.96	1030.72	1030.00	1030.881	1031.36							**PZ-16S**
PZ-16D	1037.77	1040.18	63	68	65.5		1037.48	1036.17	1036.73	1035.82	1036.872	1037.18							**PZ-16D**
Vertical Gradient							**-0.1074**	**-0.0965**	**-0.1113**	**-0.1078**	**-0.1109**	**-0.1078**							**-0.1070**
Date							05/16/11	01/11/16	2/19/2016										**Avg. Vert. Grad.**
PZ-30S	1085.67	1088.92	37	52	44.5	30	1048.01	1048.9925	1050.75										**PZ-30S**
PZ-30D	1085.73	1088.48	67	82	74.5		1047.34	1047.7717	1049.21										**PZ-30D**
Vertical Gradient							**0.0224**	**0.0407**	**0.0513**										**0.0381**

A positive vertical gradient indicates a downward component of groundwater flow (i.e. - recharge). A negaitive vertical gradient indicates an upward component of groundwater flow (i.e. - discharge).

GRAPHS

Graph 1	Relative Elevation of Ground Surface, Bedrock, and Water Table
Graph 2A	Monthly Precipitation Data – Morganton, NC, 1931-2016
Graph 2B	Monthly Precipitation Data – Morganton, NC, 1991-2016


Graph 1: Relative Elevations of Ground Surface, Bedrock, & Water Table
Ground Surface
Total Boring Depth
Bedrock Surface
Jan. 2016 Groundwater
Long Term Max. Groundwater
Elevation (Ft-AMSL)
1180
1160
1140
1120
1100
1080
1060
1040
1020
1000
980
960
940
920
900
880
MW-18
MW-19
T-3
MW-6
T-5
T-4
T-2
MW-16S
MW-16D
MW-10
MW-2
T-1
PZ-13
PZ-7
MW-14
MW-4
PZ-14
PZ-27
PZ-6
PZ-12
PZ-9S
PZ-9D
MW-3
MW-11
MW-5
MW-12
PZ-16S
PZ-16D
PZ-3
PZ-19
PZ-17
MW-7
MW-30
MW-1
PZ-18
MW-13
PZ-23
MW-22D
MW-22S
PZ-35
PZ-21
PZ-8D
PZ-8S
PZ-42
MW-15D
MW-15S
PZ-15
MW-8
PZ-41
PZ-20
PZ-40
PZ-32
MW-38
PZ-34
PZ-30S
PZ-30D
PZ-31
PZ-5
PZ-33
PZ-36
MW-21
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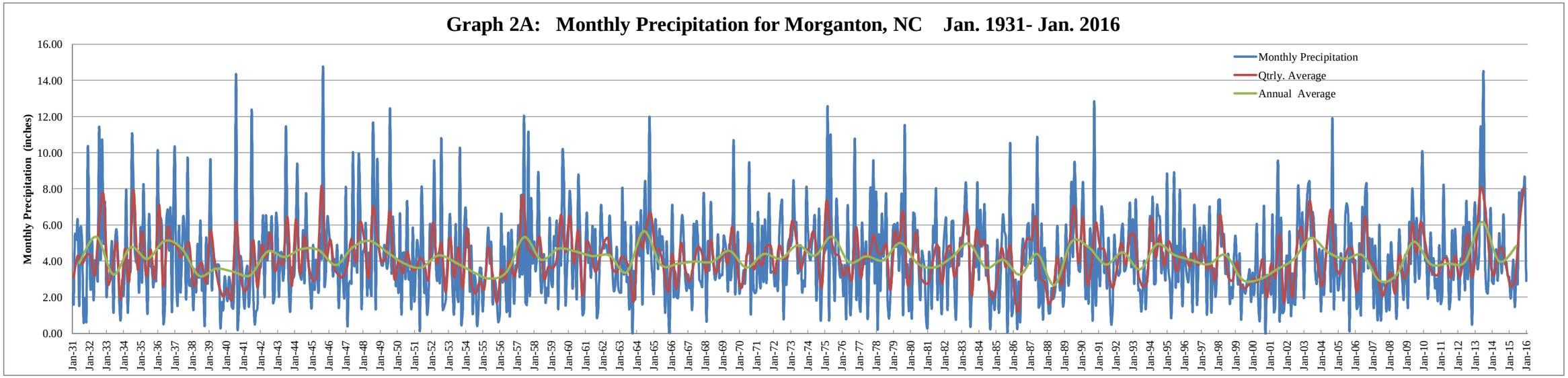
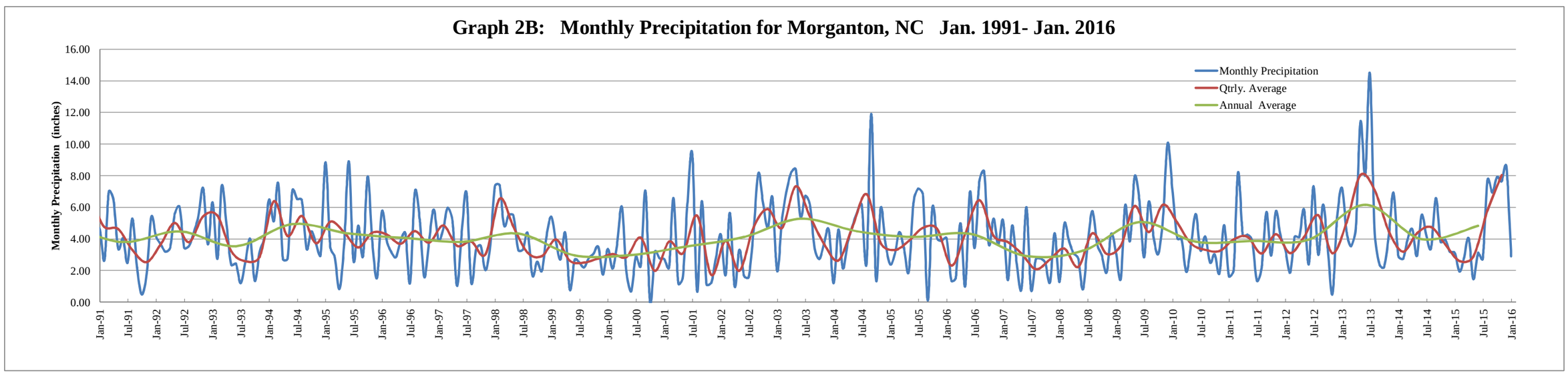
PZ-37
MW-17
PZ-26
PZ-25
MW-9
PZ-2D
PZ-2S
PZ-24


Graph 2A: Monthly Precipitation for Morganton, NC Jan. 1931- Jan. 2016
Monthly Precipitation (inches)
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Monthly Precipitation
Qtrly. Average
Annual Average
Jan-31 Jan-32 Jan-33 Jan-34 Jan-35 Jan-36 Jan-37 Jan-38 Jan-39 Jan-40 Jan-41 Jan-42 Jan-43 Jan-44 Jan-45 Jan-46 Jan-47 Jan-48 Jan-49 Jan-50 Jan-51 Jan-52 Jan-53 Jan-54 Jan-55 Jan-56 Jan-57 Jan-58 Jan-59 Jan-60 Jan-61 Jan-62 Jan-63 Jan-64 Jan-65 Jan-66 Jan-67 Jan-68 Jan-69 Jan-70 Jan-71 Jan-72 Jan-73 Jan-74 Jan-75 Jan-76 Jan-77 Jan-78 Jan-79 Jan-80 Jan-81 Jan-82 Jan-83 Jan-84 Jan-85 Jan-86 Jan-87 Jan-88 Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16


Graph 2B: Monthly Precipitation for Morganton, NC Jan. 1991- Jan. 2016
Monthly Precipitation (inches)
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Monthly Precipitation
Qtrly. Average
Annual Average
Jan-91 Jul-91 Jan-92 Jul-92 Jan-93 Jul-93 Jan-94 Jul-94 Jan-95 Jul-95 Jan-96 Jul-96 Jan-97 Jul-97 Jan-98 Jul-98 Jan-99 Jul-99 Jan-00 Jul-00 Jan-01 Jul-01 Jan-02 Jul-02 Jan-03 Jul-03 Jan-04 Jul-04 Jan-05 Jul-05 Jan-06 Jul-06 Jan-07 Jul-07 Jan-08 Jul-08 Jan-09 Jul-09 Jan-10 Jul-10 Jan-11 Jul-11 Jan-12 Jul-12 Jan-13 Jul-13 Jan-14 Jul-14 Jan-15 Jul-15 Jan-16

FIGURE

Figure 1 Site Location on USGS Topographic Map

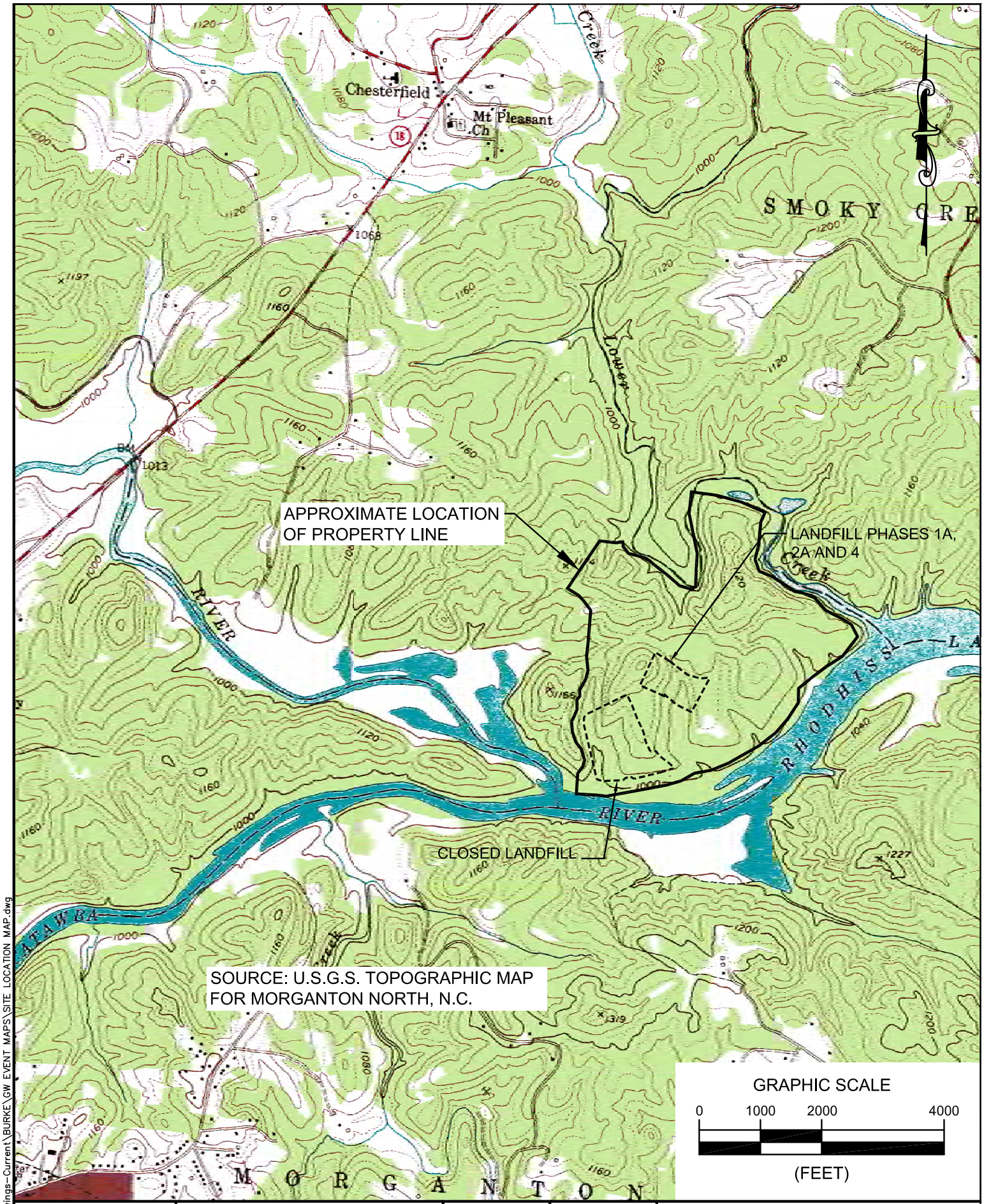
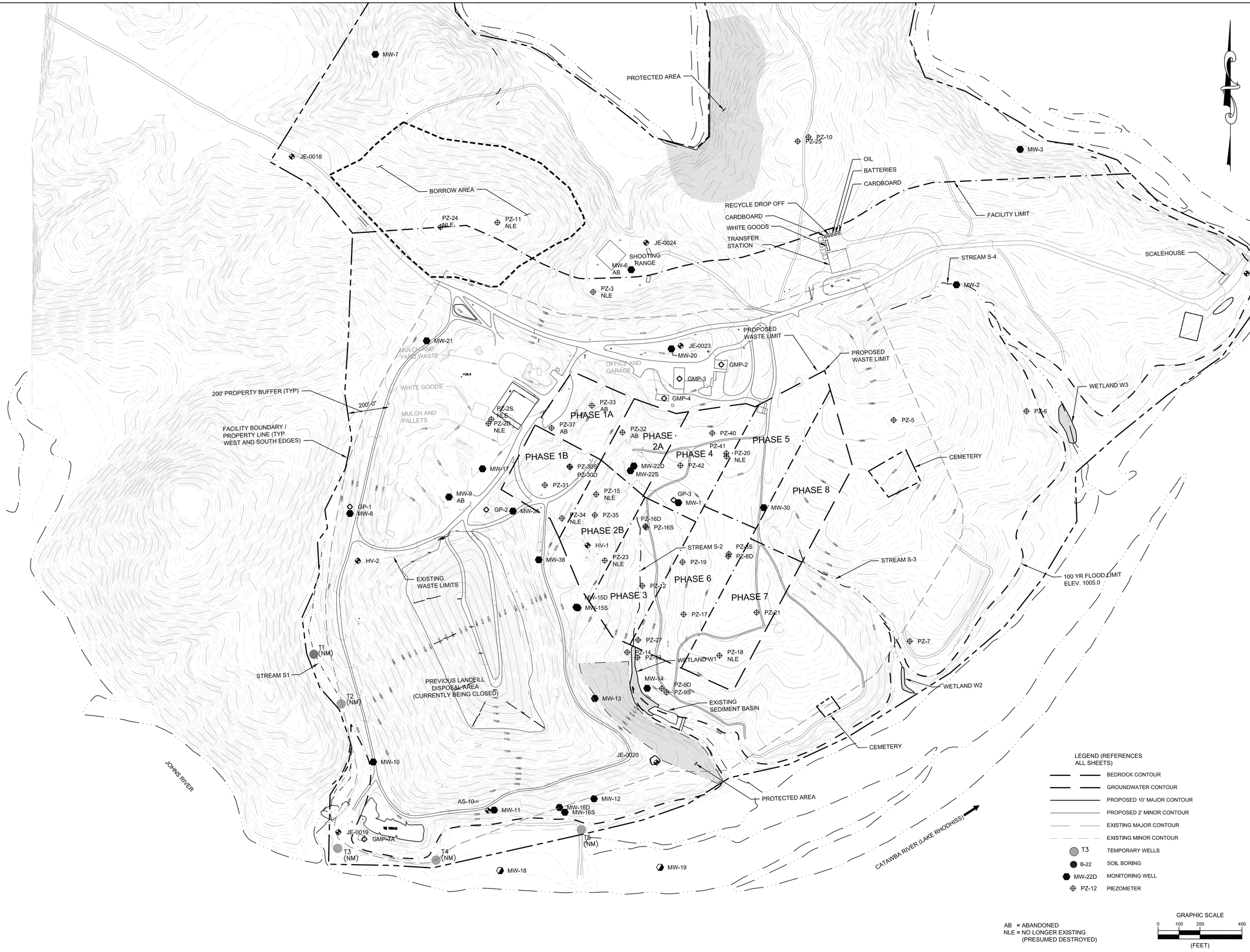


FIGURE NO. 1	JOYCE ENGINEERING 2211 WEST MEADOWVIEW ROAD GREENSBORO, N.C. 27407 PHONE: (336) 323-0092 © 2016 Joyce Engineering, Inc. All rights reserved.	SCALE 1"=2000'	PROJECT NO. 277	BURKE COUNTY LANDFILL BURKE COUNTY, NORTH CAROLINA SITE LOCATION MAP

N:\Dwgs\Drawings-Current\BURKE\GW EVENT MAPS\SITE LOCATION MAP.dwg

DRAWINGS

Drawing HG-00 Existing Conditions Map
Drawing HG-01 Bedrock Surface Map
Drawing HG-02 Seasonal High Water Table Map (February 2016)
Drawing HG-03 Long-Term High Water Table Map
Drawing HG-04 Proposed Base Grades and Cross-Section Lines
Drawing HG-05 Hydrogeologic Cross-Sections A-A, B-B, & C-C



DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED	VB
DRAWN	RWH
CHECKED	JJ
APPROVED	VB
DATE	2016

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2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0992
NC CORP LIC: C-0782

JOHN'S RIVER WASTE MANAGEMENT FACILITY
BURKE COUNTY, NORTH CAROLINA

EXISTING CONDITIONS

PROJECT NO. 277

SCALE AS SHOWN

DRAWING NO. HG-00

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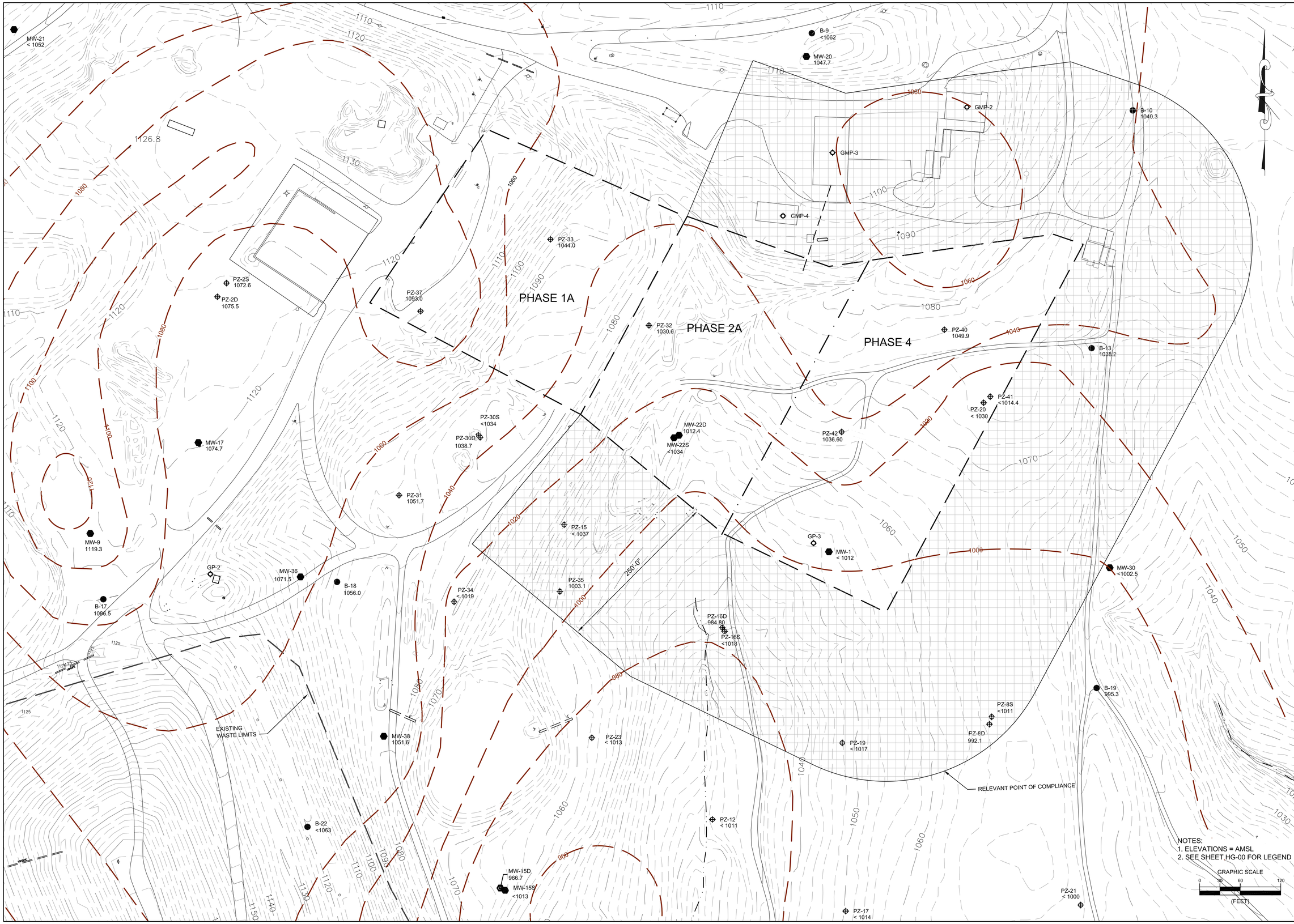

NOTES:
1. ELEVATIONS = AMSL
2. SEE SHEET HG-00 FOR LEGEND

GRAPHIC SCALE
0 30 60 120
(FEET)

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

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DRAWN	RWH
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APPROVED	GVB
DATE	05/03/16

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JOHNS RIVER WASTE MNGT FACILITY
BURKE COUNTY, NORTH CAROLINA

PHASES 2A AND 4
BEDROCK SURFACE MAP

PROJECT NO.
277.1602.12

SCALE
AS NOTED

DRAWING NO.
HG-01

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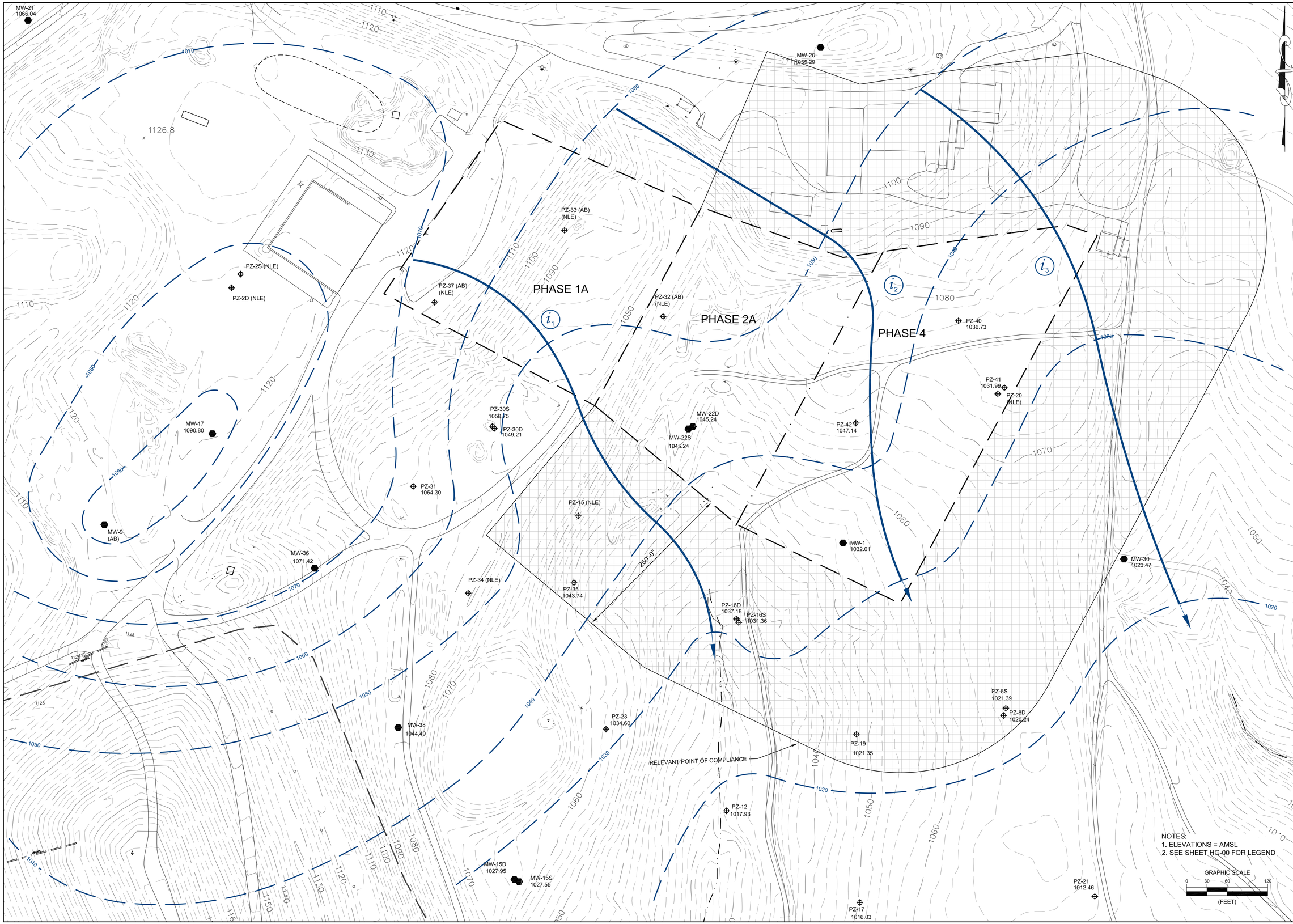

NOTES:
1. ELEVATIONS = AMSL
2. SEE SHEET HG-00 FOR LEGEND

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CHECKED	GVB
APPROVED	GVB
DATE	05/03/16

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JOHNS RIVER WASTE MNGT FACILITY
BURKE COUNTY, NORTH CAROLINA

PHASES 2A AND 4
SEASONAL HIGH GROUNDWATER TABLE MAP
FEBRUARY 19, 2016

PROJECT NO.
277.1602.12

SCALE
AS NOTED

DRAWING NO.
HG-02

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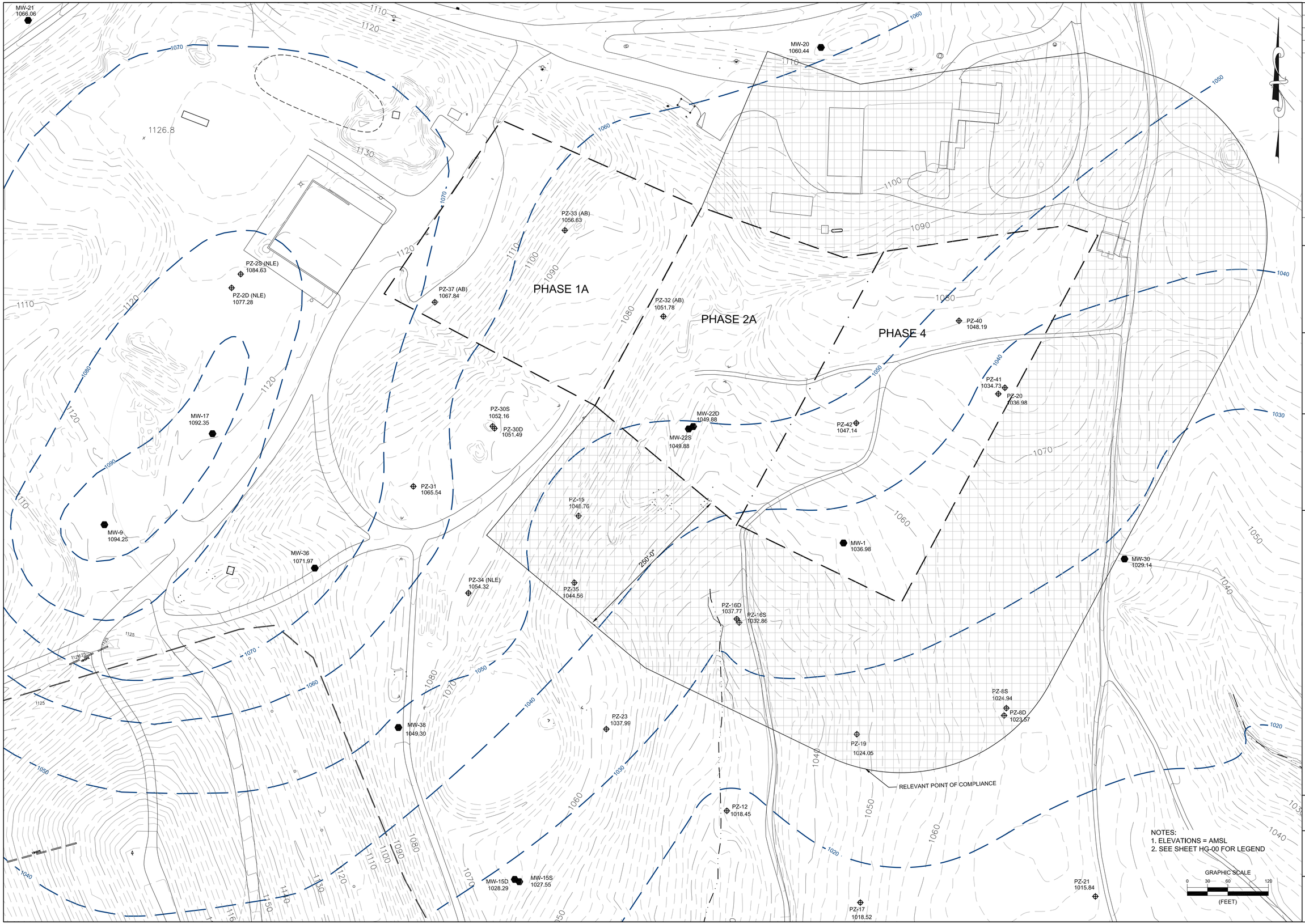

NOTES:
1. ELEVATIONS = AMSL
2. SEE SHEET HG-00 FOR LEGEND

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

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JOHNS RIVER WASTE MNGT FACILITY
BURKE COUNTY, NORTH CAROLINA

PHASES 2A AND 4
LONG-TERM HIGH GROUNDWATER TABLE MAP

PROJECT NO.
277.1602.12

SCALE
AS NOTED

DRAWING NO.
HG-03

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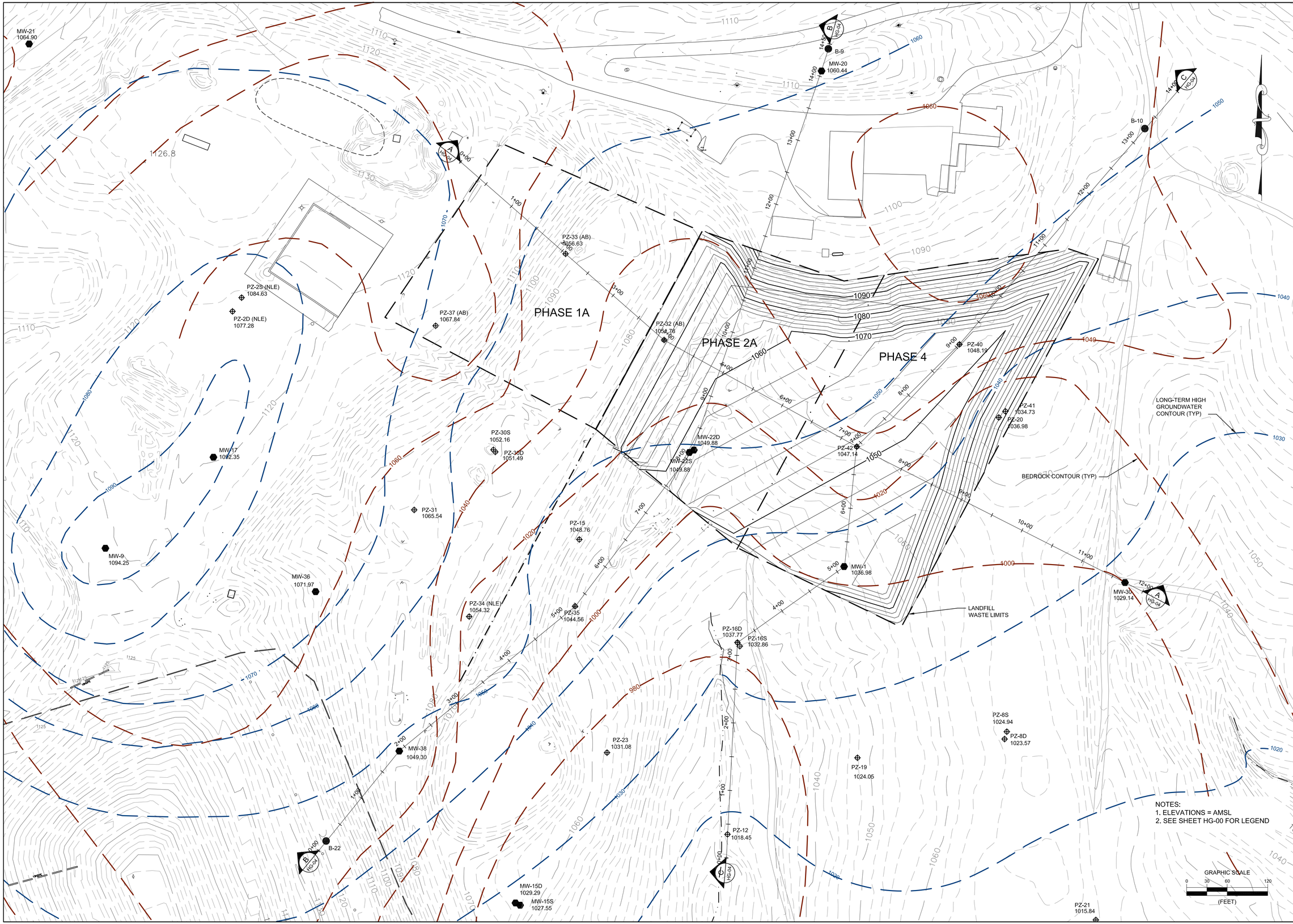

NOTES:
1. ELEVATIONS = AMSL
2. SEE SHEET HG-00 FOR LEGEND

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

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DATE	05/03/16

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JOHNS RIVER WASTE MNGT FACILITY
BURKE COUNTY, NORTH CAROLINA

PHASES 2A AND 4
PROPOSED BASE GRADES AND
CROSS-SECTION LOCATION MAP

PROJECT NO.
277.1602.12

SCALE
AS NOTED

DRAWING NO.
HG-04

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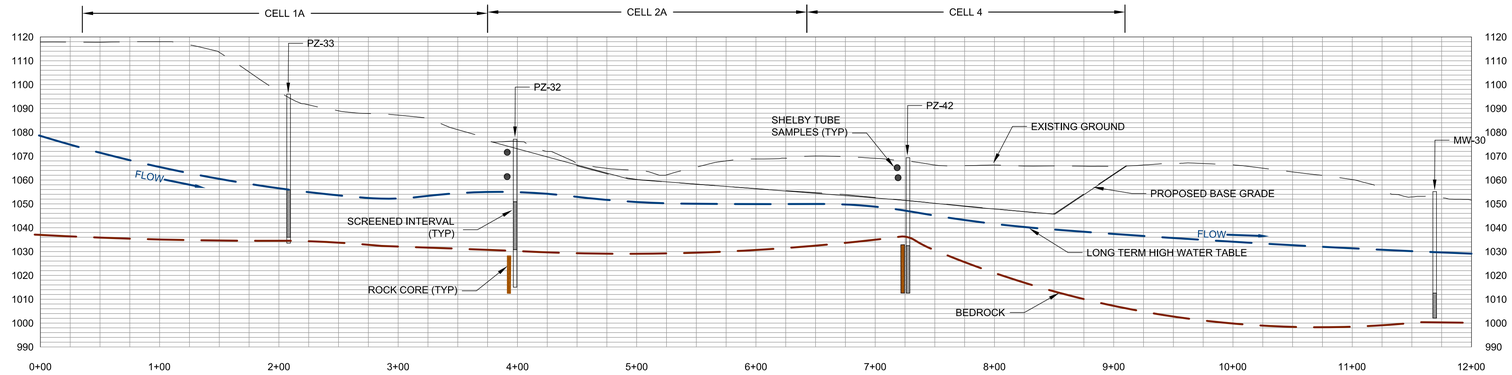
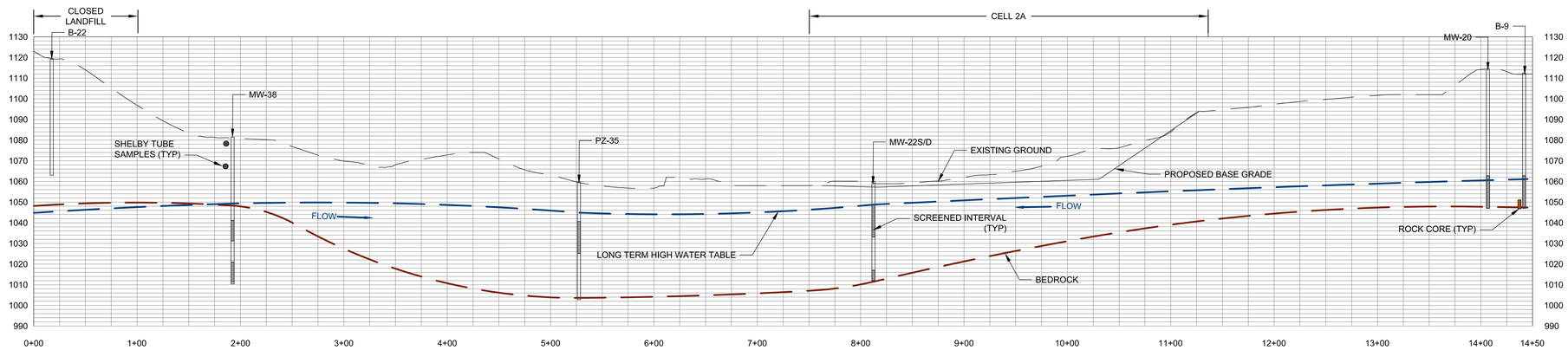


A-A PROFILE



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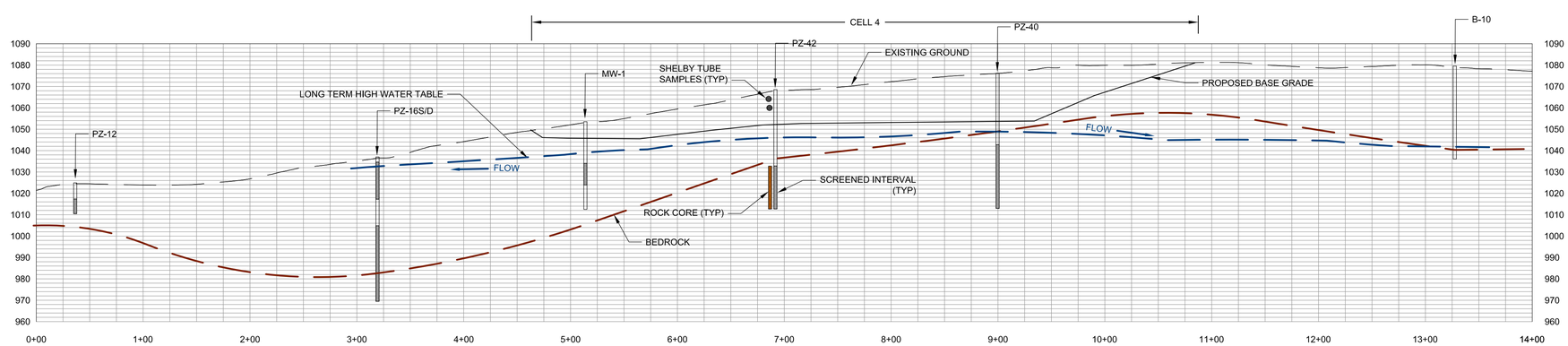
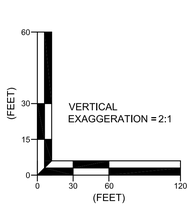


C-C PROFILE



DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED GVB
DRAWN RWH
CHECKED GVB
APPROVED GVB
DATE 05/03/16

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NC CORP LIC: C-0782

JOHNS RIVER WASTE MNGT FACILITY
BURKE COUNTY, NORTH CAROLINA

PHASES 2A AND 4
CROSS-SECTIONS A,B AND C

PROJECT NO.
277.1602.12

SCALE
AS NOTED

DRAWING NO.
HG-05

L:\Burke County\2015\PHASE 2-4 PERMITTING\HYDROGEO\HG-05 CROSS SECTION LOCATIONS.dwg Layout=sections

APPENDICES

Appendix A

Boring/Construction Logs
(PZ-40, PZ-41, PZ-42, & MW-30)

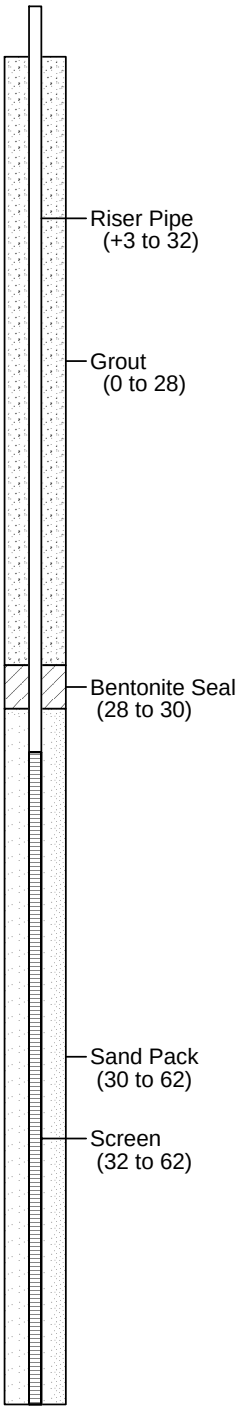
LOG OF BORING PZ-40

Burke County, NC
Johns River Landfill
PHASE 2A/4 EXPANSION
HYDROGEO INVESTIGATION
JEI Project No. 277,1602.12Task 02

Date Started	: 2015 Dec. 18	Drilling Company	: SAEDACCO
Date Completed	: 2015 Dec. 18	Northing Coord.	:
Hole Diameter	: 8.0 inch O.D.	Easting Coord.	:
Drilling Method	: HSA + Air Rotary	Survey By	: West Consultants, PLLC
Sampling Method	: Shelby Tube & Split Spoon	Logged By	: H.Kemppinen, P.G.

Depth in Feet	Surf. Elev. 1080	Blow Count	% Rec.	USCS	DESCRIPTION
0	1080			ML	Red brown silt with fine sand, cohesive, moist and soft.
5	1075	ST	30	ML	Shelby Tube from 5-7 ft. Formation very tight sapprolite, tube end crushed, poor recovery, approximately 8 inches.
10	1070	3 5 12 19	100	ML	SP 10-12 Red brown, black and white mottled silt with fine sand, weathered granite sapprolite.
15	1065	16 30 33 50/3	100	ML	SP 15-17 same as above, zones of white plagioclase feldspar, banded gneiss, and red granite sapprolite.
20	1060	30 50/3	30	ML	SS 20-22 yellow brown with black biotite, granite sapprolite, auger refusal at 22 ft. Change to roller cone and cleanout bore hole to depth 25 ft.
25	1055				Change to air rotary and drill in rock.
30	1050				
35	1045				Drilling in hard rock, occassionally going through softer or fractured zones, dry, dust.
40	1040				
45	1035				
50	1030				
55	1025				
60					End boring at 62 feet.

Well: PZ-40
TOC Elev.: 1080.5



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12.18.2015
Boring Diameter(s)	: 8.0 inch
Drilling Method(s)	: HSA + Air Rotary
Company Rep.	: Robert Miller
NC Licence No.	: 2675

WELL CASING

Material	: PVC
Diameter	: 2-inch
Joints	: Threaded
Riser Stickup (appx).	: 2.5 ft

WELL SCREEN

Material	: Slotted PVC
Diameter	: 2-inch
Joints	: Thredded
Opening	: 0.01 inch

GRAVEL PACK

Type : #2 Sand

WELL SCREEN SEAL

Type : Bentonite

ANNULUS SEAL

Type : Cement/Grout

PROTECTIVE CSG.

Type :

WELL PAD

Type :

1. Drilling performed with Gus Pech 1100E with 8 inch HSA and air rotary.

2. Water level measured:
   Dry 12.18.2015 during drilling and by the time of completion.

3. Split Spoon Sampling:
   SP 10-12 N 3, 5, 12, 19
   SP 15-17 N 16, 30, 33, 50/3
   SP 20-22 N 30, 50/3

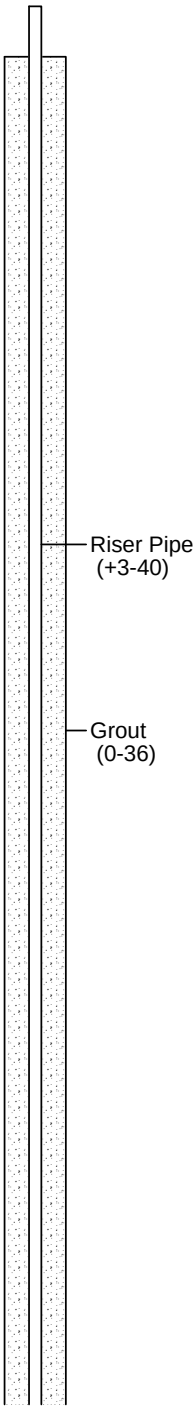
LOG OF BORING PZ-41

Burke County, NC
Johns River Landfill
PHASE 2A/4 EXPANSION
HYDROGEO INVESTIGATION
JEI Project No. 277,1602.12Task 02

Date Started	: 2015 Dec. 16	Drilling Company	: SAEDACCO
Date Completed	: 2015 Dec. 16	Northing Coord.	:
Hole Diameter	: 8.0 inch	Easting Coord.	:
Drilling Method	: Hollw Stem Auger	Survey By	: West Consultants, PLLC
Sampling Method	: Shelby Tube & Split Spoon	Logged By	: H.Kemppinen, P.G.

Depth in Feet	Surf. Elev. 1072	Blow Count	% Rec.	USCS	DESCRIPTION
0	1072			ML	0-5 brown silt with fine sand, dry.
5	1067	7 11 11 8	100	ML	SP-5-7 ft mottled red brown, black and white, weathered granite, moist, weak, relict structures.
		ST	100		Shelby Tube from 7-9 feet, granite sapprolite
10	1062	ST	100	ML	Shelby Tube from 10-12 feet, Granite sapprolite
15	1057	6 10 28 29	100	ML	SP 15-17, granite sapprolite, red, white, black mottled color, friable, relict structures, quartz, feldspar, biotite,
20	1052	6 12 12 16	100	ML	SP 20-22 same as above, moist and cohesive, weak structure.
25	1047	14 30 50/3	80	ML	SP-25-27 same as above
30					

Well: PZ-41
TOC Elev.: 1074.5



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12.16.2015
Boring Diameter(s)	: 8.0 inch
Drilling Method(s)	: HSA
Company Rep.	: Robert Miller
NC Licence No.	: 2675

WELL CASING

Material	: PVC
Diameter	: 2-inch
Joints	: Threaded
Riser Stickup (appx).	: 2.5 ft

WELL SCREEN

Material	: Slotted PVC
Diameter	: 2-inch
Joints	: Thredded
Opening	: 0.01 inch

GRAVEL PACK

Type : #2 Sand

WELL SCREEN SEAL

Type : Bentonite

ANNULUS SEAL

Type : Cement/Grout

PROTECTIVE CSG.

Type :

WELL PAD

Type :

1. Drilling performed with Gus Pech 1100E and hollow stem augers.

2. Water level measured:
   During drilling spoon wet at 30-32 ft below ground.
   12.18.2015 at 8:30 46 ft below ground.

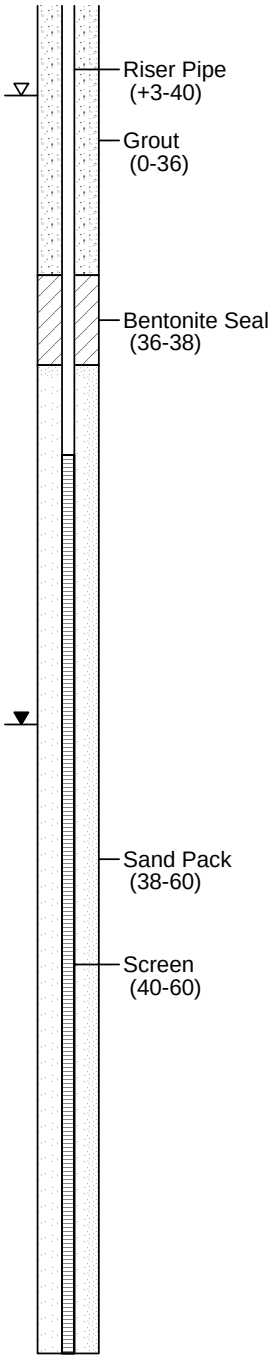
LOG OF BORING PZ-41

Burke County, NC
Johns River Landfill
PHASE 2A/4 EXPANSION
HYDROGEO INVESTIGATION
JEI Project No. 277,1602.12Task 02

Date Started	: 2015 Dec. 16	Drilling Company	: SAEDACCO
Date Completed	: 2015 Dec. 16	Northing Coord.	:
Hole Diameter	: 8.0 inch	Easting Coord.	:
Drilling Method	: Hollw Stem Auger	Survey By	: West Consultants, PLLC
Sampling Method	: Shelby Tube & Split Spoon	Logged By	: H.Kemppinen, P.G.

Depth in Feet	Surf. Elev. 1072	Blow Count	% Rec.	USCS	DESCRIPTION
30	1042	50/3	30	ML	SP-30-32 Brown and black sapprolite, fragments of biotite, banded gneiss, spoon wet.
35	1037	7 8 14 13	100	ML	Sp 35-37 fine grained granite sapprolite, feldspar, biotite, quartz grains.
40	1032	8 15 22 50/6	100	ML	SP 40-42 same as above
45	1027	5 8 12 13	100	ML	SP 45-47 same weathered granite sapprolite, moist, weak structure.
50	1022	14 43 50/5	40	ML	SP 50-52 same as above, increase in biotite content and muscovite, spoon wet. Continue augering to 60 foot depth.
55	1017				End boring at 60 feet.
60					

Well: PZ-41
TOC Elev.: 1074.5



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12.16.2015
Boring Diameter(s)	: 8.0 inch
Drilling Method(s)	: HSA
Company Rep.	: Robert Miller
NC Licence No.	: 2675

WELL CASING

Material	: PVC
Diameter	: 2-inch
Joints	: Threaded
Riser Stickup (appx).	: 2.5 ft

WELL SCREEN

Material	: Slotted PVC
Diameter	: 2-inch
Joints	: Thredded
Opening	: 0.01 inch

GRAVEL PACK

Type : #2 Sand

WELL SCREEN SEAL

Type : Bentonite

ANNULUS SEAL

Type : Cement/Grout

PROTECTIVE CSG.

Type :

WELL PAD

Type :

1. Drilling performed with Gus Pech 1100E and hollow stem augers.

2. Water level measured:
   During drilling spoon wet at 30-32 ft below ground.
   12.18.2015 at 8:30 46 ft below ground.

LOG OF BORING PZ-42

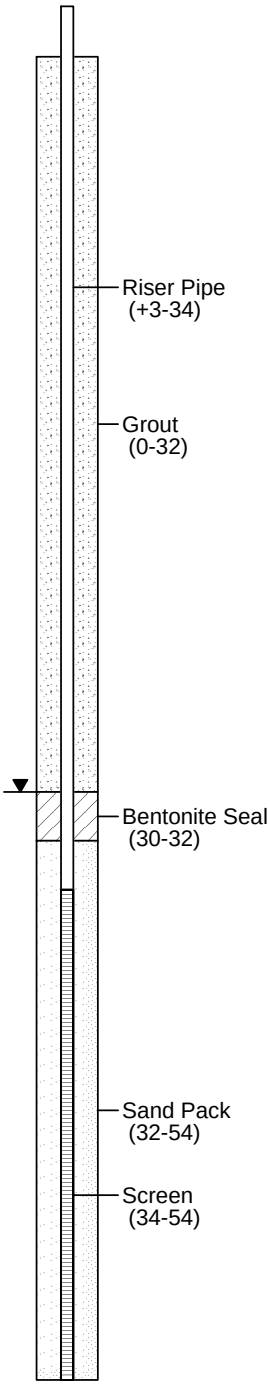
Burke County, NC
Johns River Landfill
PHASE 2A/4 EXPANSION
HYDROGEO INVESTIGATION
JEI Project No. 277,1602.12Task 02

Date Started	: 2015 Dec. 16	Drilling Company	: SAEDACCO
Date Completed	: 2015 Dec. 17	Northing Coord.	:
Hole Diameter	: 8.0 inch	Easting Coord.	:
Drilling Method	: Hollow Stem Auger, Core	Survey By	: West Consultants, PLLC
Sampling Method	: Shelby Tube & Split Spoon	Logged By	: H.Kemppinen, P.G.

Surf. Elev. 1070

Depth in Feet	Blow Count	% Rec.	USCS	DESCRIPTION
0			ML	0-5 red silt with fine sand
5	ST	100	ML	Shelby Tube 5-7, granite sapprolite
	ST	100		Shelby Tube 8-10, granite sapprolite
10	5 6 12 23	100	ML	SP 10-12 weathered granite sapprolite,mottled red, brown, white, black, feldspar, biotite, muscovite, quartz, friable, relict structures, dry.
15	7 14 17 18	100	ML	SP 15-17 same as above, zones of completely weathered, then very competent rock with quartz, dry
20	4 7 13 11	100	ML	SP 20-22 same as above, granite sapprolite, cohesive, crumbly
25	35 25/0	25	ML	SP25-27 same as above. Auger refusal at 30 feet
30				Clean out boring and advance to 35 ft drilling with roller cone.
35	RQD	64		Core 35 to 40 mica schist grading to gray white granite gneiss with biotite banding, fractures near horizontal. Grading to pink coarse grained granite,
40	RQD	65		Core 40 to 45 gray white granite gneiss with biotite banding, fractures at 45 degree angle.
45	RQD	94		Core 45 to 50 gray white granite gneiss with biotite banding, fractures at 45 degree angle.
50	RQD	68		Core 50 to 54 same as above.
55				

Well: PZ-42
TOC Elev.: 1072.5



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12.17.2015
Boring Diameter(s)	: 8.0 inch
Drilling Method(s)	: HSA, Roller Cone, Core
Company Rep.	: Robert Miller
NC Licence No.	: 2675

WELL CASING

Material	: PVC
Diameter	: 2-inch
Joints	: Threaded
Approx. Csg. Stickup	:

WELL SCREEN

Material	: Slotted PVC
Diameter	: 2-inch
Joints	: Thredded
Opening	: 0.01 inch

GRAVEL PACK

Type : #2 Sand

WELL SCREEN SEAL

Type : Bentonite

ANNULUS SEAL

Type : Cement/Grout

PROTECTIVE CSG.

Type :

WELL PAD

Type :

1. Drilling performed with Gus Pech 1100E with HSA, roller cone and coring.
2. Water level measured: 12/18/2015 30.2 ft below ground at 11:09.
3. Split spoon sampling:
   SP 10-12 5, 6, 12, 23
   SP 15-17 7, 14, 17, 18
   SP 20-22 4, 7, 13, 11
   SP 25-27 35, 25/0

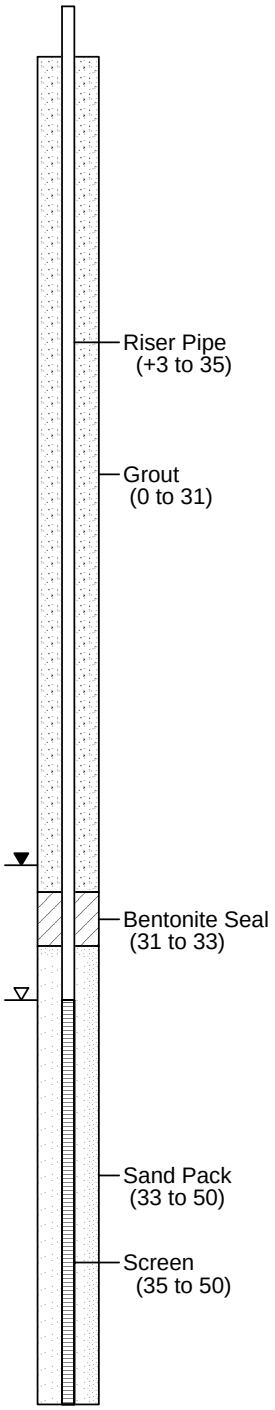
LOG OF BORING MW-30

Burke County, NC
Johns River Landfill
PHASE 2A/4 EXPANSION
HYDROGEO INVESTIGATION
JEI Project No. 277,1602.12Task 02

Date Started	: 2015 Dec. 15	Drilling Company	: SAEDACCO
Date Completed	: 2015 Dec. 16	Northing Coord.	:
Hole Diameter	: 8.0 inch	Easting Coord.	:
Drilling Method	: Hollow Stem Auger	Survey By	: West Consultants, PLLC
Sampling Method	: Split Spoon	Logged By	: H.Kemppinen, P.G.

Depth in Feet	Surf. Elev. 1052	Blow Count	% Rec.	USCS	DESCRIPTION
0	1052			ML	0-5 ft red brown silt with fine sand, dry to slightly moist, elastic.
5	1047	4 10 11 11	100	ML	SS 5-7 ft red brown silt with fine sand, micaceous, cohesive, moist.
10	1042	4 5 6 7	100	ML	SP 10-12 changing to mottled white, brown, silt with fine sand, minerals of feldspar, biotite, relict structures, weathered granitic gneiss.
15	1037	6 8 6 7	100	ML	SP 15-17 same as above, weathered granitic rock with relict structures.
20	1032	3 4 6 7	100	ML	SP 20-22 same as above, weathered granite, relict structures, minerals of feldspar, biotite, quartz,
25	1027	7 10 16 12	100	ML	SS 25-27 same as above, weathered granite and fragments of minerals.
30	1022	4 8 8 10	100	ML	SS 30-32 same as above, relict structures of banded gneiss, spoon wet.
35	1017	4 8 10 11	100	ML	SS 35-37 same relict structures of banded gneiss, spoon wet.
40	1012	15 28 50/2	50	ML	SS 40-42 same as above, spoon wet.
45	1007	30 50/6	25	ML	SS 45-47 same as above, End boring at 50 ft
50					

Well: MW-30
TOC Elev.: 1054.6



Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 12.16.2015
Boring Diameter(s)	: 8.0 inches
Drilling Method(s)	: HSA
Company Rep.	: Robert Miller
NC Licence No.	: 2675

WELL CASING

Material	: PVC
Diameter	: 2-inch
Joints	: Threaded
Riser Stickup (appx).	: 2.6 ft

WELL SCREEN

Material	: Slotted PVC
Diameter	: 2-inch
Joints	: Thredded
Opening	: 0.01 inch

GRAVEL PACK

Type	: #2 Sand

WELL SCREEN SEAL

Type	: Bentonite

ANNULUS SEAL

Type	: Cement/Grout

PROTECTIVE CSG.

Type	: Steel

WELL PAD

Type	: 3'x3' concrete

1. Drilling performed with a Gus Pech 1100E and 8 inch O.D. Hollow Stem Auger

2. Water level measured:
   During drilling at 35 feet below ground.
   12.16.2015 at 14:30 30 ft below ground.

Appendix B

Geotechnical Laboratory Report
(December 2015)

January 18, 2016

Project No. 2016-605-001

Mr. Hannu Kemppinein
Joyce Engineering, Inc.
2211 W. Meadowview Rd., Suite 101
Greensboro, NC 27407
hkemppin@joyceengineering.com

Transmittal
Laboratory Test Results
John's River Landfill – Burke Co.

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was transmitted to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens which were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectively submitted,
Geotechnics, Inc.

Michael P. Smith
Regional Manager

We understand that you have a choice in your laboratory services and we thank you for choosing Geotechnics.

DCN: Data Transmittal Letter Date: 1/28/05 Rev.: 1

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MOISTURE CONTENT

ASTM D 2216-10

Client:	JOYCE ENGINEERING, INC.
Client Reference:	JOHN'S RIVER LANDFILL- BURKE CO.
Project No.:	2016-605-001

Lab ID:	002
Boring No.:	PZ-42
Depth (ft):	5-7
Sample No.:	12/16/15
Tare Number	918
Wt. of Tare & Wet Sample (g)	232.27
Wt. of Tare & Dry Sample (g)	215.40
Weight of Tare (g)	130.63
Weight of Water (g)	16.87
Weight of Dry Sample (g)	84.77
Water Content (%)	**19.9**

Notes :

Tested By	*EL*	*Date*	*1/11/16*	*Checked By*	*GEM*	*Date*	*1/13/16*

DCN: CT-S1 DATE: 3/18/13 REVISION: 4

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SPECIFIC GRAVITY

ASTM D 854-10

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-41
Client Reference	JOHN'S RIVER LANDFILL-BURKE CO.	Depth (ft)	7-9
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-001	Visual Description	**RED**
			(MInus No.4 sieve material, airdried)

Replicate Number	**1**	**2**
Pycnometer ID	R 447	R 448
Weight of Pycnometer + Soil + Water (gm)	679.76	704.08
Temperature, T (^{o}Celsius)	23.3	23.3
Weight of Pycnometer + Water (gm)	659.30	661.92
Tare Number	377	379
Weight of Tare + Dry Soil (gm)	139.17	176.33
Weight of Tare (gm)	106.58	109.04
Weight of Dry Soil (gm)	32.59	67.29
Specific Gravity of Soil @ T	2.687	2.678
Specific Gravity of Water @ T	0.9975	0.9975
Conversion Factor for Temperature T	0.9993	0.9993
Specific Gravity @ 20° Celsius	2.689	2.680

Average Specific Gravity @ 20° Celsius	2.68

Tested By *BW* *Date* *1/13/16* *Checked By* *GEM* *Date* *1/14/16*

DCN: CT-S5 Date: 03/24/05 Revision: 10R *T:\Data Sheets\[Specific Gravity Soils 1Ral..xls]Sheet1*

UNIT WEIGHT WITH POROSITY

ASTM D2937-10

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Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-41
Client Project	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft.)	7-9
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID No.	2016-605-001-001		

Specific Gravity 2.68 Measured

Visual Description: RED SANDY SILT

MOISTURE CONTENT:

	821
Tare Number	533.79
Wt. of Tare & WS (gm.)	463.21
Wt. of Tare & DS (gm.)	131.12
Wt. of Tare (gm.)	70.58
Wt. of Water (gm.)	332.09
Wt. of DS (gm.)	
	21.3
Moisture Content (%)	

SPECIMEN: Undisturbed

Wt. of Mold/Tube & WS (gm.)	1079.05
Wt. of Mold/Tube (gm.)	0.00
Wt. of WS (gm.)	1079.05
Length 1 (in.)	6.081
Length 2 (in.)	6.066
Length 3 (in.)	6.043
Top Diameter (in.)	2.826
Middle Diameter (in.)	2.886
Bottom Diameter (in.)	2.848
Average Length (in.)	6.06
Average Area (in.^{2})	6.39
Sample Volume (cm^3)	635.34
Unit Wet Wt. (gm./ cm^3)	1.70
Unit Wet Wt. (pcf)	106.0
Unit Dry Wt. (pcf)	87.4
Unit Dry Wt. (gm./ cm^3)	1.40
Void Ratio, e	0.91
Porosity, n	**0.48**
Pore Volume (cm^3)	303.3

Tested By: AF Date: 1/8/16 Checked By: GEM Date: 1/14/16

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ATTERBERG LIMIT

ASTM D 4318-10

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-41
Client Reference	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft)	7-9
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-001	Visual Description	**RED**
			(MInus No. 40 sieve material, Wet Method)

NON - PLASTIC MATERIAL

Tested By *TB* *Date* *1/13/16* *Checked By* *GEM* *Date* 1/13/16

DCN: CT-S4C DATE: 7-11-97 REVISION : 2

T:\Data Sheets\[Limit-(NP).xls]Sheet1

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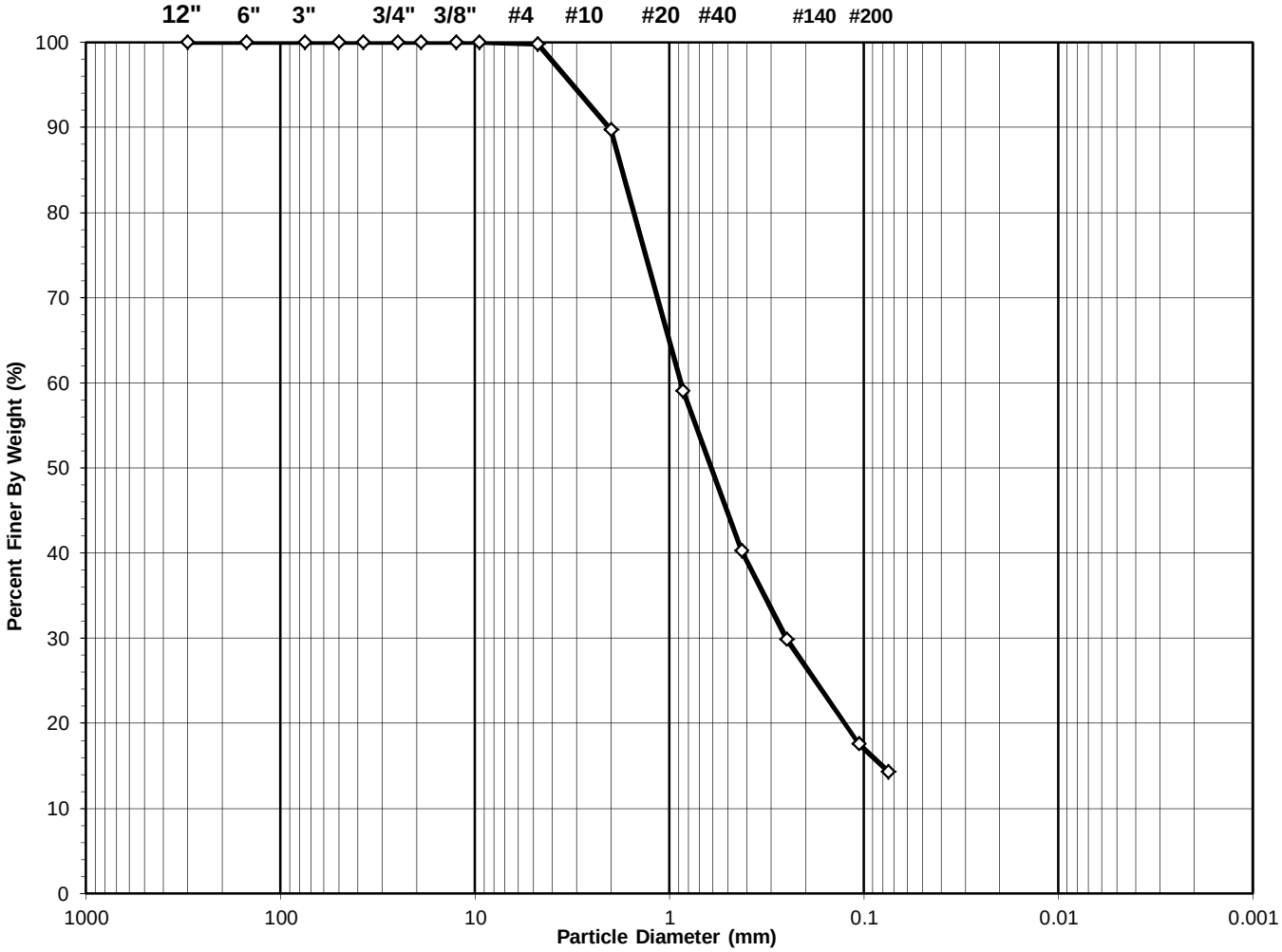
SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	JOYCE ENGINEERING, INC.	Boring No.:	PZ-41
Client Reference:	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft):	7-9
Project No.:	2016-605-001	Sample No.:	12/16/15
Lab ID:	2016-605-001-001	Soil Color:	RED

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol: ***SM, TESTED (NON PLASTIC FINES)***

USCS Classification: ***SILTY SAND***

Tested By	EL	Date	1/12/16	Checked By	GEM	Date	1/13/16

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	JOYCE ENGINEERING, INC.	Boring No.:	PZ-41
Client Reference:	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft):	7-9
Project No.:	2016-605-001	Sample No.:	12/16/15
Lab ID:	2016-605-001-001	Soil Color:	RED

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.	821	Tare No.	NA
Wt. of Tare & Wet Sample (g)	340.30	Weight of Tare & Wet Sample (g)	NA
Wt. of Tare & Dry Sample (g)	301.74	Weight of Tare & Dry Sample (g)	NA
Weight of Tare (g)	131.12	Weight of Tare (g)	NA
Weight of Water (g)	38.56	Weight of Water (g)	NA
Weight of Dry Sample (g)	170.62	Weight of Dry Sample (g)	NA
Moisture Content (%)	**22.6**	**Moisture Content (%)**	**NA**

Wet Weight of -3/4" Sample (g)	NA	Weight of the Dry Sample (g)	170.62
Dry Weight of - 3/4" Sample (g)	146.1	Weight of - #200 Sample (g)	24.49
Wet Weight of +3/4" Sample (g)	NA	Weight of + #200 Sample (g)	146.13
Dry Weight of + 3/4" Sample (g)	0.00		
Total Dry Weight of Sample (g)	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	0.33	0.19	0.19	99.81	**99.81**
#10	2.00	17.20	10.08	10.27	89.73	**89.73**
#20	0.850	52.37	30.69	40.97	59.03	**59.03**
#40	0.425	31.97	18.74	59.71	40.29	**40.29**
#60	0.250	17.75	10.40	70.11	29.89	**29.89**
#140	0.106	21.01	12.31	82.42	17.58	**17.58**
#200	0.075	5.50	3.22	85.65	14.35	**14.35**
Pan	-	24.49	14.35	100.00	-	**-**

Tested By EL Date 1/12/16 Checked By GEM Date 1/13/16

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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SPECIFIC GRAVITY

ASTM D 854-10

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Reference	JOHN'S RIVER LANDFILL-BURKE CO.	Depth (ft)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-002	Visual Description	**RED**
			(MInus No.4 sieve material, airdried)

Replicate Number	**1**	**2**
Pycnometer ID	R 344	R 345
Weight of Pycnometer + Soil + Water (gm)	689.68	685.61
Temperature, T (^{o}Celsius)	24.0	23.8
Weight of Pycnometer + Water (gm)	667.88	668.17
Tare Number	327	371
Weight of Tare + Dry Soil (gm)	136.18	131.5
Weight of Tare (gm)	101.71	103.95
Weight of Dry Soil (gm)	34.47	27.55
Specific Gravity of Soil @ T	2.720	2.724
Specific Gravity of Water @ T	0.9973	0.9974
Conversion Factor for Temperature T	0.9991	0.9992
Specific Gravity @ 20° Celsius	2.722	2.727

Average Specific Gravity @ 20° Celsius	2.72

Tested By *BW* *Date* *1/13/16* *Checked By* *GEM* *Date* *1/14/16*

DCN: CT-S5 Date: 03/24/05 Revision: 10R *T:\2016 PROJECTS\2016-605 JOYCE ENG - JOHNS RIVER LF\[2016-605-001-002 Specific Gravity Soils 1Ral..xls]Sheet1*

UNIT WEIGHT WITH POROSITY

ASTM D2937-10

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Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Project	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft.)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID No.	2016-605-001-002		

Specific Gravity 2.72 Measured

Visual Description: RED SILTY SAND

MOISTURE CONTENT:

	819
Tare Number	232.27
Wt. of Tare & WS (gm.)	215.40
Wt. of Tare & DS (gm.)	130.63
Wt. of Tare (gm.)	16.87
Wt. of Water (gm.)	84.77
Wt. of DS (gm.)	
	19.9
Moisture Content (%)	

SPECIMEN: Undisturbed

Wt. of Mold/Tube & WS (gm.)	1396.94
Wt. of Mold/Tube (gm.)	434.62
Wt. of WS (gm.)	962.32
Length 1 (in.)	5.637
Length 2 (in.)	5.777
Length 3 (in.)	5.775
Top Diameter (in.)	2.809
Middle Diameter (in.)	2.859
Bottom Diameter (in.)	2.875
Average Length (in.)	5.73
Average Area (in.^{2})	6.37
Sample Volume (cm^3)	598.00
Unit Wet Wt. (gm./ cm^3)	1.61
Unit Wet Wt. (pcf)	100.5
Unit Dry Wt. (pcf)	83.8
Unit Dry Wt. (gm./ cm^3)	1.34
Void Ratio, e	1.03
Porosity, n	**0.51**
Pore Volume (cm^3)	302.9

Tested By: EL Date: 1/11/16 Checked By: GEM Date: 1/14/16

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ATTERBERG LIMIT

ASTM D 4318-10

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Reference	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-002	Visual Description	**RED**
			(MInus No. 40 sieve material, Wet Method)

NON - PLASTIC MATERIAL

Tested By *TB* *Date* *1/13/16* *Checked By* *GEM* *Date* 1/13/16

DCN: CT-S4C DATE: 7-11-97 REVISION : 2 *T:\2016 PROJECTS\2016-605 JOYCE ENG - JOHNS RIVER LF\[2016-605-001-002 Limit-(NP).xls]Sheet1*

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (2007)

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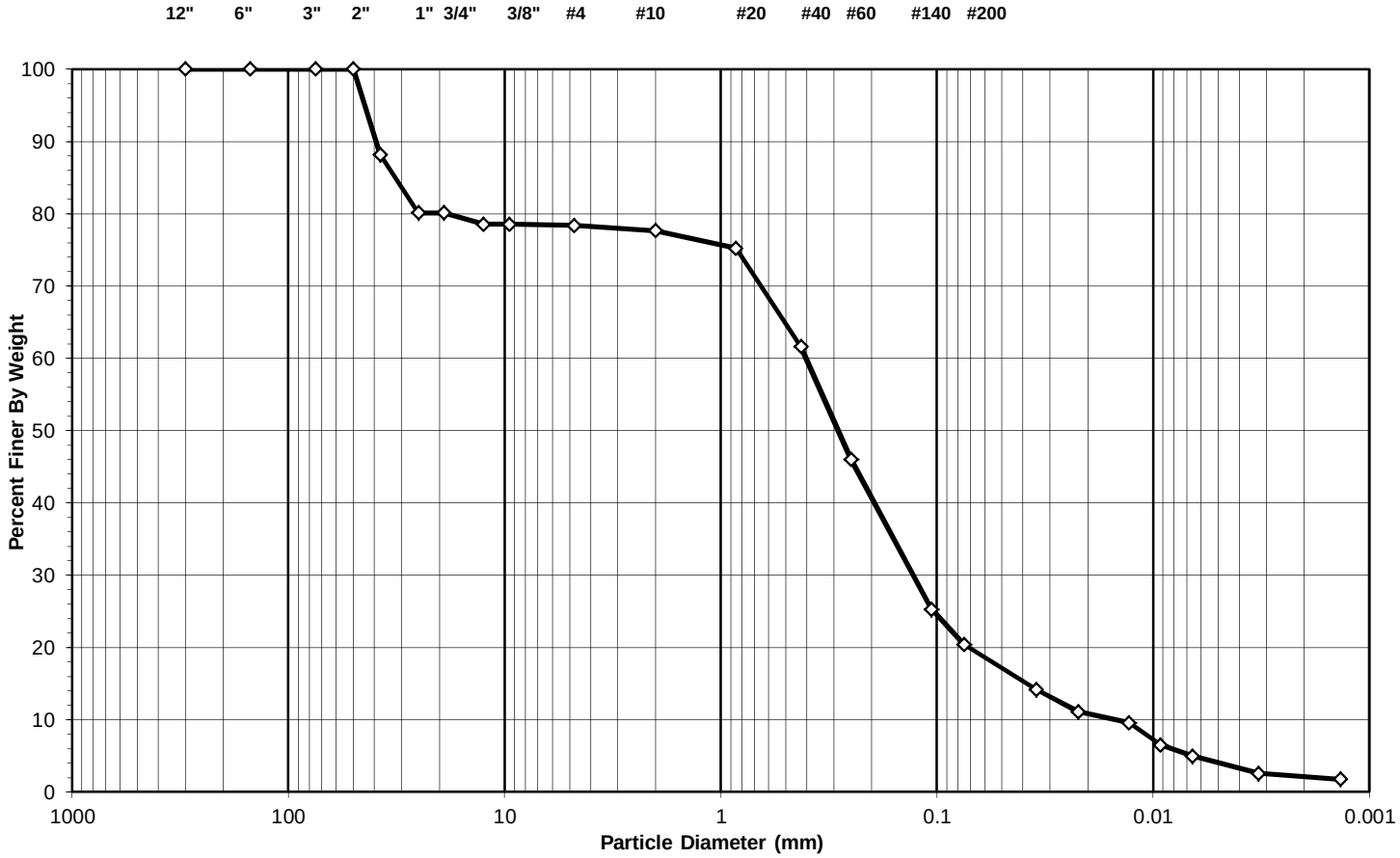
Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Reference	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-002	Soil Color	**RED**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	**cobbles**	**gravel**	**sand**	**silt and clay fraction**	
USDA	**cobbles**	**gravel**	**sand**	**silt**	**clay**



USCS Summary

Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	21.63
#4 To #200	*Sand*	57.95
Finer Than #200	*Silt & Clay*	20.42

USCS Symbol ***SM, TESTED (NON PLASTIC FINES)***

USCS Classification ***SILTY SAND WITH GRAVEL***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

T:\2016 PROJECTS\2016-605 JOYCE ENG - JOHNS RIVER LF\[2016-605-001-002 SIEVEHYD10.xls]Sheet1

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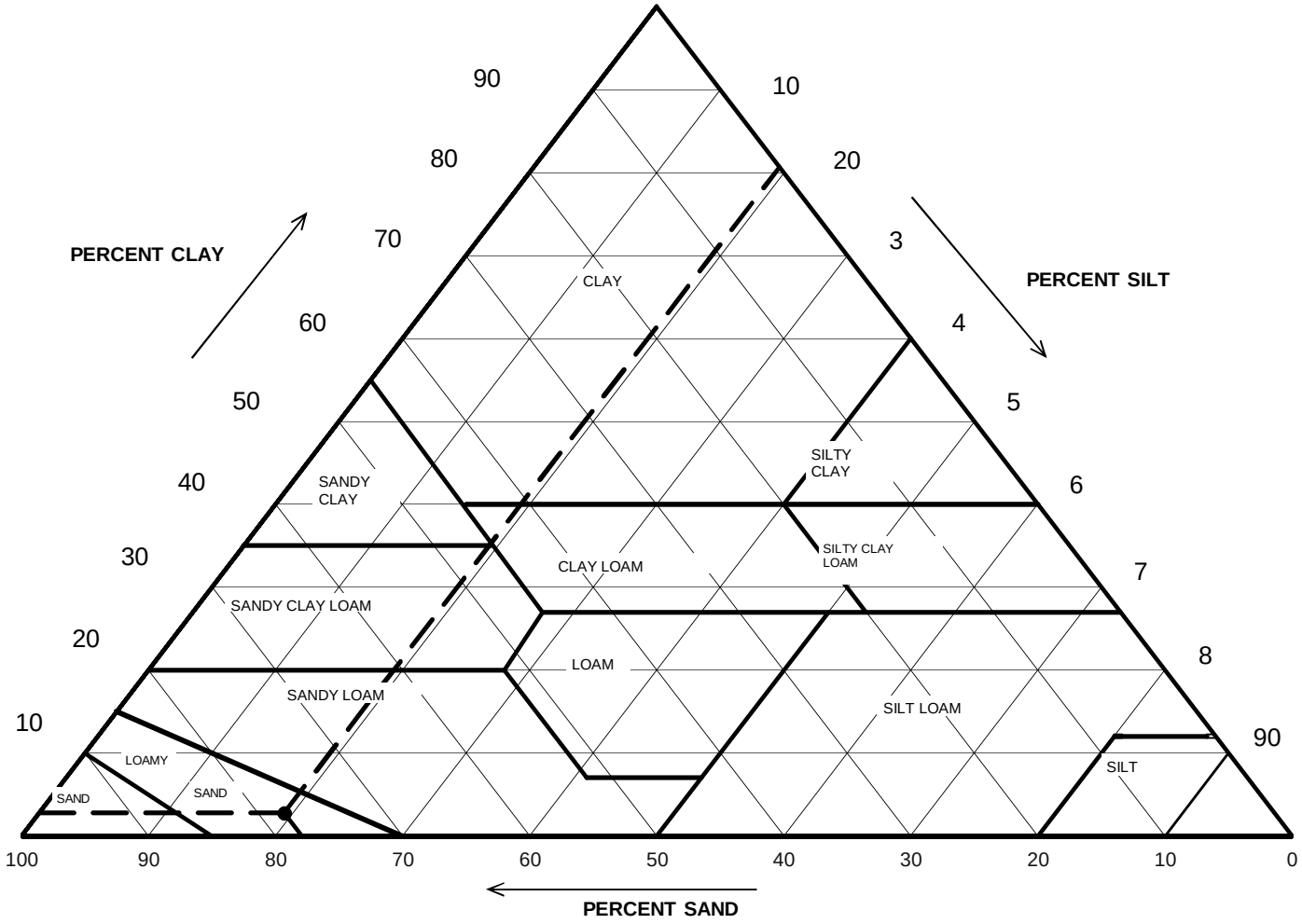
USDA CLASSIFICATION CHART

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Reference	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-002	Soil Color	RED



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	22.34	**0.00**
2	77.66	*Sand*	60.52	**77.92**
0.05	17.15	*Silt*	15.01	**19.33**
0.002	2.14	*Clay*	2.14	**2.75**

USDA Classification: ***LOAMY SAND***

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

T:\2016 PROJECTS\2016-605 JOYCE ENG - JOHNS RIVER LF\[2016-605-001-002 SIEVEHYD10.xls]Sheet1

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Reference	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-002	Soil Color	**RED**

Minus #10 for Hygroscopic Moisture Content		**Hydrometer Specimen Data**	
Tare No.	P-1	Air Dried - #10 Hydrometer Material (g)	50.00
Wgt.Tare + Wet Soil (g)	35.65	Corrected Dry Wt. of - #10 Material (g)	49.85
Wgt.Tare + Dry Soil (g)	35.61		
Weight of Tare (g)	22.34	Weight of - #200 Material (g)	13.11
Weight of Water (g)	0.04	Weight of - #10 ; + #200 Material (g)	36.74
Weight of Dry Soil (g)	13.27		
Moisture Content (%)	**0.3**	**J-FACTOR (%FINER THAN #10)**	**0.7766**
	Soil Specimen Data		
Tare No.	152		
Wgt.Tare + Air Dry Soil (g)	722.48		
Weight of Tare (g)	239.28		
Air Dried Wgt. Total Sample (g)	483.20	Dry Weight of Material Retained on #10 (g)	107.68
Total Dry Sample Weight (g)	482.07	Corrected Dry Sample Wt - #10 (g)	374.39

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.0	0.0	100.0	**100.0**
6"	150	0.00	0.0	0.0	100.0	**100.0**
3"	75	0.00	0.0	0.0	100.0	**100.0**
2"	50	0.00	0.0	0.0	100.0	**100.0**
1 1/2"	37.5	57.02	11.8	11.8	88.2	**88.2**
1"	25.0	38.85	8.1	19.9	80.1	**80.1**
3/4"	19.0	0.00	0.0	19.9	80.1	**80.1**
1/2"	12.5	7.54	1.6	21.5	78.5	**78.5**
3/8"	9.50	0.00	0.0	21.5	78.5	**78.5**
#4	4.75	0.84	0.2	21.6	78.4	**78.4**
#10	2.00	3.43	0.7	22.3	77.7	**77.7**
#20	0.85	1.56	3.1	3.1	96.9	**75.2**
#40	0.425	8.74	17.5	20.7	79.3	**61.6**
#60	0.250	10.01	20.1	40.7	59.3	**46.0**
#140	0.106	13.30	26.7	67.4	32.6	**25.3**
#200	0.075	3.13	6.3	73.7	26.3	**20.4**
Pan	-	13.11	26.3	100.0	-	**-**

Notes :

Tested By EL Date 1/15/16 Checked By GEM Date 1/18/16

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HYDROMETER ANALYSIS

ASTM D 422-63 (2007)

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Reference	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-002	Soil Color	**RED**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	14.0	21.4	4.75	9.2	18.3	0.01314	0.0348	**14.2**
5	12.0	21.4	4.75	7.2	14.3	0.01314	0.0223	**11.1**
15	11.0	21.4	4.75	6.2	12.4	0.01314	0.0129	**9.6**
30	9.0	21.4	4.75	4.2	8.4	0.01314	0.0092	**6.5**
60	8.0	21.4	4.75	3.2	6.4	0.01314	0.0066	**5.0**
250	6.5	21.2	4.82	1.7	3.3	0.01318	0.0033	**2.6**
1440	6.0	21.1	4.85	1.2	2.3	0.01319	0.0014	**1.8**

Soil Specimen Data		**Other Corrections**		
Wgt. of Dry Material (g)	49.85	Hygroscopic Moisture Factor	0.997	
Weight of Deflocculant (g)	5.0			
		a - Factor	0.986	
		Percent Finer than # 10	77.66	
		Specific Gravity	2.72	Measured

Notes:

Tested By TB Date 1/13/16 Checked By GEM Date 1/18/16

DCN: CT-S3OR DATE: 7/26/13 REVISION: 8

T:\2016 PROJECTS\2016-605 JOYCE ENG - JOHNS RIVER LF\[2016-605-001-002 SIEVEHYD10.xls]Sheet1

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PERMEABILITY TEST

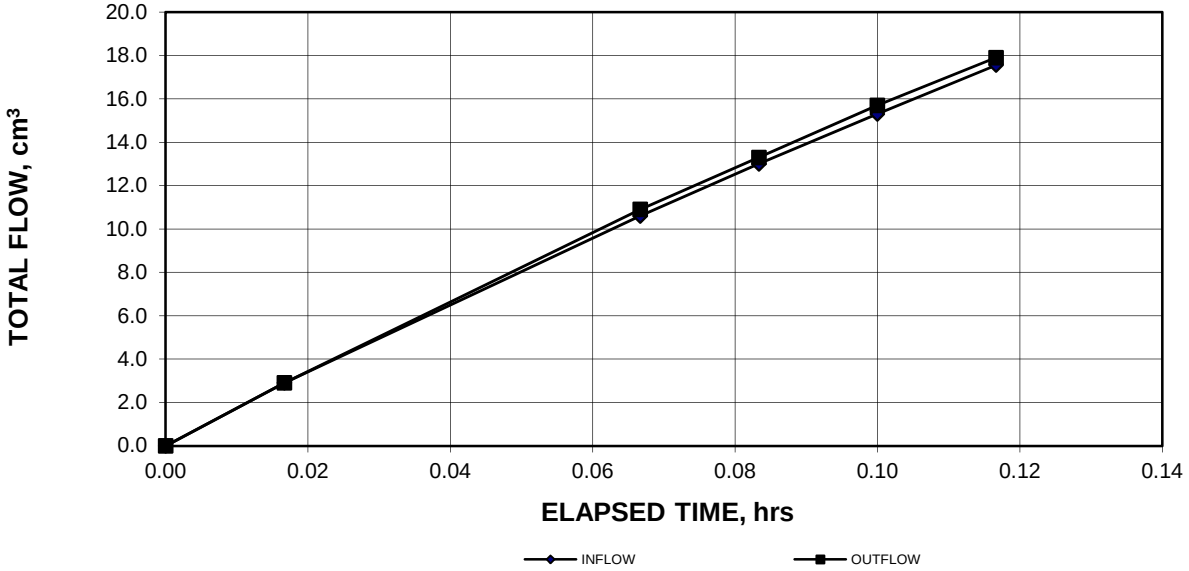
ASTM D 5084-10

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Project	John's River Landfill - Burke Co.	Depth (ft.)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID No.	2016-605-001-002		

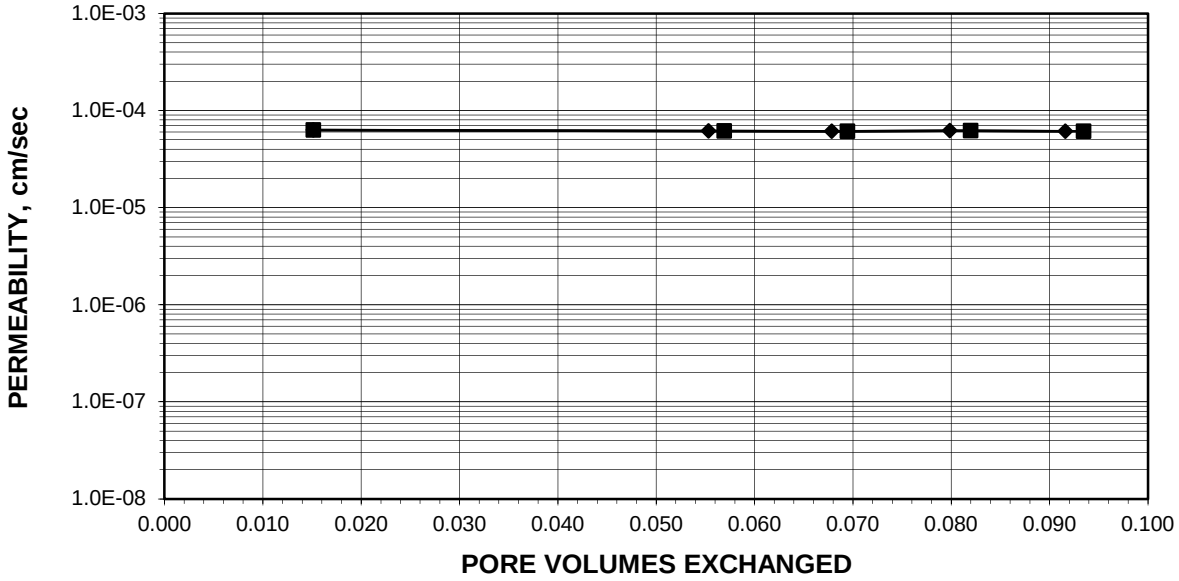
AVERAGE PERMEABILITY = 6.2E-05 cm/sec @ 20°C

AVERAGE PERMEABILITY = 6.2E-07 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: AF Date: 1/11/16 Checked By: GEM Date: 1/14/16

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PERMEABILITY TEST

ASTM D 5084-10

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Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Project	John's River Landfill - Burke Co.	Depth (ft.)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID No.	2016-605-001-002		

Specific Gravity	2.72	Measured
Sample Condition		Undisturbed

Visual Description: RED SANDY SILT

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	806	802
Wt. of Tare & WS (gm.)	287.88	443.78
Wt. of Tare & DS (gm.)	270.55	336.57
Wt. of Tare (gm.)	100.01	101.62
Wt. of Water (gm.)	17.33	107.21
Wt. of DS (gm.)	170.54	234.95
Moisture Content (%)	**10.2**	**45.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	539.57	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (calc.)(gm.)	539.57	713.30
Length 1 (in.)	3.618	3.595
Length 2 (in.)	3.605	3.578
Length 3 (in.)	3.620	3.562
Top Diameter (in.)	2.866	2.845
Middle Diameter (in.)	2.865	2.835
Bottom Diameter (in.)	2.845	2.842
Average Length (in.)	3.61	3.58
Average Area (in.^{2})	6.42	6.34
Sample Volume (cm^3)	380.14	371.63
Unit Wet Wt. (gm./ cm^3)	1.42	1.92
Unit Wet Wt. (pcf)	88.6	119.8
Unit Dry Wt. (pcf)	80.4	82.3
Unit Dry Wt. (gm./ cm^3)	1.29	1.32
Void Ratio, e	1.11	1.06
Porosity, n	0.53	0.52
Pore Volume (cm^3)	200.1	191.6
Total Wgt. Of Sample After Test		633.29

Tested By: AF Date: 1/11/16 Checked By: GEM Date: 1/14/16

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PERMEABILITY TEST

ASTM D 5084-10

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Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Project	John's River Landfill - Burke Co.	Depth (ft.)	5-7
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID No.	2016-605-001-002		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	69.0	Sample Length (cm), L	9.09
Bottom Cap (psi)	71.0	Sample Diameter (cm)	7.22
Cell (psi)	80.0	Sample Area (cm^2), A	40.89
Total Pressure Head (cm)	140.6	Inflow Burette Area (cm^2), a-in	0.880
Hydraulic Gradient	15.47	Outflow Burette Area (cm^2), a-out	0.865
		B Parameter (%)	95

AVERAGE PERMEABILITY = 6.2E-05 cm/sec @ 20°C

AVERAGE PERMEABILITY = 6.2E-07 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME **t** (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD **h** (cm)	FLOW (0 flow) (1 stop)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
1/13/16	9	7	0.00	0.0	0.0	163.7	0	21.1	NA
1/13/16	9	8	0.02	2.9	2.9	157.3	0	21.1	6.3E-05
1/13/16	9	11	0.07	10.6	10.9	139.9	0	21.1	6.2E-05
1/13/16	9	12	0.08	13.0	13.3	134.5	0	21.1	6.1E-05
1/13/16	9	13	0.10	15.3	15.7	129.3	0	21.1	6.2E-05
1/13/16	9	14	0.12	17.6	17.9	124.4	1	21.1	6.1E-05

Tested By: AF Date: 1/11/16 Checked By: GEM Date: 1/14/16

DCN: CT-22 DATE: 2/2/10 REVISION: 0 PROJECTS\2016-605 JOYCE ENG - JOHNS RIVER LF\[2016-605-001-002 PERMflow.xlsm]Sheet1

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SPECIFIC GRAVITY

ASTM D 854-10

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Reference	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft)	8-10
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-003	Visual Description	**RED**
			(MInus No.4 sieve material, airdried)

Replicate Number	**1**	**2**
Pycnometer ID	R 347	R 445
Weight of Pycnometer + Soil + Water (gm)	691.31	704.69
Temperature, T (^{o}Celsius)	22.8	22.8
Weight of Pycnometer + Water (gm)	669.36	663.00
Tare Number	347	445
Weight of Tare + Dry Soil (gm)	206.53	232.3
Weight of Tare (gm)	170.73	164.56
Weight of Dry Soil (gm)	35.80	67.74
Specific Gravity of Soil @ T	2.584	2.601
Specific Gravity of Water @ T	0.9976	0.9976
Conversion Factor for Temperature T	0.9994	0.9994
Specific Gravity @ 20° Celsius	2.586	2.602

Average Specific Gravity @ 20° Celsius	2.59

Tested By *BW* *Date* *1/18/16* *Checked By* *GEM* *Date* *1/18/16*

DCN: CT-S5 Date: 03/24/05 Revision: 10R *T:\Data Sheets\[Specific Gravity Soils 1Ral..xls]Sheet1*

UNIT WEIGHT WITH POROSITY

ASTM D2937-10

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Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Project	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft.)	8-10
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID No.	2016-605-001-003		

Specific Gravity 2.59 Measured

Visual Description: RED

MOISTURE CONTENT:

	TB-05
Tare Number	348.90
Wt. of Tare & WS (gm.)	316.32
Wt. of Tare & DS (gm.)	134.84
Wt. of Tare (gm.)	32.58
Wt. of Water (gm.)	181.48
Wt. of DS (gm.)	
Moisture Content (%)	**18.0**

SPECIMEN: Undisturbed

Wt. of Mold/Tube & WS (gm.)	1529.57
Wt. of Mold/Tube (gm.)	438.91
Wt. of WS (gm.)	1090.66
Length 1 (in.)	6.055
Length 2 (in.)	6.013
Length 3 (in.)	6.058
Top Diameter (in.)	2.815
Middle Diameter (in.)	2.823
Bottom Diameter (in.)	2.827
Average Length (in.)	6.04
Average Area (in.^{2})	6.25
Sample Volume (cm^3)	619.13
Unit Wet Wt. (gm./ cm^3)	1.76
Unit Wet Wt. (pcf)	110.0
Unit Dry Wt. (pcf)	93.2
Unit Dry Wt. (gm./ cm^3)	1.49
Void Ratio, e	0.73
Porosity, n	**0.42**
Pore Volume (cm^3)	262.1

Tested By: EL Date: 1/11/16 Checked By: GEM Date: 1/18/16

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ATTERBERG LIMIT

ASTM D 4318-10

Client	JOYCE ENGINEERING, INC.	Boring No.	PZ-42
Client Reference	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft)	8-10
Project No.	2016-605-001	Sample No.	12/16/15
Lab ID	2016-605-001-003	Visual Description	**RED**
			(MInus No. 40 sieve material, Wet Method)

NON - PLASTIC MATERIAL

Tested By *TB* *Date* *1/13/16* *Checked By* *GEM* *Date* 1/13/16

DCN: CT-S4C DATE: 7-11-97 REVISION : 2 *T:\2016 PROJECTS\2016-605 JOYCE ENG - JOHNS RIVER LF\[2016-605-001-002 Limit-(NP).xls]Sheet1*

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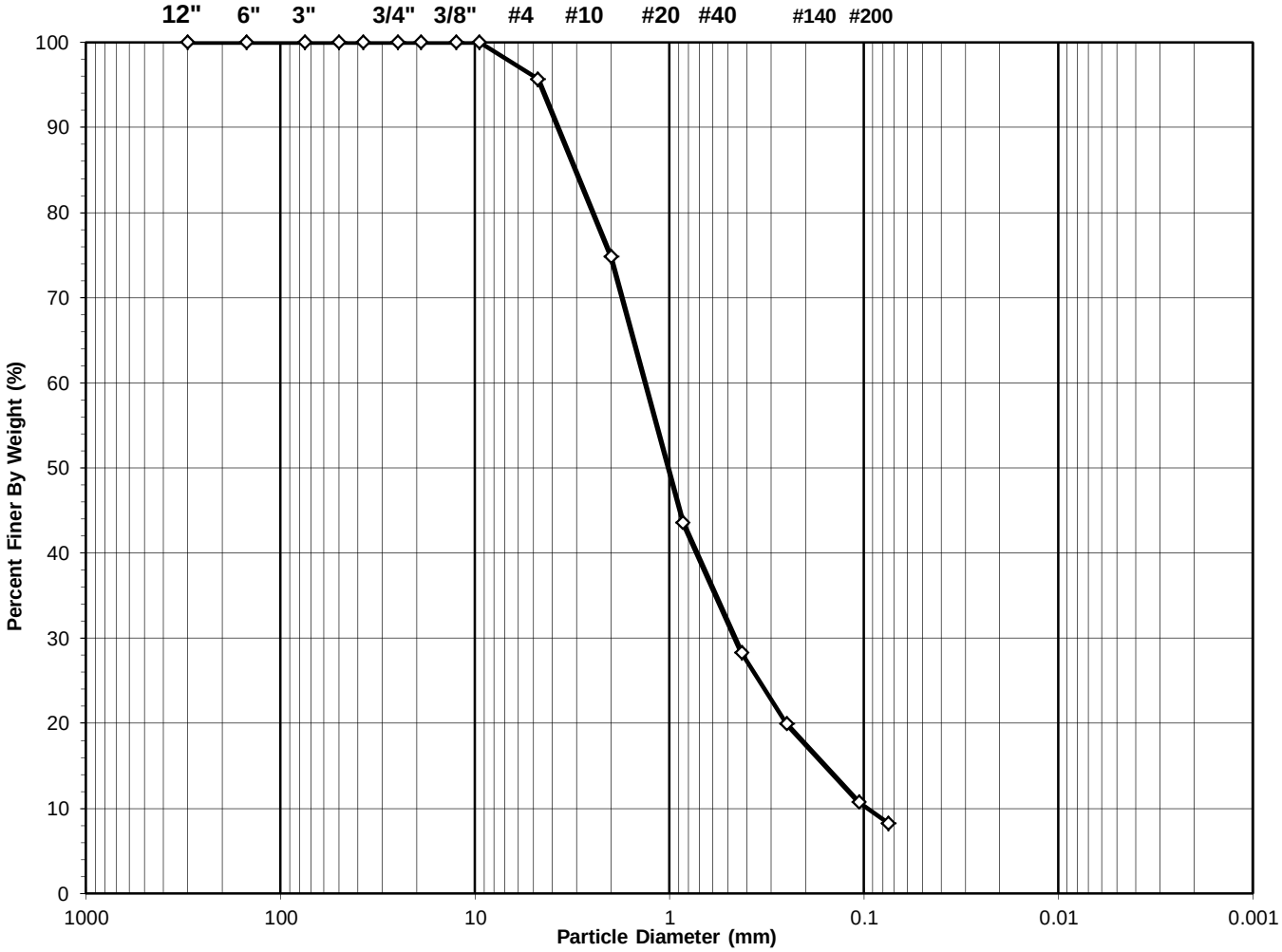
SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	JOYCE ENGINEERING, INC.	Boring No.:	PZ-42
Client Reference:	JOHN'S RIVER LANDFILL-BURKE CO.	Depth (ft):	8-10
Project No.:	2016-605-001	Sample No.:	12/16/15
Lab ID:	2016-605-001-003	Soil Color:	RED

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol: ***ML, TESTED***

USCS Classification: ***SANDY SILT***

Tested By	AMS	Date	1/13/16	Checked By	GEM	Date	1/14/16

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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WASH SIEVE ANALYSIS

ASTM D 422-63 (2007)

Client:	JOYCE ENGINEERING, INC.	Boring No.:	PZ-42
Client Reference:	JOHN'S RIVER LANDFILL-BURKE CO.	Depth (ft):	8-10
Project No.:	2016-605-001	Sample No.:	12/16/15
Lab ID:	2016-605-001-003	Soil Color:	RED

Moisture Content of Passing 3/4" Sample		Water Content of Retained 3/4" Sample	
Tare No.	826	Tare No.	NA
Wt. of Tare & Wet Sample (g)	361.85	Weight of Tare & Wet Sample (g)	NA
Wt. of Tare & Dry Sample (g)	327.37	Weight of Tare & Dry Sample (g)	NA
Weight of Tare (g)	133.78	Weight of Tare (g)	NA
Weight of Water (g)	34.48	Weight of Water (g)	NA
Weight of Dry Sample (g)	193.59	Weight of Dry Sample (g)	NA
Moisture Content (%)	**17.8**	**Moisture Content (%)**	**NA**

Wet Weight of -3/4" Sample (g)	NA	Weight of the Dry Sample (g)	193.59
Dry Weight of - 3/4" Sample (g)	177.6	Weight of - #200 Sample (g)	16.01
Wet Weight of +3/4" Sample (g)	NA	Weight of + #200 Sample (g)	177.58
Dry Weight of + 3/4" Sample (g)	0.00		
Total Dry Weight of Sample (g)	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	0.00	0.00	0.00	100.00	**100.00**
3/8"	9.50	0.00	0.00	0.00	100.00	**100.00**
#4	4.75	8.38	4.33	4.33	95.67	**95.67**
#10	2.00	40.38	20.86	25.19	74.81	**74.81**
#20	0.850	60.47	31.24	56.42	43.58	**43.58**
#40	0.425	29.60	15.29	71.71	28.29	**28.29**
#60	0.250	16.16	8.35	80.06	19.94	**19.94**
#140	0.106	17.80	9.19	89.26	10.74	**10.74**
#200	0.075	4.79	2.47	91.73	8.27	**8.27**
Pan	-	16.01	8.27	100.00	-	**-**

Tested By AMS Date 1/13/16 Checked By GEM Date 1/14/16

DCN: CT-S3C DATE 3/20/13 REVISION: 3

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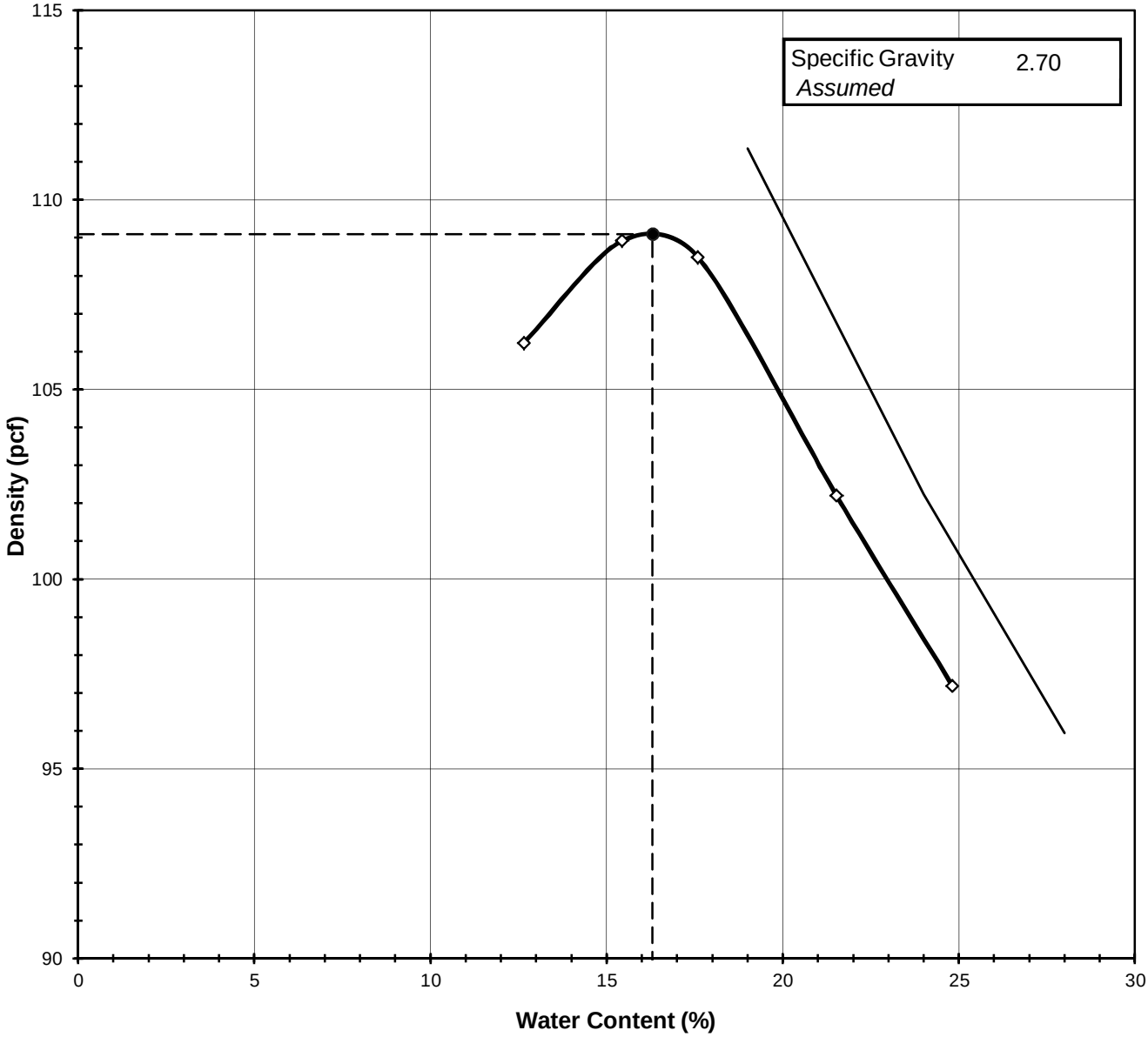
MOISTURE DENSITY RELATIONSHIP

ASTM D698-12

Client:	JOYCE ENGINEERING, INC.	Boring No.:	PZ-42
Client Reference:	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft):	5-7
Project No.:	2016-605-0001	Sample No.:	12/16/15
Lab ID:	2016-605-001-004	Test Method	**STANDARD**

Visual Description: BROWN CLAYEY SILT

Optimum Water Content	**16.3**
Maximum Dry Density	**109.1**



Tested By	*EL*	*Date*	*1/12/16*	*Checked By*	*GEM*	*Date*	1/13/16

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MOISTURE - DENSITY RELATIONSHIP

ASTM D698-12

Client:	JOYCE ENGINEERING, INC.	Boring No.:	PZ-42
Client Reference:	JOHN'S RIVER LANDFILL- BURKE CO.	Depth (ft):	5-7
Project No.:	2016-605-0001	Sample No.:	12/16/15
Lab ID:	2016-605-001-004		

Visual Description: BROWN CLAYEY SILT

Total Weight of the Sample (g)	16000
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	461
Mold diameter		4"
Weight of the Mold (g)		4168
Volume of the Mold (cm^3)		942

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5974	6066	6094	6043	5999
Wt.of Mold (g)	4168	4168	4168	4168	4168
Wt. of Wet Sample (g)	1806	1898	1926	1875	1831
Mold Volume (cm^3)	942	942	942	942	942

Moisture Content / Density

Tare Number	307	398	866	368	310
Wt. of Tare & Wet Sample (g)	558.40	479.60	521.70	566.40	545.80
Wt. of Tare & Dry Sample (g)	508.00	426.70	456.60	485.70	459.50
Wt. of Tare (g)	109.70	84.20	86.60	110.90	111.80
Wt. of Water (g)	50.40	52.90	65.10	80.70	86.30
Wt. of Dry Sample (g)	398.30	342.50	370.00	374.80	347.70

Wet Density (g/cm^3)	1.92	2.02	2.04	1.99	1.94
Wet Density (pcf)	119.7	125.7	127.6	124.2	121.3
Moisture Content (%)	**12.7**	**15.4**	**17.6**	**21.5**	**24.8**
Dry Density (pcf)	**106.2**	**108.9**	**108.5**	**102.2**	**97.2**

Zero Air Voids

Moisture Content (%)	19.0	24.0	28.0
Dry Unit Weight (pcf)	111.4	102.2	95.9

Tested By *EL* *Date* *1/12/16* *Checked By* *GEM* *Date* 1/13/16

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Appendix C

Slug Test Analyses
(January 2016)

Burke Co. JR Design Hydrogeo 2016

Site Name:	John's River LF
Location:	Phase 4
Test Date:	1/12/2016
Client:	Burke County
Project Number:	277.1602.12

Well Label:	PZ-41 Rising Head 2
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	8.3e-002 feet
Effective Radius:	0.25 feet
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	0.1535 feet
Static Water Level:	0. feet
Water Table to Screen Bottom:	15.5 feet
Anisotropy Ratio:	1.
Time Adjustment:	55.8 Seconds

Test starts with trial 2
There are 955 time and drawdown measurements
Maximum head is 2.53 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-0.93	0.	0.	0.
2	3.e-002	-0.9	0.81	0.81	0.3202
3	7.e-002	-0.86	2.53	2.53	1.
4	0.1	-0.83	2.	2.	0.7905
5	0.13	-0.8	1.58	1.58	0.6245
6	0.17	-0.76	1.27	1.27	0.502
7	0.2	-0.73	0.95	0.95	0.3755
8	0.23	-0.7	0.85	0.85	0.336
9	0.27	-0.66	0.77	0.77	0.3043
10	0.3	-0.63	0.71	0.71	0.2806
11	0.33	-0.6	0.72	0.72	0.2846
12	0.37	-0.56	0.67	0.67	0.2648
13	0.4	-0.53	0.62	0.62	0.2451
14	0.43	-0.5	0.61	0.61	0.2411
15	0.47	-0.46	0.63	0.63	0.249
16	0.5	-0.43	0.61	0.61	0.2411
17	0.53	-0.4	0.59	0.59	0.2332
18	0.57	-0.36	0.57	0.57	0.2253
19	0.6	-0.33	0.57	0.57	0.2253
20	0.63	-0.3	0.57	0.57	0.2253
21	0.67	-0.26	0.55	0.55	0.2174
22	0.7	-0.23	0.55	0.55	0.2174
23	0.73	-0.2	0.54	0.54	0.2134
24	0.77	-0.16	0.54	0.54	0.2134
25	0.8	-0.13	0.54	0.54	0.2134
26	0.83	-0.1	0.52	0.52	0.2055
27	0.87	-6.e-002	0.52	0.52	0.2055
28	0.9	-3.e-002	0.52	0.52	0.2055
29	0.93	0.	0.52	0.52	0.2055
30	0.97	4.e-002	0.51	0.51	0.2016
31	1.	7.e-002	0.51	0.51	0.2016
32	1.03	0.1	0.51	0.51	0.2016

33	1.07	0.14	0.5	0.5	0.1976
34	1.1	0.17	0.49	0.49	0.1937
35	1.13	0.2	0.49	0.49	0.1937
36	1.17	0.24	0.48	0.48	0.1897
37	1.2	0.27	0.48	0.48	0.1897
38	1.23	0.3	0.49	0.49	0.1937
39	1.27	0.34	0.48	0.48	0.1897
40	1.3	0.37	0.47	0.47	0.1858
41	1.33	0.4	0.46	0.46	0.1818
42	1.37	0.44	0.46	0.46	0.1818
43	1.4	0.47	0.46	0.46	0.1818
44	1.43	0.5	0.46	0.46	0.1818
45	1.47	0.54	0.46	0.46	0.1818
46	1.5	0.57	0.46	0.46	0.1818
47	1.53	0.6	0.47	0.47	0.1858
48	1.57	0.64	0.45	0.45	0.1779
49	1.6	0.67	0.45	0.45	0.1779
50	1.63	0.7	0.45	0.45	0.1779
51	1.67	0.74	0.44	0.44	0.1739
52	1.7	0.77	0.45	0.45	0.1779
53	1.73	0.8	0.44	0.44	0.1739
54	1.77	0.84	0.44	0.44	0.1739
55	1.8	0.87	0.43	0.43	0.17
56	1.83	0.9	0.43	0.43	0.17
57	1.87	0.94	0.43	0.43	0.17
58	1.9	0.97	0.42	0.42	0.166
59	1.93	1.	0.41	0.41	0.1621
60	1.97	1.04	0.42	0.42	0.166
61	2.	1.07	0.41	0.41	0.1621
62	2.03	1.1	0.42	0.42	0.166
63	2.07	1.14	0.4	0.4	0.1581
64	2.1	1.17	0.4	0.4	0.1581
65	2.13	1.2	0.4	0.4	0.1581
66	2.17	1.24	0.41	0.41	0.1621
67	2.2	1.27	0.41	0.41	0.1621
68	2.23	1.3	0.4	0.4	0.1581
69	2.27	1.34	0.4	0.4	0.1581
70	2.3	1.37	0.41	0.41	0.1621
71	2.33	1.4	0.4	0.4	0.1581
72	2.37	1.44	0.39	0.39	0.1542
73	2.4	1.47	0.39	0.39	0.1542
74	2.43	1.5	0.39	0.39	0.1542
75	2.47	1.54	0.39	0.39	0.1542
76	2.5	1.57	0.39	0.39	0.1542
77	2.53	1.6	0.39	0.39	0.1542
78	2.57	1.64	0.37	0.37	0.1462
79	2.6	1.67	0.37	0.37	0.1462
80	2.63	1.7	0.37	0.37	0.1462
81	2.67	1.74	0.37	0.37	0.1462
82	2.7	1.77	0.38	0.38	0.1502
83	2.73	1.8	0.39	0.39	0.1542
84	2.77	1.84	0.38	0.38	0.1502
85	2.8	1.87	0.37	0.37	0.1462
86	2.83	1.9	0.36	0.36	0.1423
87	2.87	1.94	0.37	0.37	0.1462
88	2.9	1.97	0.37	0.37	0.1462
89	2.93	2.	0.36	0.36	0.1423

90	2.97	2.04	0.37	0.37	0.1462
91	3.	2.07	0.37	0.37	0.1462
92	3.03	2.1	0.36	0.36	0.1423
93	3.07	2.14	0.36	0.36	0.1423
94	3.1	2.17	0.36	0.36	0.1423
95	3.13	2.2	0.36	0.36	0.1423
96	3.17	2.24	0.36	0.36	0.1423
97	3.2	2.27	0.35	0.35	0.1383
98	3.23	2.3	0.35	0.35	0.1383
99	3.27	2.34	0.35	0.35	0.1383
100	3.3	2.37	0.35	0.35	0.1383
101	3.33	2.4	0.35	0.35	0.1383
102	3.37	2.44	0.35	0.35	0.1383
103	3.4	2.47	0.34	0.34	0.1344
104	3.43	2.5	0.35	0.35	0.1383
105	3.47	2.54	0.35	0.35	0.1383
106	3.5	2.57	0.34	0.34	0.1344
107	3.53	2.6	0.34	0.34	0.1344
108	3.57	2.64	0.34	0.34	0.1344
109	3.6	2.67	0.33	0.33	0.1304
110	3.63	2.7	0.33	0.33	0.1304
111	3.67	2.74	0.35	0.35	0.1383
112	3.7	2.77	0.34	0.34	0.1344
113	3.73	2.8	0.33	0.33	0.1304
114	3.77	2.84	0.33	0.33	0.1304
115	3.8	2.87	0.33	0.33	0.1304
116	3.83	2.9	0.32	0.32	0.1265
117	3.87	2.94	0.33	0.33	0.1304
118	3.9	2.97	0.32	0.32	0.1265
119	3.93	3.	0.32	0.32	0.1265
120	3.97	3.04	0.33	0.33	0.1304
121	4.	3.07	0.32	0.32	0.1265
122	4.03	3.1	0.32	0.32	0.1265
123	4.07	3.14	0.32	0.32	0.1265
124	4.1	3.17	0.31	0.31	0.1225
125	4.13	3.2	0.33	0.33	0.1304
126	4.17	3.24	0.31	0.31	0.1225
127	4.2	3.27	0.31	0.31	0.1225
128	4.23	3.3	0.31	0.31	0.1225
129	4.27	3.34	0.31	0.31	0.1225
130	4.3	3.37	0.3	0.3	0.1186
131	4.33	3.4	0.31	0.31	0.1225
132	4.37	3.44	0.31	0.31	0.1225
133	4.4	3.47	0.29	0.29	0.1146
134	4.43	3.5	0.31	0.31	0.1225
135	4.47	3.54	0.31	0.31	0.1225
136	4.5	3.57	0.3	0.3	0.1186
137	4.53	3.6	0.3	0.3	0.1186
138	4.57	3.64	0.31	0.31	0.1225
139	4.6	3.67	0.3	0.3	0.1186
140	4.63	3.7	0.31	0.31	0.1225
141	4.67	3.74	0.29	0.29	0.1146
142	4.7	3.77	0.29	0.29	0.1146
143	4.73	3.8	0.3	0.3	0.1186
144	4.77	3.84	0.29	0.29	0.1146
145	4.8	3.87	0.29	0.29	0.1146
146	4.83	3.9	0.29	0.29	0.1146

147	4.87	3.94	0.29	0.29	0.1146
148	4.9	3.97	0.29	0.29	0.1146
149	4.93	4.	0.29	0.29	0.1146
150	4.97	4.04	0.28	0.28	0.1107
151	5.	4.07	0.29	0.29	0.1146
152	5.03	4.1	0.3	0.3	0.1186
153	5.07	4.14	0.29	0.29	0.1146
154	5.1	4.17	0.29	0.29	0.1146
155	5.13	4.2	0.28	0.28	0.1107
156	5.17	4.24	0.28	0.28	0.1107
157	5.2	4.27	0.28	0.28	0.1107
158	5.23	4.3	0.29	0.29	0.1146
159	5.27	4.34	0.28	0.28	0.1107
160	5.3	4.37	0.28	0.28	0.1107
161	5.33	4.4	0.27	0.27	0.1067
162	5.37	4.44	0.27	0.27	0.1067
163	5.4	4.47	0.28	0.28	0.1107
164	5.43	4.5	0.27	0.27	0.1067
165	5.47	4.54	0.29	0.29	0.1146
166	5.5	4.57	0.28	0.28	0.1107
167	5.53	4.6	0.27	0.27	0.1067
168	5.57	4.64	0.27	0.27	0.1067
169	5.6	4.67	0.28	0.28	0.1107
170	5.63	4.7	0.27	0.27	0.1067
171	5.67	4.74	0.27	0.27	0.1067
172	5.7	4.77	0.28	0.28	0.1107
173	5.73	4.8	0.26	0.26	0.1028
174	5.77	4.84	0.27	0.27	0.1067
175	5.8	4.87	0.27	0.27	0.1067
176	5.83	4.9	0.27	0.27	0.1067
177	5.87	4.94	0.26	0.26	0.1028
178	5.9	4.97	0.27	0.27	0.1067
179	5.93	5.	0.26	0.26	0.1028
180	5.97	5.04	0.26	0.26	0.1028
181	6.	5.07	0.26	0.26	0.1028
182	6.03	5.1	0.26	0.26	0.1028
183	6.07	5.14	0.25	0.25	9.881e-002
184	6.1	5.17	0.26	0.26	0.1028
185	6.13	5.2	0.26	0.26	0.1028
186	6.17	5.24	0.26	0.26	0.1028
187	6.2	5.27	0.26	0.26	0.1028
188	6.23	5.3	0.25	0.25	9.881e-002
189	6.27	5.34	0.25	0.25	9.881e-002
190	6.3	5.37	0.25	0.25	9.881e-002
191	6.33	5.4	0.26	0.26	0.1028
192	6.37	5.44	0.25	0.25	9.881e-002
193	6.4	5.47	0.26	0.26	0.1028
194	6.43	5.5	0.24	0.24	9.486e-002
195	6.47	5.54	0.25	0.25	9.881e-002
196	6.5	5.57	0.25	0.25	9.881e-002
197	6.53	5.6	0.25	0.25	9.881e-002
198	6.57	5.64	0.24	0.24	9.486e-002
199	6.6	5.67	0.24	0.24	9.486e-002
200	6.63	5.7	0.24	0.24	9.486e-002
201	6.67	5.74	0.24	0.24	9.486e-002
202	6.7	5.77	0.24	0.24	9.486e-002
203	6.73	5.8	0.25	0.25	9.881e-002

204	6.77	5.84	0.24	0.24	9.486e-002
205	6.8	5.87	0.24	0.24	9.486e-002
206	6.83	5.9	0.24	0.24	9.486e-002
207	6.87	5.94	0.24	0.24	9.486e-002
208	6.9	5.97	0.23	0.23	9.091e-002
209	6.93	6.	0.24	0.24	9.486e-002
210	6.97	6.04	0.24	0.24	9.486e-002
211	7.	6.07	0.23	0.23	9.091e-002
212	7.03	6.1	0.23	0.23	9.091e-002
213	7.07	6.14	0.23	0.23	9.091e-002
214	7.1	6.17	0.23	0.23	9.091e-002
215	7.13	6.2	0.24	0.24	9.486e-002
216	7.17	6.24	0.23	0.23	9.091e-002
217	7.2	6.27	0.22	0.22	8.696e-002
218	7.23	6.3	0.23	0.23	9.091e-002
219	7.27	6.34	0.23	0.23	9.091e-002
220	7.3	6.37	0.22	0.22	8.696e-002
221	7.33	6.4	0.22	0.22	8.696e-002
222	7.37	6.44	0.23	0.23	9.091e-002
223	7.4	6.47	0.23	0.23	9.091e-002
224	7.43	6.5	0.23	0.23	9.091e-002
225	7.47	6.54	0.23	0.23	9.091e-002
226	7.5	6.57	0.23	0.23	9.091e-002
227	7.53	6.6	0.22	0.22	8.696e-002
228	7.57	6.64	0.22	0.22	8.696e-002
229	7.6	6.67	0.22	0.22	8.696e-002
230	7.63	6.7	0.21	0.21	8.3e-002
231	7.67	6.74	0.22	0.22	8.696e-002
232	7.7	6.77	0.23	0.23	9.091e-002
233	7.73	6.8	0.22	0.22	8.696e-002
234	7.77	6.84	0.21	0.21	8.3e-002
235	7.8	6.87	0.22	0.22	8.696e-002
236	7.83	6.9	0.22	0.22	8.696e-002
237	7.87	6.94	0.23	0.23	9.091e-002
238	7.9	6.97	0.22	0.22	8.696e-002
239	7.93	7.	0.21	0.21	8.3e-002
240	7.97	7.04	0.22	0.22	8.696e-002
241	8.	7.07	0.21	0.21	8.3e-002
242	8.03	7.1	0.2	0.2	7.905e-002
243	8.07	7.14	0.21	0.21	8.3e-002
244	8.1	7.17	0.21	0.21	8.3e-002
245	8.13	7.2	0.21	0.21	8.3e-002
246	8.17	7.24	0.2	0.2	7.905e-002
247	8.2	7.27	0.21	0.21	8.3e-002
248	8.23	7.3	0.21	0.21	8.3e-002
249	8.27	7.34	0.21	0.21	8.3e-002
250	8.3	7.37	0.21	0.21	8.3e-002
251	8.33	7.4	0.2	0.2	7.905e-002
252	8.37	7.44	0.21	0.21	8.3e-002
253	8.4	7.47	0.21	0.21	8.3e-002
254	8.43	7.5	0.21	0.21	8.3e-002
255	8.47	7.54	0.21	0.21	8.3e-002
256	8.5	7.57	0.2	0.2	7.905e-002
257	8.53	7.6	0.2	0.2	7.905e-002
258	8.57	7.64	0.2	0.2	7.905e-002
259	8.6	7.67	0.21	0.21	8.3e-002
260	8.63	7.7	0.21	0.21	8.3e-002

261	8.67	7.74	0.2	0.2	7.905e-002
262	8.7	7.77	0.2	0.2	7.905e-002
263	8.73	7.8	0.19	0.19	7.51e-002
264	8.77	7.84	0.2	0.2	7.905e-002
265	8.8	7.87	0.19	0.19	7.51e-002
266	8.83	7.9	0.19	0.19	7.51e-002
267	8.87	7.94	0.19	0.19	7.51e-002
268	8.9	7.97	0.19	0.19	7.51e-002
269	8.93	8.	0.2	0.2	7.905e-002
270	8.97	8.04	0.2	0.2	7.905e-002
271	9.	8.07	0.2	0.2	7.905e-002
272	9.03	8.1	0.21	0.21	8.3e-002
273	9.07	8.14	0.19	0.19	7.51e-002
274	9.1	8.17	0.19	0.19	7.51e-002
275	9.13	8.2	0.2	0.2	7.905e-002
276	9.17	8.24	0.2	0.2	7.905e-002
277	9.2	8.27	0.19	0.19	7.51e-002
278	9.23	8.3	0.19	0.19	7.51e-002
279	9.27	8.34	0.19	0.19	7.51e-002
280	9.3	8.37	0.19	0.19	7.51e-002
281	9.33	8.4	0.18	0.18	7.115e-002
282	9.37	8.44	0.18	0.18	7.115e-002
283	9.4	8.47	0.19	0.19	7.51e-002
284	9.43	8.5	0.18	0.18	7.115e-002
285	9.47	8.54	0.18	0.18	7.115e-002
286	9.5	8.57	0.18	0.18	7.115e-002
287	9.53	8.6	0.19	0.19	7.51e-002
288	9.57	8.64	0.19	0.19	7.51e-002
289	9.6	8.67	0.18	0.18	7.115e-002
290	9.63	8.7	0.18	0.18	7.115e-002
291	9.67	8.74	0.18	0.18	7.115e-002
292	9.7	8.77	0.18	0.18	7.115e-002
293	9.73	8.8	0.19	0.19	7.51e-002
294	9.77	8.84	0.18	0.18	7.115e-002
295	9.8	8.87	0.19	0.19	7.51e-002
296	9.83	8.9	0.19	0.19	7.51e-002
297	9.87	8.94	0.18	0.18	7.115e-002
298	9.9	8.97	0.18	0.18	7.115e-002
299	9.93	9.	0.18	0.18	7.115e-002
300	9.97	9.04	0.17	0.17	6.719e-002
301	10.	9.07	0.17	0.17	6.719e-002
302	10.03	9.1	0.18	0.18	7.115e-002
303	10.07	9.14	0.18	0.18	7.115e-002
304	10.1	9.17	0.18	0.18	7.115e-002
305	10.13	9.2	0.17	0.17	6.719e-002
306	10.17	9.24	0.18	0.18	7.115e-002
307	10.2	9.27	0.18	0.18	7.115e-002
308	10.23	9.3	0.17	0.17	6.719e-002
309	10.27	9.34	0.18	0.18	7.115e-002
310	10.3	9.37	0.18	0.18	7.115e-002
311	10.33	9.4	0.17	0.17	6.719e-002
312	10.37	9.44	0.17	0.17	6.719e-002
313	10.4	9.47	0.17	0.17	6.719e-002
314	10.43	9.5	0.17	0.17	6.719e-002
315	10.47	9.54	0.17	0.17	6.719e-002
316	10.5	9.57	0.17	0.17	6.719e-002
317	10.53	9.6	0.17	0.17	6.719e-002

318	10.57	9.64	0.17	0.17	6.719e-002
319	10.6	9.67	0.18	0.18	7.115e-002
320	10.63	9.7	0.16	0.16	6.324e-002
321	10.67	9.74	0.17	0.17	6.719e-002
322	10.7	9.77	0.17	0.17	6.719e-002
323	10.73	9.8	0.17	0.17	6.719e-002
324	10.77	9.84	0.17	0.17	6.719e-002
325	10.8	9.87	0.17	0.17	6.719e-002
326	10.83	9.9	0.17	0.17	6.719e-002
327	10.87	9.94	0.16	0.16	6.324e-002
328	10.9	9.97	0.15	0.15	5.929e-002
329	10.93	10.	0.16	0.16	6.324e-002
330	10.97	10.04	0.17	0.17	6.719e-002
331	11.	10.07	0.17	0.17	6.719e-002
332	11.03	10.1	0.17	0.17	6.719e-002
333	11.07	10.14	0.15	0.15	5.929e-002
334	11.1	10.17	0.16	0.16	6.324e-002
335	11.13	10.2	0.16	0.16	6.324e-002
336	11.17	10.24	0.16	0.16	6.324e-002
337	11.2	10.27	0.16	0.16	6.324e-002
338	11.23	10.3	0.15	0.15	5.929e-002
339	11.27	10.34	0.17	0.17	6.719e-002
340	11.3	10.37	0.16	0.16	6.324e-002
341	11.33	10.4	0.15	0.15	5.929e-002
342	11.37	10.44	0.16	0.16	6.324e-002
343	11.4	10.47	0.16	0.16	6.324e-002
344	11.43	10.5	0.15	0.15	5.929e-002
345	11.47	10.54	0.16	0.16	6.324e-002
346	11.5	10.57	0.16	0.16	6.324e-002
347	11.53	10.6	0.15	0.15	5.929e-002
348	11.57	10.64	0.15	0.15	5.929e-002
349	11.6	10.67	0.16	0.16	6.324e-002
350	11.63	10.7	0.15	0.15	5.929e-002
351	11.67	10.74	0.16	0.16	6.324e-002
352	11.7	10.77	0.15	0.15	5.929e-002
353	11.73	10.8	0.16	0.16	6.324e-002
354	11.77	10.84	0.15	0.15	5.929e-002
355	11.8	10.87	0.15	0.15	5.929e-002
356	11.83	10.9	0.15	0.15	5.929e-002
357	11.87	10.94	0.15	0.15	5.929e-002
358	11.9	10.97	0.15	0.15	5.929e-002
359	11.93	11.	0.15	0.15	5.929e-002
360	11.97	11.04	0.15	0.15	5.929e-002
361	12.	11.07	0.15	0.15	5.929e-002
362	12.03	11.1	0.16	0.16	6.324e-002
363	12.07	11.14	0.15	0.15	5.929e-002
364	12.1	11.17	0.14	0.14	5.534e-002
365	12.13	11.2	0.15	0.15	5.929e-002
366	12.17	11.24	0.16	0.16	6.324e-002
367	12.2	11.27	0.16	0.16	6.324e-002
368	12.23	11.3	0.15	0.15	5.929e-002
369	12.27	11.34	0.15	0.15	5.929e-002
370	12.3	11.37	0.15	0.15	5.929e-002
371	12.33	11.4	0.14	0.14	5.534e-002
372	12.37	11.44	0.15	0.15	5.929e-002
373	12.4	11.47	0.16	0.16	6.324e-002
374	12.43	11.5	0.15	0.15	5.929e-002

375	12.47	11.54	0.14	0.14	5.534e-002
376	12.5	11.57	0.14	0.14	5.534e-002
377	12.53	11.6	0.15	0.15	5.929e-002
378	12.57	11.64	0.14	0.14	5.534e-002
379	12.6	11.67	0.14	0.14	5.534e-002
380	12.63	11.7	0.14	0.14	5.534e-002
381	12.67	11.74	0.13	0.13	5.138e-002
382	12.7	11.77	0.14	0.14	5.534e-002
383	12.73	11.8	0.13	0.13	5.138e-002
384	12.77	11.84	0.14	0.14	5.534e-002
385	12.8	11.87	0.14	0.14	5.534e-002
386	12.83	11.9	0.14	0.14	5.534e-002
387	12.87	11.94	0.14	0.14	5.534e-002
388	12.9	11.97	0.14	0.14	5.534e-002
389	12.93	12.	0.13	0.13	5.138e-002
390	12.97	12.04	0.14	0.14	5.534e-002
391	13.	12.07	0.13	0.13	5.138e-002
392	13.03	12.1	0.14	0.14	5.534e-002
393	13.07	12.14	0.13	0.13	5.138e-002
394	13.1	12.17	0.14	0.14	5.534e-002
395	13.13	12.2	0.14	0.14	5.534e-002
396	13.17	12.24	0.13	0.13	5.138e-002
397	13.2	12.27	0.14	0.14	5.534e-002
398	13.23	12.3	0.14	0.14	5.534e-002
399	13.27	12.34	0.13	0.13	5.138e-002
400	13.3	12.37	0.13	0.13	5.138e-002
401	13.33	12.4	0.14	0.14	5.534e-002
402	13.37	12.44	0.14	0.14	5.534e-002
403	13.4	12.47	0.14	0.14	5.534e-002
404	13.43	12.5	0.13	0.13	5.138e-002
405	13.47	12.54	0.14	0.14	5.534e-002
406	13.5	12.57	0.13	0.13	5.138e-002
407	13.53	12.6	0.13	0.13	5.138e-002
408	13.57	12.64	0.12	0.12	4.743e-002
409	13.6	12.67	0.12	0.12	4.743e-002
410	13.63	12.7	0.13	0.13	5.138e-002
411	13.67	12.74	0.12	0.12	4.743e-002
412	13.7	12.77	0.12	0.12	4.743e-002
413	13.73	12.8	0.13	0.13	5.138e-002
414	13.77	12.84	0.13	0.13	5.138e-002
415	13.8	12.87	0.13	0.13	5.138e-002
416	13.83	12.9	0.11	0.11	4.348e-002
417	13.87	12.94	0.14	0.14	5.534e-002
418	13.9	12.97	0.13	0.13	5.138e-002
419	13.93	13.	0.13	0.13	5.138e-002
420	13.97	13.04	0.13	0.13	5.138e-002
421	14.	13.07	0.13	0.13	5.138e-002
422	14.03	13.1	0.13	0.13	5.138e-002
423	14.07	13.14	0.13	0.13	5.138e-002
424	14.1	13.17	0.13	0.13	5.138e-002
425	14.13	13.2	0.12	0.12	4.743e-002
426	14.17	13.24	0.12	0.12	4.743e-002
427	14.2	13.27	0.12	0.12	4.743e-002
428	14.23	13.3	0.13	0.13	5.138e-002
429	14.27	13.34	0.12	0.12	4.743e-002
430	14.3	13.37	0.12	0.12	4.743e-002
431	14.33	13.4	0.13	0.13	5.138e-002

432	14.37	13.44	0.13	0.13	5.138e-002
433	14.4	13.47	0.13	0.13	5.138e-002
434	14.43	13.5	0.12	0.12	4.743e-002
435	14.47	13.54	0.12	0.12	4.743e-002
436	14.5	13.57	0.13	0.13	5.138e-002
437	14.53	13.6	0.12	0.12	4.743e-002
438	14.57	13.64	0.12	0.12	4.743e-002
439	14.6	13.67	0.12	0.12	4.743e-002
440	14.63	13.7	0.12	0.12	4.743e-002
441	14.67	13.74	0.12	0.12	4.743e-002
442	14.7	13.77	0.11	0.11	4.348e-002
443	14.73	13.8	0.11	0.11	4.348e-002
444	14.77	13.84	0.11	0.11	4.348e-002
445	14.8	13.87	0.11	0.11	4.348e-002
446	14.83	13.9	0.12	0.12	4.743e-002
447	14.87	13.94	0.11	0.11	4.348e-002
448	14.9	13.97	0.11	0.11	4.348e-002
449	14.93	14.	0.11	0.11	4.348e-002
450	14.97	14.04	0.12	0.12	4.743e-002
451	15.	14.07	0.11	0.11	4.348e-002
452	15.03	14.1	0.12	0.12	4.743e-002
453	15.07	14.14	0.12	0.12	4.743e-002
454	15.1	14.17	0.11	0.11	4.348e-002
455	15.13	14.2	0.11	0.11	4.348e-002
456	15.17	14.24	0.12	0.12	4.743e-002
457	15.2	14.27	0.11	0.11	4.348e-002
458	15.23	14.3	0.12	0.12	4.743e-002
459	15.27	14.34	0.11	0.11	4.348e-002
460	15.3	14.37	0.11	0.11	4.348e-002
461	15.33	14.4	0.12	0.12	4.743e-002
462	15.37	14.44	0.12	0.12	4.743e-002
463	15.4	14.47	0.11	0.11	4.348e-002
464	15.43	14.5	0.11	0.11	4.348e-002
465	15.47	14.54	0.12	0.12	4.743e-002
466	15.5	14.57	0.11	0.11	4.348e-002
467	15.53	14.6	0.1	0.1	3.953e-002
468	15.57	14.64	0.11	0.11	4.348e-002
469	15.6	14.67	0.11	0.11	4.348e-002
470	15.63	14.7	0.11	0.11	4.348e-002
471	15.67	14.74	0.12	0.12	4.743e-002
472	15.7	14.77	0.1	0.1	3.953e-002
473	15.73	14.8	0.11	0.11	4.348e-002
474	15.77	14.84	0.11	0.11	4.348e-002
475	15.8	14.87	0.11	0.11	4.348e-002
476	15.83	14.9	0.11	0.11	4.348e-002
477	15.87	14.94	0.11	0.11	4.348e-002
478	15.9	14.97	0.1	0.1	3.953e-002
479	15.93	15.	0.11	0.11	4.348e-002
480	15.97	15.04	0.1	0.1	3.953e-002
481	16.	15.07	0.11	0.11	4.348e-002
482	16.03	15.1	0.11	0.11	4.348e-002
483	16.07	15.14	0.11	0.11	4.348e-002
484	16.1	15.17	0.1	0.1	3.953e-002
485	16.13	15.2	0.11	0.11	4.348e-002
486	16.17	15.24	0.11	0.11	4.348e-002
487	16.2	15.27	0.11	0.11	4.348e-002
488	16.23	15.3	0.11	0.11	4.348e-002

489	16.27	15.34	0.11	0.11	4.348e-002
490	16.3	15.37	0.1	0.1	3.953e-002
491	16.33	15.4	0.11	0.11	4.348e-002
492	16.37	15.44	0.11	0.11	4.348e-002
493	16.4	15.47	0.11	0.11	4.348e-002
494	16.43	15.5	0.1	0.1	3.953e-002
495	16.47	15.54	0.1	0.1	3.953e-002
496	16.5	15.57	0.1	0.1	3.953e-002
497	16.53	15.6	0.11	0.11	4.348e-002
498	16.57	15.64	0.1	0.1	3.953e-002
499	16.6	15.67	0.1	0.1	3.953e-002
500	16.63	15.7	0.11	0.11	4.348e-002
501	16.67	15.74	0.1	0.1	3.953e-002
502	16.7	15.77	0.1	0.1	3.953e-002
503	16.73	15.8	0.1	0.1	3.953e-002
504	16.77	15.84	0.11	0.11	4.348e-002
505	16.8	15.87	0.1	0.1	3.953e-002
506	16.83	15.9	0.1	0.1	3.953e-002
507	16.87	15.94	0.1	0.1	3.953e-002
508	16.9	15.97	0.1	0.1	3.953e-002
509	16.93	16.	0.11	0.11	4.348e-002
510	16.97	16.04	9.e-002	9.e-002	3.557e-002
511	17.	16.07	0.1	0.1	3.953e-002
512	17.03	16.1	0.11	0.11	4.348e-002
513	17.07	16.14	0.1	0.1	3.953e-002
514	17.1	16.17	0.1	0.1	3.953e-002
515	17.13	16.2	0.11	0.11	4.348e-002
516	17.17	16.24	0.11	0.11	4.348e-002
517	17.2	16.27	0.1	0.1	3.953e-002
518	17.23	16.3	9.e-002	9.e-002	3.557e-002
519	17.27	16.34	0.1	0.1	3.953e-002
520	17.3	16.37	0.1	0.1	3.953e-002
521	17.33	16.4	0.1	0.1	3.953e-002
522	17.37	16.44	9.e-002	9.e-002	3.557e-002
523	17.4	16.47	9.e-002	9.e-002	3.557e-002
524	17.43	16.5	0.1	0.1	3.953e-002
525	17.47	16.54	0.1	0.1	3.953e-002
526	17.5	16.57	0.1	0.1	3.953e-002
527	17.53	16.6	0.1	0.1	3.953e-002
528	17.57	16.64	0.1	0.1	3.953e-002
529	17.6	16.67	9.e-002	9.e-002	3.557e-002
530	17.63	16.7	9.e-002	9.e-002	3.557e-002
531	17.67	16.74	0.1	0.1	3.953e-002
532	17.7	16.77	0.1	0.1	3.953e-002
533	17.73	16.8	0.11	0.11	4.348e-002
534	17.77	16.84	8.e-002	8.e-002	3.162e-002
535	17.8	16.87	0.1	0.1	3.953e-002
536	17.83	16.9	9.e-002	9.e-002	3.557e-002
537	17.87	16.94	9.e-002	9.e-002	3.557e-002
538	17.9	16.97	0.1	0.1	3.953e-002
539	17.93	17.	0.1	0.1	3.953e-002
540	17.97	17.04	0.1	0.1	3.953e-002
541	18.	17.07	9.e-002	9.e-002	3.557e-002
542	18.03	17.1	9.e-002	9.e-002	3.557e-002
543	18.07	17.14	0.1	0.1	3.953e-002
544	18.1	17.17	9.e-002	9.e-002	3.557e-002
545	18.13	17.2	9.e-002	9.e-002	3.557e-002

546	18.17	17.24	8.e-002	8.e-002	3.162e-002
547	18.2	17.27	0.1	0.1	3.953e-002
548	18.23	17.3	9.e-002	9.e-002	3.557e-002
549	18.27	17.34	9.e-002	9.e-002	3.557e-002
550	18.3	17.37	9.e-002	9.e-002	3.557e-002
551	18.33	17.4	9.e-002	9.e-002	3.557e-002
552	18.37	17.44	9.e-002	9.e-002	3.557e-002
553	18.4	17.47	9.e-002	9.e-002	3.557e-002
554	18.43	17.5	0.1	0.1	3.953e-002
555	18.47	17.54	9.e-002	9.e-002	3.557e-002
556	18.5	17.57	0.1	0.1	3.953e-002
557	18.53	17.6	9.e-002	9.e-002	3.557e-002
558	18.57	17.64	0.1	0.1	3.953e-002
559	18.6	17.67	9.e-002	9.e-002	3.557e-002
560	18.63	17.7	0.1	0.1	3.953e-002
561	18.67	17.74	9.e-002	9.e-002	3.557e-002
562	18.7	17.77	9.e-002	9.e-002	3.557e-002
563	18.73	17.8	9.e-002	9.e-002	3.557e-002
564	18.77	17.84	9.e-002	9.e-002	3.557e-002
565	18.8	17.87	9.e-002	9.e-002	3.557e-002
566	18.83	17.9	9.e-002	9.e-002	3.557e-002
567	18.87	17.94	8.e-002	8.e-002	3.162e-002
568	18.9	17.97	9.e-002	9.e-002	3.557e-002
569	18.93	18.	9.e-002	9.e-002	3.557e-002
570	18.97	18.04	9.e-002	9.e-002	3.557e-002
571	19.	18.07	0.1	0.1	3.953e-002
572	19.03	18.1	9.e-002	9.e-002	3.557e-002
573	19.07	18.14	0.1	0.1	3.953e-002
574	19.1	18.17	9.e-002	9.e-002	3.557e-002
575	19.13	18.2	9.e-002	9.e-002	3.557e-002
576	19.17	18.24	9.e-002	9.e-002	3.557e-002
577	19.2	18.27	9.e-002	9.e-002	3.557e-002
578	19.23	18.3	9.e-002	9.e-002	3.557e-002
579	19.27	18.34	9.e-002	9.e-002	3.557e-002
580	19.3	18.37	0.1	0.1	3.953e-002
581	19.33	18.4	8.e-002	8.e-002	3.162e-002
582	19.37	18.44	9.e-002	9.e-002	3.557e-002
583	19.4	18.47	8.e-002	8.e-002	3.162e-002
584	19.43	18.5	8.e-002	8.e-002	3.162e-002
585	19.47	18.54	9.e-002	9.e-002	3.557e-002
586	19.5	18.57	9.e-002	9.e-002	3.557e-002
587	19.53	18.6	9.e-002	9.e-002	3.557e-002
588	19.57	18.64	9.e-002	9.e-002	3.557e-002
589	19.6	18.67	9.e-002	9.e-002	3.557e-002
590	19.63	18.7	9.e-002	9.e-002	3.557e-002
591	19.67	18.74	8.e-002	8.e-002	3.162e-002
592	19.7	18.77	9.e-002	9.e-002	3.557e-002
593	19.73	18.8	9.e-002	9.e-002	3.557e-002
594	19.77	18.84	9.e-002	9.e-002	3.557e-002
595	19.8	18.87	8.e-002	8.e-002	3.162e-002
596	19.83	18.9	9.e-002	9.e-002	3.557e-002
597	19.87	18.94	9.e-002	9.e-002	3.557e-002
598	19.9	18.97	9.e-002	9.e-002	3.557e-002
599	19.93	19.	9.e-002	9.e-002	3.557e-002
600	19.97	19.04	8.e-002	8.e-002	3.162e-002
601	20.	19.07	9.e-002	9.e-002	3.557e-002
602	20.03	19.1	0.1	0.1	3.953e-002

603	20.07	19.14	9.e-002	9.e-002	3.557e-002
604	20.1	19.17	9.e-002	9.e-002	3.557e-002
605	20.13	19.2	9.e-002	9.e-002	3.557e-002
606	20.17	19.24	0.1	0.1	3.953e-002
607	20.2	19.27	8.e-002	8.e-002	3.162e-002
608	20.23	19.3	0.1	0.1	3.953e-002
609	20.27	19.34	8.e-002	8.e-002	3.162e-002
610	20.3	19.37	7.e-002	7.e-002	2.767e-002
611	20.33	19.4	9.e-002	9.e-002	3.557e-002
612	20.37	19.44	8.e-002	8.e-002	3.162e-002
613	20.4	19.47	9.e-002	9.e-002	3.557e-002
614	20.43	19.5	8.e-002	8.e-002	3.162e-002
615	20.47	19.54	9.e-002	9.e-002	3.557e-002
616	20.5	19.57	8.e-002	8.e-002	3.162e-002
617	20.53	19.6	9.e-002	9.e-002	3.557e-002
618	20.57	19.64	9.e-002	9.e-002	3.557e-002
619	20.6	19.67	8.e-002	8.e-002	3.162e-002
620	20.63	19.7	9.e-002	9.e-002	3.557e-002
621	20.67	19.74	8.e-002	8.e-002	3.162e-002
622	20.7	19.77	0.1	0.1	3.953e-002
623	20.73	19.8	8.e-002	8.e-002	3.162e-002
624	20.77	19.84	9.e-002	9.e-002	3.557e-002
625	20.8	19.87	8.e-002	8.e-002	3.162e-002
626	20.83	19.9	8.e-002	8.e-002	3.162e-002
627	20.87	19.94	8.e-002	8.e-002	3.162e-002
628	20.9	19.97	8.e-002	8.e-002	3.162e-002
629	20.93	20.	0.1	0.1	3.953e-002
630	20.97	20.04	8.e-002	8.e-002	3.162e-002
631	21.	20.07	8.e-002	8.e-002	3.162e-002
632	21.03	20.1	9.e-002	9.e-002	3.557e-002
633	21.07	20.14	8.e-002	8.e-002	3.162e-002
634	21.1	20.17	7.e-002	7.e-002	2.767e-002
635	21.13	20.2	9.e-002	9.e-002	3.557e-002
636	21.17	20.24	8.e-002	8.e-002	3.162e-002
637	21.2	20.27	8.e-002	8.e-002	3.162e-002
638	21.23	20.3	8.e-002	8.e-002	3.162e-002
639	21.27	20.34	9.e-002	9.e-002	3.557e-002
640	21.3	20.37	8.e-002	8.e-002	3.162e-002
641	21.33	20.4	7.e-002	7.e-002	2.767e-002
642	21.37	20.44	7.e-002	7.e-002	2.767e-002
643	21.4	20.47	9.e-002	9.e-002	3.557e-002
644	21.43	20.5	8.e-002	8.e-002	3.162e-002
645	21.47	20.54	8.e-002	8.e-002	3.162e-002
646	21.5	20.57	8.e-002	8.e-002	3.162e-002
647	21.53	20.6	7.e-002	7.e-002	2.767e-002
648	21.57	20.64	8.e-002	8.e-002	3.162e-002
649	21.6	20.67	8.e-002	8.e-002	3.162e-002
650	21.63	20.7	8.e-002	8.e-002	3.162e-002
651	21.67	20.74	8.e-002	8.e-002	3.162e-002
652	21.7	20.77	8.e-002	8.e-002	3.162e-002
653	21.73	20.8	8.e-002	8.e-002	3.162e-002
654	21.77	20.84	8.e-002	8.e-002	3.162e-002
655	21.8	20.87	9.e-002	9.e-002	3.557e-002
656	21.83	20.9	9.e-002	9.e-002	3.557e-002
657	21.87	20.94	9.e-002	9.e-002	3.557e-002
658	21.9	20.97	8.e-002	8.e-002	3.162e-002
659	21.93	21.	9.e-002	9.e-002	3.557e-002

660	21.97	21.04	8.e-002	8.e-002	3.162e-002
661	22.	21.07	7.e-002	7.e-002	2.767e-002
662	22.03	21.1	7.e-002	7.e-002	2.767e-002
663	22.07	21.14	8.e-002	8.e-002	3.162e-002
664	22.1	21.17	6.e-002	6.e-002	2.372e-002
665	22.13	21.2	8.e-002	8.e-002	3.162e-002
666	22.17	21.24	8.e-002	8.e-002	3.162e-002
667	22.2	21.27	8.e-002	8.e-002	3.162e-002
668	22.23	21.3	7.e-002	7.e-002	2.767e-002
669	22.27	21.34	8.e-002	8.e-002	3.162e-002
670	22.3	21.37	8.e-002	8.e-002	3.162e-002
671	22.33	21.4	8.e-002	8.e-002	3.162e-002
672	22.37	21.44	7.e-002	7.e-002	2.767e-002
673	22.4	21.47	7.e-002	7.e-002	2.767e-002
674	22.43	21.5	8.e-002	8.e-002	3.162e-002
675	22.47	21.54	8.e-002	8.e-002	3.162e-002
676	22.5	21.57	8.e-002	8.e-002	3.162e-002
677	22.53	21.6	8.e-002	8.e-002	3.162e-002
678	22.57	21.64	7.e-002	7.e-002	2.767e-002
679	22.6	21.67	8.e-002	8.e-002	3.162e-002
680	22.63	21.7	6.e-002	6.e-002	2.372e-002
681	22.67	21.74	8.e-002	8.e-002	3.162e-002
682	22.7	21.77	7.e-002	7.e-002	2.767e-002
683	22.73	21.8	7.e-002	7.e-002	2.767e-002
684	22.77	21.84	8.e-002	8.e-002	3.162e-002
685	22.8	21.87	7.e-002	7.e-002	2.767e-002
686	22.83	21.9	8.e-002	8.e-002	3.162e-002
687	22.87	21.94	7.e-002	7.e-002	2.767e-002
688	22.9	21.97	6.e-002	6.e-002	2.372e-002
689	22.93	22.	7.e-002	7.e-002	2.767e-002
690	22.97	22.04	7.e-002	7.e-002	2.767e-002
691	23.	22.07	7.e-002	7.e-002	2.767e-002
692	23.03	22.1	8.e-002	8.e-002	3.162e-002
693	23.07	22.14	7.e-002	7.e-002	2.767e-002
694	23.1	22.17	7.e-002	7.e-002	2.767e-002
695	23.13	22.2	7.e-002	7.e-002	2.767e-002
696	23.17	22.24	8.e-002	8.e-002	3.162e-002
697	23.2	22.27	8.e-002	8.e-002	3.162e-002
698	23.23	22.3	8.e-002	8.e-002	3.162e-002
699	23.27	22.34	7.e-002	7.e-002	2.767e-002
700	23.3	22.37	7.e-002	7.e-002	2.767e-002
701	23.33	22.4	7.e-002	7.e-002	2.767e-002
702	23.37	22.44	7.e-002	7.e-002	2.767e-002
703	23.4	22.47	6.e-002	6.e-002	2.372e-002
704	23.43	22.5	7.e-002	7.e-002	2.767e-002
705	23.47	22.54	7.e-002	7.e-002	2.767e-002
706	23.5	22.57	7.e-002	7.e-002	2.767e-002
707	23.53	22.6	7.e-002	7.e-002	2.767e-002
708	23.57	22.64	7.e-002	7.e-002	2.767e-002
709	23.6	22.67	7.e-002	7.e-002	2.767e-002
710	23.63	22.7	6.e-002	6.e-002	2.372e-002
711	23.67	22.74	7.e-002	7.e-002	2.767e-002
712	23.7	22.77	7.e-002	7.e-002	2.767e-002
713	23.73	22.8	6.e-002	6.e-002	2.372e-002
714	23.77	22.84	7.e-002	7.e-002	2.767e-002
715	23.8	22.87	7.e-002	7.e-002	2.767e-002
716	23.83	22.9	6.e-002	6.e-002	2.372e-002

717	23.87	22.94	7.e-002	7.e-002	2.767e-002
718	23.9	22.97	8.e-002	8.e-002	3.162e-002
719	23.93	23.	8.e-002	8.e-002	3.162e-002
720	23.97	23.04	7.e-002	7.e-002	2.767e-002
721	24.	23.07	7.e-002	7.e-002	2.767e-002
722	24.03	23.1	7.e-002	7.e-002	2.767e-002
723	24.07	23.14	8.e-002	8.e-002	3.162e-002
724	24.1	23.17	7.e-002	7.e-002	2.767e-002
725	24.13	23.2	7.e-002	7.e-002	2.767e-002
726	24.17	23.24	8.e-002	8.e-002	3.162e-002
727	24.2	23.27	7.e-002	7.e-002	2.767e-002
728	24.23	23.3	7.e-002	7.e-002	2.767e-002
729	24.27	23.34	7.e-002	7.e-002	2.767e-002
730	24.3	23.37	7.e-002	7.e-002	2.767e-002
731	24.33	23.4	6.e-002	6.e-002	2.372e-002
732	24.37	23.44	7.e-002	7.e-002	2.767e-002
733	24.4	23.47	7.e-002	7.e-002	2.767e-002
734	24.43	23.5	6.e-002	6.e-002	2.372e-002
735	24.47	23.54	6.e-002	6.e-002	2.372e-002
736	24.5	23.57	7.e-002	7.e-002	2.767e-002
737	24.53	23.6	6.e-002	6.e-002	2.372e-002
738	24.57	23.64	7.e-002	7.e-002	2.767e-002
739	24.6	23.67	7.e-002	7.e-002	2.767e-002
740	24.63	23.7	7.e-002	7.e-002	2.767e-002
741	24.67	23.74	7.e-002	7.e-002	2.767e-002
742	24.7	23.77	7.e-002	7.e-002	2.767e-002
743	24.73	23.8	8.e-002	8.e-002	3.162e-002
744	24.77	23.84	8.e-002	8.e-002	3.162e-002
745	24.8	23.87	6.e-002	6.e-002	2.372e-002
746	24.83	23.9	7.e-002	7.e-002	2.767e-002
747	24.87	23.94	7.e-002	7.e-002	2.767e-002
748	24.9	23.97	7.e-002	7.e-002	2.767e-002
749	24.93	24.	7.e-002	7.e-002	2.767e-002
750	24.97	24.04	6.e-002	6.e-002	2.372e-002
751	25.	24.07	7.e-002	7.e-002	2.767e-002
752	25.03	24.1	6.e-002	6.e-002	2.372e-002
753	25.07	24.14	7.e-002	7.e-002	2.767e-002
754	25.1	24.17	7.e-002	7.e-002	2.767e-002
755	25.13	24.2	7.e-002	7.e-002	2.767e-002
756	25.17	24.24	7.e-002	7.e-002	2.767e-002
757	25.2	24.27	7.e-002	7.e-002	2.767e-002
758	25.23	24.3	6.e-002	6.e-002	2.372e-002
759	25.27	24.34	6.e-002	6.e-002	2.372e-002
760	25.3	24.37	7.e-002	7.e-002	2.767e-002
761	25.33	24.4	6.e-002	6.e-002	2.372e-002
762	25.37	24.44	6.e-002	6.e-002	2.372e-002
763	25.4	24.47	7.e-002	7.e-002	2.767e-002
764	25.43	24.5	7.e-002	7.e-002	2.767e-002
765	25.47	24.54	6.e-002	6.e-002	2.372e-002
766	25.5	24.57	7.e-002	7.e-002	2.767e-002
767	25.53	24.6	6.e-002	6.e-002	2.372e-002
768	25.57	24.64	6.e-002	6.e-002	2.372e-002
769	25.6	24.67	6.e-002	6.e-002	2.372e-002
770	25.63	24.7	7.e-002	7.e-002	2.767e-002
771	25.67	24.74	6.e-002	6.e-002	2.372e-002
772	25.7	24.77	7.e-002	7.e-002	2.767e-002
773	25.73	24.8	7.e-002	7.e-002	2.767e-002

774	25.77	24.84	6.e-002	6.e-002	2.372e-002
775	25.8	24.87	7.e-002	7.e-002	2.767e-002
776	25.83	24.9	6.e-002	6.e-002	2.372e-002
777	25.87	24.94	6.e-002	6.e-002	2.372e-002
778	25.9	24.97	7.e-002	7.e-002	2.767e-002
779	25.93	25.	6.e-002	6.e-002	2.372e-002
780	25.97	25.04	6.e-002	6.e-002	2.372e-002
781	26.	25.07	6.e-002	6.e-002	2.372e-002
782	26.03	25.1	7.e-002	7.e-002	2.767e-002
783	26.07	25.14	7.e-002	7.e-002	2.767e-002
784	26.1	25.17	5.e-002	5.e-002	1.976e-002
785	26.13	25.2	6.e-002	6.e-002	2.372e-002
786	26.17	25.24	7.e-002	7.e-002	2.767e-002
787	26.2	25.27	6.e-002	6.e-002	2.372e-002
788	26.23	25.3	6.e-002	6.e-002	2.372e-002
789	26.27	25.34	7.e-002	7.e-002	2.767e-002
790	26.3	25.37	6.e-002	6.e-002	2.372e-002
791	26.33	25.4	7.e-002	7.e-002	2.767e-002
792	26.37	25.44	7.e-002	7.e-002	2.767e-002
793	26.4	25.47	7.e-002	7.e-002	2.767e-002
794	26.43	25.5	6.e-002	6.e-002	2.372e-002
795	26.47	25.54	6.e-002	6.e-002	2.372e-002
796	26.5	25.57	6.e-002	6.e-002	2.372e-002
797	26.53	25.6	6.e-002	6.e-002	2.372e-002
798	26.57	25.64	6.e-002	6.e-002	2.372e-002
799	26.6	25.67	6.e-002	6.e-002	2.372e-002
800	26.63	25.7	6.e-002	6.e-002	2.372e-002
801	26.67	25.74	5.e-002	5.e-002	1.976e-002
802	26.7	25.77	6.e-002	6.e-002	2.372e-002
803	26.73	25.8	6.e-002	6.e-002	2.372e-002
804	26.77	25.84	6.e-002	6.e-002	2.372e-002
805	26.8	25.87	6.e-002	6.e-002	2.372e-002
806	26.83	25.9	6.e-002	6.e-002	2.372e-002
807	26.87	25.94	6.e-002	6.e-002	2.372e-002
808	26.9	25.97	6.e-002	6.e-002	2.372e-002
809	26.93	26.	6.e-002	6.e-002	2.372e-002
810	26.97	26.04	6.e-002	6.e-002	2.372e-002
811	27.	26.07	6.e-002	6.e-002	2.372e-002
812	27.03	26.1	7.e-002	7.e-002	2.767e-002
813	27.07	26.14	6.e-002	6.e-002	2.372e-002
814	27.1	26.17	6.e-002	6.e-002	2.372e-002
815	27.13	26.2	7.e-002	7.e-002	2.767e-002
816	27.17	26.24	7.e-002	7.e-002	2.767e-002
817	27.2	26.27	6.e-002	6.e-002	2.372e-002
818	27.23	26.3	6.e-002	6.e-002	2.372e-002
819	27.27	26.34	6.e-002	6.e-002	2.372e-002
820	27.3	26.37	6.e-002	6.e-002	2.372e-002
821	27.33	26.4	6.e-002	6.e-002	2.372e-002
822	27.37	26.44	6.e-002	6.e-002	2.372e-002
823	27.4	26.47	6.e-002	6.e-002	2.372e-002
824	27.43	26.5	6.e-002	6.e-002	2.372e-002
825	27.47	26.54	5.e-002	5.e-002	1.976e-002
826	27.5	26.57	6.e-002	6.e-002	2.372e-002
827	27.53	26.6	6.e-002	6.e-002	2.372e-002
828	27.57	26.64	6.e-002	6.e-002	2.372e-002
829	27.6	26.67	7.e-002	7.e-002	2.767e-002
830	27.63	26.7	6.e-002	6.e-002	2.372e-002

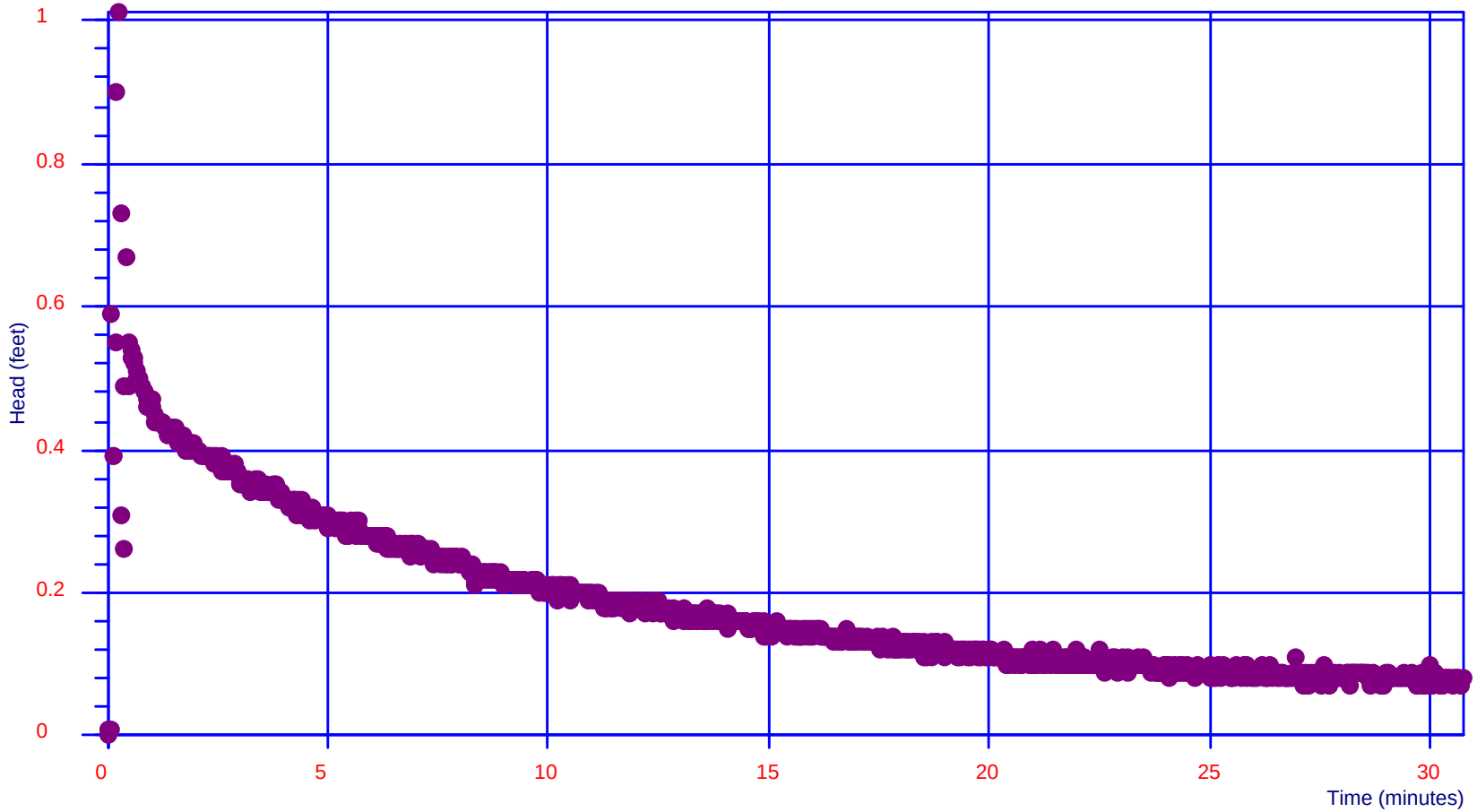
831	27.67	26.74	5.e-002	5.e-002	1.976e-002
832	27.7	26.77	6.e-002	6.e-002	2.372e-002
833	27.73	26.8	6.e-002	6.e-002	2.372e-002
834	27.77	26.84	6.e-002	6.e-002	2.372e-002
835	27.8	26.87	7.e-002	7.e-002	2.767e-002
836	27.83	26.9	6.e-002	6.e-002	2.372e-002
837	27.87	26.94	6.e-002	6.e-002	2.372e-002
838	27.9	26.97	6.e-002	6.e-002	2.372e-002
839	27.93	27.	5.e-002	5.e-002	1.976e-002
840	27.97	27.04	7.e-002	7.e-002	2.767e-002
841	28.	27.07	6.e-002	6.e-002	2.372e-002
842	28.03	27.1	5.e-002	5.e-002	1.976e-002
843	28.07	27.14	5.e-002	5.e-002	1.976e-002
844	28.1	27.17	6.e-002	6.e-002	2.372e-002
845	28.13	27.2	4.e-002	4.e-002	1.581e-002
846	28.17	27.24	6.e-002	6.e-002	2.372e-002
847	28.2	27.27	6.e-002	6.e-002	2.372e-002
848	28.23	27.3	6.e-002	6.e-002	2.372e-002
849	28.27	27.34	5.e-002	5.e-002	1.976e-002
850	28.3	27.37	6.e-002	6.e-002	2.372e-002
851	28.33	27.4	6.e-002	6.e-002	2.372e-002
852	28.37	27.44	6.e-002	6.e-002	2.372e-002
853	28.4	27.47	5.e-002	5.e-002	1.976e-002
854	28.43	27.5	6.e-002	6.e-002	2.372e-002
855	28.47	27.54	6.e-002	6.e-002	2.372e-002
856	28.5	27.57	7.e-002	7.e-002	2.767e-002
857	28.53	27.6	6.e-002	6.e-002	2.372e-002
858	28.57	27.64	6.e-002	6.e-002	2.372e-002
859	28.6	27.67	6.e-002	6.e-002	2.372e-002
860	28.63	27.7	5.e-002	5.e-002	1.976e-002
861	28.67	27.74	5.e-002	5.e-002	1.976e-002
862	28.7	27.77	6.e-002	6.e-002	2.372e-002
863	28.73	27.8	6.e-002	6.e-002	2.372e-002
864	28.77	27.84	7.e-002	7.e-002	2.767e-002
865	28.8	27.87	6.e-002	6.e-002	2.372e-002
866	28.83	27.9	5.e-002	5.e-002	1.976e-002
867	28.87	27.94	6.e-002	6.e-002	2.372e-002
868	28.9	27.97	7.e-002	7.e-002	2.767e-002
869	28.93	28.	6.e-002	6.e-002	2.372e-002
870	28.97	28.04	5.e-002	5.e-002	1.976e-002
871	29.	28.07	7.e-002	7.e-002	2.767e-002
872	29.03	28.1	6.e-002	6.e-002	2.372e-002
873	29.07	28.14	5.e-002	5.e-002	1.976e-002
874	29.1	28.17	6.e-002	6.e-002	2.372e-002
875	29.13	28.2	6.e-002	6.e-002	2.372e-002
876	29.17	28.24	5.e-002	5.e-002	1.976e-002
877	29.2	28.27	6.e-002	6.e-002	2.372e-002
878	29.23	28.3	6.e-002	6.e-002	2.372e-002
879	29.27	28.34	5.e-002	5.e-002	1.976e-002
880	29.3	28.37	5.e-002	5.e-002	1.976e-002
881	29.33	28.4	6.e-002	6.e-002	2.372e-002
882	29.37	28.44	5.e-002	5.e-002	1.976e-002
883	29.4	28.47	5.e-002	5.e-002	1.976e-002
884	29.43	28.5	6.e-002	6.e-002	2.372e-002
885	29.47	28.54	6.e-002	6.e-002	2.372e-002
886	29.5	28.57	6.e-002	6.e-002	2.372e-002
887	29.53	28.6	5.e-002	5.e-002	1.976e-002

888	29.57	28.64	6.e-002	6.e-002	2.372e-002
889	29.6	28.67	5.e-002	5.e-002	1.976e-002
890	29.63	28.7	5.e-002	5.e-002	1.976e-002
891	29.67	28.74	6.e-002	6.e-002	2.372e-002
892	29.7	28.77	6.e-002	6.e-002	2.372e-002
893	29.73	28.8	6.e-002	6.e-002	2.372e-002
894	29.77	28.84	6.e-002	6.e-002	2.372e-002
895	29.8	28.87	5.e-002	5.e-002	1.976e-002
896	29.83	28.9	6.e-002	6.e-002	2.372e-002
897	29.87	28.94	5.e-002	5.e-002	1.976e-002
898	29.9	28.97	5.e-002	5.e-002	1.976e-002
899	29.93	29.	6.e-002	6.e-002	2.372e-002
900	29.97	29.04	5.e-002	5.e-002	1.976e-002
901	30.	29.07	6.e-002	6.e-002	2.372e-002
902	30.03	29.1	6.e-002	6.e-002	2.372e-002
903	30.07	29.14	5.e-002	5.e-002	1.976e-002
904	30.1	29.17	4.e-002	4.e-002	1.581e-002
905	30.13	29.2	5.e-002	5.e-002	1.976e-002
906	30.17	29.24	5.e-002	5.e-002	1.976e-002
907	30.2	29.27	5.e-002	5.e-002	1.976e-002
908	30.23	29.3	6.e-002	6.e-002	2.372e-002
909	30.27	29.34	5.e-002	5.e-002	1.976e-002
910	30.3	29.37	4.e-002	4.e-002	1.581e-002
911	30.33	29.4	5.e-002	5.e-002	1.976e-002
912	30.37	29.44	5.e-002	5.e-002	1.976e-002
913	30.4	29.47	5.e-002	5.e-002	1.976e-002
914	30.43	29.5	5.e-002	5.e-002	1.976e-002
915	30.47	29.54	4.e-002	4.e-002	1.581e-002
916	30.5	29.57	5.e-002	5.e-002	1.976e-002
917	30.53	29.6	5.e-002	5.e-002	1.976e-002
918	30.57	29.64	5.e-002	5.e-002	1.976e-002
919	30.6	29.67	5.e-002	5.e-002	1.976e-002
920	30.63	29.7	6.e-002	6.e-002	2.372e-002
921	30.67	29.74	6.e-002	6.e-002	2.372e-002
922	30.7	29.77	5.e-002	5.e-002	1.976e-002
923	30.73	29.8	5.e-002	5.e-002	1.976e-002
924	30.77	29.84	5.e-002	5.e-002	1.976e-002
925	30.8	29.87	5.e-002	5.e-002	1.976e-002
926	30.83	29.9	5.e-002	5.e-002	1.976e-002
927	30.87	29.94	5.e-002	5.e-002	1.976e-002
928	30.9	29.97	5.e-002	5.e-002	1.976e-002
929	30.93	30.	5.e-002	5.e-002	1.976e-002
930	30.97	30.04	5.e-002	5.e-002	1.976e-002
931	31.	30.07	5.e-002	5.e-002	1.976e-002
932	31.03	30.1	6.e-002	6.e-002	2.372e-002
933	31.07	30.14	5.e-002	5.e-002	1.976e-002
934	31.1	30.17	5.e-002	5.e-002	1.976e-002
935	31.13	30.2	5.e-002	5.e-002	1.976e-002
936	31.17	30.24	4.e-002	4.e-002	1.581e-002
937	31.2	30.27	5.e-002	5.e-002	1.976e-002
938	31.23	30.3	5.e-002	5.e-002	1.976e-002
939	31.27	30.34	5.e-002	5.e-002	1.976e-002
940	31.3	30.37	5.e-002	5.e-002	1.976e-002
941	31.33	30.4	5.e-002	5.e-002	1.976e-002
942	31.37	30.44	5.e-002	5.e-002	1.976e-002
943	31.4	30.47	5.e-002	5.e-002	1.976e-002
944	31.43	30.5	5.e-002	5.e-002	1.976e-002

945	31.47	30.54	5.e-002	5.e-002	1.976e-002
946	31.5	30.57	5.e-002	5.e-002	1.976e-002
947	31.53	30.6	6.e-002	6.e-002	2.372e-002
948	31.57	30.64	5.e-002	5.e-002	1.976e-002
949	31.6	30.67	5.e-002	5.e-002	1.976e-002
950	31.63	30.7	5.e-002	5.e-002	1.976e-002
951	31.67	30.74	5.e-002	5.e-002	1.976e-002
952	31.7	30.77	5.e-002	5.e-002	1.976e-002
953	31.73	30.8	5.e-002	5.e-002	1.976e-002
954	31.77	30.84	4.e-002	4.e-002	1.581e-002
955	31.8	30.87	6.e-002	6.e-002	2.372e-002

Burke Co. JR Design Hydrogeo 2016 1/12/2016 **Arithmetic Graph**

John's River LF Phase 4 PZ-41 Falling Head 2



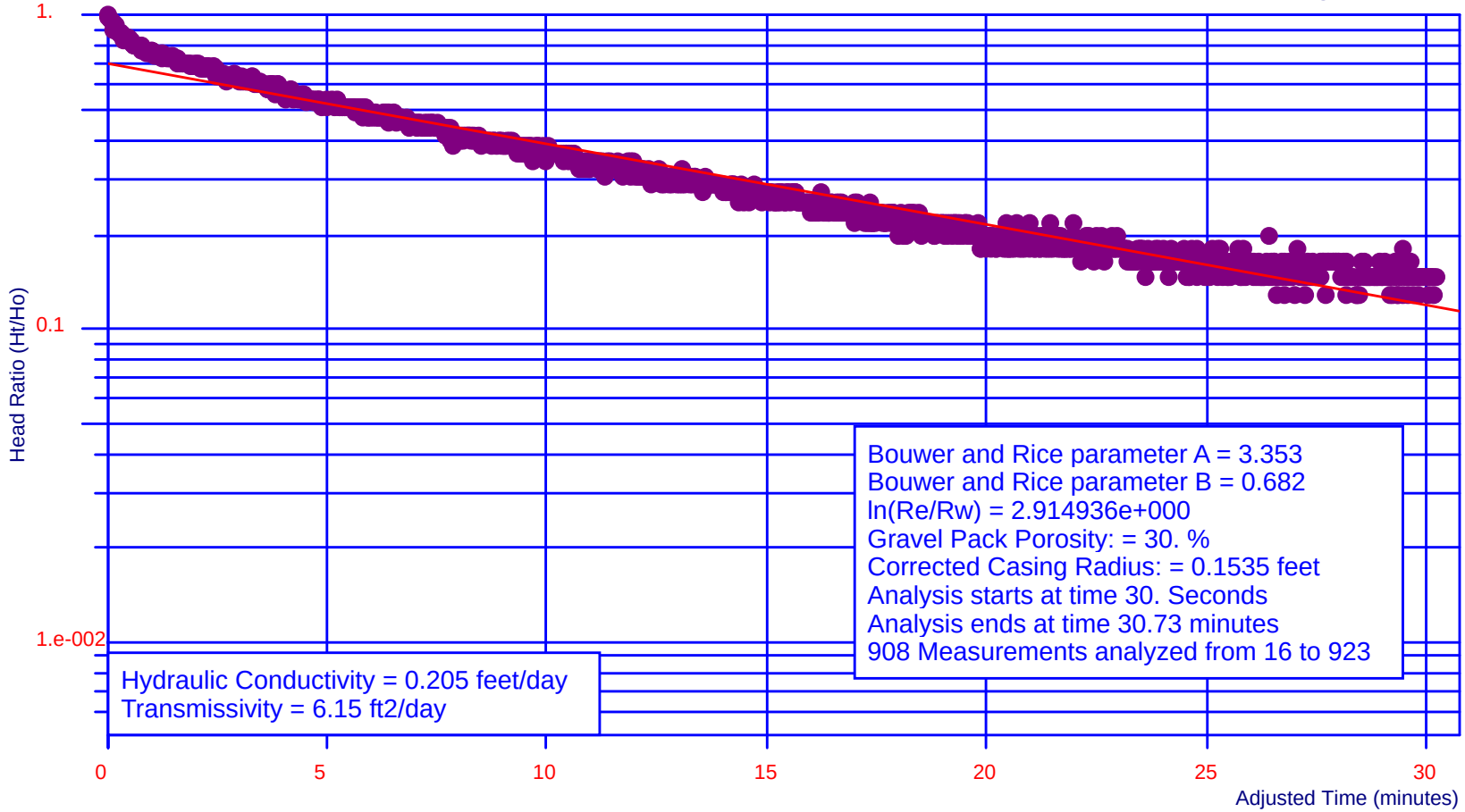
Project Number: 277.1602.12 for Burke County
Analysis by Starpoint Software

Burke Co. JR Design Hydrogeo 2016 1/12/2016

Bouwer and Rice Graph

John's River LF Phase 4

PZ-41 Falling Head 2



Ho is 0.55 feet at 30. Seconds

Project Number: 277.1602.12 for Burke County

Analysis by Starpoint Software

Bouwer and Rice Automatic Parameter Estimation

Burke Co. JR Design Hydrogeo 2016

Site Name:	John's River LF
Location:	Phase 4
Test Date:	1/12/2016
Client:	Burke County
Project Number:	277.1602.12

Well Label:	PZ-41 Falling Head 2
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	8.3e-002 feet
Effective Radius:	0.25 feet
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	0.1535 feet
Bouwer and Rice Parameter A	3.353
Bouwer and Rice Parameter B	0.682
Radius of Influence of Test	4.612 feet

Trial	Adjusted Time (minutes)	Head (feet)	Head Ratio	Hyd. Con. (feet/day)	Flow to Well (Cubic Feet/Day)
16	0.	0.55	0.5446	--	
17	3.e-002	0.54	0.5347	1.952	45.45
18	7.e-002	0.53	0.5248	1.689	38.59
19	1.e-001	0.53	0.5248	1.182	27.01
20	0.13	0.52	0.5149	1.377	30.87
21	0.17	0.5	0.495	1.789	38.57
22	0.2	0.51	0.505	1.205	26.49
23	0.23	0.5	0.495	1.323	28.51
24	0.27	0.49	0.4851	1.366	28.85
25	0.3	0.49	0.4851	1.229	25.96
26	0.33	0.48	0.4752	1.317	27.25
27	0.37	0.48	0.4752	1.174	24.3
28	0.4	0.46	0.4554	1.426	28.28
29	0.43	0.47	0.4653	1.167	23.64
30	0.47	0.47	0.4653	1.067	21.63
31	0.5	0.47	0.4653	1.003	20.33
32	0.53	0.46	0.4554	1.076	21.34
33	0.57	0.45	0.4455	1.124	21.8
34	0.6	0.44	0.4356	1.187	22.52
35	0.63	0.44	0.4356	1.131	21.44
36	0.67	0.44	0.4356	1.063	20.16
37	0.7	0.44	0.4356	1.017	19.3
38	0.73	0.44	0.4356	0.9756	18.51
39	0.77	0.44	0.4356	0.925	17.55
40	0.8	0.43	0.4257	0.982	18.2
41	0.83	0.43	0.4257	0.9465	17.55
42	0.87	0.43	0.4257	0.903	16.74
43	0.9	0.42	0.4158	0.9563	17.32
44	0.93	0.43	0.4257	0.8447	15.66
45	0.97	0.42	0.4158	0.8873	16.07
46	1.	0.43	0.4257	0.7856	14.56
47	1.03	0.43	0.4257	0.7627	14.14
48	1.07	0.42	0.4158	0.8044	14.56
49	1.1	0.41	0.4059	0.8524	15.07
50	1.13	0.42	0.4158	0.7617	13.79

51	1.17	0.41	0.4059	0.8014	14.16
52	1.2	0.41	0.4059	0.7813	13.81
53	1.23	0.42	0.4158	0.6998	12.67
54	1.27	0.4	0.396	0.8003	13.8
55	1.3	0.41	0.4059	0.7212	12.75
56	1.33	0.41	0.4059	0.705	12.46
57	1.37	0.4	0.396	0.7419	12.79
58	1.4	0.41	0.4059	0.6697	11.84
59	1.43	0.4	0.396	0.7108	12.26
60	1.47	0.41	0.4059	0.6378	11.27
61	1.5	0.4	0.396	0.6776	11.68
62	1.53	0.4	0.396	0.6643	11.46
63	1.57	0.4	0.396	0.6474	11.16
64	1.6	0.4	0.396	0.6353	10.95
65	1.63	0.39	0.3861	0.6732	11.32
66	1.67	0.39	0.3861	0.657	11.05
67	1.7	0.39	0.3861	0.6454	10.85
68	1.73	0.39	0.3861	0.6342	10.66
69	1.77	0.39	0.3861	0.6199	10.42
70	1.8	0.39	0.3861	0.6096	10.25
71	1.83	0.39	0.3861	0.5996	10.08
72	1.87	0.39	0.3861	0.5868	9.865
73	1.9	0.38	0.3762	0.6211	10.18
74	1.93	0.39	0.3861	0.5685	9.559
75	1.97	0.38	0.3762	0.5991	9.814
76	2.	0.39	0.3861	0.5486	9.224
77	2.03	0.38	0.3762	0.5814	9.524
78	2.07	0.38	0.3762	0.5701	9.34
79	2.1	0.39	0.3861	0.5225	8.785
80	2.13	0.37	0.3663	0.594	9.475
81	2.17	0.37	0.3663	0.5831	9.3
82	2.2	0.37	0.3663	0.5751	9.174
83	2.23	0.38	0.3762	0.5292	8.67
84	2.27	0.37	0.3663	0.5574	8.891
85	2.3	0.38	0.3762	0.5131	8.406
86	2.33	0.37	0.3663	0.543	8.662
87	2.37	0.37	0.3663	0.5339	8.516
88	2.4	0.38	0.3762	0.4917	8.055
89	2.43	0.37	0.3663	0.5207	8.305
90	2.47	0.37	0.3663	0.5123	8.171
91	2.5	0.35	0.3465	0.5771	8.707
92	2.53	0.36	0.3564	0.5347	8.298
93	2.57	0.35	0.3465	0.5613	8.47
94	2.6	0.36	0.3564	0.5203	8.075
95	2.63	0.35	0.3465	0.5485	8.277
96	2.67	0.36	0.3564	0.5066	7.863
97	2.7	0.35	0.3465	0.5343	8.062
98	2.73	0.34	0.3366	0.5623	8.242
99	2.77	0.35	0.3465	0.5208	7.858
100	2.8	0.35	0.3465	0.5152	7.774
101	2.83	0.35	0.3465	0.5098	7.692
102	2.87	0.36	0.3564	0.4713	7.315
103	2.9	0.36	0.3564	0.4665	7.239
104	2.93	0.35	0.3465	0.4924	7.429
105	2.97	0.35	0.3465	0.4857	7.329
106	3.	0.34	0.3366	0.5117	7.501
107	3.03	0.35	0.3465	0.4761	7.184

108	3.07	0.34	0.3366	0.5001	7.329
109	3.1	0.35	0.3465	0.4654	7.022
110	3.13	0.34	0.3366	0.4905	7.189
111	3.17	0.34	0.3366	0.4843	7.098
112	3.2	0.34	0.3366	0.4797	7.032
113	3.23	0.34	0.3366	0.4753	6.966
114	3.27	0.34	0.3366	0.4695	6.881
115	3.3	0.35	0.3465	0.4372	6.596
116	3.33	0.35	0.3465	0.4332	6.537
117	3.37	0.33	0.3267	0.4838	6.883
118	3.4	0.34	0.3366	0.4515	6.618
119	3.43	0.33	0.3267	0.4753	6.762
120	3.47	0.34	0.3366	0.4424	6.485
121	3.5	0.33	0.3267	0.4658	6.627
122	3.53	0.33	0.3267	0.4619	6.571
123	3.57	0.33	0.3267	0.4567	6.497
124	3.6	0.33	0.3267	0.4529	6.443
125	3.63	0.32	0.3168	0.4762	6.57
126	3.67	0.32	0.3168	0.471	6.498
127	3.7	0.33	0.3267	0.4407	6.269
128	3.73	0.33	0.3267	0.4371	6.219
129	3.77	0.33	0.3267	0.4325	6.153
130	3.8	0.33	0.3267	0.4291	6.104
131	3.83	0.31	0.3069	0.4778	6.385
132	3.87	0.33	0.3267	0.4213	5.994
133	3.9	0.33	0.3267	0.4181	5.948
134	3.93	0.31	0.3069	0.4656	6.223
135	3.97	0.32	0.3168	0.4354	6.007
136	4.	0.32	0.3168	0.4322	5.962
137	4.03	0.31	0.3069	0.4541	6.069
138	4.07	0.3	0.297	0.4753	6.148
139	4.1	0.31	0.3069	0.4463	5.965
140	4.13	0.31	0.3069	0.4431	5.922
141	4.17	0.32	0.3168	0.4145	5.719
142	4.2	0.31	0.3069	0.4357	5.823
143	4.23	0.3	0.297	0.4574	5.915
144	4.27	0.31	0.3069	0.4286	5.727
145	4.3	0.31	0.3069	0.4256	5.688
146	4.33	0.31	0.3069	0.4226	5.648
147	4.37	0.3	0.297	0.4427	5.726
148	4.4	0.31	0.3069	0.4159	5.558
149	4.43	0.3	0.297	0.4367	5.648
150	4.47	0.31	0.3069	0.4094	5.471
151	4.5	0.31	0.3069	0.4067	5.435
152	4.53	0.29	0.2871	0.451	5.638
153	4.57	0.3	0.297	0.4233	5.475
154	4.6	0.3	0.297	0.4206	5.439
155	4.63	0.3	0.297	0.4179	5.404
156	4.67	0.3	0.297	0.4143	5.358
157	4.7	0.29	0.2871	0.4346	5.434
158	4.73	0.3	0.297	0.409	5.29
159	4.77	0.3	0.297	0.4056	5.245
160	4.8	0.3	0.297	0.4031	5.213
161	4.83	0.3	0.297	0.4005	5.18
162	4.87	0.29	0.2871	0.4195	5.244
163	4.9	0.28	0.2772	0.4398	5.308
164	4.93	0.29	0.2871	0.4144	5.18

165	4.97	0.29	0.2871	0.411	5.139
166	5.	0.28	0.2772	0.431	5.202
167	5.03	0.3	0.297	0.3846	4.974
168	5.07	0.29	0.2871	0.4029	5.037
169	5.1	0.29	0.2871	0.4006	5.008
170	5.13	0.3	0.297	0.3771	4.877
171	5.17	0.28	0.2772	0.4168	5.031
172	5.2	0.29	0.2871	0.3929	4.911
173	5.23	0.3	0.297	0.3699	4.784
174	5.27	0.28	0.2772	0.4089	4.936
175	5.3	0.28	0.2772	0.4066	4.908
176	5.33	0.28	0.2772	0.4043	4.88
177	5.37	0.28	0.2772	0.4013	4.844
178	5.4	0.28	0.2772	0.399	4.817
179	5.43	0.28	0.2772	0.3968	4.79
180	5.47	0.28	0.2772	0.3939	4.755
181	5.5	0.28	0.2772	0.3918	4.729
182	5.53	0.28	0.2772	0.3897	4.704
183	5.57	0.28	0.2772	0.3869	4.67
184	5.6	0.28	0.2772	0.3848	4.645
185	5.63	0.27	0.2673	0.4034	4.695
186	5.67	0.28	0.2772	0.38	4.587
187	5.7	0.27	0.2673	0.3984	4.637
188	5.73	0.28	0.2772	0.3761	4.539
189	5.77	0.28	0.2772	0.3735	4.508
190	5.8	0.28	0.2772	0.3715	4.485
191	5.83	0.26	0.2574	0.4102	4.598
192	5.87	0.28	0.2772	0.3671	4.431
193	5.9	0.27	0.2673	0.3849	4.48
194	5.93	0.26	0.2574	0.4033	4.52
195	5.97	0.26	0.2574	0.4006	4.49
196	6.	0.26	0.2574	0.3986	4.467
197	6.03	0.27	0.2673	0.3766	4.384
198	6.07	0.26	0.2574	0.394	4.416
199	6.1	0.26	0.2574	0.392	4.394
200	6.13	0.27	0.2673	0.3705	4.312
201	6.17	0.26	0.2574	0.3876	4.344
202	6.2	0.26	0.2574	0.3857	4.323
203	6.23	0.26	0.2574	0.3839	4.302
204	6.27	0.27	0.2673	0.3622	4.216
205	6.3	0.26	0.2574	0.3796	4.255
206	6.33	0.26	0.2574	0.3778	4.234
207	6.37	0.27	0.2673	0.3565	4.15
208	6.4	0.25	0.2475	0.3932	4.238
209	6.43	0.27	0.2673	0.3532	4.111
210	6.47	0.26	0.2574	0.3696	4.143
211	6.5	0.26	0.2574	0.3679	4.124
212	6.53	0.27	0.2673	0.3478	4.048
213	6.57	0.26	0.2574	0.364	4.08
214	6.6	0.25	0.2475	0.3813	4.109
215	6.63	0.26	0.2574	0.3607	4.043
216	6.67	0.26	0.2574	0.3585	4.019
217	6.7	0.26	0.2574	0.3569	4.001
218	6.73	0.26	0.2574	0.3553	3.983
219	6.77	0.25	0.2475	0.3717	4.006
220	6.8	0.25	0.2475	0.3701	3.989
221	6.83	0.26	0.2574	0.3501	3.924

222	6.87	0.25	0.2475	0.3663	3.948
223	6.9	0.24	0.2376	0.3836	3.969
224	6.93	0.25	0.2475	0.3631	3.914
225	6.97	0.25	0.2475	0.3611	3.891
226	7.	0.25	0.2475	0.3595	3.875
227	7.03	0.25	0.2475	0.358	3.858
228	7.07	0.24	0.2376	0.3744	3.874
229	7.1	0.25	0.2475	0.3544	3.82
230	7.13	0.25	0.2475	0.353	3.804
231	7.17	0.24	0.2376	0.3692	3.819
232	7.2	0.24	0.2376	0.3676	3.804
233	7.23	0.25	0.2475	0.3481	3.751
234	7.27	0.25	0.2475	0.3462	3.731
235	7.3	0.24	0.2376	0.3626	3.751
236	7.33	0.24	0.2376	0.3611	3.736
237	7.37	0.25	0.2475	0.3415	3.68
238	7.4	0.25	0.2475	0.3401	3.665
239	7.43	0.25	0.2475	0.3387	3.65
240	7.47	0.24	0.2376	0.3543	3.666
241	7.5	0.24	0.2376	0.3529	3.651
242	7.53	0.25	0.2475	0.3342	3.602
243	7.57	0.24	0.2376	0.3497	3.618
244	7.6	0.24	0.2376	0.3483	3.603
245	7.63	0.24	0.2376	0.3469	3.589
246	7.67	0.24	0.2376	0.3451	3.571
247	7.7	0.23	0.2277	0.3614	3.583
248	7.73	0.24	0.2376	0.3424	3.543
249	7.77	0.23	0.2277	0.3581	3.551
250	7.8	0.24	0.2376	0.3393	3.511
251	7.83	0.22	0.2178	0.3735	3.542
252	7.87	0.21	0.2079	0.3905	3.535
253	7.9	0.23	0.2277	0.3522	3.493
254	7.93	0.22	0.2178	0.3688	3.498
255	7.97	0.23	0.2277	0.3491	3.462
256	8.	0.23	0.2277	0.3478	3.449
257	8.03	0.22	0.2178	0.3642	3.454
258	8.07	0.23	0.2277	0.3448	3.419
259	8.1	0.23	0.2277	0.3435	3.406
260	8.13	0.22	0.2178	0.3597	3.412
261	8.17	0.23	0.2277	0.3406	3.377
262	8.2	0.23	0.2277	0.3394	3.365
263	8.23	0.23	0.2277	0.3381	3.353
264	8.27	0.22	0.2178	0.3536	3.354
265	8.3	0.23	0.2277	0.3353	3.324
266	8.33	0.23	0.2277	0.3341	3.312
267	8.37	0.22	0.2178	0.3494	3.314
268	8.4	0.22	0.2178	0.3482	3.302
269	8.43	0.23	0.2277	0.3301	3.273
270	8.47	0.22	0.2178	0.3453	3.275
271	8.5	0.21	0.2079	0.3615	3.273
272	8.53	0.22	0.2178	0.3429	3.252
273	8.57	0.22	0.2178	0.3413	3.237
274	8.6	0.22	0.2178	0.3401	3.225
275	8.63	0.22	0.2178	0.3389	3.214
276	8.67	0.22	0.2178	0.3373	3.199
277	8.7	0.22	0.2178	0.3362	3.188
278	8.73	0.22	0.2178	0.335	3.177

279	8.77	0.21	0.2079	0.3504	3.172
280	8.8	0.22	0.2178	0.3323	3.152
281	8.83	0.22	0.2178	0.3312	3.141
282	8.87	0.21	0.2079	0.3465	3.137
283	8.9	0.22	0.2178	0.3286	3.117
284	8.93	0.22	0.2178	0.3275	3.106
285	8.97	0.22	0.2178	0.326	3.092
286	9.	0.21	0.2079	0.3415	3.091
287	9.03	0.21	0.2079	0.3403	3.081
288	9.07	0.21	0.2079	0.3388	3.067
289	9.1	0.22	0.2178	0.3214	3.048
290	9.13	0.21	0.2079	0.3366	3.047
291	9.17	0.22	0.2178	0.3189	3.025
292	9.2	0.21	0.2079	0.334	3.024
293	9.23	0.22	0.2178	0.3169	3.005
294	9.27	0.21	0.2079	0.3315	3.001
295	9.3	0.21	0.2079	0.3304	2.992
296	9.33	0.2	0.198	0.3461	2.984
297	9.37	0.21	0.2079	0.328	2.969
298	9.4	0.2	0.198	0.3435	2.962
299	9.43	0.2	0.198	0.3424	2.952
300	9.47	0.21	0.2079	0.3245	2.938
301	9.5	0.21	0.2079	0.3235	2.929
302	9.53	0.2	0.198	0.3388	2.921
303	9.57	0.21	0.2079	0.3211	2.907
304	9.6	0.21	0.2079	0.3201	2.898
305	9.63	0.21	0.2079	0.3191	2.889
306	9.67	0.2	0.198	0.3339	2.879
307	9.7	0.19	0.1881	0.3497	2.865
308	9.73	0.2	0.198	0.3318	2.861
309	9.77	0.21	0.2079	0.3145	2.848
310	9.8	0.21	0.2079	0.3136	2.839
311	9.83	0.21	0.2079	0.3126	2.83
312	9.87	0.2	0.198	0.3271	2.821
313	9.9	0.2	0.198	0.3261	2.812
314	9.93	0.21	0.2079	0.3095	2.802
315	9.97	0.2	0.198	0.3239	2.792
316	10.	0.19	0.1881	0.3393	2.779
317	10.03	0.21	0.2079	0.3064	2.774
318	10.07	0.2	0.198	0.3206	2.765
319	10.1	0.2	0.198	0.3197	2.756
320	10.13	0.2	0.198	0.3187	2.748
321	10.17	0.2	0.198	0.3175	2.737
322	10.2	0.2	0.198	0.3165	2.729
323	10.23	0.2	0.198	0.3156	2.721
324	10.27	0.2	0.198	0.3144	2.711
325	10.3	0.2	0.198	0.3135	2.703
326	10.33	0.2	0.198	0.3126	2.695
327	10.37	0.2	0.198	0.3114	2.685
328	10.4	0.19	0.1881	0.3262	2.672
329	10.43	0.2	0.198	0.3096	2.669
330	10.47	0.2	0.198	0.3084	2.659
331	10.5	0.2	0.198	0.3075	2.651
332	10.53	0.19	0.1881	0.3222	2.639
333	10.57	0.2	0.198	0.3055	2.634
334	10.6	0.19	0.1881	0.32	2.622
335	10.63	0.2	0.198	0.3037	2.619

336	10.67	0.19	0.1881	0.3179	2.604
337	10.7	0.19	0.1881	0.3171	2.597
338	10.73	0.19	0.1881	0.3162	2.59
339	10.77	0.18	0.1782	0.331	2.569
340	10.8	0.18	0.1782	0.3301	2.562
341	10.83	0.18	0.1782	0.3292	2.554
342	10.87	0.19	0.1881	0.3121	2.556
343	10.9	0.19	0.1881	0.3112	2.549
344	10.93	0.18	0.1782	0.3262	2.531
345	10.97	0.18	0.1782	0.325	2.522
346	11.	0.18	0.1782	0.3241	2.515
347	11.03	0.19	0.1881	0.3076	2.519
348	11.07	0.19	0.1881	0.3065	2.51
349	11.1	0.19	0.1881	0.3056	2.503
350	11.13	0.19	0.1881	0.3048	2.497
351	11.17	0.18	0.1782	0.3192	2.477
352	11.2	0.19	0.1881	0.3029	2.481
353	11.23	0.18	0.1782	0.3175	2.463
354	11.27	0.19	0.1881	0.301	2.466
355	11.3	0.18	0.1782	0.3155	2.448
356	11.33	0.17	0.1683	0.3308	2.424
357	11.37	0.18	0.1782	0.3136	2.433
358	11.4	0.19	0.1881	0.2976	2.438
359	11.43	0.19	0.1881	0.2968	2.431
360	11.47	0.18	0.1782	0.3108	2.412
361	11.5	0.18	0.1782	0.31	2.406
362	11.53	0.18	0.1782	0.3092	2.399
363	11.57	0.18	0.1782	0.3081	2.391
364	11.6	0.18	0.1782	0.3073	2.385
365	11.63	0.19	0.1881	0.2917	2.389
366	11.67	0.18	0.1782	0.3055	2.371
367	11.7	0.18	0.1782	0.3047	2.364
368	11.73	0.17	0.1683	0.3195	2.341
369	11.77	0.18	0.1782	0.3029	2.35
370	11.8	0.18	0.1782	0.3021	2.344
371	11.83	0.18	0.1782	0.3014	2.339
372	11.87	0.19	0.1881	0.2858	2.341
373	11.9	0.17	0.1683	0.3149	2.308
374	11.93	0.19	0.1881	0.2844	2.329
375	11.97	0.19	0.1881	0.2834	2.321
376	12.	0.18	0.1782	0.2971	2.305
377	12.03	0.17	0.1683	0.3115	2.283
378	12.07	0.17	0.1683	0.3105	2.275
379	12.1	0.18	0.1782	0.2946	2.286
380	12.13	0.18	0.1782	0.2939	2.281
381	12.17	0.17	0.1683	0.3079	2.257
382	12.2	0.17	0.1683	0.3072	2.251
383	12.23	0.18	0.1782	0.2915	2.262
384	12.27	0.17	0.1683	0.3054	2.238
385	12.3	0.17	0.1683	0.3047	2.233
386	12.33	0.18	0.1782	0.2891	2.244
387	12.37	0.16	0.1584	0.3186	2.198
388	12.4	0.17	0.1683	0.3022	2.215
389	12.43	0.17	0.1683	0.3015	2.21
390	12.47	0.17	0.1683	0.3005	2.202
391	12.5	0.17	0.1683	0.2998	2.197
392	12.53	0.17	0.1683	0.2991	2.192

393	12.57	0.18	0.1782	0.2836	2.201
394	12.6	0.16	0.1584	0.3128	2.157
395	12.63	0.17	0.1683	0.2967	2.175
396	12.67	0.17	0.1683	0.2958	2.168
397	12.7	0.16	0.1584	0.3103	2.14
398	12.73	0.17	0.1683	0.2944	2.157
399	12.77	0.16	0.1584	0.3086	2.129
400	12.8	0.17	0.1683	0.2928	2.146
401	12.83	0.17	0.1683	0.2921	2.141
402	12.87	0.16	0.1584	0.3062	2.112
403	12.9	0.17	0.1683	0.2905	2.129
404	12.93	0.17	0.1683	0.2898	2.124
405	12.97	0.16	0.1584	0.3039	2.096
406	13.	0.17	0.1683	0.2883	2.113
407	13.03	0.16	0.1584	0.3025	2.086
408	13.07	0.16	0.1584	0.3015	2.08
409	13.1	0.18	0.1782	0.2721	2.112
410	13.13	0.16	0.1584	0.3002	2.07
411	13.17	0.17	0.1683	0.2845	2.085
412	13.2	0.17	0.1683	0.2839	2.081
413	13.23	0.16	0.1584	0.2979	2.055
414	13.27	0.17	0.1683	0.2824	2.07
415	13.3	0.17	0.1683	0.2818	2.065
416	13.33	0.16	0.1584	0.2957	2.039
417	13.37	0.17	0.1683	0.2803	2.054
418	13.4	0.17	0.1683	0.2797	2.05
419	13.43	0.16	0.1584	0.2934	2.024
420	13.47	0.16	0.1584	0.2926	2.018
421	13.5	0.16	0.1584	0.2919	2.014
422	13.53	0.16	0.1584	0.2913	2.009
423	13.57	0.15	0.1485	0.3056	1.976
424	13.6	0.17	0.1683	0.2756	2.019
425	13.63	0.16	0.1584	0.2891	1.994
426	13.67	0.16	0.1584	0.2883	1.989
427	13.7	0.16	0.1584	0.2877	1.984
428	13.73	0.16	0.1584	0.287	1.98
429	13.77	0.16	0.1584	0.2862	1.974
430	13.8	0.16	0.1584	0.2856	1.97
431	13.83	0.16	0.1584	0.285	1.966
432	13.87	0.16	0.1584	0.2841	1.96
433	13.9	0.16	0.1584	0.2835	1.956
434	13.93	0.16	0.1584	0.2829	1.951
435	13.97	0.16	0.1584	0.2821	1.946
436	14.	0.16	0.1584	0.2815	1.942
437	14.03	0.15	0.1485	0.2956	1.911
438	14.07	0.15	0.1485	0.2947	1.906
439	14.1	0.15	0.1485	0.2941	1.902
440	14.13	0.15	0.1485	0.2935	1.898
441	14.17	0.16	0.1584	0.2781	1.918
442	14.2	0.16	0.1584	0.2775	1.914
443	14.23	0.16	0.1584	0.277	1.91
444	14.27	0.16	0.1584	0.2762	1.905
445	14.3	0.15	0.1485	0.29	1.875
446	14.33	0.15	0.1485	0.2894	1.871
447	14.37	0.14	0.1386	0.3039	1.834
448	14.4	0.16	0.1584	0.2737	1.888
449	14.43	0.15	0.1485	0.2874	1.858

450	14.47	0.14	0.1386	0.3018	1.822
451	14.5	0.15	0.1485	0.286	1.849
452	14.53	0.15	0.1485	0.2854	1.846
453	14.57	0.15	0.1485	0.2846	1.841
454	14.6	0.14	0.1386	0.2991	1.805
455	14.63	0.15	0.1485	0.2835	1.833
456	14.67	0.15	0.1485	0.2827	1.828
457	14.7	0.16	0.1584	0.2681	1.849
458	14.73	0.15	0.1485	0.2815	1.821
459	14.77	0.15	0.1485	0.2808	1.816
460	14.8	0.15	0.1485	0.2802	1.812
461	14.83	0.15	0.1485	0.2796	1.808
462	14.87	0.15	0.1485	0.2789	1.803
463	14.9	0.14	0.1386	0.2931	1.769
464	14.93	0.15	0.1485	0.2778	1.796
465	14.97	0.15	0.1485	0.277	1.791
466	15.	0.15	0.1485	0.2765	1.788
467	15.03	0.15	0.1485	0.2759	1.784
468	15.07	0.14	0.1386	0.2898	1.749
469	15.1	0.15	0.1485	0.2746	1.776
470	15.13	0.15	0.1485	0.2741	1.772
471	15.17	0.14	0.1386	0.2879	1.738
472	15.2	0.14	0.1386	0.2873	1.734
473	15.23	0.14	0.1386	0.2868	1.731
474	15.27	0.15	0.1485	0.2716	1.756
475	15.3	0.14	0.1386	0.2854	1.723
476	15.33	0.15	0.1485	0.2705	1.749
477	15.37	0.15	0.1485	0.2698	1.745
478	15.4	0.14	0.1386	0.2836	1.712
479	15.43	0.14	0.1386	0.283	1.708
480	15.47	0.15	0.1485	0.2681	1.733
481	15.5	0.15	0.1485	0.2675	1.73
482	15.53	0.14	0.1386	0.2812	1.697
483	15.57	0.15	0.1485	0.2663	1.722
484	15.6	0.15	0.1485	0.2658	1.719
485	15.63	0.15	0.1485	0.2653	1.716
486	15.67	0.15	0.1485	0.2646	1.711
487	15.7	0.14	0.1386	0.2782	1.679
488	15.73	0.14	0.1386	0.2776	1.676
489	15.77	0.14	0.1386	0.2769	1.671
490	15.8	0.14	0.1386	0.2764	1.668
491	15.83	0.14	0.1386	0.2759	1.665
492	15.87	0.14	0.1386	0.2752	1.661
493	15.9	0.14	0.1386	0.2747	1.658
494	15.93	0.14	0.1386	0.2742	1.655
495	15.97	0.14	0.1386	0.2735	1.65
496	16.	0.13	0.1287	0.2877	1.613
497	16.03	0.14	0.1386	0.2724	1.644
498	16.07	0.13	0.1287	0.2865	1.606
499	16.1	0.14	0.1386	0.2713	1.637
500	16.13	0.13	0.1287	0.2854	1.6
501	16.17	0.13	0.1287	0.2847	1.596
502	16.2	0.14	0.1386	0.2696	1.627
503	16.23	0.14	0.1386	0.2691	1.624
504	16.27	0.15	0.1485	0.2549	1.648
505	16.3	0.14	0.1386	0.2679	1.617
506	16.33	0.13	0.1287	0.2819	1.58

507	16.37	0.13	0.1287	0.2812	1.576
508	16.4	0.13	0.1287	0.2807	1.573
509	16.43	0.13	0.1287	0.2802	1.57
510	16.47	0.14	0.1386	0.2652	1.6
511	16.5	0.14	0.1386	0.2647	1.597
512	16.53	0.13	0.1287	0.2785	1.561
513	16.57	0.14	0.1386	0.2636	1.591
514	16.6	0.13	0.1287	0.2773	1.554
515	16.63	0.14	0.1386	0.2626	1.585
516	16.67	0.13	0.1287	0.2762	1.548
517	16.7	0.13	0.1287	0.2757	1.545
518	16.73	0.14	0.1386	0.261	1.575
519	16.77	0.13	0.1287	0.2745	1.539
520	16.8	0.13	0.1287	0.274	1.536
521	16.83	0.13	0.1287	0.2735	1.533
522	16.87	0.13	0.1287	0.2729	1.529
523	16.9	0.13	0.1287	0.2724	1.527
524	16.93	0.13	0.1287	0.2719	1.524
525	16.97	0.13	0.1287	0.2713	1.52
526	17.	0.14	0.1386	0.2569	1.55
527	17.03	0.12	0.1188	0.2853	1.476
528	17.07	0.14	0.1386	0.2558	1.544
529	17.1	0.13	0.1287	0.2692	1.509
530	17.13	0.13	0.1287	0.2688	1.506
531	17.17	0.13	0.1287	0.2681	1.503
532	17.2	0.13	0.1287	0.2677	1.5
533	17.23	0.12	0.1188	0.282	1.459
534	17.27	0.13	0.1287	0.2666	1.494
535	17.3	0.12	0.1188	0.2809	1.453
536	17.33	0.14	0.1386	0.252	1.521
537	17.37	0.12	0.1188	0.2797	1.447
538	17.4	0.12	0.1188	0.2793	1.445
539	17.43	0.12	0.1188	0.2788	1.442
540	17.47	0.13	0.1287	0.2635	1.477
541	17.5	0.12	0.1188	0.2777	1.436
542	17.53	0.13	0.1287	0.2626	1.472
543	17.57	0.13	0.1287	0.262	1.468
544	17.6	0.13	0.1287	0.2616	1.466
545	17.63	0.12	0.1188	0.2756	1.426
546	17.67	0.13	0.1287	0.2605	1.46
547	17.7	0.12	0.1188	0.2745	1.42
548	17.73	0.12	0.1188	0.2741	1.418
549	17.77	0.13	0.1287	0.2591	1.452
550	17.8	0.13	0.1287	0.2586	1.449
551	17.83	0.12	0.1188	0.2725	1.41
552	17.87	0.13	0.1287	0.2576	1.444
553	17.9	0.13	0.1287	0.2572	1.441
554	17.93	0.12	0.1188	0.271	1.402
555	17.97	0.12	0.1188	0.2704	1.399
556	18.	0.11	0.1089	0.2854	1.353
557	18.03	0.13	0.1287	0.2553	1.431
558	18.07	0.12	0.1188	0.2689	1.391
559	18.1	0.11	0.1089	0.2838	1.346
560	18.13	0.12	0.1188	0.268	1.387
561	18.17	0.12	0.1188	0.2674	1.383
562	18.2	0.11	0.1089	0.2823	1.338
563	18.23	0.13	0.1287	0.2525	1.415

564	18.27	0.12	0.1188	0.266	1.376
565	18.3	0.13	0.1287	0.2516	1.41
566	18.33	0.13	0.1287	0.2512	1.408
567	18.37	0.12	0.1188	0.2645	1.368
568	18.4	0.12	0.1188	0.2641	1.366
569	18.43	0.12	0.1188	0.2637	1.364
570	18.47	0.13	0.1287	0.2493	1.397
571	18.5	0.11	0.1089	0.2777	1.317
572	18.53	0.12	0.1188	0.2622	1.357
573	18.57	0.12	0.1188	0.2617	1.354
574	18.6	0.12	0.1188	0.2612	1.352
575	18.63	0.12	0.1188	0.2608	1.349
576	18.67	0.12	0.1188	0.2603	1.346
577	18.7	0.12	0.1188	0.2599	1.344
578	18.73	0.12	0.1188	0.2594	1.342
579	18.77	0.12	0.1188	0.2589	1.339
580	18.8	0.11	0.1089	0.2732	1.296
581	18.83	0.11	0.1089	0.2728	1.294
582	18.87	0.12	0.1188	0.2575	1.332
583	18.9	0.12	0.1188	0.2571	1.33
584	18.93	0.12	0.1188	0.2567	1.328
585	18.97	0.12	0.1188	0.2562	1.325
586	19.	0.12	0.1188	0.2557	1.323
587	19.03	0.11	0.1089	0.2699	1.28
588	19.07	0.12	0.1188	0.2548	1.318
589	19.1	0.11	0.1089	0.269	1.275
590	19.13	0.12	0.1188	0.254	1.314
591	19.17	0.12	0.1188	0.2535	1.311
592	19.2	0.12	0.1188	0.2531	1.309
593	19.23	0.11	0.1089	0.2671	1.267
594	19.27	0.12	0.1188	0.2522	1.305
595	19.3	0.12	0.1188	0.2518	1.302
596	19.33	0.11	0.1089	0.2658	1.26
597	19.37	0.12	0.1188	0.2509	1.298
598	19.4	0.12	0.1188	0.2505	1.296
599	19.43	0.11	0.1089	0.2644	1.254
600	19.47	0.11	0.1089	0.2638	1.251
601	19.5	0.12	0.1188	0.2492	1.289
602	19.53	0.12	0.1188	0.2488	1.287
603	19.57	0.12	0.1188	0.2483	1.285
604	19.6	0.11	0.1089	0.2621	1.243
605	19.63	0.11	0.1089	0.2617	1.241
606	19.67	0.11	0.1089	0.2612	1.238
607	19.7	0.11	0.1089	0.2608	1.237
608	19.73	0.11	0.1089	0.2604	1.235
609	19.77	0.11	0.1089	0.2598	1.232
610	19.8	0.11	0.1089	0.2594	1.23
611	19.83	0.12	0.1188	0.245	1.268
612	19.87	0.1	9.901e-002	0.2738	1.181
613	19.9	0.1	9.901e-002	0.2734	1.179
614	19.93	0.11	0.1089	0.2578	1.222
615	19.97	0.1	9.901e-002	0.2725	1.175
616	20.	0.11	0.1089	0.2568	1.218
617	20.03	0.11	0.1089	0.2565	1.216
618	20.07	0.11	0.1089	0.256	1.214
619	20.1	0.1	9.901e-002	0.2707	1.167
620	20.13	0.11	0.1089	0.2552	1.21

621	20.17	0.11	0.1089	0.2547	1.208
622	20.2	0.1	9.901e-002	0.2694	1.161
623	20.23	0.1	9.901e-002	0.269	1.16
624	20.27	0.11	0.1089	0.2534	1.202
625	20.3	0.11	0.1089	0.2531	1.2
626	20.33	0.11	0.1089	0.2527	1.198
627	20.37	0.11	0.1089	0.2522	1.196
628	20.4	0.1	9.901e-002	0.2667	1.15
629	20.43	0.1	9.901e-002	0.2663	1.148
630	20.47	0.12	0.1188	0.2374	1.228
631	20.5	0.1	9.901e-002	0.2654	1.144
632	20.53	0.1	9.901e-002	0.265	1.143
633	20.57	0.1	9.901e-002	0.2645	1.14
634	20.6	0.11	0.1089	0.2494	1.183
635	20.63	0.1	9.901e-002	0.2638	1.137
636	20.67	0.12	0.1188	0.2351	1.216
637	20.7	0.11	0.1089	0.2482	1.177
638	20.73	0.1	9.901e-002	0.2625	1.132
639	20.77	0.11	0.1089	0.2473	1.173
640	20.8	0.1	9.901e-002	0.2616	1.128
641	20.83	0.11	0.1089	0.2466	1.169
642	20.87	0.1	9.901e-002	0.2607	1.124
643	20.9	0.11	0.1089	0.2458	1.166
644	20.93	0.11	0.1089	0.2454	1.164
645	20.97	0.12	0.1188	0.2317	1.199
646	21.	0.1	9.901e-002	0.2591	1.117
647	21.03	0.11	0.1089	0.2443	1.158
648	21.07	0.11	0.1089	0.2438	1.156
649	21.1	0.1	9.901e-002	0.2579	1.112
650	21.13	0.1	9.901e-002	0.2575	1.11
651	21.17	0.11	0.1089	0.2427	1.151
652	21.2	0.1	9.901e-002	0.2567	1.106
653	21.23	0.1	9.901e-002	0.2563	1.105
654	21.27	0.11	0.1089	0.2415	1.145
655	21.3	0.11	0.1089	0.2412	1.144
656	21.33	0.1	9.901e-002	0.2551	1.1
657	21.37	0.11	0.1089	0.2404	1.14
658	21.4	0.1	9.901e-002	0.2543	1.096
659	21.43	0.1	9.901e-002	0.2539	1.095
660	21.47	0.12	0.1188	0.2263	1.171
661	21.5	0.11	0.1089	0.2389	1.133
662	21.53	0.1	9.901e-002	0.2527	1.09
663	21.57	0.11	0.1089	0.2382	1.129
664	21.6	0.1	9.901e-002	0.2519	1.086
665	21.63	0.11	0.1089	0.2375	1.126
666	21.67	0.11	0.1089	0.2371	1.124
667	21.7	0.1	9.901e-002	0.2507	1.081
668	21.73	0.1	9.901e-002	0.2504	1.079
669	21.77	0.1	9.901e-002	0.2499	1.077
670	21.8	0.1	9.901e-002	0.2496	1.076
671	21.83	0.1	9.901e-002	0.2493	1.075
672	21.87	0.1	9.901e-002	0.2488	1.073
673	21.9	0.1	9.901e-002	0.2485	1.071
674	21.93	0.1	9.901e-002	0.2481	1.07
675	21.97	0.11	0.1089	0.2338	1.109
676	22.	0.12	0.1188	0.2209	1.143
677	22.03	0.1	9.901e-002	0.247	1.065

678	22.07	0.1	9.901e-002	0.2465	1.063
679	22.1	0.1	9.901e-002	0.2462	1.061
680	22.13	9.e-002	8.911e-002	0.2611	1.013
681	22.17	0.1	9.901e-002	0.2454	1.058
682	22.2	0.1	9.901e-002	0.2451	1.057
683	22.23	0.1	9.901e-002	0.2448	1.055
684	22.27	0.11	0.1089	0.2307	1.094
685	22.3	0.1	9.901e-002	0.244	1.052
686	22.33	0.11	0.1089	0.23	1.091
687	22.37	0.1	9.901e-002	0.2432	1.049
688	22.4	0.1	9.901e-002	0.2429	1.047
689	22.43	9.e-002	8.911e-002	0.2576	0.9994
690	22.47	0.1	9.901e-002	0.2422	1.044
691	22.5	0.1	9.901e-002	0.2418	1.043
692	22.53	0.11	0.1089	0.228	1.081
693	22.57	0.1	9.901e-002	0.2411	1.039
694	22.6	0.1	9.901e-002	0.2408	1.038
695	22.63	0.11	0.1089	0.227	1.076
696	22.67	9.e-002	8.911e-002	0.2549	0.9888
697	22.7	0.1	9.901e-002	0.2397	1.033
698	22.73	0.1	9.901e-002	0.2394	1.032
699	22.77	0.1	9.901e-002	0.239	1.03
700	22.8	0.1	9.901e-002	0.2386	1.029
701	22.83	0.1	9.901e-002	0.2383	1.027
702	22.87	0.11	0.1089	0.2246	1.065
703	22.9	0.1	9.901e-002	0.2376	1.024
704	22.93	0.1	9.901e-002	0.2373	1.023
705	22.97	0.1	9.901e-002	0.2369	1.021
706	23.	0.11	0.1089	0.2233	1.059
707	23.03	0.1	9.901e-002	0.2363	1.019
708	23.07	0.1	9.901e-002	0.2359	1.017
709	23.1	0.1	9.901e-002	0.2355	1.015
710	23.13	0.1	9.901e-002	0.2352	1.014
711	23.17	0.1	9.901e-002	0.2348	1.012
712	23.2	9.e-002	8.911e-002	0.249	0.9662
713	23.23	0.1	9.901e-002	0.2342	1.01
714	23.27	9.e-002	8.911e-002	0.2483	0.9633
715	23.3	9.e-002	8.911e-002	0.248	0.9621
716	23.33	9.e-002	8.911e-002	0.2476	0.9608
717	23.37	9.e-002	8.911e-002	0.2472	0.9592
718	23.4	9.e-002	8.911e-002	0.2469	0.958
719	23.43	9.e-002	8.911e-002	0.2466	0.9567
720	23.47	0.1	9.901e-002	0.2318	0.9994
721	23.5	0.1	9.901e-002	0.2315	0.9982
722	23.53	0.1	9.901e-002	0.2312	0.9969
723	23.57	0.1	9.901e-002	0.2309	0.9952
724	23.6	8.e-002	7.921e-002	0.2607	0.8992
725	23.63	9.e-002	8.911e-002	0.2445	0.9486
726	23.67	9.e-002	8.911e-002	0.2441	0.947
727	23.7	0.1	9.901e-002	0.2296	0.9897
728	23.73	9.e-002	8.911e-002	0.2435	0.9446
729	23.77	9.e-002	8.911e-002	0.2431	0.943
730	23.8	9.e-002	8.911e-002	0.2428	0.9419
731	23.83	0.1	9.901e-002	0.2283	0.9843
732	23.87	9.e-002	8.911e-002	0.242	0.9391
733	23.9	0.1	9.901e-002	0.2277	0.9815
734	23.93	9.e-002	8.911e-002	0.2414	0.9367

735	23.97	9.e-002	8.911e-002	0.241	0.9352
736	24.	0.1	9.901e-002	0.2267	0.9774
737	24.03	9.e-002	8.911e-002	0.2404	0.9328
738	24.07	9.e-002	8.911e-002	0.24	0.9313
739	24.1	9.e-002	8.911e-002	0.2397	0.9301
740	24.13	9.e-002	8.911e-002	0.2394	0.929
741	24.17	8.e-002	7.921e-002	0.2546	0.878
742	24.2	9.e-002	8.911e-002	0.2387	0.9263
743	24.23	0.1	9.901e-002	0.2246	0.9681
744	24.27	9.e-002	8.911e-002	0.238	0.9236
745	24.3	9.e-002	8.911e-002	0.2378	0.9225
746	24.33	9.e-002	8.911e-002	0.2375	0.9213
747	24.37	9.e-002	8.911e-002	0.2371	0.9198
748	24.4	9.e-002	8.911e-002	0.2368	0.9187
749	24.43	9.e-002	8.911e-002	0.2365	0.9176
750	24.47	9.e-002	8.911e-002	0.2361	0.9161
751	24.5	0.1	9.901e-002	0.2221	0.9574
752	24.53	8.e-002	7.921e-002	0.2509	0.8651
753	24.57	9.e-002	8.911e-002	0.2351	0.9123
754	24.6	8.e-002	7.921e-002	0.2501	0.8627
755	24.63	8.e-002	7.921e-002	0.2498	0.8616
756	24.67	0.1	9.901e-002	0.2206	0.9508
757	24.7	9.e-002	8.911e-002	0.2339	0.9075
758	24.73	9.e-002	8.911e-002	0.2336	0.9064
759	24.77	8.e-002	7.921e-002	0.2484	0.8568
760	24.8	0.1	9.901e-002	0.2194	0.9458
761	24.83	9.e-002	8.911e-002	0.2327	0.9028
762	24.87	9.e-002	8.911e-002	0.2323	0.9013
763	24.9	9.e-002	8.911e-002	0.232	0.9002
764	24.93	9.e-002	8.911e-002	0.2317	0.8992
765	24.97	8.e-002	7.921e-002	0.2464	0.8499
766	25.	8.e-002	7.921e-002	0.2461	0.8489
767	25.03	9.e-002	8.911e-002	0.2308	0.8956
768	25.07	8.e-002	7.921e-002	0.2454	0.8465
769	25.1	9.e-002	8.911e-002	0.2302	0.8931
770	25.13	0.1	9.901e-002	0.2165	0.9334
771	25.17	9.e-002	8.911e-002	0.2295	0.8906
772	25.2	9.e-002	8.911e-002	0.2293	0.8895
773	25.23	8.e-002	7.921e-002	0.2439	0.8411
774	25.27	0.1	9.901e-002	0.2153	0.9283
775	25.3	9.e-002	8.911e-002	0.2284	0.886
776	25.33	0.1	9.901e-002	0.2148	0.9261
777	25.37	8.e-002	7.921e-002	0.2425	0.8365
778	25.4	9.e-002	8.911e-002	0.2275	0.8825
779	25.43	9.e-002	8.911e-002	0.2272	0.8815
780	25.47	8.e-002	7.921e-002	0.2416	0.8332
781	25.5	8.e-002	7.921e-002	0.2413	0.8322
782	25.53	9.e-002	8.911e-002	0.2263	0.878
783	25.57	8.e-002	7.921e-002	0.2406	0.83
784	25.6	9.e-002	8.911e-002	0.2257	0.8756
785	25.63	9.e-002	8.911e-002	0.2254	0.8746
786	25.67	9.e-002	8.911e-002	0.2251	0.8732
787	25.7	0.1	9.901e-002	0.2117	0.9127
788	25.73	9.e-002	8.911e-002	0.2245	0.8712
789	25.77	8.e-002	7.921e-002	0.2388	0.8235
790	25.8	8.e-002	7.921e-002	0.2385	0.8226
791	25.83	8.e-002	7.921e-002	0.2382	0.8216

792	25.87	0.1	9.901e-002	0.2103	0.9067
793	25.9	9.e-002	8.911e-002	0.2231	0.8655
794	25.93	8.e-002	7.921e-002	0.2373	0.8184
795	25.97	9.e-002	8.911e-002	0.2225	0.8632
796	26.	9.e-002	8.911e-002	0.2222	0.8622
797	26.03	9.e-002	8.911e-002	0.222	0.8612
798	26.07	8.e-002	7.921e-002	0.236	0.814
799	26.1	9.e-002	8.911e-002	0.2214	0.8589
800	26.13	8.e-002	7.921e-002	0.2355	0.8122
801	26.17	9.e-002	8.911e-002	0.2208	0.8566
802	26.2	8.e-002	7.921e-002	0.2349	0.81
803	26.23	8.e-002	7.921e-002	0.2346	0.8091
804	26.27	8.e-002	7.921e-002	0.2342	0.8078
805	26.3	8.e-002	7.921e-002	0.234	0.8069
806	26.33	8.e-002	7.921e-002	0.2337	0.806
807	26.37	9.e-002	8.911e-002	0.2191	0.8501
808	26.4	8.e-002	7.921e-002	0.2331	0.8039
809	26.43	0.11	0.1089	0.1944	0.9217
810	26.47	9.e-002	8.911e-002	0.2183	0.8468
811	26.5	8.e-002	7.921e-002	0.2322	0.8008
812	26.53	9.e-002	8.911e-002	0.2178	0.8449
813	26.57	9.e-002	8.911e-002	0.2174	0.8437
814	26.6	8.e-002	7.921e-002	0.2313	0.7978
815	26.63	7.e-002	6.931e-002	0.2471	0.7456
816	26.67	8.e-002	7.921e-002	0.2307	0.7957
817	26.7	9.e-002	8.911e-002	0.2164	0.8396
818	26.73	8.e-002	7.921e-002	0.2302	0.7939
819	26.77	7.e-002	6.931e-002	0.2458	0.7417
820	26.8	9.e-002	8.911e-002	0.2156	0.8364
821	26.83	8.e-002	7.921e-002	0.2293	0.791
822	26.87	8.e-002	7.921e-002	0.229	0.7898
823	26.9	9.e-002	8.911e-002	0.2148	0.8333
824	26.93	9.e-002	8.911e-002	0.2145	0.8324
825	26.97	8.e-002	7.921e-002	0.2282	0.7869
826	27.	9.e-002	8.911e-002	0.214	0.8302
827	27.03	7.e-002	6.931e-002	0.2434	0.7346
828	27.07	0.1	9.901e-002	0.201	0.8665
829	27.1	9.e-002	8.911e-002	0.2132	0.8272
830	27.13	8.e-002	7.921e-002	0.2268	0.7822
831	27.17	8.e-002	7.921e-002	0.2265	0.7811
832	27.2	8.e-002	7.921e-002	0.2262	0.7802
833	27.23	7.e-002	6.931e-002	0.2416	0.7292
834	27.27	8.e-002	7.921e-002	0.2256	0.7782
835	27.3	8.e-002	7.921e-002	0.2254	0.7774
836	27.33	9.e-002	8.911e-002	0.2114	0.8202
837	27.37	8.e-002	7.921e-002	0.2248	0.7754
838	27.4	8.e-002	7.921e-002	0.2246	0.7745
839	27.43	9.e-002	8.911e-002	0.2106	0.8172
840	27.47	8.e-002	7.921e-002	0.224	0.7725
841	27.5	8.e-002	7.921e-002	0.2238	0.7717
842	27.53	8.e-002	7.921e-002	0.2235	0.7709
843	27.57	8.e-002	7.921e-002	0.2232	0.7697
844	27.6	9.e-002	8.911e-002	0.2093	0.8122
845	27.63	9.e-002	8.911e-002	0.2091	0.8113
846	27.67	9.e-002	8.911e-002	0.2088	0.8101
847	27.7	7.e-002	6.931e-002	0.2375	0.7168
848	27.73	9.e-002	8.911e-002	0.2083	0.8084

849	27.77	9.e-002	8.911e-002	0.208	0.8072
850	27.8	9.e-002	8.911e-002	0.2078	0.8063
851	27.83	9.e-002	8.911e-002	0.2076	0.8055
852	27.87	9.e-002	8.911e-002	0.2073	0.8043
853	27.9	9.e-002	8.911e-002	0.2071	0.8034
854	27.93	9.e-002	8.911e-002	0.2069	0.8026
855	27.97	9.e-002	8.911e-002	0.2066	0.8014
856	28.	9.e-002	8.911e-002	0.2063	0.8006
857	28.03	9.e-002	8.911e-002	0.2061	0.7997
858	28.07	8.e-002	7.921e-002	0.2192	0.756
859	28.1	9.e-002	8.911e-002	0.2056	0.7977
860	28.13	8.e-002	7.921e-002	0.2187	0.7544
861	28.17	7.e-002	6.931e-002	0.2336	0.7048
862	28.2	9.e-002	8.911e-002	0.2049	0.7949
863	28.23	8.e-002	7.921e-002	0.218	0.7518
864	28.27	8.e-002	7.921e-002	0.2177	0.7507
865	28.3	8.e-002	7.921e-002	0.2174	0.7499
866	28.33	8.e-002	7.921e-002	0.2172	0.7491
867	28.37	8.e-002	7.921e-002	0.2169	0.748
868	28.4	7.e-002	6.931e-002	0.2317	0.6991
869	28.43	7.e-002	6.931e-002	0.2314	0.6984
870	28.47	7.e-002	6.931e-002	0.2311	0.6974
871	28.5	8.e-002	7.921e-002	0.2159	0.7446
872	28.53	9.e-002	8.911e-002	0.2025	0.7857
873	28.57	9.e-002	8.911e-002	0.2022	0.7846
874	28.6	8.e-002	7.921e-002	0.2152	0.742
875	28.63	8.e-002	7.921e-002	0.2149	0.7412
876	28.67	8.e-002	7.921e-002	0.2146	0.7402
877	28.7	8.e-002	7.921e-002	0.2144	0.7394
878	28.73	8.e-002	7.921e-002	0.2142	0.7387
879	28.77	8.e-002	7.921e-002	0.2139	0.7376
880	28.8	8.e-002	7.921e-002	0.2137	0.7369
881	28.83	8.e-002	7.921e-002	0.2134	0.7361
882	28.87	8.e-002	7.921e-002	0.2131	0.7351
883	28.9	8.e-002	7.921e-002	0.2129	0.7343
884	28.93	9.e-002	8.911e-002	0.1997	0.7748
885	28.97	8.e-002	7.921e-002	0.2124	0.7325
886	29.	8.e-002	7.921e-002	0.2122	0.7318
887	29.03	8.e-002	7.921e-002	0.212	0.731
888	29.07	9.e-002	8.911e-002	0.1987	0.7711
889	29.1	8.e-002	7.921e-002	0.2115	0.7293
890	29.13	8.e-002	7.921e-002	0.2112	0.7285
891	29.17	8.e-002	7.921e-002	0.2109	0.7275
892	29.2	7.e-002	6.931e-002	0.2253	0.68
893	29.23	7.e-002	6.931e-002	0.2251	0.6793
894	29.27	8.e-002	7.921e-002	0.2102	0.725
895	29.3	9.e-002	8.911e-002	0.1972	0.7651
896	29.33	7.e-002	6.931e-002	0.2243	0.677
897	29.37	7.e-002	6.931e-002	0.224	0.676
898	29.4	8.e-002	7.921e-002	0.2093	0.7218
899	29.43	9.e-002	8.911e-002	0.1963	0.7617
900	29.47	0.1	9.901e-002	0.1846	0.796
901	29.5	7.e-002	6.931e-002	0.223	0.6731
902	29.53	8.e-002	7.921e-002	0.2084	0.7187
903	29.57	7.e-002	6.931e-002	0.2225	0.6715
904	29.6	8.e-002	7.921e-002	0.2079	0.717
905	29.63	9.e-002	8.911e-002	0.195	0.7565

906	29.67	8.e-002	7.921e-002	0.2074	0.7153
907	29.7	8.e-002	7.921e-002	0.2072	0.7145
908	29.73	7.e-002	6.931e-002	0.2213	0.6679
909	29.77	8.e-002	7.921e-002	0.2067	0.7129
910	29.8	7.e-002	6.931e-002	0.2208	0.6663
911	29.83	8.e-002	7.921e-002	0.2063	0.7114
912	29.87	8.e-002	7.921e-002	0.206	0.7105
913	29.9	8.e-002	7.921e-002	0.2058	0.7098
914	29.93	8.e-002	7.921e-002	0.2056	0.7091
915	29.97	8.e-002	7.921e-002	0.2053	0.7081
916	30.	8.e-002	7.921e-002	0.2051	0.7074
917	30.03	7.e-002	6.931e-002	0.2191	0.6612
918	30.07	8.e-002	7.921e-002	0.2046	0.7058
919	30.1	8.e-002	7.921e-002	0.2044	0.705
920	30.13	8.e-002	7.921e-002	0.2042	0.7043
921	30.17	8.e-002	7.921e-002	0.204	0.7034
922	30.2	7.e-002	6.931e-002	0.2179	0.6575
923	30.23	8.e-002	7.921e-002	0.2036	0.702

Arithmetic Means:

Hydraulic Conductivity	0.3392 feet/day
Transmissivity	10.18 ft2/day

Geometric Means:

Hydraulic Conductivity	0.3108 feet/day
Transmissivity	9.324 ft2/day

Sensitivity Analysis:

Hydraulic Conductivity	0.299 feet/day
Transmissivity	8.969 ft2/day

Burke Co. JR Design Hydrogeo 2016

Site Name:	John's River LF
Location:	Phase 4
Test Date:	1/12/2016
Client:	Burke County
Project Number:	277.1602.12

Well Label:	PZ-41 Falling Head 2
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	8.3e-002 feet
Effective Radius:	0.25 feet
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	0.1535 feet
Static Water Level:	0. feet
Water Table to Screen Bottom:	15.5 feet
Anisotropy Ratio:	1.
Time Adjustment:	30. Seconds

Test starts with trial 8
There are 923 time and drawdown measurements
Maximum head is 1.01 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-0.5	0.	0.	0.
2	3.e-002	-0.47	-1.e-002	1.e-002	9.901e-003
3	7.e-002	-0.43	-1.e-002	1.e-002	9.901e-003
4	0.1	-0.4	-0.59	0.59	0.5842
5	0.13	-0.37	-0.39	0.39	0.3861
6	0.17	-0.33	-0.39	0.39	0.3861
7	0.2	-0.3	-0.9	0.9	0.8911
8	0.23	-0.27	-0.55	0.55	0.5446
9	0.27	-0.23	-1.01	1.01	1.
10	0.3	-0.2	-0.31	0.31	0.3069
11	0.33	-0.17	-0.73	0.73	0.7228
12	0.37	-0.13	-0.26	0.26	0.2574
13	0.4	-0.1	-0.49	0.49	0.4851
14	0.43	-7.e-002	-0.67	0.67	0.6634
15	0.47	-3.e-002	-0.49	0.49	0.4851
16	0.5	0.	-0.55	0.55	0.5446
17	0.53	3.e-002	-0.54	0.54	0.5347
18	0.57	7.e-002	-0.53	0.53	0.5248
19	0.6	1.e-001	-0.53	0.53	0.5248
20	0.63	0.13	-0.52	0.52	0.5149
21	0.67	0.17	-0.5	0.5	0.495
22	0.7	0.2	-0.51	0.51	0.505
23	0.73	0.23	-0.5	0.5	0.495
24	0.77	0.27	-0.49	0.49	0.4851
25	0.8	0.3	-0.49	0.49	0.4851
26	0.83	0.33	-0.48	0.48	0.4752
27	0.87	0.37	-0.48	0.48	0.4752
28	0.9	0.4	-0.46	0.46	0.4554
29	0.93	0.43	-0.47	0.47	0.4653
30	0.97	0.47	-0.47	0.47	0.4653
31	1.	0.5	-0.47	0.47	0.4653
32	1.03	0.53	-0.46	0.46	0.4554

33	1.07	0.57	-0.45	0.45	0.4455
34	1.1	0.6	-0.44	0.44	0.4356
35	1.13	0.63	-0.44	0.44	0.4356
36	1.17	0.67	-0.44	0.44	0.4356
37	1.2	0.7	-0.44	0.44	0.4356
38	1.23	0.73	-0.44	0.44	0.4356
39	1.27	0.77	-0.44	0.44	0.4356
40	1.3	0.8	-0.43	0.43	0.4257
41	1.33	0.83	-0.43	0.43	0.4257
42	1.37	0.87	-0.43	0.43	0.4257
43	1.4	0.9	-0.42	0.42	0.4158
44	1.43	0.93	-0.43	0.43	0.4257
45	1.47	0.97	-0.42	0.42	0.4158
46	1.5	1.	-0.43	0.43	0.4257
47	1.53	1.03	-0.43	0.43	0.4257
48	1.57	1.07	-0.42	0.42	0.4158
49	1.6	1.1	-0.41	0.41	0.4059
50	1.63	1.13	-0.42	0.42	0.4158
51	1.67	1.17	-0.41	0.41	0.4059
52	1.7	1.2	-0.41	0.41	0.4059
53	1.73	1.23	-0.42	0.42	0.4158
54	1.77	1.27	-0.4	0.4	0.396
55	1.8	1.3	-0.41	0.41	0.4059
56	1.83	1.33	-0.41	0.41	0.4059
57	1.87	1.37	-0.4	0.4	0.396
58	1.9	1.4	-0.41	0.41	0.4059
59	1.93	1.43	-0.4	0.4	0.396
60	1.97	1.47	-0.41	0.41	0.4059
61	2.	1.5	-0.4	0.4	0.396
62	2.03	1.53	-0.4	0.4	0.396
63	2.07	1.57	-0.4	0.4	0.396
64	2.1	1.6	-0.4	0.4	0.396
65	2.13	1.63	-0.39	0.39	0.3861
66	2.17	1.67	-0.39	0.39	0.3861
67	2.2	1.7	-0.39	0.39	0.3861
68	2.23	1.73	-0.39	0.39	0.3861
69	2.27	1.77	-0.39	0.39	0.3861
70	2.3	1.8	-0.39	0.39	0.3861
71	2.33	1.83	-0.39	0.39	0.3861
72	2.37	1.87	-0.39	0.39	0.3861
73	2.4	1.9	-0.38	0.38	0.3762
74	2.43	1.93	-0.39	0.39	0.3861
75	2.47	1.97	-0.38	0.38	0.3762
76	2.5	2.	-0.39	0.39	0.3861
77	2.53	2.03	-0.38	0.38	0.3762
78	2.57	2.07	-0.38	0.38	0.3762
79	2.6	2.1	-0.39	0.39	0.3861
80	2.63	2.13	-0.37	0.37	0.3663
81	2.67	2.17	-0.37	0.37	0.3663
82	2.7	2.2	-0.37	0.37	0.3663
83	2.73	2.23	-0.38	0.38	0.3762
84	2.77	2.27	-0.37	0.37	0.3663
85	2.8	2.3	-0.38	0.38	0.3762
86	2.83	2.33	-0.37	0.37	0.3663
87	2.87	2.37	-0.37	0.37	0.3663
88	2.9	2.4	-0.38	0.38	0.3762
89	2.93	2.43	-0.37	0.37	0.3663

90	2.97	2.47	-0.37	0.37	0.3663
91	3.	2.5	-0.35	0.35	0.3465
92	3.03	2.53	-0.36	0.36	0.3564
93	3.07	2.57	-0.35	0.35	0.3465
94	3.1	2.6	-0.36	0.36	0.3564
95	3.13	2.63	-0.35	0.35	0.3465
96	3.17	2.67	-0.36	0.36	0.3564
97	3.2	2.7	-0.35	0.35	0.3465
98	3.23	2.73	-0.34	0.34	0.3366
99	3.27	2.77	-0.35	0.35	0.3465
100	3.3	2.8	-0.35	0.35	0.3465
101	3.33	2.83	-0.35	0.35	0.3465
102	3.37	2.87	-0.36	0.36	0.3564
103	3.4	2.9	-0.36	0.36	0.3564
104	3.43	2.93	-0.35	0.35	0.3465
105	3.47	2.97	-0.35	0.35	0.3465
106	3.5	3.	-0.34	0.34	0.3366
107	3.53	3.03	-0.35	0.35	0.3465
108	3.57	3.07	-0.34	0.34	0.3366
109	3.6	3.1	-0.35	0.35	0.3465
110	3.63	3.13	-0.34	0.34	0.3366
111	3.67	3.17	-0.34	0.34	0.3366
112	3.7	3.2	-0.34	0.34	0.3366
113	3.73	3.23	-0.34	0.34	0.3366
114	3.77	3.27	-0.34	0.34	0.3366
115	3.8	3.3	-0.35	0.35	0.3465
116	3.83	3.33	-0.35	0.35	0.3465
117	3.87	3.37	-0.33	0.33	0.3267
118	3.9	3.4	-0.34	0.34	0.3366
119	3.93	3.43	-0.33	0.33	0.3267
120	3.97	3.47	-0.34	0.34	0.3366
121	4.	3.5	-0.33	0.33	0.3267
122	4.03	3.53	-0.33	0.33	0.3267
123	4.07	3.57	-0.33	0.33	0.3267
124	4.1	3.6	-0.33	0.33	0.3267
125	4.13	3.63	-0.32	0.32	0.3168
126	4.17	3.67	-0.32	0.32	0.3168
127	4.2	3.7	-0.33	0.33	0.3267
128	4.23	3.73	-0.33	0.33	0.3267
129	4.27	3.77	-0.33	0.33	0.3267
130	4.3	3.8	-0.33	0.33	0.3267
131	4.33	3.83	-0.31	0.31	0.3069
132	4.37	3.87	-0.33	0.33	0.3267
133	4.4	3.9	-0.33	0.33	0.3267
134	4.43	3.93	-0.31	0.31	0.3069
135	4.47	3.97	-0.32	0.32	0.3168
136	4.5	4.	-0.32	0.32	0.3168
137	4.53	4.03	-0.31	0.31	0.3069
138	4.57	4.07	-0.3	0.3	0.297
139	4.6	4.1	-0.31	0.31	0.3069
140	4.63	4.13	-0.31	0.31	0.3069
141	4.67	4.17	-0.32	0.32	0.3168
142	4.7	4.2	-0.31	0.31	0.3069
143	4.73	4.23	-0.3	0.3	0.297
144	4.77	4.27	-0.31	0.31	0.3069
145	4.8	4.3	-0.31	0.31	0.3069
146	4.83	4.33	-0.31	0.31	0.3069

147	4.87	4.37	-0.3	0.3	0.297
148	4.9	4.4	-0.31	0.31	0.3069
149	4.93	4.43	-0.3	0.3	0.297
150	4.97	4.47	-0.31	0.31	0.3069
151	5.	4.5	-0.31	0.31	0.3069
152	5.03	4.53	-0.29	0.29	0.2871
153	5.07	4.57	-0.3	0.3	0.297
154	5.1	4.6	-0.3	0.3	0.297
155	5.13	4.63	-0.3	0.3	0.297
156	5.17	4.67	-0.3	0.3	0.297
157	5.2	4.7	-0.29	0.29	0.2871
158	5.23	4.73	-0.3	0.3	0.297
159	5.27	4.77	-0.3	0.3	0.297
160	5.3	4.8	-0.3	0.3	0.297
161	5.33	4.83	-0.3	0.3	0.297
162	5.37	4.87	-0.29	0.29	0.2871
163	5.4	4.9	-0.28	0.28	0.2772
164	5.43	4.93	-0.29	0.29	0.2871
165	5.47	4.97	-0.29	0.29	0.2871
166	5.5	5.	-0.28	0.28	0.2772
167	5.53	5.03	-0.3	0.3	0.297
168	5.57	5.07	-0.29	0.29	0.2871
169	5.6	5.1	-0.29	0.29	0.2871
170	5.63	5.13	-0.3	0.3	0.297
171	5.67	5.17	-0.28	0.28	0.2772
172	5.7	5.2	-0.29	0.29	0.2871
173	5.73	5.23	-0.3	0.3	0.297
174	5.77	5.27	-0.28	0.28	0.2772
175	5.8	5.3	-0.28	0.28	0.2772
176	5.83	5.33	-0.28	0.28	0.2772
177	5.87	5.37	-0.28	0.28	0.2772
178	5.9	5.4	-0.28	0.28	0.2772
179	5.93	5.43	-0.28	0.28	0.2772
180	5.97	5.47	-0.28	0.28	0.2772
181	6.	5.5	-0.28	0.28	0.2772
182	6.03	5.53	-0.28	0.28	0.2772
183	6.07	5.57	-0.28	0.28	0.2772
184	6.1	5.6	-0.28	0.28	0.2772
185	6.13	5.63	-0.27	0.27	0.2673
186	6.17	5.67	-0.28	0.28	0.2772
187	6.2	5.7	-0.27	0.27	0.2673
188	6.23	5.73	-0.28	0.28	0.2772
189	6.27	5.77	-0.28	0.28	0.2772
190	6.3	5.8	-0.28	0.28	0.2772
191	6.33	5.83	-0.26	0.26	0.2574
192	6.37	5.87	-0.28	0.28	0.2772
193	6.4	5.9	-0.27	0.27	0.2673
194	6.43	5.93	-0.26	0.26	0.2574
195	6.47	5.97	-0.26	0.26	0.2574
196	6.5	6.	-0.26	0.26	0.2574
197	6.53	6.03	-0.27	0.27	0.2673
198	6.57	6.07	-0.26	0.26	0.2574
199	6.6	6.1	-0.26	0.26	0.2574
200	6.63	6.13	-0.27	0.27	0.2673
201	6.67	6.17	-0.26	0.26	0.2574
202	6.7	6.2	-0.26	0.26	0.2574
203	6.73	6.23	-0.26	0.26	0.2574

204	6.77	6.27	-0.27	0.27	0.2673
205	6.8	6.3	-0.26	0.26	0.2574
206	6.83	6.33	-0.26	0.26	0.2574
207	6.87	6.37	-0.27	0.27	0.2673
208	6.9	6.4	-0.25	0.25	0.2475
209	6.93	6.43	-0.27	0.27	0.2673
210	6.97	6.47	-0.26	0.26	0.2574
211	7.	6.5	-0.26	0.26	0.2574
212	7.03	6.53	-0.27	0.27	0.2673
213	7.07	6.57	-0.26	0.26	0.2574
214	7.1	6.6	-0.25	0.25	0.2475
215	7.13	6.63	-0.26	0.26	0.2574
216	7.17	6.67	-0.26	0.26	0.2574
217	7.2	6.7	-0.26	0.26	0.2574
218	7.23	6.73	-0.26	0.26	0.2574
219	7.27	6.77	-0.25	0.25	0.2475
220	7.3	6.8	-0.25	0.25	0.2475
221	7.33	6.83	-0.26	0.26	0.2574
222	7.37	6.87	-0.25	0.25	0.2475
223	7.4	6.9	-0.24	0.24	0.2376
224	7.43	6.93	-0.25	0.25	0.2475
225	7.47	6.97	-0.25	0.25	0.2475
226	7.5	7.	-0.25	0.25	0.2475
227	7.53	7.03	-0.25	0.25	0.2475
228	7.57	7.07	-0.24	0.24	0.2376
229	7.6	7.1	-0.25	0.25	0.2475
230	7.63	7.13	-0.25	0.25	0.2475
231	7.67	7.17	-0.24	0.24	0.2376
232	7.7	7.2	-0.24	0.24	0.2376
233	7.73	7.23	-0.25	0.25	0.2475
234	7.77	7.27	-0.25	0.25	0.2475
235	7.8	7.3	-0.24	0.24	0.2376
236	7.83	7.33	-0.24	0.24	0.2376
237	7.87	7.37	-0.25	0.25	0.2475
238	7.9	7.4	-0.25	0.25	0.2475
239	7.93	7.43	-0.25	0.25	0.2475
240	7.97	7.47	-0.24	0.24	0.2376
241	8.	7.5	-0.24	0.24	0.2376
242	8.03	7.53	-0.25	0.25	0.2475
243	8.07	7.57	-0.24	0.24	0.2376
244	8.1	7.6	-0.24	0.24	0.2376
245	8.13	7.63	-0.24	0.24	0.2376
246	8.17	7.67	-0.24	0.24	0.2376
247	8.2	7.7	-0.23	0.23	0.2277
248	8.23	7.73	-0.24	0.24	0.2376
249	8.27	7.77	-0.23	0.23	0.2277
250	8.3	7.8	-0.24	0.24	0.2376
251	8.33	7.83	-0.22	0.22	0.2178
252	8.37	7.87	-0.21	0.21	0.2079
253	8.4	7.9	-0.23	0.23	0.2277
254	8.43	7.93	-0.22	0.22	0.2178
255	8.47	7.97	-0.23	0.23	0.2277
256	8.5	8.	-0.23	0.23	0.2277
257	8.53	8.03	-0.22	0.22	0.2178
258	8.57	8.07	-0.23	0.23	0.2277
259	8.6	8.1	-0.23	0.23	0.2277
260	8.63	8.13	-0.22	0.22	0.2178

261	8.67	8.17	-0.23	0.23	0.2277
262	8.7	8.2	-0.23	0.23	0.2277
263	8.73	8.23	-0.23	0.23	0.2277
264	8.77	8.27	-0.22	0.22	0.2178
265	8.8	8.3	-0.23	0.23	0.2277
266	8.83	8.33	-0.23	0.23	0.2277
267	8.87	8.37	-0.22	0.22	0.2178
268	8.9	8.4	-0.22	0.22	0.2178
269	8.93	8.43	-0.23	0.23	0.2277
270	8.97	8.47	-0.22	0.22	0.2178
271	9.	8.5	-0.21	0.21	0.2079
272	9.03	8.53	-0.22	0.22	0.2178
273	9.07	8.57	-0.22	0.22	0.2178
274	9.1	8.6	-0.22	0.22	0.2178
275	9.13	8.63	-0.22	0.22	0.2178
276	9.17	8.67	-0.22	0.22	0.2178
277	9.2	8.7	-0.22	0.22	0.2178
278	9.23	8.73	-0.22	0.22	0.2178
279	9.27	8.77	-0.21	0.21	0.2079
280	9.3	8.8	-0.22	0.22	0.2178
281	9.33	8.83	-0.22	0.22	0.2178
282	9.37	8.87	-0.21	0.21	0.2079
283	9.4	8.9	-0.22	0.22	0.2178
284	9.43	8.93	-0.22	0.22	0.2178
285	9.47	8.97	-0.22	0.22	0.2178
286	9.5	9.	-0.21	0.21	0.2079
287	9.53	9.03	-0.21	0.21	0.2079
288	9.57	9.07	-0.21	0.21	0.2079
289	9.6	9.1	-0.22	0.22	0.2178
290	9.63	9.13	-0.21	0.21	0.2079
291	9.67	9.17	-0.22	0.22	0.2178
292	9.7	9.2	-0.21	0.21	0.2079
293	9.73	9.23	-0.22	0.22	0.2178
294	9.77	9.27	-0.21	0.21	0.2079
295	9.8	9.3	-0.21	0.21	0.2079
296	9.83	9.33	-0.2	0.2	0.198
297	9.87	9.37	-0.21	0.21	0.2079
298	9.9	9.4	-0.2	0.2	0.198
299	9.93	9.43	-0.2	0.2	0.198
300	9.97	9.47	-0.21	0.21	0.2079
301	10.	9.5	-0.21	0.21	0.2079
302	10.03	9.53	-0.2	0.2	0.198
303	10.07	9.57	-0.21	0.21	0.2079
304	10.1	9.6	-0.21	0.21	0.2079
305	10.13	9.63	-0.21	0.21	0.2079
306	10.17	9.67	-0.2	0.2	0.198
307	10.2	9.7	-0.19	0.19	0.1881
308	10.23	9.73	-0.2	0.2	0.198
309	10.27	9.77	-0.21	0.21	0.2079
310	10.3	9.8	-0.21	0.21	0.2079
311	10.33	9.83	-0.21	0.21	0.2079
312	10.37	9.87	-0.2	0.2	0.198
313	10.4	9.9	-0.2	0.2	0.198
314	10.43	9.93	-0.21	0.21	0.2079
315	10.47	9.97	-0.2	0.2	0.198
316	10.5	10.	-0.19	0.19	0.1881
317	10.53	10.03	-0.21	0.21	0.2079

318	10.57	10.07	-0.2	0.2	0.198
319	10.6	10.1	-0.2	0.2	0.198
320	10.63	10.13	-0.2	0.2	0.198
321	10.67	10.17	-0.2	0.2	0.198
322	10.7	10.2	-0.2	0.2	0.198
323	10.73	10.23	-0.2	0.2	0.198
324	10.77	10.27	-0.2	0.2	0.198
325	10.8	10.3	-0.2	0.2	0.198
326	10.83	10.33	-0.2	0.2	0.198
327	10.87	10.37	-0.2	0.2	0.198
328	10.9	10.4	-0.19	0.19	0.1881
329	10.93	10.43	-0.2	0.2	0.198
330	10.97	10.47	-0.2	0.2	0.198
331	11.	10.5	-0.2	0.2	0.198
332	11.03	10.53	-0.19	0.19	0.1881
333	11.07	10.57	-0.2	0.2	0.198
334	11.1	10.6	-0.19	0.19	0.1881
335	11.13	10.63	-0.2	0.2	0.198
336	11.17	10.67	-0.19	0.19	0.1881
337	11.2	10.7	-0.19	0.19	0.1881
338	11.23	10.73	-0.19	0.19	0.1881
339	11.27	10.77	-0.18	0.18	0.1782
340	11.3	10.8	-0.18	0.18	0.1782
341	11.33	10.83	-0.18	0.18	0.1782
342	11.37	10.87	-0.19	0.19	0.1881
343	11.4	10.9	-0.19	0.19	0.1881
344	11.43	10.93	-0.18	0.18	0.1782
345	11.47	10.97	-0.18	0.18	0.1782
346	11.5	11.	-0.18	0.18	0.1782
347	11.53	11.03	-0.19	0.19	0.1881
348	11.57	11.07	-0.19	0.19	0.1881
349	11.6	11.1	-0.19	0.19	0.1881
350	11.63	11.13	-0.19	0.19	0.1881
351	11.67	11.17	-0.18	0.18	0.1782
352	11.7	11.2	-0.19	0.19	0.1881
353	11.73	11.23	-0.18	0.18	0.1782
354	11.77	11.27	-0.19	0.19	0.1881
355	11.8	11.3	-0.18	0.18	0.1782
356	11.83	11.33	-0.17	0.17	0.1683
357	11.87	11.37	-0.18	0.18	0.1782
358	11.9	11.4	-0.19	0.19	0.1881
359	11.93	11.43	-0.19	0.19	0.1881
360	11.97	11.47	-0.18	0.18	0.1782
361	12.	11.5	-0.18	0.18	0.1782
362	12.03	11.53	-0.18	0.18	0.1782
363	12.07	11.57	-0.18	0.18	0.1782
364	12.1	11.6	-0.18	0.18	0.1782
365	12.13	11.63	-0.19	0.19	0.1881
366	12.17	11.67	-0.18	0.18	0.1782
367	12.2	11.7	-0.18	0.18	0.1782
368	12.23	11.73	-0.17	0.17	0.1683
369	12.27	11.77	-0.18	0.18	0.1782
370	12.3	11.8	-0.18	0.18	0.1782
371	12.33	11.83	-0.18	0.18	0.1782
372	12.37	11.87	-0.19	0.19	0.1881
373	12.4	11.9	-0.17	0.17	0.1683
374	12.43	11.93	-0.19	0.19	0.1881

375	12.47	11.97	-0.19	0.19	0.1881
376	12.5	12.	-0.18	0.18	0.1782
377	12.53	12.03	-0.17	0.17	0.1683
378	12.57	12.07	-0.17	0.17	0.1683
379	12.6	12.1	-0.18	0.18	0.1782
380	12.63	12.13	-0.18	0.18	0.1782
381	12.67	12.17	-0.17	0.17	0.1683
382	12.7	12.2	-0.17	0.17	0.1683
383	12.73	12.23	-0.18	0.18	0.1782
384	12.77	12.27	-0.17	0.17	0.1683
385	12.8	12.3	-0.17	0.17	0.1683
386	12.83	12.33	-0.18	0.18	0.1782
387	12.87	12.37	-0.16	0.16	0.1584
388	12.9	12.4	-0.17	0.17	0.1683
389	12.93	12.43	-0.17	0.17	0.1683
390	12.97	12.47	-0.17	0.17	0.1683
391	13.	12.5	-0.17	0.17	0.1683
392	13.03	12.53	-0.17	0.17	0.1683
393	13.07	12.57	-0.18	0.18	0.1782
394	13.1	12.6	-0.16	0.16	0.1584
395	13.13	12.63	-0.17	0.17	0.1683
396	13.17	12.67	-0.17	0.17	0.1683
397	13.2	12.7	-0.16	0.16	0.1584
398	13.23	12.73	-0.17	0.17	0.1683
399	13.27	12.77	-0.16	0.16	0.1584
400	13.3	12.8	-0.17	0.17	0.1683
401	13.33	12.83	-0.17	0.17	0.1683
402	13.37	12.87	-0.16	0.16	0.1584
403	13.4	12.9	-0.17	0.17	0.1683
404	13.43	12.93	-0.17	0.17	0.1683
405	13.47	12.97	-0.16	0.16	0.1584
406	13.5	13.	-0.17	0.17	0.1683
407	13.53	13.03	-0.16	0.16	0.1584
408	13.57	13.07	-0.16	0.16	0.1584
409	13.6	13.1	-0.18	0.18	0.1782
410	13.63	13.13	-0.16	0.16	0.1584
411	13.67	13.17	-0.17	0.17	0.1683
412	13.7	13.2	-0.17	0.17	0.1683
413	13.73	13.23	-0.16	0.16	0.1584
414	13.77	13.27	-0.17	0.17	0.1683
415	13.8	13.3	-0.17	0.17	0.1683
416	13.83	13.33	-0.16	0.16	0.1584
417	13.87	13.37	-0.17	0.17	0.1683
418	13.9	13.4	-0.17	0.17	0.1683
419	13.93	13.43	-0.16	0.16	0.1584
420	13.97	13.47	-0.16	0.16	0.1584
421	14.	13.5	-0.16	0.16	0.1584
422	14.03	13.53	-0.16	0.16	0.1584
423	14.07	13.57	-0.15	0.15	0.1485
424	14.1	13.6	-0.17	0.17	0.1683
425	14.13	13.63	-0.16	0.16	0.1584
426	14.17	13.67	-0.16	0.16	0.1584
427	14.2	13.7	-0.16	0.16	0.1584
428	14.23	13.73	-0.16	0.16	0.1584
429	14.27	13.77	-0.16	0.16	0.1584
430	14.3	13.8	-0.16	0.16	0.1584
431	14.33	13.83	-0.16	0.16	0.1584

432	14.37	13.87	-0.16	0.16	0.1584
433	14.4	13.9	-0.16	0.16	0.1584
434	14.43	13.93	-0.16	0.16	0.1584
435	14.47	13.97	-0.16	0.16	0.1584
436	14.5	14.	-0.16	0.16	0.1584
437	14.53	14.03	-0.15	0.15	0.1485
438	14.57	14.07	-0.15	0.15	0.1485
439	14.6	14.1	-0.15	0.15	0.1485
440	14.63	14.13	-0.15	0.15	0.1485
441	14.67	14.17	-0.16	0.16	0.1584
442	14.7	14.2	-0.16	0.16	0.1584
443	14.73	14.23	-0.16	0.16	0.1584
444	14.77	14.27	-0.16	0.16	0.1584
445	14.8	14.3	-0.15	0.15	0.1485
446	14.83	14.33	-0.15	0.15	0.1485
447	14.87	14.37	-0.14	0.14	0.1386
448	14.9	14.4	-0.16	0.16	0.1584
449	14.93	14.43	-0.15	0.15	0.1485
450	14.97	14.47	-0.14	0.14	0.1386
451	15.	14.5	-0.15	0.15	0.1485
452	15.03	14.53	-0.15	0.15	0.1485
453	15.07	14.57	-0.15	0.15	0.1485
454	15.1	14.6	-0.14	0.14	0.1386
455	15.13	14.63	-0.15	0.15	0.1485
456	15.17	14.67	-0.15	0.15	0.1485
457	15.2	14.7	-0.16	0.16	0.1584
458	15.23	14.73	-0.15	0.15	0.1485
459	15.27	14.77	-0.15	0.15	0.1485
460	15.3	14.8	-0.15	0.15	0.1485
461	15.33	14.83	-0.15	0.15	0.1485
462	15.37	14.87	-0.15	0.15	0.1485
463	15.4	14.9	-0.14	0.14	0.1386
464	15.43	14.93	-0.15	0.15	0.1485
465	15.47	14.97	-0.15	0.15	0.1485
466	15.5	15.	-0.15	0.15	0.1485
467	15.53	15.03	-0.15	0.15	0.1485
468	15.57	15.07	-0.14	0.14	0.1386
469	15.6	15.1	-0.15	0.15	0.1485
470	15.63	15.13	-0.15	0.15	0.1485
471	15.67	15.17	-0.14	0.14	0.1386
472	15.7	15.2	-0.14	0.14	0.1386
473	15.73	15.23	-0.14	0.14	0.1386
474	15.77	15.27	-0.15	0.15	0.1485
475	15.8	15.3	-0.14	0.14	0.1386
476	15.83	15.33	-0.15	0.15	0.1485
477	15.87	15.37	-0.15	0.15	0.1485
478	15.9	15.4	-0.14	0.14	0.1386
479	15.93	15.43	-0.14	0.14	0.1386
480	15.97	15.47	-0.15	0.15	0.1485
481	16.	15.5	-0.15	0.15	0.1485
482	16.03	15.53	-0.14	0.14	0.1386
483	16.07	15.57	-0.15	0.15	0.1485
484	16.1	15.6	-0.15	0.15	0.1485
485	16.13	15.63	-0.15	0.15	0.1485
486	16.17	15.67	-0.15	0.15	0.1485
487	16.2	15.7	-0.14	0.14	0.1386
488	16.23	15.73	-0.14	0.14	0.1386

489	16.27	15.77	-0.14	0.14	0.1386
490	16.3	15.8	-0.14	0.14	0.1386
491	16.33	15.83	-0.14	0.14	0.1386
492	16.37	15.87	-0.14	0.14	0.1386
493	16.4	15.9	-0.14	0.14	0.1386
494	16.43	15.93	-0.14	0.14	0.1386
495	16.47	15.97	-0.14	0.14	0.1386
496	16.5	16.	-0.13	0.13	0.1287
497	16.53	16.03	-0.14	0.14	0.1386
498	16.57	16.07	-0.13	0.13	0.1287
499	16.6	16.1	-0.14	0.14	0.1386
500	16.63	16.13	-0.13	0.13	0.1287
501	16.67	16.17	-0.13	0.13	0.1287
502	16.7	16.2	-0.14	0.14	0.1386
503	16.73	16.23	-0.14	0.14	0.1386
504	16.77	16.27	-0.15	0.15	0.1485
505	16.8	16.3	-0.14	0.14	0.1386
506	16.83	16.33	-0.13	0.13	0.1287
507	16.87	16.37	-0.13	0.13	0.1287
508	16.9	16.4	-0.13	0.13	0.1287
509	16.93	16.43	-0.13	0.13	0.1287
510	16.97	16.47	-0.14	0.14	0.1386
511	17.	16.5	-0.14	0.14	0.1386
512	17.03	16.53	-0.13	0.13	0.1287
513	17.07	16.57	-0.14	0.14	0.1386
514	17.1	16.6	-0.13	0.13	0.1287
515	17.13	16.63	-0.14	0.14	0.1386
516	17.17	16.67	-0.13	0.13	0.1287
517	17.2	16.7	-0.13	0.13	0.1287
518	17.23	16.73	-0.14	0.14	0.1386
519	17.27	16.77	-0.13	0.13	0.1287
520	17.3	16.8	-0.13	0.13	0.1287
521	17.33	16.83	-0.13	0.13	0.1287
522	17.37	16.87	-0.13	0.13	0.1287
523	17.4	16.9	-0.13	0.13	0.1287
524	17.43	16.93	-0.13	0.13	0.1287
525	17.47	16.97	-0.13	0.13	0.1287
526	17.5	17.	-0.14	0.14	0.1386
527	17.53	17.03	-0.12	0.12	0.1188
528	17.57	17.07	-0.14	0.14	0.1386
529	17.6	17.1	-0.13	0.13	0.1287
530	17.63	17.13	-0.13	0.13	0.1287
531	17.67	17.17	-0.13	0.13	0.1287
532	17.7	17.2	-0.13	0.13	0.1287
533	17.73	17.23	-0.12	0.12	0.1188
534	17.77	17.27	-0.13	0.13	0.1287
535	17.8	17.3	-0.12	0.12	0.1188
536	17.83	17.33	-0.14	0.14	0.1386
537	17.87	17.37	-0.12	0.12	0.1188
538	17.9	17.4	-0.12	0.12	0.1188
539	17.93	17.43	-0.12	0.12	0.1188
540	17.97	17.47	-0.13	0.13	0.1287
541	18.	17.5	-0.12	0.12	0.1188
542	18.03	17.53	-0.13	0.13	0.1287
543	18.07	17.57	-0.13	0.13	0.1287
544	18.1	17.6	-0.13	0.13	0.1287
545	18.13	17.63	-0.12	0.12	0.1188

546	18.17	17.67	-0.13	0.13	0.1287
547	18.2	17.7	-0.12	0.12	0.1188
548	18.23	17.73	-0.12	0.12	0.1188
549	18.27	17.77	-0.13	0.13	0.1287
550	18.3	17.8	-0.13	0.13	0.1287
551	18.33	17.83	-0.12	0.12	0.1188
552	18.37	17.87	-0.13	0.13	0.1287
553	18.4	17.9	-0.13	0.13	0.1287
554	18.43	17.93	-0.12	0.12	0.1188
555	18.47	17.97	-0.12	0.12	0.1188
556	18.5	18.	-0.11	0.11	0.1089
557	18.53	18.03	-0.13	0.13	0.1287
558	18.57	18.07	-0.12	0.12	0.1188
559	18.6	18.1	-0.11	0.11	0.1089
560	18.63	18.13	-0.12	0.12	0.1188
561	18.67	18.17	-0.12	0.12	0.1188
562	18.7	18.2	-0.11	0.11	0.1089
563	18.73	18.23	-0.13	0.13	0.1287
564	18.77	18.27	-0.12	0.12	0.1188
565	18.8	18.3	-0.13	0.13	0.1287
566	18.83	18.33	-0.13	0.13	0.1287
567	18.87	18.37	-0.12	0.12	0.1188
568	18.9	18.4	-0.12	0.12	0.1188
569	18.93	18.43	-0.12	0.12	0.1188
570	18.97	18.47	-0.13	0.13	0.1287
571	19.	18.5	-0.11	0.11	0.1089
572	19.03	18.53	-0.12	0.12	0.1188
573	19.07	18.57	-0.12	0.12	0.1188
574	19.1	18.6	-0.12	0.12	0.1188
575	19.13	18.63	-0.12	0.12	0.1188
576	19.17	18.67	-0.12	0.12	0.1188
577	19.2	18.7	-0.12	0.12	0.1188
578	19.23	18.73	-0.12	0.12	0.1188
579	19.27	18.77	-0.12	0.12	0.1188
580	19.3	18.8	-0.11	0.11	0.1089
581	19.33	18.83	-0.11	0.11	0.1089
582	19.37	18.87	-0.12	0.12	0.1188
583	19.4	18.9	-0.12	0.12	0.1188
584	19.43	18.93	-0.12	0.12	0.1188
585	19.47	18.97	-0.12	0.12	0.1188
586	19.5	19.	-0.12	0.12	0.1188
587	19.53	19.03	-0.11	0.11	0.1089
588	19.57	19.07	-0.12	0.12	0.1188
589	19.6	19.1	-0.11	0.11	0.1089
590	19.63	19.13	-0.12	0.12	0.1188
591	19.67	19.17	-0.12	0.12	0.1188
592	19.7	19.2	-0.12	0.12	0.1188
593	19.73	19.23	-0.11	0.11	0.1089
594	19.77	19.27	-0.12	0.12	0.1188
595	19.8	19.3	-0.12	0.12	0.1188
596	19.83	19.33	-0.11	0.11	0.1089
597	19.87	19.37	-0.12	0.12	0.1188
598	19.9	19.4	-0.12	0.12	0.1188
599	19.93	19.43	-0.11	0.11	0.1089
600	19.97	19.47	-0.11	0.11	0.1089
601	20.	19.5	-0.12	0.12	0.1188
602	20.03	19.53	-0.12	0.12	0.1188

603	20.07	19.57	-0.12	0.12	0.1188
604	20.1	19.6	-0.11	0.11	0.1089
605	20.13	19.63	-0.11	0.11	0.1089
606	20.17	19.67	-0.11	0.11	0.1089
607	20.2	19.7	-0.11	0.11	0.1089
608	20.23	19.73	-0.11	0.11	0.1089
609	20.27	19.77	-0.11	0.11	0.1089
610	20.3	19.8	-0.11	0.11	0.1089
611	20.33	19.83	-0.12	0.12	0.1188
612	20.37	19.87	-0.1	0.1	9.901e-002
613	20.4	19.9	-0.1	0.1	9.901e-002
614	20.43	19.93	-0.11	0.11	0.1089
615	20.47	19.97	-0.1	0.1	9.901e-002
616	20.5	20.	-0.11	0.11	0.1089
617	20.53	20.03	-0.11	0.11	0.1089
618	20.57	20.07	-0.11	0.11	0.1089
619	20.6	20.1	-0.1	0.1	9.901e-002
620	20.63	20.13	-0.11	0.11	0.1089
621	20.67	20.17	-0.11	0.11	0.1089
622	20.7	20.2	-0.1	0.1	9.901e-002
623	20.73	20.23	-0.1	0.1	9.901e-002
624	20.77	20.27	-0.11	0.11	0.1089
625	20.8	20.3	-0.11	0.11	0.1089
626	20.83	20.33	-0.11	0.11	0.1089
627	20.87	20.37	-0.11	0.11	0.1089
628	20.9	20.4	-0.1	0.1	9.901e-002
629	20.93	20.43	-0.1	0.1	9.901e-002
630	20.97	20.47	-0.12	0.12	0.1188
631	21.	20.5	-0.1	0.1	9.901e-002
632	21.03	20.53	-0.1	0.1	9.901e-002
633	21.07	20.57	-0.1	0.1	9.901e-002
634	21.1	20.6	-0.11	0.11	0.1089
635	21.13	20.63	-0.1	0.1	9.901e-002
636	21.17	20.67	-0.12	0.12	0.1188
637	21.2	20.7	-0.11	0.11	0.1089
638	21.23	20.73	-0.1	0.1	9.901e-002
639	21.27	20.77	-0.11	0.11	0.1089
640	21.3	20.8	-0.1	0.1	9.901e-002
641	21.33	20.83	-0.11	0.11	0.1089
642	21.37	20.87	-0.1	0.1	9.901e-002
643	21.4	20.9	-0.11	0.11	0.1089
644	21.43	20.93	-0.11	0.11	0.1089
645	21.47	20.97	-0.12	0.12	0.1188
646	21.5	21.	-0.1	0.1	9.901e-002
647	21.53	21.03	-0.11	0.11	0.1089
648	21.57	21.07	-0.11	0.11	0.1089
649	21.6	21.1	-0.1	0.1	9.901e-002
650	21.63	21.13	-0.1	0.1	9.901e-002
651	21.67	21.17	-0.11	0.11	0.1089
652	21.7	21.2	-0.1	0.1	9.901e-002
653	21.73	21.23	-0.1	0.1	9.901e-002
654	21.77	21.27	-0.11	0.11	0.1089
655	21.8	21.3	-0.11	0.11	0.1089
656	21.83	21.33	-0.1	0.1	9.901e-002
657	21.87	21.37	-0.11	0.11	0.1089
658	21.9	21.4	-0.1	0.1	9.901e-002
659	21.93	21.43	-0.1	0.1	9.901e-002

660	21.97	21.47	-0.12	0.12	0.1188
661	22.	21.5	-0.11	0.11	0.1089
662	22.03	21.53	-0.1	0.1	9.901e-002
663	22.07	21.57	-0.11	0.11	0.1089
664	22.1	21.6	-0.1	0.1	9.901e-002
665	22.13	21.63	-0.11	0.11	0.1089
666	22.17	21.67	-0.11	0.11	0.1089
667	22.2	21.7	-0.1	0.1	9.901e-002
668	22.23	21.73	-0.1	0.1	9.901e-002
669	22.27	21.77	-0.1	0.1	9.901e-002
670	22.3	21.8	-0.1	0.1	9.901e-002
671	22.33	21.83	-0.1	0.1	9.901e-002
672	22.37	21.87	-0.1	0.1	9.901e-002
673	22.4	21.9	-0.1	0.1	9.901e-002
674	22.43	21.93	-0.1	0.1	9.901e-002
675	22.47	21.97	-0.11	0.11	0.1089
676	22.5	22.	-0.12	0.12	0.1188
677	22.53	22.03	-0.1	0.1	9.901e-002
678	22.57	22.07	-0.1	0.1	9.901e-002
679	22.6	22.1	-0.1	0.1	9.901e-002
680	22.63	22.13	-9.e-002	9.e-002	8.911e-002
681	22.67	22.17	-0.1	0.1	9.901e-002
682	22.7	22.2	-0.1	0.1	9.901e-002
683	22.73	22.23	-0.1	0.1	9.901e-002
684	22.77	22.27	-0.11	0.11	0.1089
685	22.8	22.3	-0.1	0.1	9.901e-002
686	22.83	22.33	-0.11	0.11	0.1089
687	22.87	22.37	-0.1	0.1	9.901e-002
688	22.9	22.4	-0.1	0.1	9.901e-002
689	22.93	22.43	-9.e-002	9.e-002	8.911e-002
690	22.97	22.47	-0.1	0.1	9.901e-002
691	23.	22.5	-0.1	0.1	9.901e-002
692	23.03	22.53	-0.11	0.11	0.1089
693	23.07	22.57	-0.1	0.1	9.901e-002
694	23.1	22.6	-0.1	0.1	9.901e-002
695	23.13	22.63	-0.11	0.11	0.1089
696	23.17	22.67	-9.e-002	9.e-002	8.911e-002
697	23.2	22.7	-0.1	0.1	9.901e-002
698	23.23	22.73	-0.1	0.1	9.901e-002
699	23.27	22.77	-0.1	0.1	9.901e-002
700	23.3	22.8	-0.1	0.1	9.901e-002
701	23.33	22.83	-0.1	0.1	9.901e-002
702	23.37	22.87	-0.11	0.11	0.1089
703	23.4	22.9	-0.1	0.1	9.901e-002
704	23.43	22.93	-0.1	0.1	9.901e-002
705	23.47	22.97	-0.1	0.1	9.901e-002
706	23.5	23.	-0.11	0.11	0.1089
707	23.53	23.03	-0.1	0.1	9.901e-002
708	23.57	23.07	-0.1	0.1	9.901e-002
709	23.6	23.1	-0.1	0.1	9.901e-002
710	23.63	23.13	-0.1	0.1	9.901e-002
711	23.67	23.17	-0.1	0.1	9.901e-002
712	23.7	23.2	-9.e-002	9.e-002	8.911e-002
713	23.73	23.23	-0.1	0.1	9.901e-002
714	23.77	23.27	-9.e-002	9.e-002	8.911e-002
715	23.8	23.3	-9.e-002	9.e-002	8.911e-002
716	23.83	23.33	-9.e-002	9.e-002	8.911e-002

717	23.87	23.37	-9.e-002	9.e-002	8.911e-002
718	23.9	23.4	-9.e-002	9.e-002	8.911e-002
719	23.93	23.43	-9.e-002	9.e-002	8.911e-002
720	23.97	23.47	-0.1	0.1	9.901e-002
721	24.	23.5	-0.1	0.1	9.901e-002
722	24.03	23.53	-0.1	0.1	9.901e-002
723	24.07	23.57	-0.1	0.1	9.901e-002
724	24.1	23.6	-8.e-002	8.e-002	7.921e-002
725	24.13	23.63	-9.e-002	9.e-002	8.911e-002
726	24.17	23.67	-9.e-002	9.e-002	8.911e-002
727	24.2	23.7	-0.1	0.1	9.901e-002
728	24.23	23.73	-9.e-002	9.e-002	8.911e-002
729	24.27	23.77	-9.e-002	9.e-002	8.911e-002
730	24.3	23.8	-9.e-002	9.e-002	8.911e-002
731	24.33	23.83	-0.1	0.1	9.901e-002
732	24.37	23.87	-9.e-002	9.e-002	8.911e-002
733	24.4	23.9	-0.1	0.1	9.901e-002
734	24.43	23.93	-9.e-002	9.e-002	8.911e-002
735	24.47	23.97	-9.e-002	9.e-002	8.911e-002
736	24.5	24.	-0.1	0.1	9.901e-002
737	24.53	24.03	-9.e-002	9.e-002	8.911e-002
738	24.57	24.07	-9.e-002	9.e-002	8.911e-002
739	24.6	24.1	-9.e-002	9.e-002	8.911e-002
740	24.63	24.13	-9.e-002	9.e-002	8.911e-002
741	24.67	24.17	-8.e-002	8.e-002	7.921e-002
742	24.7	24.2	-9.e-002	9.e-002	8.911e-002
743	24.73	24.23	-0.1	0.1	9.901e-002
744	24.77	24.27	-9.e-002	9.e-002	8.911e-002
745	24.8	24.3	-9.e-002	9.e-002	8.911e-002
746	24.83	24.33	-9.e-002	9.e-002	8.911e-002
747	24.87	24.37	-9.e-002	9.e-002	8.911e-002
748	24.9	24.4	-9.e-002	9.e-002	8.911e-002
749	24.93	24.43	-9.e-002	9.e-002	8.911e-002
750	24.97	24.47	-9.e-002	9.e-002	8.911e-002
751	25.	24.5	-0.1	0.1	9.901e-002
752	25.03	24.53	-8.e-002	8.e-002	7.921e-002
753	25.07	24.57	-9.e-002	9.e-002	8.911e-002
754	25.1	24.6	-8.e-002	8.e-002	7.921e-002
755	25.13	24.63	-8.e-002	8.e-002	7.921e-002
756	25.17	24.67	-0.1	0.1	9.901e-002
757	25.2	24.7	-9.e-002	9.e-002	8.911e-002
758	25.23	24.73	-9.e-002	9.e-002	8.911e-002
759	25.27	24.77	-8.e-002	8.e-002	7.921e-002
760	25.3	24.8	-0.1	0.1	9.901e-002
761	25.33	24.83	-9.e-002	9.e-002	8.911e-002
762	25.37	24.87	-9.e-002	9.e-002	8.911e-002
763	25.4	24.9	-9.e-002	9.e-002	8.911e-002
764	25.43	24.93	-9.e-002	9.e-002	8.911e-002
765	25.47	24.97	-8.e-002	8.e-002	7.921e-002
766	25.5	25.	-8.e-002	8.e-002	7.921e-002
767	25.53	25.03	-9.e-002	9.e-002	8.911e-002
768	25.57	25.07	-8.e-002	8.e-002	7.921e-002
769	25.6	25.1	-9.e-002	9.e-002	8.911e-002
770	25.63	25.13	-0.1	0.1	9.901e-002
771	25.67	25.17	-9.e-002	9.e-002	8.911e-002
772	25.7	25.2	-9.e-002	9.e-002	8.911e-002
773	25.73	25.23	-8.e-002	8.e-002	7.921e-002

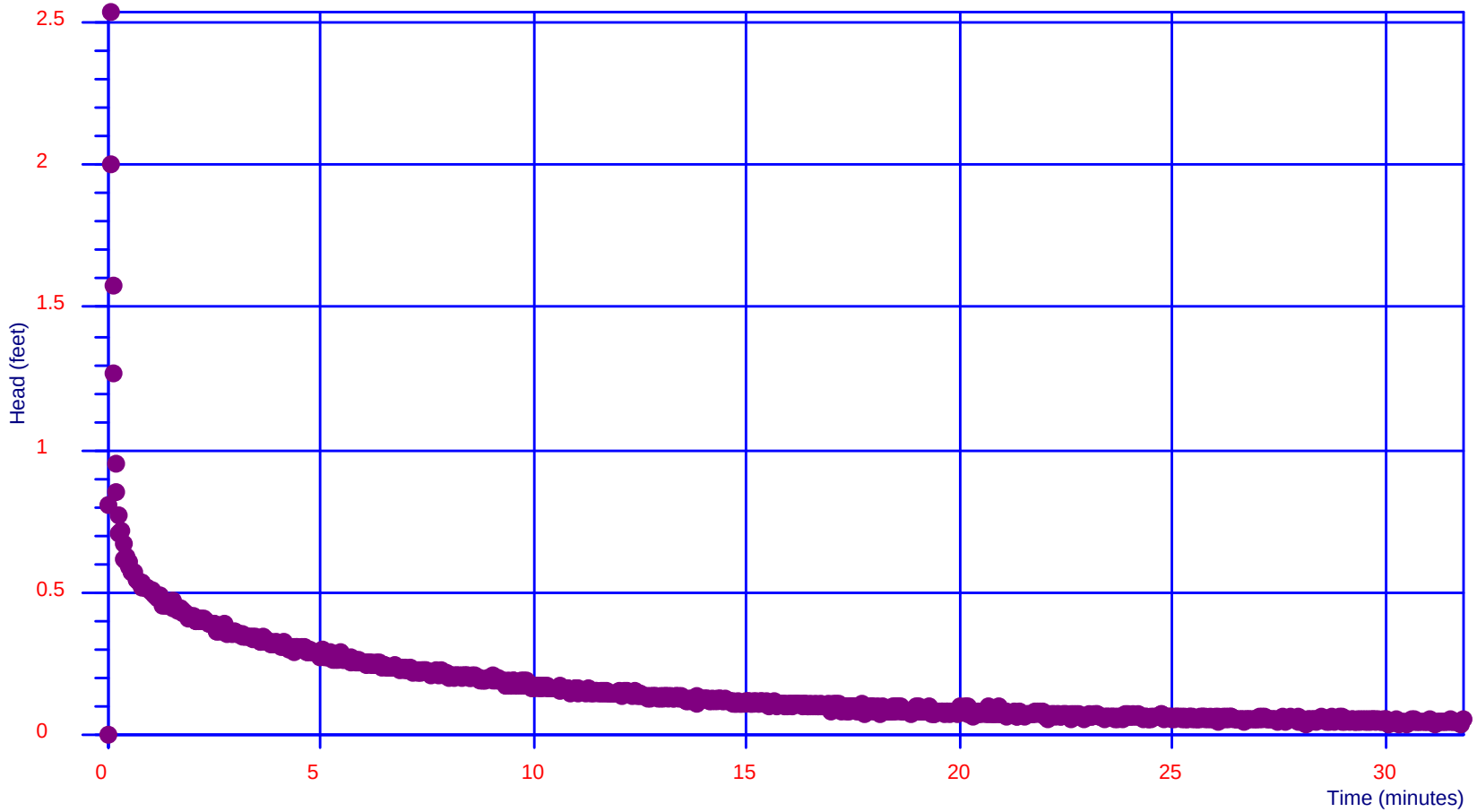
774	25.77	25.27	-0.1	0.1	9.901e-002
775	25.8	25.3	-9.e-002	9.e-002	8.911e-002
776	25.83	25.33	-0.1	0.1	9.901e-002
777	25.87	25.37	-8.e-002	8.e-002	7.921e-002
778	25.9	25.4	-9.e-002	9.e-002	8.911e-002
779	25.93	25.43	-9.e-002	9.e-002	8.911e-002
780	25.97	25.47	-8.e-002	8.e-002	7.921e-002
781	26.	25.5	-8.e-002	8.e-002	7.921e-002
782	26.03	25.53	-9.e-002	9.e-002	8.911e-002
783	26.07	25.57	-8.e-002	8.e-002	7.921e-002
784	26.1	25.6	-9.e-002	9.e-002	8.911e-002
785	26.13	25.63	-9.e-002	9.e-002	8.911e-002
786	26.17	25.67	-9.e-002	9.e-002	8.911e-002
787	26.2	25.7	-0.1	0.1	9.901e-002
788	26.23	25.73	-9.e-002	9.e-002	8.911e-002
789	26.27	25.77	-8.e-002	8.e-002	7.921e-002
790	26.3	25.8	-8.e-002	8.e-002	7.921e-002
791	26.33	25.83	-8.e-002	8.e-002	7.921e-002
792	26.37	25.87	-0.1	0.1	9.901e-002
793	26.4	25.9	-9.e-002	9.e-002	8.911e-002
794	26.43	25.93	-8.e-002	8.e-002	7.921e-002
795	26.47	25.97	-9.e-002	9.e-002	8.911e-002
796	26.5	26.	-9.e-002	9.e-002	8.911e-002
797	26.53	26.03	-9.e-002	9.e-002	8.911e-002
798	26.57	26.07	-8.e-002	8.e-002	7.921e-002
799	26.6	26.1	-9.e-002	9.e-002	8.911e-002
800	26.63	26.13	-8.e-002	8.e-002	7.921e-002
801	26.67	26.17	-9.e-002	9.e-002	8.911e-002
802	26.7	26.2	-8.e-002	8.e-002	7.921e-002
803	26.73	26.23	-8.e-002	8.e-002	7.921e-002
804	26.77	26.27	-8.e-002	8.e-002	7.921e-002
805	26.8	26.3	-8.e-002	8.e-002	7.921e-002
806	26.83	26.33	-8.e-002	8.e-002	7.921e-002
807	26.87	26.37	-9.e-002	9.e-002	8.911e-002
808	26.9	26.4	-8.e-002	8.e-002	7.921e-002
809	26.93	26.43	-0.11	0.11	0.1089
810	26.97	26.47	-9.e-002	9.e-002	8.911e-002
811	27.	26.5	-8.e-002	8.e-002	7.921e-002
812	27.03	26.53	-9.e-002	9.e-002	8.911e-002
813	27.07	26.57	-9.e-002	9.e-002	8.911e-002
814	27.1	26.6	-8.e-002	8.e-002	7.921e-002
815	27.13	26.63	-7.e-002	7.e-002	6.931e-002
816	27.17	26.67	-8.e-002	8.e-002	7.921e-002
817	27.2	26.7	-9.e-002	9.e-002	8.911e-002
818	27.23	26.73	-8.e-002	8.e-002	7.921e-002
819	27.27	26.77	-7.e-002	7.e-002	6.931e-002
820	27.3	26.8	-9.e-002	9.e-002	8.911e-002
821	27.33	26.83	-8.e-002	8.e-002	7.921e-002
822	27.37	26.87	-8.e-002	8.e-002	7.921e-002
823	27.4	26.9	-9.e-002	9.e-002	8.911e-002
824	27.43	26.93	-9.e-002	9.e-002	8.911e-002
825	27.47	26.97	-8.e-002	8.e-002	7.921e-002
826	27.5	27.	-9.e-002	9.e-002	8.911e-002
827	27.53	27.03	-7.e-002	7.e-002	6.931e-002
828	27.57	27.07	-0.1	0.1	9.901e-002
829	27.6	27.1	-9.e-002	9.e-002	8.911e-002
830	27.63	27.13	-8.e-002	8.e-002	7.921e-002

831	27.67	27.17	-8.e-002	8.e-002	7.921e-002
832	27.7	27.2	-8.e-002	8.e-002	7.921e-002
833	27.73	27.23	-7.e-002	7.e-002	6.931e-002
834	27.77	27.27	-8.e-002	8.e-002	7.921e-002
835	27.8	27.3	-8.e-002	8.e-002	7.921e-002
836	27.83	27.33	-9.e-002	9.e-002	8.911e-002
837	27.87	27.37	-8.e-002	8.e-002	7.921e-002
838	27.9	27.4	-8.e-002	8.e-002	7.921e-002
839	27.93	27.43	-9.e-002	9.e-002	8.911e-002
840	27.97	27.47	-8.e-002	8.e-002	7.921e-002
841	28.	27.5	-8.e-002	8.e-002	7.921e-002
842	28.03	27.53	-8.e-002	8.e-002	7.921e-002
843	28.07	27.57	-8.e-002	8.e-002	7.921e-002
844	28.1	27.6	-9.e-002	9.e-002	8.911e-002
845	28.13	27.63	-9.e-002	9.e-002	8.911e-002
846	28.17	27.67	-9.e-002	9.e-002	8.911e-002
847	28.2	27.7	-7.e-002	7.e-002	6.931e-002
848	28.23	27.73	-9.e-002	9.e-002	8.911e-002
849	28.27	27.77	-9.e-002	9.e-002	8.911e-002
850	28.3	27.8	-9.e-002	9.e-002	8.911e-002
851	28.33	27.83	-9.e-002	9.e-002	8.911e-002
852	28.37	27.87	-9.e-002	9.e-002	8.911e-002
853	28.4	27.9	-9.e-002	9.e-002	8.911e-002
854	28.43	27.93	-9.e-002	9.e-002	8.911e-002
855	28.47	27.97	-9.e-002	9.e-002	8.911e-002
856	28.5	28.	-9.e-002	9.e-002	8.911e-002
857	28.53	28.03	-9.e-002	9.e-002	8.911e-002
858	28.57	28.07	-8.e-002	8.e-002	7.921e-002
859	28.6	28.1	-9.e-002	9.e-002	8.911e-002
860	28.63	28.13	-8.e-002	8.e-002	7.921e-002
861	28.67	28.17	-7.e-002	7.e-002	6.931e-002
862	28.7	28.2	-9.e-002	9.e-002	8.911e-002
863	28.73	28.23	-8.e-002	8.e-002	7.921e-002
864	28.77	28.27	-8.e-002	8.e-002	7.921e-002
865	28.8	28.3	-8.e-002	8.e-002	7.921e-002
866	28.83	28.33	-8.e-002	8.e-002	7.921e-002
867	28.87	28.37	-8.e-002	8.e-002	7.921e-002
868	28.9	28.4	-7.e-002	7.e-002	6.931e-002
869	28.93	28.43	-7.e-002	7.e-002	6.931e-002
870	28.97	28.47	-7.e-002	7.e-002	6.931e-002
871	29.	28.5	-8.e-002	8.e-002	7.921e-002
872	29.03	28.53	-9.e-002	9.e-002	8.911e-002
873	29.07	28.57	-9.e-002	9.e-002	8.911e-002
874	29.1	28.6	-8.e-002	8.e-002	7.921e-002
875	29.13	28.63	-8.e-002	8.e-002	7.921e-002
876	29.17	28.67	-8.e-002	8.e-002	7.921e-002
877	29.2	28.7	-8.e-002	8.e-002	7.921e-002
878	29.23	28.73	-8.e-002	8.e-002	7.921e-002
879	29.27	28.77	-8.e-002	8.e-002	7.921e-002
880	29.3	28.8	-8.e-002	8.e-002	7.921e-002
881	29.33	28.83	-8.e-002	8.e-002	7.921e-002
882	29.37	28.87	-8.e-002	8.e-002	7.921e-002
883	29.4	28.9	-8.e-002	8.e-002	7.921e-002
884	29.43	28.93	-9.e-002	9.e-002	8.911e-002
885	29.47	28.97	-8.e-002	8.e-002	7.921e-002
886	29.5	29.	-8.e-002	8.e-002	7.921e-002
887	29.53	29.03	-8.e-002	8.e-002	7.921e-002

888	29.57	29.07	-9.e-002	9.e-002	8.911e-002
889	29.6	29.1	-8.e-002	8.e-002	7.921e-002
890	29.63	29.13	-8.e-002	8.e-002	7.921e-002
891	29.67	29.17	-8.e-002	8.e-002	7.921e-002
892	29.7	29.2	-7.e-002	7.e-002	6.931e-002
893	29.73	29.23	-7.e-002	7.e-002	6.931e-002
894	29.77	29.27	-8.e-002	8.e-002	7.921e-002
895	29.8	29.3	-9.e-002	9.e-002	8.911e-002
896	29.83	29.33	-7.e-002	7.e-002	6.931e-002
897	29.87	29.37	-7.e-002	7.e-002	6.931e-002
898	29.9	29.4	-8.e-002	8.e-002	7.921e-002
899	29.93	29.43	-9.e-002	9.e-002	8.911e-002
900	29.97	29.47	-0.1	0.1	9.901e-002
901	30.	29.5	-7.e-002	7.e-002	6.931e-002
902	30.03	29.53	-8.e-002	8.e-002	7.921e-002
903	30.07	29.57	-7.e-002	7.e-002	6.931e-002
904	30.1	29.6	-8.e-002	8.e-002	7.921e-002
905	30.13	29.63	-9.e-002	9.e-002	8.911e-002
906	30.17	29.67	-8.e-002	8.e-002	7.921e-002
907	30.2	29.7	-8.e-002	8.e-002	7.921e-002
908	30.23	29.73	-7.e-002	7.e-002	6.931e-002
909	30.27	29.77	-8.e-002	8.e-002	7.921e-002
910	30.3	29.8	-7.e-002	7.e-002	6.931e-002
911	30.33	29.83	-8.e-002	8.e-002	7.921e-002
912	30.37	29.87	-8.e-002	8.e-002	7.921e-002
913	30.4	29.9	-8.e-002	8.e-002	7.921e-002
914	30.43	29.93	-8.e-002	8.e-002	7.921e-002
915	30.47	29.97	-8.e-002	8.e-002	7.921e-002
916	30.5	30.	-8.e-002	8.e-002	7.921e-002
917	30.53	30.03	-7.e-002	7.e-002	6.931e-002
918	30.57	30.07	-8.e-002	8.e-002	7.921e-002
919	30.6	30.1	-8.e-002	8.e-002	7.921e-002
920	30.63	30.13	-8.e-002	8.e-002	7.921e-002
921	30.67	30.17	-8.e-002	8.e-002	7.921e-002
922	30.7	30.2	-7.e-002	7.e-002	6.931e-002
923	30.73	30.23	-8.e-002	8.e-002	7.921e-002

Burke Co. JR Design Hydrogeo 2016 1/12/2016 **Arithmetic Graph**

John's River LF Phase 4 PZ-41 Rising Head 2



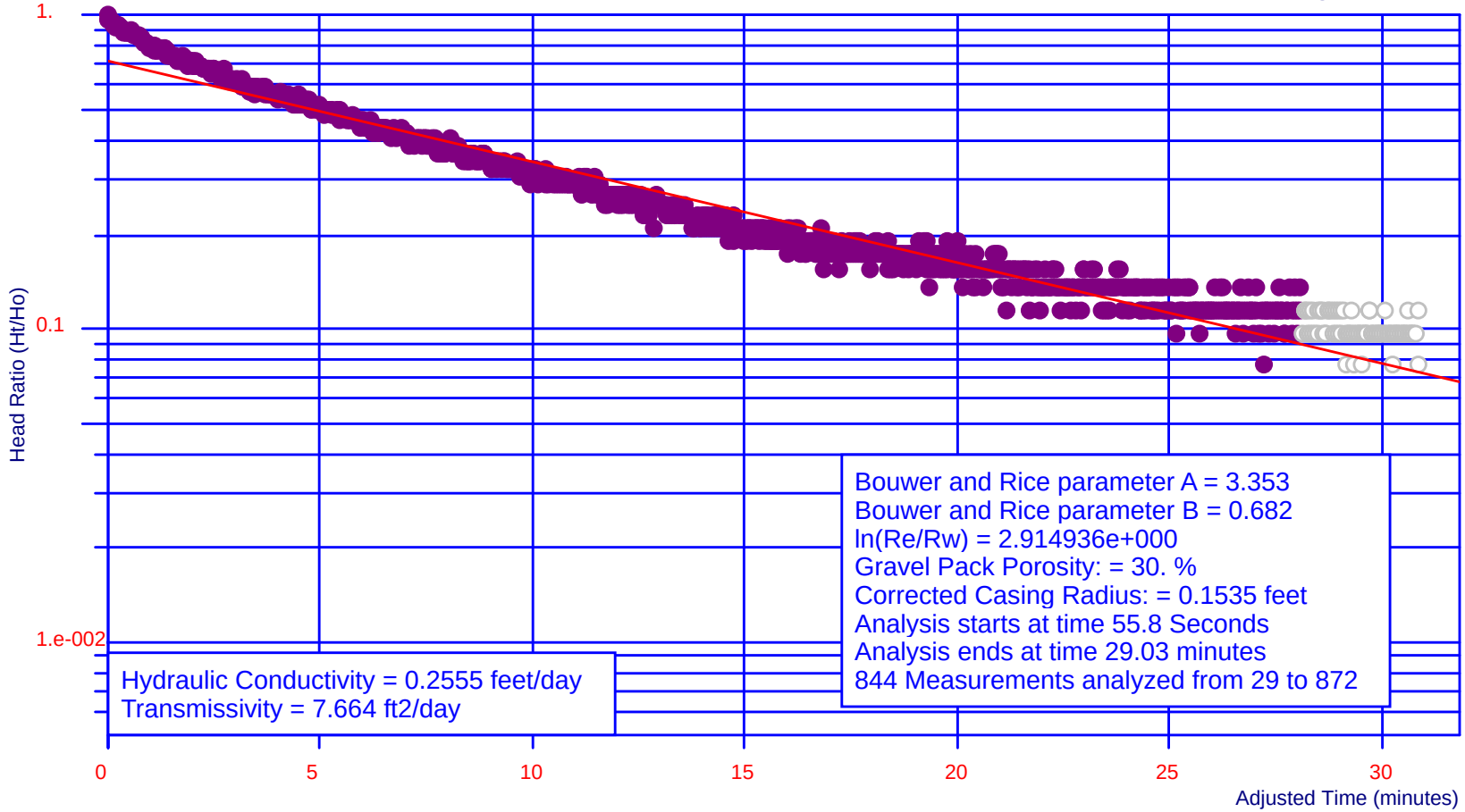
Project Number: 277.1602.12 for Burke County
Analysis by Starpoint Software

Burke Co. JR Design Hydrogeo 2016 1/12/2016

Bouwer and Rice Graph

John's River LF Phase 4

PZ-41 Rising Head 2



Project Number: 277.1602.12 for Burke County

Analysis by Starpoint Software

Ho is 0.52 feet at 55.8 Seconds

Bouwer and Rice Automatic Parameter Estimation

Burke Co. JR Design Hydrogeo 2016

Site Name:	John's River LF
Location:	Phase 4
Test Date:	1/12/2016
Client:	Burke County
Project Number:	277.1602.12

Well Label:	PZ-41 Rising Head 2
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	8.3e-002 feet
Effective Radius:	0.25 feet
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	0.1535 feet
Bouwer and Rice Parameter A	3.353
Bouwer and Rice Parameter B	0.682
Radius of Influence of Test	4.612 feet

Trial	Adjusted Time (minutes)	Head (feet)	Head Ratio	Hyd. Con. (feet/day)	Flow to Well (Cubic Feet/Day)
29	0.	0.52	0.2055	--	
30	4.e-002	0.51	0.2016	1.549	34.07
31	7.e-002	0.51	0.2016	0.8854	19.47
32	0.1	0.51	0.2016	0.6198	13.63
33	0.14	0.5	0.1976	0.8942	19.27
34	0.17	0.49	0.1937	1.116	23.57
35	0.2	0.49	0.1937	0.9483	20.03
36	0.24	0.48	0.1897	1.064	22.03
37	0.27	0.48	0.1897	0.9462	19.58
38	0.3	0.49	0.1937	0.6322	13.36
39	0.34	0.48	0.1897	0.7514	15.55
40	0.37	0.47	0.1858	0.8721	17.67
41	0.4	0.46	0.1818	0.9783	19.4
42	0.44	0.46	0.1818	0.8894	17.64
43	0.47	0.46	0.1818	0.8326	16.51
44	0.5	0.46	0.1818	0.7826	15.52
45	0.54	0.46	0.1818	0.7247	14.37
46	0.57	0.46	0.1818	0.6865	13.61
47	0.6	0.47	0.1858	0.5378	10.9
48	0.64	0.45	0.1779	0.721	13.99
49	0.67	0.45	0.1779	0.6888	13.36
50	0.7	0.45	0.1779	0.6592	12.79
51	0.74	0.44	0.1739	0.7205	13.67
52	0.77	0.45	0.1779	0.5993	11.63
53	0.8	0.44	0.1739	0.6665	12.64
54	0.84	0.44	0.1739	0.6348	12.04
55	0.87	0.43	0.17	0.6972	12.92
56	0.9	0.43	0.17	0.674	12.49
57	0.94	0.43	0.17	0.6453	11.96
58	0.97	0.42	0.166	0.7028	12.72
59	1.	0.41	0.1621	0.7586	13.41
60	1.04	0.42	0.166	0.6555	11.87
61	1.07	0.41	0.1621	0.709	12.53
62	1.1	0.42	0.166	0.6197	11.22
63	1.14	0.4	0.1581	0.7346	12.67

64	1.17	0.4	0.1581	0.7157	12.34
65	1.2	0.4	0.1581	0.6978	12.03
66	1.24	0.41	0.1621	0.6118	10.81
67	1.27	0.41	0.1621	0.5973	10.56
68	1.3	0.4	0.1581	0.6442	11.11
69	1.34	0.4	0.1581	0.6249	10.78
70	1.37	0.41	0.1621	0.5537	9.787
71	1.4	0.4	0.1581	0.5981	10.31
72	1.44	0.39	0.1542	0.6376	10.72
73	1.47	0.39	0.1542	0.6246	10.5
74	1.5	0.39	0.1542	0.6121	10.29
75	1.54	0.39	0.1542	0.5962	10.02
76	1.57	0.39	0.1542	0.5849	9.833
77	1.6	0.39	0.1542	0.5739	9.649
78	1.64	0.37	0.1462	0.6623	10.56
79	1.67	0.37	0.1462	0.6504	10.38
80	1.7	0.37	0.1462	0.639	10.19
81	1.74	0.37	0.1462	0.6243	9.958
82	1.77	0.38	0.1502	0.5656	9.266
83	1.8	0.39	0.1542	0.5101	8.577
84	1.84	0.38	0.1502	0.5441	8.913
85	1.87	0.37	0.1462	0.5809	9.265
86	1.9	0.36	0.1423	0.6177	9.587
87	1.94	0.37	0.1462	0.5599	8.931
88	1.97	0.37	0.1462	0.5514	8.795
89	2.	0.36	0.1423	0.5868	9.108
90	2.04	0.37	0.1462	0.5325	8.493
91	2.07	0.37	0.1462	0.5248	8.37
92	2.1	0.36	0.1423	0.5589	8.674
93	2.14	0.36	0.1423	0.5485	8.512
94	2.17	0.36	0.1423	0.5409	8.394
95	2.2	0.36	0.1423	0.5335	8.28
96	2.24	0.36	0.1423	0.524	8.132
97	2.27	0.35	0.1383	0.5567	8.399
98	2.3	0.35	0.1383	0.5494	8.29
99	2.34	0.35	0.1383	0.54	8.148
100	2.37	0.35	0.1383	0.5332	8.045
101	2.4	0.35	0.1383	0.5265	7.944
102	2.44	0.35	0.1383	0.5179	7.814
103	2.47	0.34	0.1344	0.549	8.048
104	2.5	0.35	0.1383	0.5054	7.626
105	2.54	0.35	0.1383	0.4975	7.506
106	2.57	0.34	0.1344	0.5277	7.734
107	2.6	0.34	0.1344	0.5216	7.645
108	2.64	0.34	0.1344	0.5137	7.529
109	2.67	0.33	0.1304	0.5436	7.733
110	2.7	0.33	0.1304	0.5376	7.648
111	2.74	0.35	0.1383	0.4612	6.958
112	2.77	0.34	0.1344	0.4896	7.176
113	2.8	0.33	0.1304	0.5184	7.374
114	2.84	0.33	0.1304	0.5111	7.271
115	2.87	0.33	0.1304	0.5057	7.195
116	2.9	0.32	0.1265	0.5344	7.372
117	2.94	0.33	0.1304	0.4937	7.023
118	2.97	0.32	0.1265	0.5218	7.198
119	3.	0.32	0.1265	0.5165	7.126
120	3.04	0.33	0.1304	0.4774	6.792

121	3.07	0.32	0.1265	0.5048	6.963
122	3.1	0.32	0.1265	0.4999	6.896
123	3.14	0.32	0.1265	0.4935	6.808
124	3.17	0.31	0.1225	0.5208	6.96
125	3.2	0.33	0.1304	0.4536	6.453
126	3.24	0.31	0.1225	0.5096	6.81
127	3.27	0.31	0.1225	0.5049	6.747
128	3.3	0.31	0.1225	0.5003	6.686
129	3.34	0.31	0.1225	0.4943	6.606
130	3.37	0.3	0.1186	0.521	6.738
131	3.4	0.31	0.1225	0.4856	6.489
132	3.44	0.31	0.1225	0.4799	6.414
133	3.47	0.29	0.1146	0.5371	6.715
134	3.5	0.31	0.1225	0.4717	6.304
135	3.54	0.31	0.1225	0.4664	6.233
136	3.57	0.3	0.1186	0.4918	6.36
137	3.6	0.3	0.1186	0.4877	6.307
138	3.64	0.31	0.1225	0.4536	6.061
139	3.67	0.3	0.1186	0.4784	6.187
140	3.7	0.31	0.1225	0.4462	5.963
141	3.74	0.29	0.1146	0.4983	6.23
142	3.77	0.29	0.1146	0.4944	6.181
143	3.8	0.3	0.1186	0.462	5.975
144	3.84	0.29	0.1146	0.4854	6.068
145	3.87	0.29	0.1146	0.4816	6.021
146	3.9	0.29	0.1146	0.4779	5.975
147	3.94	0.29	0.1146	0.4731	5.914
148	3.97	0.29	0.1146	0.4695	5.869
149	4.	0.29	0.1146	0.466	5.825
150	4.04	0.28	0.1107	0.4891	5.903
151	4.07	0.29	0.1146	0.4579	5.725
152	4.1	0.3	0.1186	0.4282	5.538
153	4.14	0.29	0.1146	0.4502	5.628
154	4.17	0.29	0.1146	0.447	5.588
155	4.2	0.28	0.1107	0.4704	5.679
156	4.24	0.28	0.1107	0.466	5.625
157	4.27	0.28	0.1107	0.4627	5.585
158	4.3	0.29	0.1146	0.4334	5.419
159	4.34	0.28	0.1107	0.4553	5.495
160	4.37	0.28	0.1107	0.4521	5.458
161	4.4	0.27	0.1067	0.4754	5.534
162	4.44	0.27	0.1067	0.4712	5.484
163	4.47	0.28	0.1107	0.442	5.336
164	4.5	0.27	0.1067	0.4649	5.411
165	4.54	0.29	0.1146	0.4105	5.132
166	4.57	0.28	0.1107	0.4323	5.219
167	4.6	0.27	0.1067	0.4548	5.293
168	4.64	0.27	0.1067	0.4508	5.248
169	4.67	0.28	0.1107	0.4231	5.107
170	4.7	0.27	0.1067	0.4451	5.181
171	4.74	0.27	0.1067	0.4413	5.137
172	4.77	0.28	0.1107	0.4142	5.
173	4.8	0.26	0.1028	0.4609	5.166
174	4.84	0.27	0.1067	0.4322	5.031
175	4.87	0.27	0.1067	0.4296	5.
176	4.9	0.27	0.1067	0.4269	4.969
177	4.94	0.26	0.1028	0.4478	5.02

178	4.97	0.27	0.1067	0.4209	4.899
179	5.	0.26	0.1028	0.4425	4.96
180	5.04	0.26	0.1028	0.439	4.92
181	5.07	0.26	0.1028	0.4364	4.891
182	5.1	0.26	0.1028	0.4338	4.862
183	5.14	0.25	9.881e-002	0.4548	4.901
184	5.17	0.26	0.1028	0.4279	4.796
185	5.2	0.26	0.1028	0.4255	4.769
186	5.24	0.26	0.1028	0.4222	4.732
187	5.27	0.26	0.1028	0.4198	4.705
188	5.3	0.25	9.881e-002	0.441	4.753
189	5.34	0.25	9.881e-002	0.4377	4.718
190	5.37	0.25	9.881e-002	0.4353	4.691
191	5.4	0.26	0.1028	0.4097	4.592
192	5.44	0.25	9.881e-002	0.4297	4.631
193	5.47	0.26	0.1028	0.4045	4.533
194	5.5	0.24	9.486e-002	0.4487	4.642
195	5.54	0.25	9.881e-002	0.4219	4.547
196	5.57	0.25	9.881e-002	0.4197	4.523
197	5.6	0.25	9.881e-002	0.4174	4.499
198	5.64	0.24	9.486e-002	0.4376	4.527
199	5.67	0.24	9.486e-002	0.4352	4.503
200	5.7	0.24	9.486e-002	0.433	4.48
201	5.74	0.24	9.486e-002	0.4299	4.448
202	5.77	0.24	9.486e-002	0.4277	4.425
203	5.8	0.25	9.881e-002	0.403	4.344
204	5.84	0.24	9.486e-002	0.4226	4.372
205	5.87	0.24	9.486e-002	0.4204	4.35
206	5.9	0.24	9.486e-002	0.4183	4.328
207	5.94	0.24	9.486e-002	0.4155	4.299
208	5.97	0.23	9.091e-002	0.4361	4.324
209	6.	0.24	9.486e-002	0.4113	4.256
210	6.04	0.24	9.486e-002	0.4086	4.227
211	6.07	0.23	9.091e-002	0.4289	4.253
212	6.1	0.23	9.091e-002	0.4268	4.232
213	6.14	0.23	9.091e-002	0.4241	4.205
214	6.17	0.23	9.091e-002	0.422	4.184
215	6.2	0.24	9.486e-002	0.398	4.118
216	6.24	0.23	9.091e-002	0.4173	4.137
217	6.27	0.22	8.696e-002	0.4379	4.153
218	6.3	0.23	9.091e-002	0.4133	4.098
219	6.34	0.23	9.091e-002	0.4107	4.072
220	6.37	0.22	8.696e-002	0.431	4.088
221	6.4	0.22	8.696e-002	0.429	4.069
222	6.44	0.23	9.091e-002	0.4043	4.009
223	6.47	0.23	9.091e-002	0.4024	3.99
224	6.5	0.23	9.091e-002	0.4006	3.972
225	6.54	0.23	9.091e-002	0.3981	3.947
226	6.57	0.23	9.091e-002	0.3963	3.929
227	6.6	0.22	8.696e-002	0.416	3.945
228	6.64	0.22	8.696e-002	0.4135	3.922
229	6.67	0.22	8.696e-002	0.4116	3.904
230	6.7	0.21	8.3e-002	0.4319	3.91
231	6.74	0.22	8.696e-002	0.4074	3.863
232	6.77	0.23	9.091e-002	0.3846	3.813
233	6.8	0.22	8.696e-002	0.4038	3.829
234	6.84	0.21	8.3e-002	0.4231	3.83

235	6.87	0.22	8.696e-002	0.3996	3.79
236	6.9	0.22	8.696e-002	0.3979	3.774
237	6.94	0.23	9.091e-002	0.3752	3.72
238	6.97	0.22	8.696e-002	0.3939	3.736
239	7.	0.21	8.3e-002	0.4134	3.743
240	7.04	0.22	8.696e-002	0.39	3.699
241	7.07	0.21	8.3e-002	0.4093	3.706
242	7.1	0.2	7.905e-002	0.4295	3.704
243	7.14	0.21	8.3e-002	0.4053	3.67
244	7.17	0.21	8.3e-002	0.4036	3.654
245	7.2	0.21	8.3e-002	0.402	3.639
246	7.24	0.2	7.905e-002	0.4212	3.632
247	7.27	0.21	8.3e-002	0.3981	3.604
248	7.3	0.21	8.3e-002	0.3964	3.589
249	7.34	0.21	8.3e-002	0.3943	3.57
250	7.37	0.21	8.3e-002	0.3927	3.555
251	7.4	0.2	7.905e-002	0.4121	3.553
252	7.44	0.21	8.3e-002	0.389	3.522
253	7.47	0.21	8.3e-002	0.3874	3.507
254	7.5	0.21	8.3e-002	0.3859	3.493
255	7.54	0.21	8.3e-002	0.3838	3.475
256	7.57	0.2	7.905e-002	0.4029	3.474
257	7.6	0.2	7.905e-002	0.4013	3.46
258	7.64	0.2	7.905e-002	0.3992	3.442
259	7.67	0.21	8.3e-002	0.3773	3.416
260	7.7	0.21	8.3e-002	0.3759	3.403
261	7.74	0.2	7.905e-002	0.394	3.397
262	7.77	0.2	7.905e-002	0.3925	3.384
263	7.8	0.19	7.51e-002	0.412	3.375
264	7.84	0.2	7.905e-002	0.389	3.354
265	7.87	0.19	7.51e-002	0.4083	3.345
266	7.9	0.19	7.51e-002	0.4068	3.332
267	7.94	0.19	7.51e-002	0.4047	3.315
268	7.97	0.19	7.51e-002	0.4032	3.303
269	8.	0.2	7.905e-002	0.3812	3.287
270	8.04	0.2	7.905e-002	0.3793	3.271
271	8.07	0.2	7.905e-002	0.3779	3.258
272	8.1	0.21	8.3e-002	0.3573	3.235
273	8.14	0.19	7.51e-002	0.3948	3.234
274	8.17	0.19	7.51e-002	0.3933	3.222
275	8.2	0.2	7.905e-002	0.3719	3.207
276	8.24	0.2	7.905e-002	0.3701	3.191
277	8.27	0.19	7.51e-002	0.3886	3.183
278	8.3	0.19	7.51e-002	0.3872	3.171
279	8.34	0.19	7.51e-002	0.3853	3.156
280	8.37	0.19	7.51e-002	0.3839	3.145
281	8.4	0.18	7.115e-002	0.4031	3.128
282	8.44	0.18	7.115e-002	0.4012	3.113
283	8.47	0.19	7.51e-002	0.3794	3.108
284	8.5	0.18	7.115e-002	0.3984	3.091
285	8.54	0.18	7.115e-002	0.3965	3.077
286	8.57	0.18	7.115e-002	0.3951	3.066
287	8.6	0.19	7.51e-002	0.3737	3.061
288	8.64	0.19	7.51e-002	0.3719	3.046
289	8.67	0.18	7.115e-002	0.3905	3.031
290	8.7	0.18	7.115e-002	0.3892	3.02
291	8.74	0.18	7.115e-002	0.3874	3.006

292	8.77	0.18	7.115e-002	0.3861	2.996
293	8.8	0.19	7.51e-002	0.3652	2.991
294	8.84	0.18	7.115e-002	0.383	2.972
295	8.87	0.19	7.51e-002	0.3623	2.967
296	8.9	0.19	7.51e-002	0.3611	2.957
297	8.94	0.18	7.115e-002	0.3788	2.939
298	8.97	0.18	7.115e-002	0.3775	2.929
299	9.	0.18	7.115e-002	0.3762	2.919
300	9.04	0.17	6.719e-002	0.3947	2.893
301	9.07	0.17	6.719e-002	0.3934	2.883
302	9.1	0.18	7.115e-002	0.3721	2.887
303	9.14	0.18	7.115e-002	0.3705	2.875
304	9.17	0.18	7.115e-002	0.3693	2.865
305	9.2	0.17	6.719e-002	0.3879	2.843
306	9.24	0.18	7.115e-002	0.3665	2.844
307	9.27	0.18	7.115e-002	0.3653	2.834
308	9.3	0.17	6.719e-002	0.3837	2.812
309	9.34	0.18	7.115e-002	0.3625	2.813
310	9.37	0.18	7.115e-002	0.3614	2.804
311	9.4	0.17	6.719e-002	0.3796	2.782
312	9.44	0.17	6.719e-002	0.378	2.77
313	9.47	0.17	6.719e-002	0.3768	2.762
314	9.5	0.17	6.719e-002	0.3756	2.753
315	9.54	0.17	6.719e-002	0.3741	2.741
316	9.57	0.17	6.719e-002	0.3729	2.733
317	9.6	0.17	6.719e-002	0.3717	2.724
318	9.64	0.17	6.719e-002	0.3702	2.713
319	9.67	0.18	7.115e-002	0.3502	2.717
320	9.7	0.16	6.324e-002	0.3878	2.675
321	9.74	0.17	6.719e-002	0.3664	2.685
322	9.77	0.17	6.719e-002	0.3653	2.677
323	9.8	0.17	6.719e-002	0.3641	2.669
324	9.84	0.17	6.719e-002	0.3627	2.658
325	9.87	0.17	6.719e-002	0.3615	2.65
326	9.9	0.17	6.719e-002	0.3605	2.642
327	9.94	0.16	6.324e-002	0.3785	2.611
328	9.97	0.15	5.929e-002	0.398	2.574
329	10.	0.16	6.324e-002	0.3762	2.595
330	10.04	0.17	6.719e-002	0.3554	2.605
331	10.07	0.17	6.719e-002	0.3544	2.597
332	10.1	0.17	6.719e-002	0.3533	2.589
333	10.14	0.15	5.929e-002	0.3913	2.53
334	10.17	0.16	6.324e-002	0.3699	2.552
335	10.2	0.16	6.324e-002	0.3688	2.544
336	10.24	0.16	6.324e-002	0.3674	2.534
337	10.27	0.16	6.324e-002	0.3663	2.527
338	10.3	0.15	5.929e-002	0.3852	2.491
339	10.34	0.17	6.719e-002	0.3451	2.529
340	10.37	0.16	6.324e-002	0.3628	2.502
341	10.4	0.15	5.929e-002	0.3815	2.467
342	10.44	0.16	6.324e-002	0.3603	2.486
343	10.47	0.16	6.324e-002	0.3593	2.478
344	10.5	0.15	5.929e-002	0.3779	2.444
345	10.54	0.16	6.324e-002	0.3569	2.462
346	10.57	0.16	6.324e-002	0.3559	2.455
347	10.6	0.15	5.929e-002	0.3743	2.421
348	10.64	0.15	5.929e-002	0.3729	2.412

349	10.67	0.16	6.324e-002	0.3526	2.432
350	10.7	0.15	5.929e-002	0.3708	2.398
351	10.74	0.16	6.324e-002	0.3503	2.416
352	10.77	0.15	5.929e-002	0.3684	2.382
353	10.8	0.16	6.324e-002	0.3483	2.403
354	10.84	0.15	5.929e-002	0.3661	2.367
355	10.87	0.15	5.929e-002	0.365	2.361
356	10.9	0.15	5.929e-002	0.364	2.354
357	10.94	0.15	5.929e-002	0.3627	2.345
358	10.97	0.15	5.929e-002	0.3617	2.339
359	11.	0.15	5.929e-002	0.3607	2.333
360	11.04	0.15	5.929e-002	0.3594	2.324
361	11.07	0.15	5.929e-002	0.3584	2.318
362	11.1	0.16	6.324e-002	0.3389	2.338
363	11.14	0.15	5.929e-002	0.3562	2.303
364	11.17	0.14	5.534e-002	0.375	2.263
365	11.2	0.15	5.929e-002	0.3543	2.291
366	11.24	0.16	6.324e-002	0.3347	2.309
367	11.27	0.16	6.324e-002	0.3338	2.302
368	11.3	0.15	5.929e-002	0.3511	2.271
369	11.34	0.15	5.929e-002	0.3499	2.263
370	11.37	0.15	5.929e-002	0.349	2.257
371	11.4	0.14	5.534e-002	0.3674	2.217
372	11.44	0.15	5.929e-002	0.3469	2.243
373	11.47	0.16	6.324e-002	0.328	2.262
374	11.5	0.15	5.929e-002	0.345	2.231
375	11.54	0.14	5.534e-002	0.3629	2.19
376	11.57	0.14	5.534e-002	0.362	2.185
377	11.6	0.15	5.929e-002	0.3421	2.212
378	11.64	0.14	5.534e-002	0.3598	2.172
379	11.67	0.14	5.534e-002	0.3589	2.166
380	11.7	0.14	5.534e-002	0.358	2.16
381	11.74	0.13	5.138e-002	0.3769	2.112
382	11.77	0.14	5.534e-002	0.3558	2.148
383	11.8	0.13	5.138e-002	0.375	2.102
384	11.84	0.14	5.534e-002	0.3537	2.135
385	11.87	0.14	5.534e-002	0.3528	2.13
386	11.9	0.14	5.534e-002	0.3519	2.124
387	11.94	0.14	5.534e-002	0.3508	2.117
388	11.97	0.14	5.534e-002	0.3499	2.112
389	12.	0.13	5.138e-002	0.3687	2.066
390	12.04	0.14	5.534e-002	0.3479	2.099
391	12.07	0.13	5.138e-002	0.3666	2.054
392	12.1	0.14	5.534e-002	0.3461	2.089
393	12.14	0.13	5.138e-002	0.3645	2.043
394	12.17	0.14	5.534e-002	0.3441	2.077
395	12.2	0.14	5.534e-002	0.3433	2.072
396	12.24	0.13	5.138e-002	0.3615	2.026
397	12.27	0.14	5.534e-002	0.3413	2.06
398	12.3	0.14	5.534e-002	0.3405	2.055
399	12.34	0.13	5.138e-002	0.3586	2.01
400	12.37	0.13	5.138e-002	0.3577	2.005
401	12.4	0.14	5.534e-002	0.3378	2.039
402	12.44	0.14	5.534e-002	0.3367	2.032
403	12.47	0.14	5.534e-002	0.3359	2.027
404	12.5	0.13	5.138e-002	0.354	1.984
405	12.54	0.14	5.534e-002	0.334	2.016

406	12.57	0.13	5.138e-002	0.352	1.973
407	12.6	0.13	5.138e-002	0.3512	1.968
408	12.64	0.12	4.743e-002	0.3703	1.915
409	12.67	0.12	4.743e-002	0.3694	1.911
410	12.7	0.13	5.138e-002	0.3484	1.953
411	12.74	0.12	4.743e-002	0.3674	1.9
412	12.77	0.12	4.743e-002	0.3665	1.896
413	12.8	0.13	5.138e-002	0.3457	1.937
414	12.84	0.13	5.138e-002	0.3446	1.931
415	12.87	0.13	5.138e-002	0.3438	1.927
416	12.9	0.11	4.348e-002	0.3843	1.823
417	12.94	0.14	5.534e-002	0.3237	1.953
418	12.97	0.13	5.138e-002	0.3412	1.912
419	13.	0.13	5.138e-002	0.3404	1.908
420	13.04	0.13	5.138e-002	0.3393	1.902
421	13.07	0.13	5.138e-002	0.3385	1.897
422	13.1	0.13	5.138e-002	0.3378	1.893
423	13.14	0.13	5.138e-002	0.3367	1.887
424	13.17	0.13	5.138e-002	0.336	1.883
425	13.2	0.12	4.743e-002	0.3546	1.834
426	13.24	0.12	4.743e-002	0.3535	1.829
427	13.27	0.12	4.743e-002	0.3527	1.825
428	13.3	0.13	5.138e-002	0.3327	1.864
429	13.34	0.12	4.743e-002	0.3508	1.815
430	13.37	0.12	4.743e-002	0.3501	1.811
431	13.4	0.13	5.138e-002	0.3302	1.851
432	13.44	0.13	5.138e-002	0.3292	1.845
433	13.47	0.13	5.138e-002	0.3285	1.841
434	13.5	0.12	4.743e-002	0.3467	1.793
435	13.54	0.12	4.743e-002	0.3457	1.788
436	13.57	0.13	5.138e-002	0.3261	1.827
437	13.6	0.12	4.743e-002	0.3441	1.78
438	13.64	0.12	4.743e-002	0.3431	1.775
439	13.67	0.12	4.743e-002	0.3424	1.771
440	13.7	0.12	4.743e-002	0.3416	1.767
441	13.74	0.12	4.743e-002	0.3406	1.762
442	13.77	0.11	4.348e-002	0.3601	1.707
443	13.8	0.11	4.348e-002	0.3593	1.704
444	13.84	0.11	4.348e-002	0.3582	1.699
445	13.87	0.11	4.348e-002	0.3575	1.695
446	13.9	0.12	4.743e-002	0.3367	1.742
447	13.94	0.11	4.348e-002	0.3557	1.687
448	13.97	0.11	4.348e-002	0.3549	1.683
449	14.	0.11	4.348e-002	0.3541	1.679
450	14.04	0.12	4.743e-002	0.3333	1.724
451	14.07	0.11	4.348e-002	0.3524	1.671
452	14.1	0.12	4.743e-002	0.3319	1.717
453	14.14	0.12	4.743e-002	0.331	1.712
454	14.17	0.11	4.348e-002	0.3499	1.659
455	14.2	0.11	4.348e-002	0.3492	1.656
456	14.24	0.12	4.743e-002	0.3287	1.7
457	14.27	0.11	4.348e-002	0.3474	1.648
458	14.3	0.12	4.743e-002	0.3273	1.693
459	14.34	0.11	4.348e-002	0.3457	1.64
460	14.37	0.11	4.348e-002	0.345	1.636
461	14.4	0.12	4.743e-002	0.325	1.681
462	14.44	0.12	4.743e-002	0.3241	1.677

463	14.47	0.11	4.348e-002	0.3426	1.625
464	14.5	0.11	4.348e-002	0.3419	1.621
465	14.54	0.12	4.743e-002	0.3219	1.665
466	14.57	0.11	4.348e-002	0.3403	1.614
467	14.6	0.1	3.953e-002	0.3604	1.554
468	14.64	0.11	4.348e-002	0.3387	1.606
469	14.67	0.11	4.348e-002	0.338	1.603
470	14.7	0.11	4.348e-002	0.3373	1.599
471	14.74	0.12	4.743e-002	0.3175	1.643
472	14.77	0.1	3.953e-002	0.3563	1.536
473	14.8	0.11	4.348e-002	0.335	1.589
474	14.84	0.11	4.348e-002	0.3341	1.584
475	14.87	0.11	4.348e-002	0.3334	1.581
476	14.9	0.11	4.348e-002	0.3327	1.578
477	14.94	0.11	4.348e-002	0.3319	1.574
478	14.97	0.1	3.953e-002	0.3515	1.515
479	15.	0.11	4.348e-002	0.3305	1.567
480	15.04	0.1	3.953e-002	0.3499	1.508
481	15.07	0.11	4.348e-002	0.329	1.56
482	15.1	0.11	4.348e-002	0.3283	1.557
483	15.14	0.11	4.348e-002	0.3275	1.553
484	15.17	0.1	3.953e-002	0.3469	1.495
485	15.2	0.11	4.348e-002	0.3262	1.547
486	15.24	0.11	4.348e-002	0.3253	1.543
487	15.27	0.11	4.348e-002	0.3247	1.54
488	15.3	0.11	4.348e-002	0.324	1.537
489	15.34	0.11	4.348e-002	0.3232	1.533
490	15.37	0.1	3.953e-002	0.3424	1.476
491	15.4	0.11	4.348e-002	0.3219	1.527
492	15.44	0.11	4.348e-002	0.3211	1.523
493	15.47	0.11	4.348e-002	0.3205	1.52
494	15.5	0.1	3.953e-002	0.3395	1.464
495	15.54	0.1	3.953e-002	0.3386	1.46
496	15.57	0.1	3.953e-002	0.338	1.457
497	15.6	0.11	4.348e-002	0.3178	1.507
498	15.64	0.1	3.953e-002	0.3365	1.45
499	15.67	0.1	3.953e-002	0.3358	1.448
500	15.7	0.11	4.348e-002	0.3158	1.498
501	15.74	0.1	3.953e-002	0.3343	1.441
502	15.77	0.1	3.953e-002	0.3337	1.439
503	15.8	0.1	3.953e-002	0.333	1.436
504	15.84	0.11	4.348e-002	0.313	1.484
505	15.87	0.1	3.953e-002	0.3316	1.429
506	15.9	0.1	3.953e-002	0.331	1.427
507	15.94	0.1	3.953e-002	0.3301	1.423
508	15.97	0.1	3.953e-002	0.3295	1.42
509	16.	0.11	4.348e-002	0.3099	1.469
510	16.04	9.e-002	3.557e-002	0.349	1.354
511	16.07	0.1	3.953e-002	0.3275	1.412
512	16.1	0.11	4.348e-002	0.3079	1.46
513	16.14	0.1	3.953e-002	0.326	1.406
514	16.17	0.1	3.953e-002	0.3254	1.403
515	16.2	0.11	4.348e-002	0.306	1.451
516	16.24	0.11	4.348e-002	0.3053	1.448
517	16.27	0.1	3.953e-002	0.3234	1.394
518	16.3	9.e-002	3.557e-002	0.3435	1.333
519	16.34	0.1	3.953e-002	0.322	1.388

520	16.37	0.1	3.953e-002	0.3215	1.386
521	16.4	0.1	3.953e-002	0.3209	1.383
522	16.44	9.e-002	3.557e-002	0.3405	1.321
523	16.47	9.e-002	3.557e-002	0.3399	1.319
524	16.5	0.1	3.953e-002	0.3189	1.375
525	16.54	0.1	3.953e-002	0.3181	1.372
526	16.57	0.1	3.953e-002	0.3176	1.369
527	16.6	0.1	3.953e-002	0.317	1.367
528	16.64	0.1	3.953e-002	0.3162	1.363
529	16.67	9.e-002	3.557e-002	0.3358	1.303
530	16.7	9.e-002	3.557e-002	0.3352	1.301
531	16.74	0.1	3.953e-002	0.3143	1.355
532	16.77	0.1	3.953e-002	0.3138	1.353
533	16.8	0.11	4.348e-002	0.2951	1.399
534	16.84	8.e-002	3.162e-002	0.3548	1.224
535	16.87	0.1	3.953e-002	0.3119	1.345
536	16.9	9.e-002	3.557e-002	0.3313	1.285
537	16.94	9.e-002	3.557e-002	0.3305	1.282
538	16.97	0.1	3.953e-002	0.3101	1.337
539	17.	0.1	3.953e-002	0.3095	1.334
540	17.04	0.1	3.953e-002	0.3088	1.331
541	17.07	9.e-002	3.557e-002	0.328	1.272
542	17.1	9.e-002	3.557e-002	0.3274	1.27
543	17.14	0.1	3.953e-002	0.307	1.324
544	17.17	9.e-002	3.557e-002	0.3261	1.265
545	17.2	9.e-002	3.557e-002	0.3255	1.263
546	17.24	8.e-002	3.162e-002	0.3465	1.195
547	17.27	0.1	3.953e-002	0.3047	1.314
548	17.3	9.e-002	3.557e-002	0.3236	1.256
549	17.34	9.e-002	3.557e-002	0.3229	1.253
550	17.37	9.e-002	3.557e-002	0.3223	1.251
551	17.4	9.e-002	3.557e-002	0.3217	1.248
552	17.44	9.e-002	3.557e-002	0.321	1.245
553	17.47	9.e-002	3.557e-002	0.3205	1.243
554	17.5	0.1	3.953e-002	0.3007	1.296
555	17.54	9.e-002	3.557e-002	0.3192	1.238
556	17.57	0.1	3.953e-002	0.2995	1.291
557	17.6	9.e-002	3.557e-002	0.3181	1.234
558	17.64	0.1	3.953e-002	0.2983	1.286
559	17.67	9.e-002	3.557e-002	0.3168	1.229
560	17.7	0.1	3.953e-002	0.2973	1.282
561	17.74	9.e-002	3.557e-002	0.3156	1.224
562	17.77	9.e-002	3.557e-002	0.315	1.222
563	17.8	9.e-002	3.557e-002	0.3145	1.22
564	17.84	9.e-002	3.557e-002	0.3138	1.218
565	17.87	9.e-002	3.557e-002	0.3133	1.216
566	17.9	9.e-002	3.557e-002	0.3128	1.213
567	17.94	8.e-002	3.162e-002	0.333	1.149
568	17.97	9.e-002	3.557e-002	0.3115	1.209
569	18.	9.e-002	3.557e-002	0.311	1.207
570	18.04	9.e-002	3.557e-002	0.3103	1.204
571	18.07	0.1	3.953e-002	0.2912	1.255
572	18.1	9.e-002	3.557e-002	0.3093	1.2
573	18.14	0.1	3.953e-002	0.2901	1.251
574	18.17	9.e-002	3.557e-002	0.3081	1.195
575	18.2	9.e-002	3.557e-002	0.3076	1.193
576	18.24	9.e-002	3.557e-002	0.3069	1.191

577	18.27	9.e-002	3.557e-002	0.3064	1.189
578	18.3	9.e-002	3.557e-002	0.3059	1.187
579	18.34	9.e-002	3.557e-002	0.3053	1.184
580	18.37	0.1	3.953e-002	0.2865	1.235
581	18.4	8.e-002	3.162e-002	0.3247	1.12
582	18.44	9.e-002	3.557e-002	0.3036	1.178
583	18.47	8.e-002	3.162e-002	0.3235	1.116
584	18.5	8.e-002	3.162e-002	0.3229	1.114
585	18.54	9.e-002	3.557e-002	0.302	1.172
586	18.57	9.e-002	3.557e-002	0.3015	1.17
587	18.6	9.e-002	3.557e-002	0.301	1.168
588	18.64	9.e-002	3.557e-002	0.3003	1.165
589	18.67	9.e-002	3.557e-002	0.2999	1.163
590	18.7	9.e-002	3.557e-002	0.2994	1.162
591	18.74	8.e-002	3.162e-002	0.3188	1.099
592	18.77	9.e-002	3.557e-002	0.2983	1.157
593	18.8	9.e-002	3.557e-002	0.2978	1.155
594	18.84	9.e-002	3.557e-002	0.2972	1.153
595	18.87	8.e-002	3.162e-002	0.3166	1.092
596	18.9	9.e-002	3.557e-002	0.2962	1.149
597	18.94	9.e-002	3.557e-002	0.2956	1.147
598	18.97	9.e-002	3.557e-002	0.2951	1.145
599	19.	9.e-002	3.557e-002	0.2947	1.143
600	19.04	8.e-002	3.162e-002	0.3138	1.082
601	19.07	9.e-002	3.557e-002	0.2936	1.139
602	19.1	0.1	3.953e-002	0.2755	1.188
603	19.14	9.e-002	3.557e-002	0.2925	1.135
604	19.17	9.e-002	3.557e-002	0.292	1.133
605	19.2	9.e-002	3.557e-002	0.2916	1.131
606	19.24	0.1	3.953e-002	0.2735	1.179
607	19.27	8.e-002	3.162e-002	0.31	1.069
608	19.3	0.1	3.953e-002	0.2726	1.175
609	19.34	8.e-002	3.162e-002	0.3089	1.065
610	19.37	7.e-002	2.767e-002	0.3304	0.9972
611	19.4	9.e-002	3.557e-002	0.2886	1.12
612	19.44	8.e-002	3.162e-002	0.3073	1.06
613	19.47	9.e-002	3.557e-002	0.2875	1.116
614	19.5	8.e-002	3.162e-002	0.3064	1.057
615	19.54	9.e-002	3.557e-002	0.2865	1.112
616	19.57	8.e-002	3.162e-002	0.3053	1.053
617	19.6	9.e-002	3.557e-002	0.2856	1.108
618	19.64	9.e-002	3.557e-002	0.2851	1.106
619	19.67	8.e-002	3.162e-002	0.3037	1.048
620	19.7	9.e-002	3.557e-002	0.2842	1.103
621	19.74	8.e-002	3.162e-002	0.3027	1.044
622	19.77	0.1	3.953e-002	0.2662	1.147
623	19.8	8.e-002	3.162e-002	0.3017	1.041
624	19.84	9.e-002	3.557e-002	0.2822	1.095
625	19.87	8.e-002	3.162e-002	0.3007	1.037
626	19.9	8.e-002	3.162e-002	0.3002	1.035
627	19.94	8.e-002	3.162e-002	0.2996	1.033
628	19.97	8.e-002	3.162e-002	0.2992	1.032
629	20.	0.1	3.953e-002	0.2631	1.134
630	20.04	8.e-002	3.162e-002	0.2981	1.028
631	20.07	8.e-002	3.162e-002	0.2977	1.027
632	20.1	9.e-002	3.557e-002	0.2785	1.081
633	20.14	8.e-002	3.162e-002	0.2966	1.023

634	20.17	7.e-002	2.767e-002	0.3173	0.9576
635	20.2	9.e-002	3.557e-002	0.2771	1.075
636	20.24	8.e-002	3.162e-002	0.2952	1.018
637	20.27	8.e-002	3.162e-002	0.2947	1.017
638	20.3	8.e-002	3.162e-002	0.2943	1.015
639	20.34	9.e-002	3.557e-002	0.2752	1.068
640	20.37	8.e-002	3.162e-002	0.2933	1.012
641	20.4	7.e-002	2.767e-002	0.3138	0.9468
642	20.44	7.e-002	2.767e-002	0.3131	0.945
643	20.47	9.e-002	3.557e-002	0.2735	1.061
644	20.5	8.e-002	3.162e-002	0.2914	1.005
645	20.54	8.e-002	3.162e-002	0.2909	1.003
646	20.57	8.e-002	3.162e-002	0.2904	1.002
647	20.6	7.e-002	2.767e-002	0.3107	0.9376
648	20.64	8.e-002	3.162e-002	0.2895	0.9983
649	20.67	8.e-002	3.162e-002	0.289	0.9968
650	20.7	8.e-002	3.162e-002	0.2886	0.9954
651	20.74	8.e-002	3.162e-002	0.2881	0.9935
652	20.77	8.e-002	3.162e-002	0.2876	0.992
653	20.8	8.e-002	3.162e-002	0.2872	0.9906
654	20.84	8.e-002	3.162e-002	0.2867	0.9887
655	20.87	9.e-002	3.557e-002	0.2683	1.041
656	20.9	9.e-002	3.557e-002	0.2679	1.039
657	20.94	9.e-002	3.557e-002	0.2674	1.037
658	20.97	8.e-002	3.162e-002	0.2849	0.9826
659	21.	9.e-002	3.557e-002	0.2666	1.034
660	21.04	8.e-002	3.162e-002	0.284	0.9793
661	21.07	7.e-002	2.767e-002	0.3038	0.9167
662	21.1	7.e-002	2.767e-002	0.3033	0.9154
663	21.14	8.e-002	3.162e-002	0.2826	0.9747
664	21.17	6.e-002	2.372e-002	0.3256	0.8422
665	21.2	8.e-002	3.162e-002	0.2818	0.9719
666	21.24	8.e-002	3.162e-002	0.2813	0.9701
667	21.27	8.e-002	3.162e-002	0.2809	0.9687
668	21.3	7.e-002	2.767e-002	0.3005	0.9068
669	21.34	8.e-002	3.162e-002	0.28	0.9655
670	21.37	8.e-002	3.162e-002	0.2796	0.9642
671	21.4	8.e-002	3.162e-002	0.2792	0.9628
672	21.44	7.e-002	2.767e-002	0.2985	0.9009
673	21.47	7.e-002	2.767e-002	0.2981	0.8996
674	21.5	8.e-002	3.162e-002	0.2779	0.9583
675	21.54	8.e-002	3.162e-002	0.2774	0.9566
676	21.57	8.e-002	3.162e-002	0.277	0.9552
677	21.6	8.e-002	3.162e-002	0.2766	0.9539
678	21.64	7.e-002	2.767e-002	0.2958	0.8926
679	21.67	8.e-002	3.162e-002	0.2757	0.9508
680	21.7	6.e-002	2.372e-002	0.3176	0.8216
681	21.74	8.e-002	3.162e-002	0.2748	0.9478
682	21.77	7.e-002	2.767e-002	0.294	0.8872
683	21.8	7.e-002	2.767e-002	0.2936	0.886
684	21.84	8.e-002	3.162e-002	0.2736	0.9434
685	21.87	7.e-002	2.767e-002	0.2927	0.8832
686	21.9	8.e-002	3.162e-002	0.2728	0.9408
687	21.94	7.e-002	2.767e-002	0.2917	0.8804
688	21.97	6.e-002	2.372e-002	0.3137	0.8115
689	22.	7.e-002	2.767e-002	0.2909	0.878
690	22.04	7.e-002	2.767e-002	0.2904	0.8764

691	22.07	7.e-002	2.767e-002	0.29	0.8752
692	22.1	8.e-002	3.162e-002	0.2703	0.9323
693	22.14	7.e-002	2.767e-002	0.2891	0.8724
694	22.17	7.e-002	2.767e-002	0.2887	0.8712
695	22.2	7.e-002	2.767e-002	0.2883	0.8701
696	22.24	8.e-002	3.162e-002	0.2686	0.9265
697	22.27	8.e-002	3.162e-002	0.2683	0.9252
698	22.3	8.e-002	3.162e-002	0.2679	0.924
699	22.34	7.e-002	2.767e-002	0.2865	0.8646
700	22.37	7.e-002	2.767e-002	0.2861	0.8634
701	22.4	7.e-002	2.767e-002	0.2857	0.8623
702	22.44	7.e-002	2.767e-002	0.2852	0.8607
703	22.47	6.e-002	2.372e-002	0.3067	0.7934
704	22.5	7.e-002	2.767e-002	0.2845	0.8584
705	22.54	7.e-002	2.767e-002	0.284	0.8569
706	22.57	7.e-002	2.767e-002	0.2836	0.8558
707	22.6	7.e-002	2.767e-002	0.2832	0.8547
708	22.64	7.e-002	2.767e-002	0.2827	0.8531
709	22.67	7.e-002	2.767e-002	0.2823	0.852
710	22.7	6.e-002	2.372e-002	0.3036	0.7854
711	22.74	7.e-002	2.767e-002	0.2815	0.8494
712	22.77	7.e-002	2.767e-002	0.2811	0.8483
713	22.8	6.e-002	2.372e-002	0.3023	0.782
714	22.84	7.e-002	2.767e-002	0.2802	0.8457
715	22.87	7.e-002	2.767e-002	0.2799	0.8446
716	22.9	6.e-002	2.372e-002	0.301	0.7785
717	22.94	7.e-002	2.767e-002	0.279	0.842
718	22.97	8.e-002	3.162e-002	0.2601	0.897
719	23.	8.e-002	3.162e-002	0.2598	0.8958
720	23.04	7.e-002	2.767e-002	0.2778	0.8383
721	23.07	7.e-002	2.767e-002	0.2774	0.8372
722	23.1	7.e-002	2.767e-002	0.2771	0.8362
723	23.14	8.e-002	3.162e-002	0.2582	0.8904
724	23.17	7.e-002	2.767e-002	0.2762	0.8336
725	23.2	7.e-002	2.767e-002	0.2759	0.8325
726	23.24	8.e-002	3.162e-002	0.2571	0.8866
727	23.27	7.e-002	2.767e-002	0.2751	0.83
728	23.3	7.e-002	2.767e-002	0.2747	0.829
729	23.34	7.e-002	2.767e-002	0.2742	0.8276
730	23.37	7.e-002	2.767e-002	0.2739	0.8265
731	23.4	6.e-002	2.372e-002	0.2946	0.7619
732	23.44	7.e-002	2.767e-002	0.2731	0.824
733	23.47	7.e-002	2.767e-002	0.2727	0.823
734	23.5	6.e-002	2.372e-002	0.2933	0.7587
735	23.54	6.e-002	2.372e-002	0.2928	0.7574
736	23.57	7.e-002	2.767e-002	0.2716	0.8195
737	23.6	6.e-002	2.372e-002	0.2921	0.7554
738	23.64	7.e-002	2.767e-002	0.2708	0.8171
739	23.67	7.e-002	2.767e-002	0.2704	0.816
740	23.7	7.e-002	2.767e-002	0.2701	0.815
741	23.74	7.e-002	2.767e-002	0.2696	0.8136
742	23.77	7.e-002	2.767e-002	0.2693	0.8126
743	23.8	8.e-002	3.162e-002	0.251	0.8657
744	23.84	8.e-002	3.162e-002	0.2506	0.8643
745	23.87	6.e-002	2.372e-002	0.2888	0.7469
746	23.9	7.e-002	2.767e-002	0.2678	0.8082
747	23.94	7.e-002	2.767e-002	0.2674	0.8068

748	23.97	7.e-002	2.767e-002	0.267	0.8058
749	24.	7.e-002	2.767e-002	0.2667	0.8048
750	24.04	6.e-002	2.372e-002	0.2867	0.7416
751	24.07	7.e-002	2.767e-002	0.2659	0.8025
752	24.1	6.e-002	2.372e-002	0.286	0.7398
753	24.14	7.e-002	2.767e-002	0.2651	0.8001
754	24.17	7.e-002	2.767e-002	0.2648	0.7991
755	24.2	7.e-002	2.767e-002	0.2645	0.7981
756	24.24	7.e-002	2.767e-002	0.264	0.7968
757	24.27	7.e-002	2.767e-002	0.2637	0.7958
758	24.3	6.e-002	2.372e-002	0.2836	0.7337
759	24.34	6.e-002	2.372e-002	0.2832	0.7325
760	24.37	7.e-002	2.767e-002	0.2626	0.7926
761	24.4	6.e-002	2.372e-002	0.2825	0.7307
762	24.44	6.e-002	2.372e-002	0.282	0.7295
763	24.47	7.e-002	2.767e-002	0.2616	0.7893
764	24.5	7.e-002	2.767e-002	0.2612	0.7884
765	24.54	6.e-002	2.372e-002	0.2809	0.7265
766	24.57	7.e-002	2.767e-002	0.2605	0.7861
767	24.6	6.e-002	2.372e-002	0.2802	0.7247
768	24.64	6.e-002	2.372e-002	0.2797	0.7236
769	24.67	6.e-002	2.372e-002	0.2794	0.7227
770	24.7	7.e-002	2.767e-002	0.2591	0.782
771	24.74	6.e-002	2.372e-002	0.2786	0.7206
772	24.77	7.e-002	2.767e-002	0.2584	0.7798
773	24.8	7.e-002	2.767e-002	0.2581	0.7788
774	24.84	6.e-002	2.372e-002	0.2775	0.7177
775	24.87	7.e-002	2.767e-002	0.2574	0.7766
776	24.9	6.e-002	2.372e-002	0.2768	0.716
777	24.94	6.e-002	2.372e-002	0.2764	0.7149
778	24.97	7.e-002	2.767e-002	0.2563	0.7735
779	25.	6.e-002	2.372e-002	0.2757	0.7131
780	25.04	6.e-002	2.372e-002	0.2753	0.712
781	25.07	6.e-002	2.372e-002	0.2749	0.7111
782	25.1	7.e-002	2.767e-002	0.255	0.7695
783	25.14	7.e-002	2.767e-002	0.2546	0.7683
784	25.17	5.e-002	1.976e-002	0.297	0.6401
785	25.2	6.e-002	2.372e-002	0.2735	0.7075
786	25.24	7.e-002	2.767e-002	0.2536	0.7653
787	25.27	6.e-002	2.372e-002	0.2728	0.7055
788	25.3	6.e-002	2.372e-002	0.2724	0.7047
789	25.34	7.e-002	2.767e-002	0.2526	0.7622
790	25.37	6.e-002	2.372e-002	0.2717	0.7027
791	25.4	7.e-002	2.767e-002	0.252	0.7604
792	25.44	7.e-002	2.767e-002	0.2516	0.7592
793	25.47	7.e-002	2.767e-002	0.2513	0.7583
794	25.5	6.e-002	2.372e-002	0.2703	0.6992
795	25.54	6.e-002	2.372e-002	0.2699	0.6981
796	25.57	6.e-002	2.372e-002	0.2696	0.6972
797	25.6	6.e-002	2.372e-002	0.2692	0.6964
798	25.64	6.e-002	2.372e-002	0.2688	0.6953
799	25.67	6.e-002	2.372e-002	0.2685	0.6945
800	25.7	6.e-002	2.372e-002	0.2682	0.6937
801	25.74	5.e-002	1.976e-002	0.2904	0.6259
802	25.77	6.e-002	2.372e-002	0.2675	0.6918
803	25.8	6.e-002	2.372e-002	0.2672	0.691
804	25.84	6.e-002	2.372e-002	0.2667	0.69

805	25.87	6.e-002	2.372e-002	0.2664	0.6892
806	25.9	6.e-002	2.372e-002	0.2661	0.6884
807	25.94	6.e-002	2.372e-002	0.2657	0.6873
808	25.97	6.e-002	2.372e-002	0.2654	0.6865
809	26.	6.e-002	2.372e-002	0.2651	0.6857
810	26.04	6.e-002	2.372e-002	0.2647	0.6847
811	26.07	6.e-002	2.372e-002	0.2644	0.6839
812	26.1	7.e-002	2.767e-002	0.2452	0.74
813	26.14	6.e-002	2.372e-002	0.2637	0.682
814	26.17	6.e-002	2.372e-002	0.2634	0.6813
815	26.2	7.e-002	2.767e-002	0.2443	0.7372
816	26.24	7.e-002	2.767e-002	0.2439	0.7361
817	26.27	6.e-002	2.372e-002	0.2624	0.6787
818	26.3	6.e-002	2.372e-002	0.2621	0.6779
819	26.34	6.e-002	2.372e-002	0.2617	0.6769
820	26.37	6.e-002	2.372e-002	0.2614	0.6761
821	26.4	6.e-002	2.372e-002	0.2611	0.6753
822	26.44	6.e-002	2.372e-002	0.2607	0.6743
823	26.47	6.e-002	2.372e-002	0.2604	0.6735
824	26.5	6.e-002	2.372e-002	0.2601	0.6728
825	26.54	5.e-002	1.976e-002	0.2816	0.6071
826	26.57	6.e-002	2.372e-002	0.2594	0.671
827	26.6	6.e-002	2.372e-002	0.2591	0.6702
828	26.64	6.e-002	2.372e-002	0.2587	0.6692
829	26.67	7.e-002	2.767e-002	0.24	0.7242
830	26.7	6.e-002	2.372e-002	0.2581	0.6677
831	26.74	5.e-002	1.976e-002	0.2795	0.6025
832	26.77	6.e-002	2.372e-002	0.2575	0.666
833	26.8	6.e-002	2.372e-002	0.2572	0.6652
834	26.84	6.e-002	2.372e-002	0.2568	0.6642
835	26.87	7.e-002	2.767e-002	0.2382	0.7188
836	26.9	6.e-002	2.372e-002	0.2562	0.6628
837	26.94	6.e-002	2.372e-002	0.2558	0.6618
838	26.97	6.e-002	2.372e-002	0.2556	0.661
839	27.	5.e-002	1.976e-002	0.2768	0.5967
840	27.04	7.e-002	2.767e-002	0.2367	0.7143
841	27.07	6.e-002	2.372e-002	0.2546	0.6586
842	27.1	5.e-002	1.976e-002	0.2758	0.5945
843	27.14	5.e-002	1.976e-002	0.2754	0.5936
844	27.17	6.e-002	2.372e-002	0.2537	0.6562
845	27.2	4.e-002	1.581e-002	0.301	0.519
846	27.24	6.e-002	2.372e-002	0.253	0.6545
847	27.27	6.e-002	2.372e-002	0.2528	0.6538
848	27.3	6.e-002	2.372e-002	0.2525	0.6531
849	27.34	5.e-002	1.976e-002	0.2734	0.5893
850	27.37	6.e-002	2.372e-002	0.2518	0.6514
851	27.4	6.e-002	2.372e-002	0.2516	0.6507
852	27.44	6.e-002	2.372e-002	0.2512	0.6497
853	27.47	5.e-002	1.976e-002	0.2721	0.5865
854	27.5	6.e-002	2.372e-002	0.2506	0.6483
855	27.54	6.e-002	2.372e-002	0.2503	0.6474
856	27.57	7.e-002	2.767e-002	0.2322	0.7006
857	27.6	6.e-002	2.372e-002	0.2497	0.646
858	27.64	6.e-002	2.372e-002	0.2494	0.645
859	27.67	6.e-002	2.372e-002	0.2491	0.6443
860	27.7	5.e-002	1.976e-002	0.2698	0.5816
861	27.74	5.e-002	1.976e-002	0.2694	0.5808

862	27.77	6.e-002	2.372e-002	0.2482	0.642
863	27.8	6.e-002	2.372e-002	0.2479	0.6413
864	27.84	7.e-002	2.767e-002	0.2299	0.6938
865	27.87	6.e-002	2.372e-002	0.2473	0.6397
866	27.9	5.e-002	1.976e-002	0.2679	0.5775
867	27.94	6.e-002	2.372e-002	0.2467	0.6381
868	27.97	7.e-002	2.767e-002	0.2288	0.6906
869	28.	6.e-002	2.372e-002	0.2462	0.6367
870	28.04	5.e-002	1.976e-002	0.2666	0.5746
871	28.07	7.e-002	2.767e-002	0.228	0.6881
872	28.1	6.e-002	2.372e-002	0.2453	0.6345

Arithmetic Means:

Hydraulic Conductivity	0.3698 feet/day
Transmissivity	11.09 ft2/day

Geometric Means:

Hydraulic Conductivity	0.3548 feet/day
Transmissivity	10.64 ft2/day

Sensitivity Analysis:

Hydraulic Conductivity	0.3568 feet/day
Transmissivity	10.7 ft2/day

Burke Co. JR Design Hydrogeo 2016

Site Name:	John's River LF
Location:	Phase 4
Test Date:	1/12/2016
Client:	Burke County
Project Number:	277.1602.12

Well Label:	PZ-42 Falling Head 1
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	8.3e-002 feet
Effective Radius:	0.25 feet
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	0.1535 feet
Static Water Level:	0. feet
Water Table to Screen Bottom:	24. feet
Anisotropy Ratio:	1.
Time Adjustment:	28.2 Seconds

Test starts with trial 14
There are 820 time and drawdown measurements
Maximum head is 3.08 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-0.47	-1.e-002	1.e-002	3.247e-003
2	3.e-002	-0.44	-1.e-002	1.e-002	3.247e-003
3	7.e-002	-0.4	0.	0.	0.
4	0.1	-0.37	-2.e-002	2.e-002	6.494e-003
5	0.13	-0.34	-1.e-002	1.e-002	3.247e-003
6	0.17	-0.3	-1.e-002	1.e-002	3.247e-003
7	0.2	-0.27	0.	0.	0.
8	0.23	-0.24	0.	0.	0.
9	0.27	-0.2	-1.e-002	1.e-002	3.247e-003
10	0.3	-0.17	0.	0.	0.
11	0.33	-0.14	0.	0.	0.
12	0.37	-1.e-001	0.	0.	0.
13	0.4	-7.e-002	-2.e-002	2.e-002	6.494e-003
14	0.43	-4.e-002	-2.52	2.52	0.8182
15	0.47	0.	-3.08	3.08	1.
16	0.5	3.e-002	-2.99	2.99	0.9708
17	0.53	6.e-002	-3.01	3.01	0.9773
18	0.57	0.1	-2.68	2.68	0.8701
19	0.6	0.13	-2.73	2.73	0.8864
20	0.63	0.16	-2.73	2.73	0.8864
21	0.67	0.2	-2.71	2.71	0.8799
22	0.7	0.23	-2.69	2.69	0.8734
23	0.73	0.26	-2.68	2.68	0.8701
24	0.77	0.3	-2.67	2.67	0.8669
25	0.8	0.33	-2.67	2.67	0.8669
26	0.83	0.36	-2.63	2.63	0.8539
27	0.87	0.4	-2.65	2.65	0.8604
28	0.9	0.43	-2.62	2.62	0.8506
29	0.93	0.46	-2.62	2.62	0.8506
30	0.97	0.5	-2.59	2.59	0.8409
31	1.	0.53	-2.59	2.59	0.8409
32	1.03	0.56	-2.58	2.58	0.8377

33	1.07	0.6	-2.57	2.57	0.8344
34	1.1	0.63	-2.56	2.56	0.8312
35	1.13	0.66	-2.54	2.54	0.8247
36	1.17	0.7	-2.54	2.54	0.8247
37	1.2	0.73	-2.53	2.53	0.8214
38	1.23	0.76	-2.51	2.51	0.8149
39	1.27	0.8	-2.51	2.51	0.8149
40	1.3	0.83	-2.5	2.5	0.8117
41	1.33	0.86	-2.5	2.5	0.8117
42	1.37	0.9	-2.48	2.48	0.8052
43	1.4	0.93	-2.47	2.47	0.8019
44	1.43	0.96	-2.47	2.47	0.8019
45	1.47	1.	-2.46	2.46	0.7987
46	1.5	1.03	-2.44	2.44	0.7922
47	1.53	1.06	-2.44	2.44	0.7922
48	1.57	1.1	-2.43	2.43	0.789
49	1.6	1.13	-2.41	2.41	0.7825
50	1.63	1.16	-2.4	2.4	0.7792
51	1.67	1.2	-2.41	2.41	0.7825
52	1.7	1.23	-2.39	2.39	0.776
53	1.73	1.26	-2.39	2.39	0.776
54	1.77	1.3	-2.38	2.38	0.7727
55	1.8	1.33	-2.37	2.37	0.7695
56	1.83	1.36	-2.36	2.36	0.7662
57	1.87	1.4	-2.34	2.34	0.7597
58	1.9	1.43	-2.35	2.35	0.763
59	1.93	1.46	-2.33	2.33	0.7565
60	1.97	1.5	-2.32	2.32	0.7532
61	2.	1.53	-2.31	2.31	0.75
62	2.03	1.56	-2.31	2.31	0.75
63	2.07	1.6	-2.3	2.3	0.7468
64	2.1	1.63	-2.29	2.29	0.7435
65	2.13	1.66	-2.28	2.28	0.7403
66	2.17	1.7	-2.28	2.28	0.7403
67	2.2	1.73	-2.27	2.27	0.737
68	2.23	1.76	-2.27	2.27	0.737
69	2.27	1.8	-2.26	2.26	0.7338
70	2.3	1.83	-2.25	2.25	0.7305
71	2.33	1.86	-2.25	2.25	0.7305
72	2.37	1.9	-2.24	2.24	0.7273
73	2.4	1.93	-2.23	2.23	0.724
74	2.43	1.96	-2.22	2.22	0.7208
75	2.47	2.	-2.22	2.22	0.7208
76	2.5	2.03	-2.2	2.2	0.7143
77	2.53	2.06	-2.2	2.2	0.7143
78	2.57	2.1	-2.19	2.19	0.711
79	2.6	2.13	-2.2	2.2	0.7143
80	2.63	2.16	-2.18	2.18	0.7078
81	2.67	2.2	-2.17	2.17	0.7045
82	2.7	2.23	-2.17	2.17	0.7045
83	2.73	2.26	-2.16	2.16	0.7013
84	2.77	2.3	-2.15	2.15	0.6981
85	2.8	2.33	-2.14	2.14	0.6948
86	2.83	2.36	-2.15	2.15	0.6981
87	2.87	2.4	-2.13	2.13	0.6916
88	2.9	2.43	-2.12	2.12	0.6883
89	2.93	2.46	-2.13	2.13	0.6916

90	2.97	2.5	-2.11	2.11	0.6851
91	3.	2.53	-2.1	2.1	0.6818
92	3.03	2.56	-2.1	2.1	0.6818
93	3.07	2.6	-2.1	2.1	0.6818
94	3.1	2.63	-2.1	2.1	0.6818
95	3.13	2.66	-2.08	2.08	0.6753
96	3.17	2.7	-2.09	2.09	0.6786
97	3.2	2.73	-2.08	2.08	0.6753
98	3.23	2.76	-2.07	2.07	0.6721
99	3.27	2.8	-2.06	2.06	0.6688
100	3.3	2.83	-2.05	2.05	0.6656
101	3.33	2.86	-2.05	2.05	0.6656
102	3.37	2.9	-2.04	2.04	0.6623
103	3.4	2.93	-2.04	2.04	0.6623
104	3.43	2.96	-2.03	2.03	0.6591
105	3.47	3.	-2.03	2.03	0.6591
106	3.5	3.03	-2.03	2.03	0.6591
107	3.53	3.06	-2.01	2.01	0.6526
108	3.57	3.1	-2.01	2.01	0.6526
109	3.6	3.13	-2.	2.	0.6494
110	3.63	3.16	-1.99	1.99	0.6461
111	3.67	3.2	-1.99	1.99	0.6461
112	3.7	3.23	-1.99	1.99	0.6461
113	3.73	3.26	-1.97	1.97	0.6396
114	3.77	3.3	-1.97	1.97	0.6396
115	3.8	3.33	-1.95	1.95	0.6331
116	3.83	3.36	-1.95	1.95	0.6331
117	3.87	3.4	-1.95	1.95	0.6331
118	3.9	3.43	-1.95	1.95	0.6331
119	3.93	3.46	-1.95	1.95	0.6331
120	3.97	3.5	-1.93	1.93	0.6266
121	4.	3.53	-1.93	1.93	0.6266
122	4.03	3.56	-1.92	1.92	0.6234
123	4.07	3.6	-1.93	1.93	0.6266
124	4.1	3.63	-1.91	1.91	0.6201
125	4.13	3.66	-1.91	1.91	0.6201
126	4.17	3.7	-1.91	1.91	0.6201
127	4.2	3.73	-1.91	1.91	0.6201
128	4.23	3.76	-1.89	1.89	0.6136
129	4.27	3.8	-1.88	1.88	0.6104
130	4.3	3.83	-1.89	1.89	0.6136
131	4.33	3.86	-1.88	1.88	0.6104
132	4.37	3.9	-1.88	1.88	0.6104
133	4.4	3.93	-1.86	1.86	0.6039
134	4.43	3.96	-1.86	1.86	0.6039
135	4.47	4.	-1.86	1.86	0.6039
136	4.5	4.03	-1.85	1.85	0.6006
137	4.53	4.06	-1.83	1.83	0.5942
138	4.57	4.1	-1.84	1.84	0.5974
139	4.6	4.13	-1.84	1.84	0.5974
140	4.63	4.16	-1.83	1.83	0.5942
141	4.67	4.2	-1.82	1.82	0.5909
142	4.7	4.23	-1.83	1.83	0.5942
143	4.73	4.26	-1.81	1.81	0.5877
144	4.77	4.3	-1.81	1.81	0.5877
145	4.8	4.33	-1.81	1.81	0.5877
146	4.83	4.36	-1.8	1.8	0.5844

147	4.87	4.4	-1.8	1.8	0.5844
148	4.9	4.43	-1.78	1.78	0.5779
149	4.93	4.46	-1.78	1.78	0.5779
150	4.97	4.5	-1.78	1.78	0.5779
151	5.	4.53	-1.78	1.78	0.5779
152	5.03	4.56	-1.77	1.77	0.5747
153	5.07	4.6	-1.76	1.76	0.5714
154	5.1	4.63	-1.77	1.77	0.5747
155	5.13	4.66	-1.76	1.76	0.5714
156	5.17	4.7	-1.75	1.75	0.5682
157	5.2	4.73	-1.75	1.75	0.5682
158	5.23	4.76	-1.74	1.74	0.5649
159	5.27	4.8	-1.74	1.74	0.5649
160	5.3	4.83	-1.73	1.73	0.5617
161	5.33	4.86	-1.73	1.73	0.5617
162	5.37	4.9	-1.73	1.73	0.5617
163	5.4	4.93	-1.72	1.72	0.5584
164	5.43	4.96	-1.72	1.72	0.5584
165	5.47	5.	-1.71	1.71	0.5552
166	5.5	5.03	-1.7	1.7	0.5519
167	5.53	5.06	-1.69	1.69	0.5487
168	5.57	5.1	-1.69	1.69	0.5487
169	5.6	5.13	-1.69	1.69	0.5487
170	5.63	5.16	-1.7	1.7	0.5519
171	5.67	5.2	-1.67	1.67	0.5422
172	5.7	5.23	-1.67	1.67	0.5422
173	5.73	5.26	-1.66	1.66	0.539
174	5.77	5.3	-1.67	1.67	0.5422
175	5.8	5.33	-1.67	1.67	0.5422
176	5.83	5.36	-1.66	1.66	0.539
177	5.87	5.4	-1.66	1.66	0.539
178	5.9	5.43	-1.65	1.65	0.5357
179	5.93	5.46	-1.64	1.64	0.5325
180	5.97	5.5	-1.63	1.63	0.5292
181	6.	5.53	-1.63	1.63	0.5292
182	6.03	5.56	-1.65	1.65	0.5357
183	6.07	5.6	-1.64	1.64	0.5325
184	6.1	5.63	-1.63	1.63	0.5292
185	6.13	5.66	-1.63	1.63	0.5292
186	6.17	5.7	-1.63	1.63	0.5292
187	6.2	5.73	-1.61	1.61	0.5227
188	6.23	5.76	-1.61	1.61	0.5227
189	6.27	5.8	-1.6	1.6	0.5195
190	6.3	5.83	-1.6	1.6	0.5195
191	6.33	5.86	-1.59	1.59	0.5162
192	6.37	5.9	-1.59	1.59	0.5162
193	6.4	5.93	-1.59	1.59	0.5162
194	6.43	5.96	-1.57	1.57	0.5097
195	6.47	6.	-1.58	1.58	0.513
196	6.5	6.03	-1.58	1.58	0.513
197	6.53	6.06	-1.55	1.55	0.5032
198	6.57	6.1	-1.56	1.56	0.5065
199	6.6	6.13	-1.56	1.56	0.5065
200	6.63	6.16	-1.56	1.56	0.5065
201	6.67	6.2	-1.55	1.55	0.5032
202	6.7	6.23	-1.55	1.55	0.5032
203	6.73	6.26	-1.55	1.55	0.5032

204	6.77	6.3	-1.55	1.55	0.5032
205	6.8	6.33	-1.54	1.54	0.5
206	6.83	6.36	-1.54	1.54	0.5
207	6.87	6.4	-1.54	1.54	0.5
208	6.9	6.43	-1.53	1.53	0.4968
209	6.93	6.46	-1.53	1.53	0.4968
210	6.97	6.5	-1.51	1.51	0.4903
211	7.	6.53	-1.51	1.51	0.4903
212	7.03	6.56	-1.51	1.51	0.4903
213	7.07	6.6	-1.5	1.5	0.487
214	7.1	6.63	-1.51	1.51	0.4903
215	7.13	6.66	-1.5	1.5	0.487
216	7.17	6.7	-1.5	1.5	0.487
217	7.2	6.73	-1.49	1.49	0.4838
218	7.23	6.76	-1.48	1.48	0.4805
219	7.27	6.8	-1.48	1.48	0.4805
220	7.3	6.83	-1.48	1.48	0.4805
221	7.33	6.86	-1.47	1.47	0.4773
222	7.37	6.9	-1.47	1.47	0.4773
223	7.4	6.93	-1.47	1.47	0.4773
224	7.43	6.96	-1.47	1.47	0.4773
225	7.47	7.	-1.46	1.46	0.474
226	7.5	7.03	-1.45	1.45	0.4708
227	7.53	7.06	-1.46	1.46	0.474
228	7.57	7.1	-1.45	1.45	0.4708
229	7.6	7.13	-1.45	1.45	0.4708
230	7.63	7.16	-1.44	1.44	0.4675
231	7.67	7.2	-1.44	1.44	0.4675
232	7.7	7.23	-1.44	1.44	0.4675
233	7.73	7.26	-1.44	1.44	0.4675
234	7.77	7.3	-1.42	1.42	0.461
235	7.8	7.33	-1.43	1.43	0.4643
236	7.83	7.36	-1.42	1.42	0.461
237	7.87	7.4	-1.42	1.42	0.461
238	7.9	7.43	-1.41	1.41	0.4578
239	7.93	7.46	-1.41	1.41	0.4578
240	7.97	7.5	-1.42	1.42	0.461
241	8.	7.53	-1.4	1.4	0.4545
242	8.03	7.56	-1.41	1.41	0.4578
243	8.07	7.6	-1.41	1.41	0.4578
244	8.1	7.63	-1.41	1.41	0.4578
245	8.13	7.66	-1.39	1.39	0.4513
246	8.17	7.7	-1.39	1.39	0.4513
247	8.2	7.73	-1.39	1.39	0.4513
248	8.23	7.76	-1.38	1.38	0.4481
249	8.27	7.8	-1.38	1.38	0.4481
250	8.3	7.83	-1.38	1.38	0.4481
251	8.33	7.86	-1.37	1.37	0.4448
252	8.37	7.9	-1.37	1.37	0.4448
253	8.4	7.93	-1.37	1.37	0.4448
254	8.43	7.96	-1.37	1.37	0.4448
255	8.47	8.	-1.35	1.35	0.4383
256	8.5	8.03	-1.36	1.36	0.4416
257	8.53	8.06	-1.35	1.35	0.4383
258	8.57	8.1	-1.35	1.35	0.4383
259	8.6	8.13	-1.35	1.35	0.4383
260	8.63	8.16	-1.34	1.34	0.4351

261	8.67	8.2	-1.34	1.34	0.4351
262	8.7	8.23	-1.35	1.35	0.4383
263	8.73	8.26	-1.34	1.34	0.4351
264	8.77	8.3	-1.33	1.33	0.4318
265	8.8	8.33	-1.34	1.34	0.4351
266	8.83	8.36	-1.33	1.33	0.4318
267	8.87	8.4	-1.33	1.33	0.4318
268	8.9	8.43	-1.32	1.32	0.4286
269	8.93	8.46	-1.32	1.32	0.4286
270	8.97	8.5	-1.32	1.32	0.4286
271	9.	8.53	-1.31	1.31	0.4253
272	9.03	8.56	-1.3	1.3	0.4221
273	9.07	8.6	-1.3	1.3	0.4221
274	9.1	8.63	-1.3	1.3	0.4221
275	9.13	8.66	-1.3	1.3	0.4221
276	9.17	8.7	-1.31	1.31	0.4253
277	9.2	8.73	-1.29	1.29	0.4188
278	9.23	8.76	-1.29	1.29	0.4188
279	9.27	8.8	-1.29	1.29	0.4188
280	9.3	8.83	-1.29	1.29	0.4188
281	9.33	8.86	-1.28	1.28	0.4156
282	9.37	8.9	-1.28	1.28	0.4156
283	9.4	8.93	-1.27	1.27	0.4123
284	9.43	8.96	-1.27	1.27	0.4123
285	9.47	9.	-1.27	1.27	0.4123
286	9.5	9.03	-1.27	1.27	0.4123
287	9.53	9.06	-1.26	1.26	0.4091
288	9.57	9.1	-1.26	1.26	0.4091
289	9.6	9.13	-1.25	1.25	0.4058
290	9.63	9.16	-1.26	1.26	0.4091
291	9.67	9.2	-1.25	1.25	0.4058
292	9.7	9.23	-1.24	1.24	0.4026
293	9.73	9.26	-1.25	1.25	0.4058
294	9.77	9.3	-1.25	1.25	0.4058
295	9.8	9.33	-1.24	1.24	0.4026
296	9.83	9.36	-1.23	1.23	0.3994
297	9.87	9.4	-1.23	1.23	0.3994
298	9.9	9.43	-1.23	1.23	0.3994
299	9.93	9.46	-1.23	1.23	0.3994
300	9.97	9.5	-1.23	1.23	0.3994
301	10.	9.53	-1.23	1.23	0.3994
302	10.03	9.56	-1.23	1.23	0.3994
303	10.07	9.6	-1.22	1.22	0.3961
304	10.1	9.63	-1.22	1.22	0.3961
305	10.13	9.66	-1.22	1.22	0.3961
306	10.17	9.7	-1.2	1.2	0.3896
307	10.2	9.73	-1.21	1.21	0.3929
308	10.23	9.76	-1.21	1.21	0.3929
309	10.27	9.8	-1.21	1.21	0.3929
310	10.3	9.83	-1.2	1.2	0.3896
311	10.33	9.86	-1.2	1.2	0.3896
312	10.37	9.9	-1.19	1.19	0.3864
313	10.4	9.93	-1.2	1.2	0.3896
314	10.43	9.96	-1.19	1.19	0.3864
315	10.47	10.	-1.18	1.18	0.3831
316	10.5	10.03	-1.18	1.18	0.3831
317	10.53	10.06	-1.18	1.18	0.3831

318	10.57	10.1	-1.18	1.18	0.3831
319	10.6	10.13	-1.18	1.18	0.3831
320	10.63	10.16	-1.17	1.17	0.3799
321	10.67	10.2	-1.17	1.17	0.3799
322	10.7	10.23	-1.17	1.17	0.3799
323	10.73	10.26	-1.17	1.17	0.3799
324	10.77	10.3	-1.16	1.16	0.3766
325	10.8	10.33	-1.16	1.16	0.3766
326	10.83	10.36	-1.15	1.15	0.3734
327	10.87	10.4	-1.15	1.15	0.3734
328	10.9	10.43	-1.15	1.15	0.3734
329	10.93	10.46	-1.15	1.15	0.3734
330	10.97	10.5	-1.15	1.15	0.3734
331	11.	10.53	-1.14	1.14	0.3701
332	11.03	10.56	-1.14	1.14	0.3701
333	11.07	10.6	-1.14	1.14	0.3701
334	11.1	10.63	-1.13	1.13	0.3669
335	11.13	10.66	-1.13	1.13	0.3669
336	11.17	10.7	-1.13	1.13	0.3669
337	11.2	10.73	-1.12	1.12	0.3636
338	11.23	10.76	-1.13	1.13	0.3669
339	11.27	10.8	-1.13	1.13	0.3669
340	11.3	10.83	-1.12	1.12	0.3636
341	11.33	10.86	-1.12	1.12	0.3636
342	11.37	10.9	-1.11	1.11	0.3604
343	11.4	10.93	-1.11	1.11	0.3604
344	11.43	10.96	-1.12	1.12	0.3636
345	11.47	11.	-1.11	1.11	0.3604
346	11.5	11.03	-1.11	1.11	0.3604
347	11.53	11.06	-1.1	1.1	0.3571
348	11.57	11.1	-1.12	1.12	0.3636
349	11.6	11.13	-1.1	1.1	0.3571
350	11.63	11.16	-1.1	1.1	0.3571
351	11.67	11.2	-1.1	1.1	0.3571
352	11.7	11.23	-1.09	1.09	0.3539
353	11.73	11.26	-1.09	1.09	0.3539
354	11.77	11.3	-1.09	1.09	0.3539
355	11.8	11.33	-1.1	1.1	0.3571
356	11.83	11.36	-1.08	1.08	0.3506
357	11.87	11.4	-1.08	1.08	0.3506
358	11.9	11.43	-1.06	1.06	0.3442
359	11.93	11.46	-1.07	1.07	0.3474
360	11.97	11.5	-1.06	1.06	0.3442
361	12.	11.53	-1.06	1.06	0.3442
362	12.03	11.56	-1.07	1.07	0.3474
363	12.07	11.6	-1.07	1.07	0.3474
364	12.1	11.63	-1.07	1.07	0.3474
365	12.13	11.66	-1.06	1.06	0.3442
366	12.17	11.7	-1.06	1.06	0.3442
367	12.2	11.73	-1.06	1.06	0.3442
368	12.23	11.76	-1.06	1.06	0.3442
369	12.27	11.8	-1.06	1.06	0.3442
370	12.3	11.83	-1.05	1.05	0.3409
371	12.33	11.86	-1.05	1.05	0.3409
372	12.37	11.9	-1.06	1.06	0.3442
373	12.4	11.93	-1.05	1.05	0.3409
374	12.43	11.96	-1.05	1.05	0.3409

375	12.47	12.	-1.03	1.03	0.3344
376	12.5	12.03	-1.04	1.04	0.3377
377	12.53	12.06	-1.03	1.03	0.3344
378	12.57	12.1	-1.03	1.03	0.3344
379	12.6	12.13	-1.04	1.04	0.3377
380	12.63	12.16	-1.02	1.02	0.3312
381	12.67	12.2	-1.03	1.03	0.3344
382	12.7	12.23	-1.02	1.02	0.3312
383	12.73	12.26	-1.03	1.03	0.3344
384	12.77	12.3	-1.02	1.02	0.3312
385	12.8	12.33	-1.01	1.01	0.3279
386	12.83	12.36	-1.01	1.01	0.3279
387	12.87	12.4	-1.01	1.01	0.3279
388	12.9	12.43	-1.01	1.01	0.3279
389	12.93	12.46	-1.02	1.02	0.3312
390	12.97	12.5	-1.	1.	0.3247
391	13.	12.53	-1.01	1.01	0.3279
392	13.03	12.56	-1.	1.	0.3247
393	13.07	12.6	-1.	1.	0.3247
394	13.1	12.63	-1.	1.	0.3247
395	13.13	12.66	-1.	1.	0.3247
396	13.17	12.7	-1.	1.	0.3247
397	13.2	12.73	-1.	1.	0.3247
398	13.23	12.76	-0.98	0.98	0.3182
399	13.27	12.8	-0.98	0.98	0.3182
400	13.3	12.83	-0.99	0.99	0.3214
401	13.33	12.86	-0.99	0.99	0.3214
402	13.37	12.9	-0.97	0.97	0.3149
403	13.4	12.93	-0.97	0.97	0.3149
404	13.43	12.96	-0.97	0.97	0.3149
405	13.47	13.	-0.97	0.97	0.3149
406	13.5	13.03	-0.97	0.97	0.3149
407	13.53	13.06	-0.98	0.98	0.3182
408	13.57	13.1	-0.97	0.97	0.3149
409	13.6	13.13	-0.97	0.97	0.3149
410	13.63	13.16	-0.97	0.97	0.3149
411	13.67	13.2	-0.97	0.97	0.3149
412	13.7	13.23	-0.96	0.96	0.3117
413	13.73	13.26	-0.96	0.96	0.3117
414	13.77	13.3	-0.96	0.96	0.3117
415	13.8	13.33	-0.95	0.95	0.3084
416	13.83	13.36	-0.96	0.96	0.3117
417	13.87	13.4	-0.95	0.95	0.3084
418	13.9	13.43	-0.94	0.94	0.3052
419	13.93	13.46	-0.95	0.95	0.3084
420	13.97	13.5	-0.95	0.95	0.3084
421	14.	13.53	-0.94	0.94	0.3052
422	14.03	13.56	-0.94	0.94	0.3052
423	14.07	13.6	-0.94	0.94	0.3052
424	14.1	13.63	-0.94	0.94	0.3052
425	14.13	13.66	-0.94	0.94	0.3052
426	14.17	13.7	-0.93	0.93	0.3019
427	14.2	13.73	-0.93	0.93	0.3019
428	14.23	13.76	-0.93	0.93	0.3019
429	14.27	13.8	-0.93	0.93	0.3019
430	14.3	13.83	-0.92	0.92	0.2987
431	14.33	13.86	-0.92	0.92	0.2987

432	14.37	13.9	-0.94	0.94	0.3052
433	14.4	13.93	-0.93	0.93	0.3019
434	14.43	13.96	-0.99	0.99	0.3214
435	14.47	14.	-0.95	0.95	0.3084
436	14.5	14.03	-0.92	0.92	0.2987
437	14.53	14.06	-0.91	0.91	0.2955
438	14.57	14.1	-0.91	0.91	0.2955
439	14.6	14.13	-0.97	0.97	0.3149
440	14.63	14.16	-0.91	0.91	0.2955
441	14.67	14.2	-0.9	0.9	0.2922
442	14.7	14.23	-0.9	0.9	0.2922
443	14.73	14.26	-0.9	0.9	0.2922
444	14.77	14.3	-0.9	0.9	0.2922
445	14.8	14.33	-0.89	0.89	0.289
446	14.83	14.36	-0.89	0.89	0.289
447	14.87	14.4	-0.9	0.9	0.2922
448	14.9	14.43	-0.89	0.89	0.289
449	14.93	14.46	-0.9	0.9	0.2922
450	14.97	14.5	-0.88	0.88	0.2857
451	15.	14.53	-0.88	0.88	0.2857
452	15.03	14.56	-0.88	0.88	0.2857
453	15.07	14.6	-0.88	0.88	0.2857
454	15.1	14.63	-0.89	0.89	0.289
455	15.13	14.66	-0.88	0.88	0.2857
456	15.17	14.7	-0.88	0.88	0.2857
457	15.2	14.73	-0.87	0.87	0.2825
458	15.23	14.76	-0.89	0.89	0.289
459	15.27	14.8	-0.88	0.88	0.2857
460	15.3	14.83	-0.88	0.88	0.2857
461	15.33	14.86	-0.88	0.88	0.2857
462	15.37	14.9	-0.87	0.87	0.2825
463	15.4	14.93	-0.87	0.87	0.2825
464	15.43	14.96	-0.88	0.88	0.2857
465	15.47	15.	-0.87	0.87	0.2825
466	15.5	15.03	-0.86	0.86	0.2792
467	15.53	15.06	-0.86	0.86	0.2792
468	15.57	15.1	-0.87	0.87	0.2825
469	15.6	15.13	-0.84	0.84	0.2727
470	15.63	15.16	-0.85	0.85	0.276
471	15.67	15.2	-0.86	0.86	0.2792
472	15.7	15.23	-0.85	0.85	0.276
473	15.73	15.26	-0.9	0.9	0.2922
474	15.77	15.3	-0.87	0.87	0.2825
475	15.8	15.33	-0.87	0.87	0.2825
476	15.83	15.36	-0.87	0.87	0.2825
477	15.87	15.4	-0.87	0.87	0.2825
478	15.9	15.43	-0.86	0.86	0.2792
479	15.93	15.46	-0.86	0.86	0.2792
480	15.97	15.5	-0.86	0.86	0.2792
481	16.	15.53	-0.85	0.85	0.276
482	16.03	15.56	-0.85	0.85	0.276
483	16.07	15.6	-0.85	0.85	0.276
484	16.1	15.63	-0.86	0.86	0.2792
485	16.13	15.66	-0.86	0.86	0.2792
486	16.17	15.7	-0.85	0.85	0.276
487	16.2	15.73	-0.85	0.85	0.276
488	16.23	15.76	-0.84	0.84	0.2727

489	16.27	15.8	-0.85	0.85	0.276
490	16.3	15.83	-0.84	0.84	0.2727
491	16.33	15.86	-0.84	0.84	0.2727
492	16.37	15.9	-0.84	0.84	0.2727
493	16.4	15.93	-0.85	0.85	0.276
494	16.43	15.96	-0.83	0.83	0.2695
495	16.47	16.	-0.83	0.83	0.2695
496	16.5	16.03	-0.83	0.83	0.2695
497	16.53	16.06	-0.83	0.83	0.2695
498	16.57	16.1	-0.83	0.83	0.2695
499	16.6	16.13	-0.82	0.82	0.2662
500	16.63	16.16	-0.82	0.82	0.2662
501	16.67	16.2	-0.81	0.81	0.263
502	16.7	16.23	-0.82	0.82	0.2662
503	16.73	16.26	-0.81	0.81	0.263
504	16.77	16.3	-0.81	0.81	0.263
505	16.8	16.33	-0.82	0.82	0.2662
506	16.83	16.36	-0.81	0.81	0.263
507	16.87	16.4	-0.81	0.81	0.263
508	16.9	16.43	-0.81	0.81	0.263
509	16.93	16.46	-0.81	0.81	0.263
510	16.97	16.5	-0.8	0.8	0.2597
511	17.	16.53	-0.8	0.8	0.2597
512	17.03	16.56	-0.81	0.81	0.263
513	17.07	16.6	-0.8	0.8	0.2597
514	17.1	16.63	-0.8	0.8	0.2597
515	17.13	16.66	-0.8	0.8	0.2597
516	17.17	16.7	-0.79	0.79	0.2565
517	17.2	16.73	-0.79	0.79	0.2565
518	17.23	16.76	-0.79	0.79	0.2565
519	17.27	16.8	-0.79	0.79	0.2565
520	17.3	16.83	-0.79	0.79	0.2565
521	17.33	16.86	-0.8	0.8	0.2597
522	17.37	16.9	-0.79	0.79	0.2565
523	17.4	16.93	-0.79	0.79	0.2565
524	17.43	16.96	-0.78	0.78	0.2532
525	17.47	17.	-0.78	0.78	0.2532
526	17.5	17.03	-0.78	0.78	0.2532
527	17.53	17.06	-0.78	0.78	0.2532
528	17.57	17.1	-0.77	0.77	0.25
529	17.6	17.13	-0.78	0.78	0.2532
530	17.63	17.16	-0.77	0.77	0.25
531	17.67	17.2	-0.77	0.77	0.25
532	17.7	17.23	-0.77	0.77	0.25
533	17.73	17.26	-0.77	0.77	0.25
534	17.77	17.3	-0.77	0.77	0.25
535	17.8	17.33	-0.77	0.77	0.25
536	17.83	17.36	-0.76	0.76	0.2468
537	17.87	17.4	-0.76	0.76	0.2468
538	17.9	17.43	-0.78	0.78	0.2532
539	17.93	17.46	-0.8	0.8	0.2597
540	17.97	17.5	-0.78	0.78	0.2532
541	18.	17.53	-0.79	0.79	0.2565
542	18.03	17.56	-0.76	0.76	0.2468
543	18.07	17.6	-0.75	0.75	0.2435
544	18.1	17.63	-0.74	0.74	0.2403
545	18.13	17.66	-0.74	0.74	0.2403

546	18.17	17.7	-0.74	0.74	0.2403
547	18.2	17.73	-0.75	0.75	0.2435
548	18.23	17.76	-0.74	0.74	0.2403
549	18.27	17.8	-0.73	0.73	0.237
550	18.3	17.83	-0.75	0.75	0.2435
551	18.33	17.86	-0.74	0.74	0.2403
552	18.37	17.9	-0.73	0.73	0.237
553	18.4	17.93	-0.73	0.73	0.237
554	18.43	17.96	-0.73	0.73	0.237
555	18.47	18.	-0.73	0.73	0.237
556	18.5	18.03	-0.73	0.73	0.237
557	18.53	18.06	-0.73	0.73	0.237
558	18.57	18.1	-0.72	0.72	0.2338
559	18.6	18.13	-0.73	0.73	0.237
560	18.63	18.16	-0.72	0.72	0.2338
561	18.67	18.2	-0.73	0.73	0.237
562	18.7	18.23	-0.71	0.71	0.2305
563	18.73	18.26	-0.72	0.72	0.2338
564	18.77	18.3	-0.72	0.72	0.2338
565	18.8	18.33	-0.73	0.73	0.237
566	18.83	18.36	-0.71	0.71	0.2305
567	18.87	18.4	-0.73	0.73	0.237
568	18.9	18.43	-0.71	0.71	0.2305
569	18.93	18.46	-0.71	0.71	0.2305
570	18.97	18.5	-0.71	0.71	0.2305
571	19.	18.53	-0.72	0.72	0.2338
572	19.03	18.56	-0.71	0.71	0.2305
573	19.07	18.6	-0.71	0.71	0.2305
574	19.1	18.63	-0.7	0.7	0.2273
575	19.13	18.66	-0.71	0.71	0.2305
576	19.17	18.7	-0.71	0.71	0.2305
577	19.2	18.73	-0.71	0.71	0.2305
578	19.23	18.76	-0.7	0.7	0.2273
579	19.27	18.8	-0.7	0.7	0.2273
580	19.3	18.83	-0.71	0.71	0.2305
581	19.33	18.86	-0.7	0.7	0.2273
582	19.37	18.9	-0.71	0.71	0.2305
583	19.4	18.93	-0.7	0.7	0.2273
584	19.43	18.96	-0.7	0.7	0.2273
585	19.47	19.	-0.69	0.69	0.224
586	19.5	19.03	-0.69	0.69	0.224
587	19.53	19.06	-0.69	0.69	0.224
588	19.57	19.1	-0.69	0.69	0.224
589	19.6	19.13	-0.69	0.69	0.224
590	19.63	19.16	-0.69	0.69	0.224
591	19.67	19.2	-0.7	0.7	0.2273
592	19.7	19.23	-0.69	0.69	0.224
593	19.73	19.26	-0.68	0.68	0.2208
594	19.77	19.3	-0.69	0.69	0.224
595	19.8	19.33	-0.69	0.69	0.224
596	19.83	19.36	-0.68	0.68	0.2208
597	19.87	19.4	-0.68	0.68	0.2208
598	19.9	19.43	-0.69	0.69	0.224
599	19.93	19.46	-0.68	0.68	0.2208
600	19.97	19.5	-0.68	0.68	0.2208
601	20.	19.53	-0.67	0.67	0.2175
602	20.03	19.56	-0.68	0.68	0.2208

603	20.07	19.6	-0.68	0.68	0.2208
604	20.1	19.63	-0.68	0.68	0.2208
605	20.13	19.66	-0.68	0.68	0.2208
606	20.17	19.7	-0.67	0.67	0.2175
607	20.2	19.73	-0.67	0.67	0.2175
608	20.23	19.76	-0.67	0.67	0.2175
609	20.27	19.8	-0.67	0.67	0.2175
610	20.3	19.83	-0.66	0.66	0.2143
611	20.33	19.86	-0.66	0.66	0.2143
612	20.37	19.9	-0.66	0.66	0.2143
613	20.4	19.93	-0.67	0.67	0.2175
614	20.43	19.96	-0.66	0.66	0.2143
615	20.47	20.	-0.67	0.67	0.2175
616	20.5	20.03	-0.67	0.67	0.2175
617	20.53	20.06	-0.67	0.67	0.2175
618	20.57	20.1	-0.66	0.66	0.2143
619	20.6	20.13	-0.66	0.66	0.2143
620	20.63	20.16	-0.66	0.66	0.2143
621	20.67	20.2	-0.65	0.65	0.211
622	20.7	20.23	-0.66	0.66	0.2143
623	20.73	20.26	-0.65	0.65	0.211
624	20.77	20.3	-0.65	0.65	0.211
625	20.8	20.33	-0.65	0.65	0.211
626	20.83	20.36	-0.65	0.65	0.211
627	20.87	20.4	-0.64	0.64	0.2078
628	20.9	20.43	-0.65	0.65	0.211
629	20.93	20.46	-0.66	0.66	0.2143
630	20.97	20.5	-0.65	0.65	0.211
631	21.	20.53	-0.65	0.65	0.211
632	21.03	20.56	-0.65	0.65	0.211
633	21.07	20.6	-0.65	0.65	0.211
634	21.1	20.63	-0.65	0.65	0.211
635	21.13	20.66	-0.63	0.63	0.2045
636	21.17	20.7	-0.63	0.63	0.2045
637	21.2	20.73	-0.65	0.65	0.211
638	21.23	20.76	-0.64	0.64	0.2078
639	21.27	20.8	-0.66	0.66	0.2143
640	21.3	20.83	-0.64	0.64	0.2078
641	21.33	20.86	-0.65	0.65	0.211
642	21.37	20.9	-0.65	0.65	0.211
643	21.4	20.93	-0.63	0.63	0.2045
644	21.43	20.96	-0.63	0.63	0.2045
645	21.47	21.	-0.64	0.64	0.2078
646	21.5	21.03	-0.64	0.64	0.2078
647	21.53	21.06	-0.64	0.64	0.2078
648	21.57	21.1	-0.63	0.63	0.2045
649	21.6	21.13	-0.64	0.64	0.2078
650	21.63	21.16	-0.63	0.63	0.2045
651	21.67	21.2	-0.63	0.63	0.2045
652	21.7	21.23	-0.63	0.63	0.2045
653	21.73	21.26	-0.63	0.63	0.2045
654	21.77	21.3	-0.63	0.63	0.2045
655	21.8	21.33	-0.63	0.63	0.2045
656	21.83	21.36	-0.63	0.63	0.2045
657	21.87	21.4	-0.63	0.63	0.2045
658	21.9	21.43	-0.63	0.63	0.2045
659	21.93	21.46	-0.64	0.64	0.2078

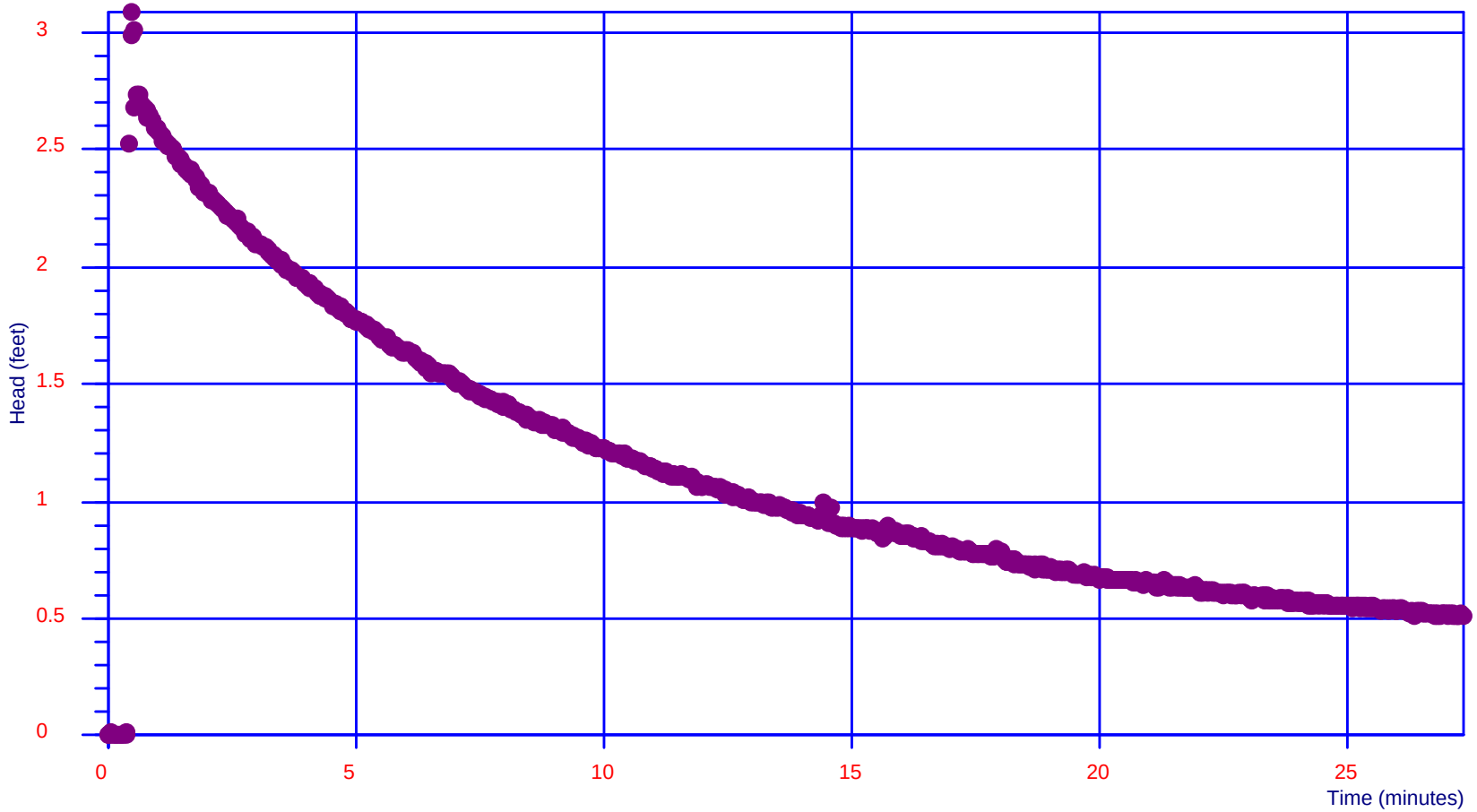
660	21.97	21.5	-0.63	0.63	0.2045
661	22.	21.53	-0.61	0.61	0.1981
662	22.03	21.56	-0.62	0.62	0.2013
663	22.07	21.6	-0.61	0.61	0.1981
664	22.1	21.63	-0.62	0.62	0.2013
665	22.13	21.66	-0.62	0.62	0.2013
666	22.17	21.7	-0.61	0.61	0.1981
667	22.2	21.73	-0.62	0.62	0.2013
668	22.23	21.76	-0.62	0.62	0.2013
669	22.27	21.8	-0.61	0.61	0.1981
670	22.3	21.83	-0.62	0.62	0.2013
671	22.33	21.86	-0.61	0.61	0.1981
672	22.37	21.9	-0.61	0.61	0.1981
673	22.4	21.93	-0.61	0.61	0.1981
674	22.43	21.96	-0.61	0.61	0.1981
675	22.47	22.	-0.6	0.6	0.1948
676	22.5	22.03	-0.61	0.61	0.1981
677	22.53	22.06	-0.61	0.61	0.1981
678	22.57	22.1	-0.61	0.61	0.1981
679	22.6	22.13	-0.61	0.61	0.1981
680	22.63	22.16	-0.6	0.6	0.1948
681	22.67	22.2	-0.61	0.61	0.1981
682	22.7	22.23	-0.6	0.6	0.1948
683	22.73	22.26	-0.6	0.6	0.1948
684	22.77	22.3	-0.6	0.6	0.1948
685	22.8	22.33	-0.61	0.61	0.1981
686	22.83	22.36	-0.61	0.61	0.1981
687	22.87	22.4	-0.6	0.6	0.1948
688	22.9	22.43	-0.61	0.61	0.1981
689	22.93	22.46	-0.61	0.61	0.1981
690	22.97	22.5	-0.6	0.6	0.1948
691	23.	22.53	-0.6	0.6	0.1948
692	23.03	22.56	-0.59	0.59	0.1916
693	23.07	22.6	-0.58	0.58	0.1883
694	23.1	22.63	-0.6	0.6	0.1948
695	23.13	22.66	-0.6	0.6	0.1948
696	23.17	22.7	-0.59	0.59	0.1916
697	23.2	22.73	-0.59	0.59	0.1916
698	23.23	22.76	-0.59	0.59	0.1916
699	23.27	22.8	-0.6	0.6	0.1948
700	23.3	22.83	-0.58	0.58	0.1883
701	23.33	22.86	-0.6	0.6	0.1948
702	23.37	22.9	-0.6	0.6	0.1948
703	23.4	22.93	-0.58	0.58	0.1883
704	23.43	22.96	-0.58	0.58	0.1883
705	23.47	23.	-0.59	0.59	0.1916
706	23.5	23.03	-0.58	0.58	0.1883
707	23.53	23.06	-0.58	0.58	0.1883
708	23.57	23.1	-0.58	0.58	0.1883
709	23.6	23.13	-0.58	0.58	0.1883
710	23.63	23.16	-0.59	0.59	0.1916
711	23.67	23.2	-0.58	0.58	0.1883
712	23.7	23.23	-0.59	0.59	0.1916
713	23.73	23.26	-0.58	0.58	0.1883
714	23.77	23.3	-0.57	0.57	0.1851
715	23.8	23.33	-0.59	0.59	0.1916
716	23.83	23.36	-0.57	0.57	0.1851

717	23.87	23.4	-0.57	0.57	0.1851
718	23.9	23.43	-0.58	0.58	0.1883
719	23.93	23.46	-0.58	0.58	0.1883
720	23.97	23.5	-0.58	0.58	0.1883
721	24.	23.53	-0.57	0.57	0.1851
722	24.03	23.56	-0.58	0.58	0.1883
723	24.07	23.6	-0.57	0.57	0.1851
724	24.1	23.63	-0.57	0.57	0.1851
725	24.13	23.66	-0.58	0.58	0.1883
726	24.17	23.7	-0.57	0.57	0.1851
727	24.2	23.73	-0.58	0.58	0.1883
728	24.23	23.76	-0.56	0.56	0.1818
729	24.27	23.8	-0.56	0.56	0.1818
730	24.3	23.83	-0.57	0.57	0.1851
731	24.33	23.86	-0.56	0.56	0.1818
732	24.37	23.9	-0.57	0.57	0.1851
733	24.4	23.93	-0.56	0.56	0.1818
734	24.43	23.96	-0.57	0.57	0.1851
735	24.47	24.	-0.57	0.57	0.1851
736	24.5	24.03	-0.55	0.55	0.1786
737	24.53	24.06	-0.57	0.57	0.1851
738	24.57	24.1	-0.57	0.57	0.1851
739	24.6	24.13	-0.56	0.56	0.1818
740	24.63	24.16	-0.56	0.56	0.1818
741	24.67	24.2	-0.55	0.55	0.1786
742	24.7	24.23	-0.55	0.55	0.1786
743	24.73	24.26	-0.55	0.55	0.1786
744	24.77	24.3	-0.56	0.56	0.1818
745	24.8	24.33	-0.56	0.56	0.1818
746	24.83	24.36	-0.56	0.56	0.1818
747	24.87	24.4	-0.55	0.55	0.1786
748	24.9	24.43	-0.56	0.56	0.1818
749	24.93	24.46	-0.55	0.55	0.1786
750	24.97	24.5	-0.56	0.56	0.1818
751	25.	24.53	-0.55	0.55	0.1786
752	25.03	24.56	-0.55	0.55	0.1786
753	25.07	24.6	-0.54	0.54	0.1753
754	25.1	24.63	-0.55	0.55	0.1786
755	25.13	24.66	-0.55	0.55	0.1786
756	25.17	24.7	-0.55	0.55	0.1786
757	25.2	24.73	-0.55	0.55	0.1786
758	25.23	24.76	-0.55	0.55	0.1786
759	25.27	24.8	-0.54	0.54	0.1753
760	25.3	24.83	-0.55	0.55	0.1786
761	25.33	24.86	-0.54	0.54	0.1753
762	25.37	24.9	-0.55	0.55	0.1786
763	25.4	24.93	-0.54	0.54	0.1753
764	25.43	24.96	-0.54	0.54	0.1753
765	25.47	25.	-0.55	0.55	0.1786
766	25.5	25.03	-0.55	0.55	0.1786
767	25.53	25.06	-0.54	0.54	0.1753
768	25.57	25.1	-0.54	0.54	0.1753
769	25.6	25.13	-0.54	0.54	0.1753
770	25.63	25.16	-0.54	0.54	0.1753
771	25.67	25.2	-0.53	0.53	0.1721
772	25.7	25.23	-0.54	0.54	0.1753
773	25.73	25.26	-0.54	0.54	0.1753

774	25.77	25.3	-0.54	0.54	0.1753
775	25.8	25.33	-0.53	0.53	0.1721
776	25.83	25.36	-0.54	0.54	0.1753
777	25.87	25.4	-0.54	0.54	0.1753
778	25.9	25.43	-0.54	0.54	0.1753
779	25.93	25.46	-0.54	0.54	0.1753
780	25.97	25.5	-0.53	0.53	0.1721
781	26.	25.53	-0.53	0.53	0.1721
782	26.03	25.56	-0.54	0.54	0.1753
783	26.07	25.6	-0.54	0.54	0.1753
784	26.1	25.63	-0.54	0.54	0.1753
785	26.13	25.66	-0.53	0.53	0.1721
786	26.17	25.7	-0.53	0.53	0.1721
787	26.2	25.73	-0.53	0.53	0.1721
788	26.23	25.76	-0.52	0.52	0.1688
789	26.27	25.8	-0.53	0.53	0.1721
790	26.3	25.83	-0.52	0.52	0.1688
791	26.33	25.86	-0.51	0.51	0.1656
792	26.37	25.9	-0.52	0.52	0.1688
793	26.4	25.93	-0.53	0.53	0.1721
794	26.43	25.96	-0.53	0.53	0.1721
795	26.47	26.	-0.53	0.53	0.1721
796	26.5	26.03	-0.52	0.52	0.1688
797	26.53	26.06	-0.52	0.52	0.1688
798	26.57	26.1	-0.52	0.52	0.1688
799	26.6	26.13	-0.52	0.52	0.1688
800	26.63	26.16	-0.52	0.52	0.1688
801	26.67	26.2	-0.52	0.52	0.1688
802	26.7	26.23	-0.52	0.52	0.1688
803	26.73	26.26	-0.52	0.52	0.1688
804	26.77	26.3	-0.51	0.51	0.1656
805	26.8	26.33	-0.52	0.52	0.1688
806	26.83	26.36	-0.51	0.51	0.1656
807	26.87	26.4	-0.51	0.51	0.1656
808	26.9	26.43	-0.52	0.52	0.1688
809	26.93	26.46	-0.52	0.52	0.1688
810	26.97	26.5	-0.52	0.52	0.1688
811	27.	26.53	-0.51	0.51	0.1656
812	27.03	26.56	-0.52	0.52	0.1688
813	27.07	26.6	-0.52	0.52	0.1688
814	27.1	26.63	-0.52	0.52	0.1688
815	27.13	26.66	-0.51	0.51	0.1656
816	27.17	26.7	-0.51	0.51	0.1656
817	27.2	26.73	-0.51	0.51	0.1656
818	27.23	26.76	-0.51	0.51	0.1656
819	27.27	26.8	-0.52	0.52	0.1688
820	27.3	26.83	-0.51	0.51	0.1656

Burke Co. JR Design Hydrogeo 2016 1/12/2016 **Arithmetic Graph**

John's River LF Phase 4 PZ-42 Falling Head 1



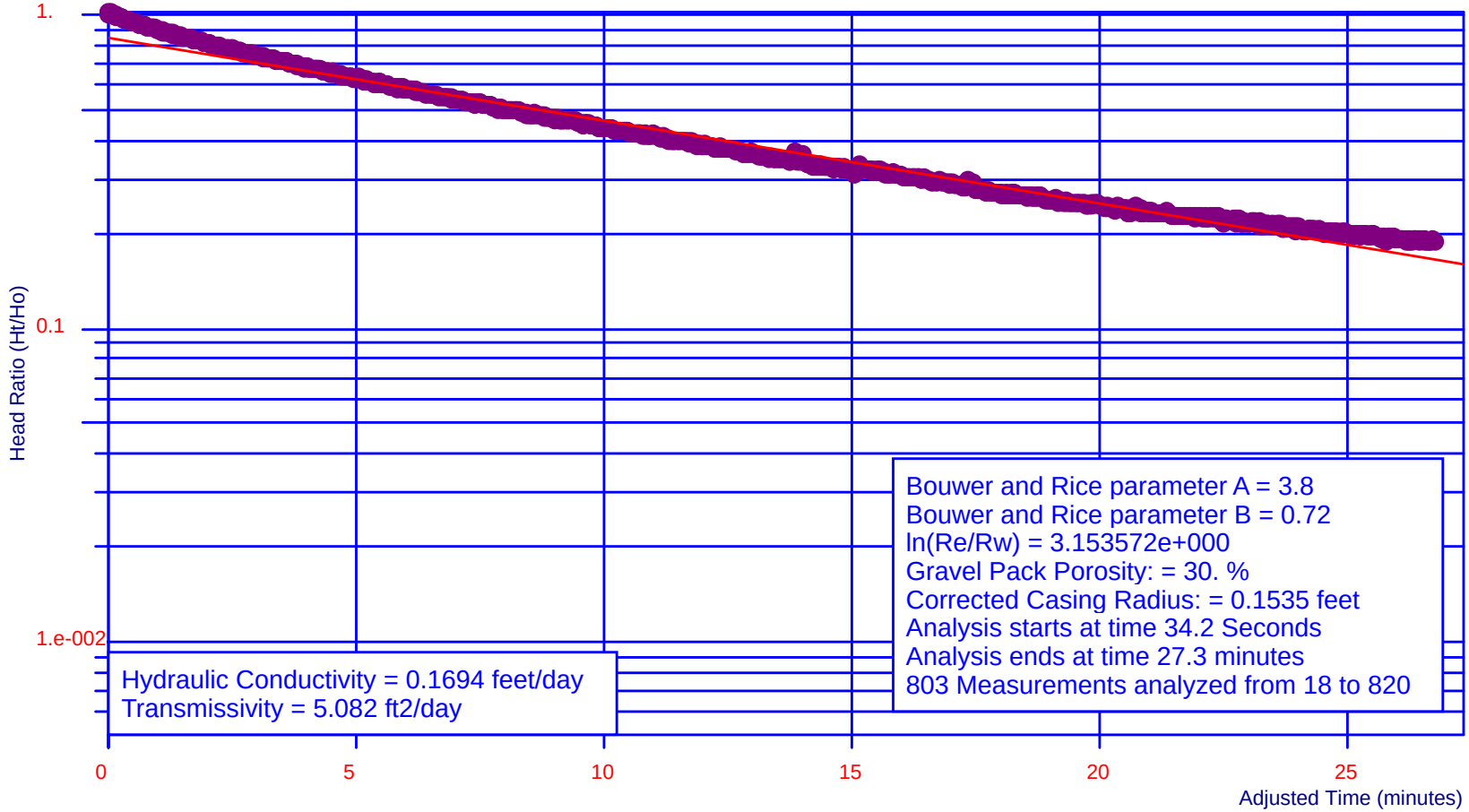
Project Number: 277.1602.12 for Burke County
Analysis by Starpoint Software

Burke Co. JR Design Hydrogeo 2016 1/12/2016

Bouwer and Rice Graph

John's River LF Phase 4

PZ-42 Falling Head 1



Ho is 2.68 feet at 34.2 Seconds

Project Number: 277.1602.12 for Burke County

Analysis by Starpoint Software

Bouwer and Rice Automatic Parameter Estimation

Burke Co. JR Design Hydrogeo 2016

Site Name:	John's River LF
Location:	Phase 4
Test Date:	1/12/2016
Client:	Burke County
Project Number:	277.1602.12

Well Label:	PZ-42 Falling Head 1
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	8.3e-002 feet
Effective Radius:	0.25 feet
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	0.1535 feet
Bouwer and Rice Parameter A	3.8
Bouwer and Rice Parameter B	0.72
Radius of Influence of Test	5.855 feet

Trial	Adjusted Time (minutes)	Head (feet)	Head Ratio	Hyd. Con. (feet/day)	Flow to Well (Cubic Feet/Day)
15	0.	3.08	1.	--	
16	3.e-002	2.99	0.9708	2.645	315.2
17	6.e-002	3.01	0.9773	1.025	123.
18	0.1	2.68	0.8701	3.723	397.6
19	0.13	2.73	0.8864	2.483	270.1
20	0.16	2.73	0.8864	2.018	219.5
21	0.2	2.71	0.8799	1.712	184.9
22	0.23	2.69	0.8734	1.575	168.9
23	0.26	2.68	0.8701	1.432	152.9
24	0.3	2.67	0.8669	1.274	135.6
25	0.33	2.67	0.8669	1.158	123.3
26	0.36	2.63	0.8539	1.174	123.
27	0.4	2.65	0.8604	1.006	106.2
28	0.43	2.62	0.8506	1.007	105.1
29	0.46	2.62	0.8506	0.941	98.25
30	0.5	2.59	0.8409	0.9274	95.71
31	0.53	2.59	0.8409	0.8749	90.3
32	0.56	2.58	0.8377	0.8465	87.03
33	0.6	2.57	0.8344	0.8074	82.69
34	0.63	2.56	0.8312	0.7855	80.13
35	0.66	2.54	0.8247	0.7816	79.11
36	0.7	2.54	0.8247	0.737	74.59
37	0.73	2.53	0.8214	0.7211	72.7
38	0.76	2.51	0.8149	0.7206	72.07
39	0.8	2.51	0.8149	0.6846	68.47
40	0.83	2.5	0.8117	0.6727	67.01
41	0.86	2.5	0.8117	0.6492	64.68
42	0.9	2.48	0.8052	0.6443	63.67
43	0.93	2.47	0.8019	0.6351	62.51
44	0.96	2.47	0.8019	0.6153	60.56
45	1.	2.46	0.7987	0.6015	58.96
46	1.03	2.44	0.7922	0.6052	58.84
47	1.06	2.44	0.7922	0.5881	57.18
48	1.1	2.43	0.789	0.5767	55.84
49	1.13	2.41	0.7825	0.5809	55.79

50	1.16	2.4	0.7792	0.5755	55.04
51	1.2	2.41	0.7825	0.5471	52.54
52	1.23	2.39	0.776	0.5518	52.56
53	1.26	2.39	0.776	0.5387	51.3
54	1.3	2.38	0.7727	0.5308	50.34
55	1.33	2.37	0.7695	0.5273	49.79
56	1.36	2.36	0.7662	0.5239	49.27
57	1.4	2.34	0.7597	0.5252	48.98
58	1.43	2.35	0.763	0.5062	47.41
59	1.46	2.33	0.7565	0.5115	47.49
60	1.5	2.32	0.7532	0.5055	46.74
61	1.53	2.31	0.75	0.5032	46.32
62	1.56	2.31	0.75	0.4935	45.43
63	1.6	2.3	0.7468	0.4884	44.76
64	1.63	2.29	0.7435	0.4866	44.4
65	1.66	2.28	0.7403	0.4849	44.05
66	1.7	2.28	0.7403	0.4734	43.01
67	1.73	2.27	0.737	0.472	42.7
68	1.76	2.27	0.737	0.464	41.97
69	1.8	2.26	0.7338	0.4602	41.45
70	1.83	2.25	0.7305	0.4592	41.17
71	1.86	2.25	0.7305	0.4518	40.51
72	1.9	2.24	0.7273	0.4485	40.04
73	1.93	2.23	0.724	0.4478	39.79
74	1.96	2.22	0.7208	0.4471	39.55
75	2.	2.22	0.7208	0.4381	38.76
76	2.03	2.2	0.7143	0.4436	38.89
77	2.06	2.2	0.7143	0.4371	38.32
78	2.1	2.19	0.711	0.4346	37.93
79	2.13	2.2	0.7143	0.4227	37.06
80	2.16	2.18	0.7078	0.4282	37.2
81	2.2	2.17	0.7045	0.426	36.84
82	2.23	2.17	0.7045	0.4203	36.34
83	2.26	2.16	0.7013	0.4202	36.16
84	2.3	2.15	0.6981	0.4182	35.83
85	2.33	2.14	0.6948	0.4182	35.66
86	2.36	2.15	0.6981	0.4076	34.92
87	2.4	2.13	0.6916	0.4112	34.9
88	2.43	2.12	0.6883	0.4113	34.75
89	2.46	2.13	0.6916	0.4012	34.05
90	2.5	2.11	0.6851	0.4049	34.04
91	2.53	2.1	0.6818	0.4051	33.9
92	2.56	2.1	0.6818	0.4004	33.5
93	2.6	2.1	0.6818	0.3942	32.99
94	2.63	2.1	0.6818	0.3897	32.61
95	2.66	2.08	0.6753	0.3949	32.73
96	2.7	2.09	0.6786	0.3843	32.01
97	2.73	2.08	0.6753	0.3848	31.9
98	2.76	2.07	0.6721	0.3853	31.78
99	2.8	2.06	0.6688	0.3844	31.56
100	2.83	2.05	0.6656	0.385	31.45
101	2.86	2.05	0.6656	0.3809	31.12
102	2.9	2.04	0.6623	0.3802	30.9
103	2.93	2.04	0.6623	0.3763	30.59
104	2.96	2.03	0.6591	0.3769	30.49
105	3.	2.03	0.6591	0.3719	30.08
106	3.03	2.03	0.6591	0.3682	29.78

107	3.06	2.01	0.6526	0.3733	29.9
108	3.1	2.01	0.6526	0.3684	29.51
109	3.13	2.	0.6494	0.3692	29.42
110	3.16	1.99	0.6461	0.3699	29.33
111	3.2	1.99	0.6461	0.3653	28.97
112	3.23	1.99	0.6461	0.3619	28.7
113	3.26	1.97	0.6396	0.3669	28.8
114	3.3	1.97	0.6396	0.3624	28.45
115	3.33	1.95	0.6331	0.3673	28.54
116	3.36	1.95	0.6331	0.3641	28.29
117	3.4	1.95	0.6331	0.3598	27.96
118	3.43	1.95	0.6331	0.3566	27.71
119	3.46	1.95	0.6331	0.3535	27.47
120	3.5	1.93	0.6266	0.3574	27.49
121	3.53	1.93	0.6266	0.3543	27.25
122	3.56	1.92	0.6234	0.3553	27.18
123	3.6	1.93	0.6266	0.3475	26.72
124	3.63	1.91	0.6201	0.3523	26.81
125	3.66	1.91	0.6201	0.3494	26.59
126	3.7	1.91	0.6201	0.3456	26.3
127	3.73	1.91	0.6201	0.3428	26.09
128	3.76	1.89	0.6136	0.3476	26.18
129	3.8	1.88	0.6104	0.3477	26.04
130	3.83	1.89	0.6136	0.3412	25.7
131	3.86	1.88	0.6104	0.3423	25.64
132	3.9	1.88	0.6104	0.3387	25.38
133	3.93	1.86	0.6039	0.3434	25.45
134	3.96	1.86	0.6039	0.3408	25.26
135	4.	1.86	0.6039	0.3374	25.01
136	4.03	1.85	0.6006	0.3385	24.95
137	4.06	1.83	0.5942	0.3432	25.02
138	4.1	1.84	0.5974	0.3363	24.65
139	4.13	1.84	0.5974	0.3338	24.48
140	4.16	1.83	0.5942	0.3349	24.42
141	4.2	1.82	0.5909	0.3352	24.31
142	4.23	1.83	0.5942	0.3294	24.02
143	4.26	1.81	0.5877	0.334	24.09
144	4.3	1.81	0.5877	0.3308	23.86
145	4.33	1.81	0.5877	0.3286	23.7
146	4.36	1.8	0.5844	0.3297	23.65
147	4.4	1.8	0.5844	0.3267	23.43
148	4.43	1.78	0.5779	0.3312	23.49
149	4.46	1.78	0.5779	0.329	23.34
150	4.5	1.78	0.5779	0.3261	23.13
151	4.53	1.78	0.5779	0.3239	22.98
152	4.56	1.77	0.5747	0.3251	22.93
153	4.6	1.76	0.5714	0.3256	22.83
154	4.63	1.77	0.5747	0.3202	22.58
155	4.66	1.76	0.5714	0.3214	22.54
156	4.7	1.75	0.5682	0.3219	22.45
157	4.73	1.75	0.5682	0.3198	22.3
158	4.76	1.74	0.5649	0.321	22.26
159	4.8	1.74	0.5649	0.3184	22.07
160	4.83	1.73	0.5617	0.3196	22.03
161	4.86	1.73	0.5617	0.3176	21.9
162	4.9	1.73	0.5617	0.315	21.72
163	4.93	1.72	0.5584	0.3163	21.68

164	4.96	1.72	0.5584	0.3143	21.54
165	5.	1.71	0.5552	0.3149	21.46
166	5.03	1.7	0.5519	0.3162	21.42
167	5.06	1.69	0.5487	0.3174	21.38
168	5.1	1.69	0.5487	0.3149	21.21
169	5.13	1.69	0.5487	0.3131	21.09
170	5.16	1.7	0.5519	0.3082	20.88
171	5.2	1.67	0.5422	0.315	20.96
172	5.23	1.67	0.5422	0.3132	20.84
173	5.26	1.66	0.539	0.3145	20.8
174	5.3	1.67	0.5422	0.3091	20.57
175	5.33	1.67	0.5422	0.3073	20.45
176	5.36	1.66	0.539	0.3086	20.41
177	5.4	1.66	0.539	0.3063	20.26
178	5.43	1.65	0.5357	0.3076	20.23
179	5.46	1.64	0.5325	0.3089	20.19
180	5.5	1.63	0.5292	0.3096	20.11
181	5.53	1.63	0.5292	0.3079	20.
182	5.56	1.65	0.5357	0.3004	19.75
183	5.6	1.64	0.5325	0.3012	19.68
184	5.63	1.63	0.5292	0.3025	19.65
185	5.66	1.63	0.5292	0.3009	19.54
186	5.7	1.63	0.5292	0.2988	19.41
187	5.73	1.61	0.5227	0.303	19.44
188	5.76	1.61	0.5227	0.3014	19.34
189	5.8	1.6	0.5195	0.3022	19.27
190	5.83	1.6	0.5195	0.3006	19.17
191	5.86	1.59	0.5162	0.302	19.13
192	5.9	1.59	0.5162	0.2999	19.
193	5.93	1.59	0.5162	0.2984	18.91
194	5.96	1.57	0.5097	0.3026	18.93
195	6.	1.58	0.513	0.2977	18.74
196	6.03	1.58	0.513	0.2962	18.65
197	6.06	1.55	0.5032	0.3032	18.73
198	6.1	1.56	0.5065	0.2984	18.55
199	6.13	1.56	0.5065	0.297	18.46
200	6.16	1.56	0.5065	0.2955	18.37
201	6.2	1.55	0.5032	0.2964	18.31
202	6.23	1.55	0.5032	0.295	18.22
203	6.26	1.55	0.5032	0.2936	18.13
204	6.3	1.55	0.5032	0.2917	18.02
205	6.33	1.54	0.5	0.293	17.98
206	6.36	1.54	0.5	0.2917	17.9
207	6.4	1.54	0.5	0.2898	17.79
208	6.43	1.53	0.4968	0.2912	17.75
209	6.46	1.53	0.4968	0.2898	17.67
210	6.5	1.51	0.4903	0.2935	17.66
211	6.53	1.51	0.4903	0.2921	17.58
212	6.56	1.51	0.4903	0.2908	17.5
213	6.6	1.5	0.487	0.2917	17.44
214	6.63	1.51	0.4903	0.2877	17.31
215	6.66	1.5	0.487	0.2891	17.28
216	6.7	1.5	0.487	0.2874	17.18
217	6.73	1.49	0.4838	0.2887	17.14
218	6.76	1.48	0.4805	0.2901	17.11
219	6.8	1.48	0.4805	0.2884	17.01
220	6.83	1.48	0.4805	0.2872	16.94

221	6.86	1.47	0.4773	0.2885	16.9
222	6.9	1.47	0.4773	0.2869	16.8
223	6.93	1.47	0.4773	0.2856	16.73
224	6.96	1.47	0.4773	0.2844	16.66
225	7.	1.46	0.474	0.2854	16.6
226	7.03	1.45	0.4708	0.2868	16.57
227	7.06	1.46	0.474	0.283	16.46
228	7.1	1.45	0.4708	0.284	16.41
229	7.13	1.45	0.4708	0.2828	16.34
230	7.16	1.44	0.4675	0.2842	16.31
231	7.2	1.44	0.4675	0.2826	16.22
232	7.23	1.44	0.4675	0.2814	16.15
233	7.26	1.44	0.4675	0.2803	16.08
234	7.3	1.42	0.461	0.2838	16.06
235	7.33	1.43	0.4643	0.2801	15.96
236	7.36	1.42	0.461	0.2815	15.93
237	7.4	1.42	0.461	0.28	15.84
238	7.43	1.41	0.4578	0.2814	15.81
239	7.46	1.41	0.4578	0.2803	15.75
240	7.5	1.42	0.461	0.2763	15.63
241	7.53	1.4	0.4545	0.2802	15.63
242	7.56	1.41	0.4578	0.2766	15.54
243	7.6	1.41	0.4578	0.2751	15.46
244	7.63	1.41	0.4578	0.274	15.4
245	7.66	1.39	0.4513	0.278	15.4
246	7.7	1.39	0.4513	0.2765	15.32
247	7.73	1.39	0.4513	0.2754	15.26
248	7.76	1.38	0.4481	0.2769	15.23
249	7.8	1.38	0.4481	0.2755	15.15
250	7.83	1.38	0.4481	0.2744	15.09
251	7.86	1.37	0.4448	0.2758	15.06
252	7.9	1.37	0.4448	0.2744	14.98
253	7.93	1.37	0.4448	0.2734	14.92
254	7.96	1.37	0.4448	0.2724	14.87
255	8.	1.35	0.4383	0.2759	14.84
256	8.03	1.36	0.4416	0.2724	14.76
257	8.06	1.35	0.4383	0.2739	14.73
258	8.1	1.35	0.4383	0.2725	14.66
259	8.13	1.35	0.4383	0.2715	14.61
260	8.16	1.34	0.4351	0.2729	14.57
261	8.2	1.34	0.4351	0.2716	14.5
262	8.23	1.35	0.4383	0.2682	14.43
263	8.26	1.34	0.4351	0.2696	14.4
264	8.3	1.33	0.4318	0.2708	14.35
265	8.33	1.34	0.4351	0.2674	14.28
266	8.36	1.33	0.4318	0.2688	14.25
267	8.4	1.33	0.4318	0.2675	14.18
268	8.43	1.32	0.4286	0.269	14.15
269	8.46	1.32	0.4286	0.268	14.1
270	8.5	1.32	0.4286	0.2668	14.03
271	8.53	1.31	0.4253	0.2682	14.
272	8.56	1.3	0.4221	0.2697	13.97
273	8.6	1.3	0.4221	0.2684	13.9
274	8.63	1.3	0.4221	0.2675	13.86
275	8.66	1.3	0.4221	0.2666	13.81
276	8.7	1.31	0.4253	0.263	13.73
277	8.73	1.29	0.4188	0.2668	13.71

278	8.76	1.29	0.4188	0.2659	13.67
279	8.8	1.29	0.4188	0.2647	13.6
280	8.83	1.29	0.4188	0.2638	13.56
281	8.86	1.28	0.4156	0.2652	13.53
282	8.9	1.28	0.4156	0.264	13.47
283	8.93	1.27	0.4123	0.2655	13.44
284	8.96	1.27	0.4123	0.2646	13.39
285	9.	1.27	0.4123	0.2634	13.33
286	9.03	1.27	0.4123	0.2625	13.29
287	9.06	1.26	0.4091	0.264	13.26
288	9.1	1.26	0.4091	0.2629	13.2
289	9.13	1.25	0.4058	0.2643	13.17
290	9.16	1.26	0.4091	0.2611	13.11
291	9.2	1.25	0.4058	0.2623	13.07
292	9.23	1.24	0.4026	0.2638	13.03
293	9.26	1.25	0.4058	0.2606	12.98
294	9.3	1.25	0.4058	0.2595	12.93
295	9.33	1.24	0.4026	0.261	12.89
296	9.36	1.23	0.3994	0.2624	12.86
297	9.4	1.23	0.3994	0.2613	12.81
298	9.43	1.23	0.3994	0.2605	12.77
299	9.46	1.23	0.3994	0.2597	12.73
300	9.5	1.23	0.3994	0.2586	12.67
301	9.53	1.23	0.3994	0.2578	12.63
302	9.56	1.23	0.3994	0.257	12.59
303	9.6	1.22	0.3961	0.2582	12.55
304	9.63	1.22	0.3961	0.2574	12.51
305	9.66	1.22	0.3961	0.2566	12.47
306	9.7	1.2	0.3896	0.2601	12.44
307	9.73	1.21	0.3929	0.257	12.39
308	9.76	1.21	0.3929	0.2562	12.35
309	9.8	1.21	0.3929	0.2551	12.3
310	9.83	1.2	0.3896	0.2566	12.27
311	9.86	1.2	0.3896	0.2558	12.23
312	9.9	1.19	0.3864	0.2571	12.19
313	9.93	1.2	0.3896	0.254	12.15
314	9.96	1.19	0.3864	0.2555	12.12
315	10.	1.18	0.3831	0.2568	12.07
316	10.03	1.18	0.3831	0.256	12.04
317	10.06	1.18	0.3831	0.2552	12.
318	10.1	1.18	0.3831	0.2542	11.95
319	10.13	1.18	0.3831	0.2535	11.92
320	10.16	1.17	0.3799	0.255	11.89
321	10.2	1.17	0.3799	0.254	11.84
322	10.23	1.17	0.3799	0.2532	11.81
323	10.26	1.17	0.3799	0.2525	11.77
324	10.3	1.16	0.3766	0.2537	11.73
325	10.33	1.16	0.3766	0.253	11.69
326	10.36	1.15	0.3734	0.2545	11.66
327	10.4	1.15	0.3734	0.2535	11.62
328	10.43	1.15	0.3734	0.2528	11.58
329	10.46	1.15	0.3734	0.252	11.55
330	10.5	1.15	0.3734	0.2511	11.51
331	10.53	1.14	0.3701	0.2526	11.47
332	10.56	1.14	0.3701	0.2519	11.44
333	10.6	1.14	0.3701	0.2509	11.4
334	10.63	1.13	0.3669	0.2524	11.37

335	10.66	1.13	0.3669	0.2517	11.33
336	10.7	1.13	0.3669	0.2508	11.29
337	10.73	1.12	0.3636	0.2523	11.26
338	10.76	1.13	0.3669	0.2494	11.23
339	10.8	1.13	0.3669	0.2485	11.19
340	10.83	1.12	0.3636	0.25	11.16
341	10.86	1.12	0.3636	0.2493	11.13
342	10.9	1.11	0.3604	0.2506	11.08
343	10.93	1.11	0.3604	0.2499	11.05
344	10.96	1.12	0.3636	0.247	11.02
345	11.	1.11	0.3604	0.2483	10.98
346	11.03	1.11	0.3604	0.2476	10.95
347	11.06	1.1	0.3571	0.2491	10.92
348	11.1	1.12	0.3636	0.2439	10.88
349	11.13	1.1	0.3571	0.2476	10.85
350	11.16	1.1	0.3571	0.2469	10.82
351	11.2	1.1	0.3571	0.246	10.78
352	11.23	1.09	0.3539	0.2475	10.75
353	11.26	1.09	0.3539	0.2469	10.72
354	11.3	1.09	0.3539	0.246	10.68
355	11.33	1.1	0.3571	0.2432	10.66
356	11.36	1.08	0.3506	0.2469	10.62
357	11.4	1.08	0.3506	0.246	10.59
358	11.43	1.06	0.3442	0.2497	10.55
359	11.46	1.07	0.3474	0.2469	10.53
360	11.5	1.06	0.3442	0.2482	10.48
361	11.53	1.06	0.3442	0.2476	10.46
362	11.56	1.07	0.3474	0.2448	10.44
363	11.6	1.07	0.3474	0.2439	10.4
364	11.63	1.07	0.3474	0.2433	10.37
365	11.66	1.06	0.3442	0.2448	10.34
366	11.7	1.06	0.3442	0.244	10.31
367	11.73	1.06	0.3442	0.2434	10.28
368	11.76	1.06	0.3442	0.2427	10.25
369	11.8	1.06	0.3442	0.2419	10.22
370	11.83	1.05	0.3409	0.2434	10.19
371	11.86	1.05	0.3409	0.2428	10.16
372	11.9	1.06	0.3442	0.2399	10.13
373	11.93	1.05	0.3409	0.2414	10.1
374	11.96	1.05	0.3409	0.2408	10.07
375	12.	1.03	0.3344	0.2443	10.03
376	12.03	1.04	0.3377	0.2415	10.01
377	12.06	1.03	0.3344	0.2431	9.976
378	12.1	1.03	0.3344	0.2423	9.943
379	12.13	1.04	0.3377	0.2395	9.927
380	12.16	1.02	0.3312	0.2432	9.885
381	12.2	1.03	0.3344	0.2403	9.862
382	12.23	1.02	0.3312	0.2418	9.829
383	12.26	1.03	0.3344	0.2391	9.813
384	12.3	1.02	0.3312	0.2404	9.773
385	12.33	1.01	0.3279	0.242	9.74
386	12.36	1.01	0.3279	0.2414	9.716
387	12.4	1.01	0.3279	0.2406	9.685
388	12.43	1.01	0.3279	0.2401	9.661
389	12.46	1.02	0.3312	0.2374	9.647
390	12.5	1.	0.3247	0.2408	9.597
391	12.53	1.01	0.3279	0.2381	9.584

392	12.56	1.	0.3247	0.2397	9.551
393	12.6	1.	0.3247	0.2389	9.521
394	12.63	1.	0.3247	0.2384	9.498
395	12.66	1.	0.3247	0.2378	9.476
396	12.7	1.	0.3247	0.237	9.446
397	12.73	1.	0.3247	0.2365	9.423
398	12.76	0.98	0.3182	0.2402	9.379
399	12.8	0.98	0.3182	0.2394	9.349
400	12.83	0.99	0.3214	0.2367	9.339
401	12.86	0.99	0.3214	0.2362	9.317
402	12.9	0.97	0.3149	0.2397	9.265
403	12.93	0.97	0.3149	0.2391	9.243
404	12.96	0.97	0.3149	0.2386	9.222
405	13.	0.97	0.3149	0.2378	9.193
406	13.03	0.97	0.3149	0.2373	9.172
407	13.06	0.98	0.3182	0.2346	9.163
408	13.1	0.97	0.3149	0.236	9.123
409	13.13	0.97	0.3149	0.2355	9.102
410	13.16	0.97	0.3149	0.235	9.082
411	13.2	0.97	0.3149	0.2342	9.054
412	13.23	0.96	0.3117	0.2358	9.021
413	13.26	0.96	0.3117	0.2353	9.
414	13.3	0.96	0.3117	0.2346	8.973
415	13.33	0.95	0.3084	0.2361	8.939
416	13.36	0.96	0.3117	0.2335	8.933
417	13.4	0.95	0.3084	0.2349	8.892
418	13.43	0.94	0.3052	0.2365	8.858
419	13.46	0.95	0.3084	0.2339	8.853
420	13.5	0.95	0.3084	0.2332	8.827
421	13.53	0.94	0.3052	0.2347	8.793
422	13.56	0.94	0.3052	0.2342	8.773
423	13.6	0.94	0.3052	0.2335	8.747
424	13.63	0.94	0.3052	0.233	8.728
425	13.66	0.94	0.3052	0.2325	8.709
426	13.7	0.93	0.3019	0.2339	8.669
427	13.73	0.93	0.3019	0.2334	8.65
428	13.76	0.93	0.3019	0.2329	8.631
429	13.8	0.93	0.3019	0.2322	8.606
430	13.83	0.92	0.2987	0.2338	8.572
431	13.86	0.92	0.2987	0.2333	8.553
432	13.9	0.94	0.3052	0.2285	8.559
433	13.93	0.93	0.3019	0.2301	8.526
434	13.96	0.99	0.3214	0.2176	8.583
435	14.	0.95	0.3084	0.2248	8.511
436	14.03	0.92	0.2987	0.2305	8.449
437	14.06	0.91	0.2955	0.2321	8.415
438	14.1	0.91	0.2955	0.2314	8.391
439	14.13	0.97	0.3149	0.2188	8.458
440	14.16	0.91	0.2955	0.2304	8.356
441	14.2	0.9	0.2922	0.2319	8.315
442	14.23	0.9	0.2922	0.2314	8.298
443	14.26	0.9	0.2922	0.2309	8.28
444	14.3	0.9	0.2922	0.2302	8.257
445	14.33	0.89	0.289	0.2318	8.222
446	14.36	0.89	0.289	0.2314	8.205
447	14.4	0.9	0.2922	0.2286	8.2
448	14.43	0.89	0.289	0.2302	8.165

449	14.46	0.9	0.2922	0.2277	8.166
450	14.5	0.88	0.2857	0.2312	8.108
451	14.53	0.88	0.2857	0.2307	8.091
452	14.56	0.88	0.2857	0.2303	8.074
453	14.6	0.88	0.2857	0.2296	8.052
454	14.63	0.89	0.289	0.2271	8.054
455	14.66	0.88	0.2857	0.2287	8.019
456	14.7	0.88	0.2857	0.2281	7.997
457	14.73	0.87	0.2825	0.2297	7.962
458	14.76	0.89	0.289	0.2251	7.983
459	14.8	0.88	0.2857	0.2265	7.943
460	14.83	0.88	0.2857	0.2261	7.927
461	14.86	0.88	0.2857	0.2256	7.911
462	14.9	0.87	0.2825	0.2271	7.872
463	14.93	0.87	0.2825	0.2266	7.856
464	14.96	0.88	0.2857	0.2241	7.858
465	15.	0.87	0.2825	0.2255	7.819
466	15.03	0.86	0.2792	0.2272	7.784
467	15.06	0.86	0.2792	0.2267	7.769
468	15.1	0.87	0.2825	0.224	7.767
469	15.13	0.84	0.2727	0.2298	7.692
470	15.16	0.85	0.276	0.2273	7.698
471	15.2	0.86	0.2792	0.2246	7.697
472	15.23	0.85	0.276	0.2262	7.662
473	15.26	0.9	0.2922	0.2158	7.738
474	15.3	0.87	0.2825	0.2211	7.666
475	15.33	0.87	0.2825	0.2207	7.651
476	15.36	0.87	0.2825	0.2203	7.636
477	15.4	0.87	0.2825	0.2197	7.616
478	15.43	0.86	0.2792	0.2213	7.583
479	15.46	0.86	0.2792	0.2208	7.568
480	15.5	0.86	0.2792	0.2203	7.548
481	15.53	0.85	0.276	0.2219	7.514
482	15.56	0.85	0.276	0.2214	7.5
483	15.6	0.85	0.276	0.2209	7.481
484	15.63	0.86	0.2792	0.2184	7.485
485	15.66	0.86	0.2792	0.218	7.471
486	15.7	0.85	0.276	0.2195	7.433
487	15.73	0.85	0.276	0.219	7.419
488	15.76	0.84	0.2727	0.2206	7.385
489	15.8	0.85	0.276	0.2181	7.386
490	15.83	0.84	0.2727	0.2196	7.352
491	15.86	0.84	0.2727	0.2192	7.338
492	15.9	0.84	0.2727	0.2187	7.32
493	15.93	0.85	0.276	0.2163	7.326
494	15.96	0.83	0.2695	0.2199	7.272
495	16.	0.83	0.2695	0.2193	7.254
496	16.03	0.83	0.2695	0.2189	7.24
497	16.06	0.83	0.2695	0.2185	7.227
498	16.1	0.83	0.2695	0.218	7.209
499	16.13	0.82	0.2662	0.2196	7.174
500	16.16	0.82	0.2662	0.2192	7.161
501	16.2	0.81	0.263	0.2206	7.122
502	16.23	0.82	0.2662	0.2182	7.13
503	16.26	0.81	0.263	0.2198	7.095
504	16.3	0.81	0.263	0.2193	7.078
505	16.33	0.82	0.2662	0.2169	7.086

506	16.36	0.81	0.263	0.2185	7.052
507	16.4	0.81	0.263	0.2179	7.035
508	16.43	0.81	0.263	0.2176	7.022
509	16.46	0.81	0.263	0.2172	7.009
510	16.5	0.8	0.2597	0.2186	6.97
511	16.53	0.8	0.2597	0.2182	6.957
512	16.56	0.81	0.263	0.2158	6.967
513	16.6	0.8	0.2597	0.2173	6.928
514	16.63	0.8	0.2597	0.2169	6.916
515	16.66	0.8	0.2597	0.2165	6.903
516	16.7	0.79	0.2565	0.218	6.864
517	16.73	0.79	0.2565	0.2176	6.852
518	16.76	0.79	0.2565	0.2173	6.839
519	16.8	0.79	0.2565	0.2167	6.823
520	16.83	0.79	0.2565	0.2164	6.811
521	16.86	0.8	0.2597	0.214	6.821
522	16.9	0.79	0.2565	0.2155	6.783
523	16.93	0.79	0.2565	0.2151	6.771
524	16.96	0.78	0.2532	0.2167	6.736
525	17.	0.78	0.2532	0.2162	6.72
526	17.03	0.78	0.2532	0.2158	6.708
527	17.06	0.78	0.2532	0.2154	6.696
528	17.1	0.77	0.25	0.217	6.657
529	17.13	0.78	0.2532	0.2146	6.669
530	17.16	0.77	0.25	0.2162	6.634
531	17.2	0.77	0.25	0.2157	6.618
532	17.23	0.77	0.25	0.2153	6.607
533	17.26	0.77	0.25	0.2149	6.595
534	17.3	0.77	0.25	0.2144	6.58
535	17.33	0.77	0.25	0.2141	6.568
536	17.36	0.76	0.2468	0.2157	6.533
537	17.4	0.76	0.2468	0.2152	6.518
538	17.43	0.78	0.2532	0.2109	6.554
539	17.46	0.8	0.2597	0.2066	6.587
540	17.5	0.78	0.2532	0.21	6.528
541	17.53	0.79	0.2565	0.2077	6.539
542	17.56	0.76	0.2468	0.2133	6.459
543	17.6	0.75	0.2435	0.2148	6.419
544	17.63	0.74	0.2403	0.2165	6.383
545	17.66	0.74	0.2403	0.2161	6.372
546	17.7	0.74	0.2403	0.2156	6.358
547	17.73	0.75	0.2435	0.2132	6.372
548	17.76	0.74	0.2403	0.2149	6.336
549	17.8	0.73	0.237	0.2164	6.296
550	17.83	0.75	0.2435	0.212	6.336
551	17.86	0.74	0.2403	0.2137	6.301
552	17.9	0.73	0.237	0.2152	6.261
553	17.93	0.73	0.237	0.2149	6.25
554	17.96	0.73	0.237	0.2145	6.24
555	18.	0.73	0.237	0.214	6.226
556	18.03	0.73	0.237	0.2137	6.216
557	18.06	0.73	0.237	0.2133	6.205
558	18.1	0.72	0.2338	0.2149	6.165
559	18.13	0.73	0.237	0.2125	6.181
560	18.16	0.72	0.2338	0.2142	6.145
561	18.2	0.73	0.237	0.2117	6.158
562	18.23	0.71	0.2305	0.2154	6.095

563	18.26	0.72	0.2338	0.213	6.111
564	18.3	0.72	0.2338	0.2125	6.098
565	18.33	0.73	0.237	0.2102	6.114
566	18.36	0.71	0.2305	0.2139	6.051
567	18.4	0.73	0.237	0.2094	6.091
568	18.43	0.71	0.2305	0.2131	6.028
569	18.46	0.71	0.2305	0.2127	6.019
570	18.5	0.71	0.2305	0.2123	6.006
571	18.53	0.72	0.2338	0.2099	6.022
572	18.56	0.71	0.2305	0.2116	5.986
573	18.6	0.71	0.2305	0.2111	5.973
574	18.63	0.7	0.2273	0.2128	5.937
575	18.66	0.71	0.2305	0.2105	5.954
576	18.7	0.71	0.2305	0.21	5.941
577	18.73	0.71	0.2305	0.2097	5.932
578	18.76	0.7	0.2273	0.2114	5.895
579	18.8	0.7	0.2273	0.2109	5.883
580	18.83	0.71	0.2305	0.2086	5.9
581	18.86	0.7	0.2273	0.2102	5.864
582	18.9	0.71	0.2305	0.2078	5.878
583	18.93	0.7	0.2273	0.2095	5.842
584	18.96	0.7	0.2273	0.2091	5.833
585	19.	0.69	0.224	0.2107	5.793
586	19.03	0.69	0.224	0.2104	5.784
587	19.06	0.69	0.224	0.21	5.775
588	19.1	0.69	0.224	0.2096	5.763
589	19.13	0.69	0.224	0.2093	5.754
590	19.16	0.69	0.224	0.2089	5.745
591	19.2	0.7	0.2273	0.2065	5.76
592	19.23	0.69	0.224	0.2082	5.724
593	19.26	0.68	0.2208	0.2099	5.687
594	19.3	0.69	0.224	0.2074	5.703
595	19.33	0.69	0.224	0.2071	5.695
596	19.36	0.68	0.2208	0.2088	5.658
597	19.4	0.68	0.2208	0.2084	5.646
598	19.43	0.69	0.224	0.206	5.665
599	19.46	0.68	0.2208	0.2077	5.629
600	19.5	0.68	0.2208	0.2073	5.617
601	19.53	0.67	0.2175	0.209	5.58
602	19.56	0.68	0.2208	0.2067	5.6
603	19.6	0.68	0.2208	0.2063	5.589
604	19.63	0.68	0.2208	0.2059	5.58
605	19.66	0.68	0.2208	0.2056	5.572
606	19.7	0.67	0.2175	0.2072	5.532
607	19.73	0.67	0.2175	0.2069	5.524
608	19.76	0.67	0.2175	0.2066	5.516
609	19.8	0.67	0.2175	0.2062	5.504
610	19.83	0.66	0.2143	0.2079	5.467
611	19.86	0.66	0.2143	0.2076	5.459
612	19.9	0.66	0.2143	0.2072	5.448
613	19.93	0.67	0.2175	0.2048	5.468
614	19.96	0.66	0.2143	0.2065	5.432
615	20.	0.67	0.2175	0.2041	5.449
616	20.03	0.67	0.2175	0.2038	5.441
617	20.06	0.67	0.2175	0.2035	5.433
618	20.1	0.66	0.2143	0.2051	5.394
619	20.13	0.66	0.2143	0.2048	5.386

620	20.16	0.66	0.2143	0.2045	5.378
621	20.2	0.65	0.211	0.2061	5.338
622	20.23	0.66	0.2143	0.2038	5.359
623	20.26	0.65	0.211	0.2055	5.323
624	20.3	0.65	0.211	0.2051	5.312
625	20.33	0.65	0.211	0.2048	5.304
626	20.36	0.65	0.211	0.2045	5.296
627	20.4	0.64	0.2078	0.2061	5.257
628	20.43	0.65	0.211	0.2038	5.278
629	20.46	0.66	0.2143	0.2015	5.299
630	20.5	0.65	0.211	0.2031	5.26
631	20.53	0.65	0.211	0.2028	5.253
632	20.56	0.65	0.211	0.2025	5.245
633	20.6	0.65	0.211	0.2021	5.235
634	20.63	0.65	0.211	0.2018	5.227
635	20.66	0.63	0.2045	0.2056	5.161
636	20.7	0.63	0.2045	0.2052	5.151
637	20.73	0.65	0.211	0.2008	5.202
638	20.76	0.64	0.2078	0.2025	5.165
639	20.8	0.66	0.2143	0.1982	5.212
640	20.83	0.64	0.2078	0.2019	5.148
641	20.86	0.65	0.211	0.1996	5.169
642	20.9	0.65	0.211	0.1992	5.16
643	20.93	0.63	0.2045	0.2029	5.094
644	20.96	0.63	0.2045	0.2026	5.087
645	21.	0.64	0.2078	0.2002	5.106
646	21.03	0.64	0.2078	0.1999	5.099
647	21.06	0.64	0.2078	0.1997	5.092
648	21.1	0.63	0.2045	0.2013	5.053
649	21.13	0.64	0.2078	0.199	5.075
650	21.16	0.63	0.2045	0.2007	5.039
651	21.2	0.63	0.2045	0.2003	5.029
652	21.23	0.63	0.2045	0.2	5.022
653	21.26	0.63	0.2045	0.1998	5.015
654	21.3	0.63	0.2045	0.1994	5.005
655	21.33	0.63	0.2045	0.1991	4.998
656	21.36	0.63	0.2045	0.1988	4.991
657	21.4	0.63	0.2045	0.1985	4.982
658	21.43	0.63	0.2045	0.1982	4.975
659	21.46	0.64	0.2078	0.1959	4.997
660	21.5	0.63	0.2045	0.1975	4.959
661	21.53	0.61	0.1981	0.2013	4.892
662	21.56	0.62	0.2013	0.199	4.916
663	21.6	0.61	0.1981	0.2006	4.876
664	21.63	0.62	0.2013	0.1983	4.9
665	21.66	0.62	0.2013	0.198	4.893
666	21.7	0.61	0.1981	0.1997	4.854
667	21.73	0.62	0.2013	0.1974	4.877
668	21.76	0.62	0.2013	0.1971	4.87
669	21.8	0.61	0.1981	0.1988	4.832
670	21.83	0.62	0.2013	0.1965	4.855
671	21.86	0.61	0.1981	0.1982	4.818
672	21.9	0.61	0.1981	0.1979	4.81
673	21.93	0.61	0.1981	0.1976	4.803
674	21.96	0.61	0.1981	0.1973	4.796
675	22.	0.6	0.1948	0.199	4.757
676	22.03	0.61	0.1981	0.1967	4.781

677	22.06	0.61	0.1981	0.1964	4.775
678	22.1	0.61	0.1981	0.1961	4.766
679	22.13	0.61	0.1981	0.1958	4.76
680	22.16	0.6	0.1948	0.1975	4.723
681	22.2	0.61	0.1981	0.1952	4.745
682	22.23	0.6	0.1948	0.1969	4.708
683	22.26	0.6	0.1948	0.1967	4.702
684	22.3	0.6	0.1948	0.1963	4.693
685	22.33	0.61	0.1981	0.1941	4.717
686	22.36	0.61	0.1981	0.1938	4.711
687	22.4	0.6	0.1948	0.1954	4.672
688	22.43	0.61	0.1981	0.1932	4.696
689	22.46	0.61	0.1981	0.1929	4.69
690	22.5	0.6	0.1948	0.1946	4.652
691	22.53	0.6	0.1948	0.1943	4.645
692	22.56	0.59	0.1916	0.196	4.609
693	22.6	0.58	0.1883	0.1977	4.569
694	22.63	0.6	0.1948	0.1934	4.625
695	22.66	0.6	0.1948	0.1932	4.619
696	22.7	0.59	0.1916	0.1948	4.58
697	22.73	0.59	0.1916	0.1946	4.574
698	22.76	0.59	0.1916	0.1943	4.568
699	22.8	0.6	0.1948	0.192	4.59
700	22.83	0.58	0.1883	0.1957	4.523
701	22.86	0.6	0.1948	0.1915	4.578
702	22.9	0.6	0.1948	0.1912	4.57
703	22.93	0.58	0.1883	0.1949	4.504
704	22.96	0.58	0.1883	0.1946	4.498
705	23.	0.59	0.1916	0.1923	4.521
706	23.03	0.58	0.1883	0.194	4.484
707	23.06	0.58	0.1883	0.1938	4.478
708	23.1	0.58	0.1883	0.1934	4.471
709	23.13	0.58	0.1883	0.1932	4.465
710	23.16	0.59	0.1916	0.191	4.489
711	23.2	0.58	0.1883	0.1926	4.451
712	23.23	0.59	0.1916	0.1904	4.476
713	23.26	0.58	0.1883	0.1921	4.44
714	23.3	0.57	0.1851	0.1938	4.401
715	23.33	0.59	0.1916	0.1896	4.457
716	23.36	0.57	0.1851	0.1933	4.39
717	23.4	0.57	0.1851	0.1929	4.382
718	23.43	0.58	0.1883	0.1907	4.408
719	23.46	0.58	0.1883	0.1905	4.402
720	23.5	0.58	0.1883	0.1901	4.394
721	23.53	0.57	0.1851	0.1919	4.358
722	23.56	0.58	0.1883	0.1897	4.383
723	23.6	0.57	0.1851	0.1913	4.345
724	23.63	0.57	0.1851	0.1911	4.34
725	23.66	0.58	0.1883	0.1889	4.365
726	23.7	0.57	0.1851	0.1905	4.327
727	23.73	0.58	0.1883	0.1883	4.352
728	23.76	0.56	0.1818	0.192	4.285
729	23.8	0.56	0.1818	0.1917	4.277
730	23.83	0.57	0.1851	0.1895	4.303
731	23.86	0.56	0.1818	0.1912	4.267
732	23.9	0.57	0.1851	0.1889	4.291
733	23.93	0.56	0.1818	0.1906	4.254

734	23.96	0.57	0.1851	0.1884	4.28
735	24.	0.57	0.1851	0.1881	4.273
736	24.03	0.55	0.1786	0.1919	4.205
737	24.06	0.57	0.1851	0.1876	4.262
738	24.1	0.57	0.1851	0.1873	4.255
739	24.13	0.56	0.1818	0.1891	4.219
740	24.16	0.56	0.1818	0.1888	4.214
741	24.2	0.55	0.1786	0.1905	4.175
742	24.23	0.55	0.1786	0.1903	4.17
743	24.26	0.55	0.1786	0.19	4.165
744	24.3	0.56	0.1818	0.1877	4.189
745	24.33	0.56	0.1818	0.1875	4.184
746	24.36	0.56	0.1818	0.1873	4.179
747	24.4	0.55	0.1786	0.1889	4.141
748	24.43	0.56	0.1818	0.1867	4.167
749	24.46	0.55	0.1786	0.1885	4.131
750	24.5	0.56	0.1818	0.1862	4.155
751	24.53	0.55	0.1786	0.1879	4.119
752	24.56	0.55	0.1786	0.1877	4.114
753	24.6	0.54	0.1753	0.1894	4.076
754	24.63	0.55	0.1786	0.1872	4.102
755	24.66	0.55	0.1786	0.187	4.097
756	24.7	0.55	0.1786	0.1867	4.091
757	24.73	0.55	0.1786	0.1864	4.086
758	24.76	0.55	0.1786	0.1862	4.081
759	24.8	0.54	0.1753	0.1879	4.043
760	24.83	0.55	0.1786	0.1857	4.069
761	24.86	0.54	0.1753	0.1874	4.033
762	24.9	0.55	0.1786	0.1852	4.058
763	24.93	0.54	0.1753	0.1869	4.022
764	24.96	0.54	0.1753	0.1867	4.017
765	25.	0.55	0.1786	0.1844	4.042
766	25.03	0.55	0.1786	0.1842	4.037
767	25.06	0.54	0.1753	0.1859	4.001
768	25.1	0.54	0.1753	0.1856	3.994
769	25.13	0.54	0.1753	0.1854	3.99
770	25.16	0.54	0.1753	0.1852	3.985
771	25.2	0.53	0.1721	0.1869	3.947
772	25.23	0.54	0.1753	0.1847	3.974
773	25.26	0.54	0.1753	0.1845	3.969
774	25.3	0.54	0.1753	0.1842	3.963
775	25.33	0.53	0.1721	0.1859	3.927
776	25.36	0.54	0.1753	0.1837	3.954
777	25.4	0.54	0.1753	0.1834	3.947
778	25.43	0.54	0.1753	0.1832	3.943
779	25.46	0.54	0.1753	0.183	3.938
780	25.5	0.53	0.1721	0.1847	3.9
781	25.53	0.53	0.1721	0.1845	3.896
782	25.56	0.54	0.1753	0.1823	3.923
783	25.6	0.54	0.1753	0.182	3.916
784	25.63	0.54	0.1753	0.1818	3.912
785	25.66	0.53	0.1721	0.1835	3.876
786	25.7	0.53	0.1721	0.1832	3.87
787	25.73	0.53	0.1721	0.183	3.866
788	25.76	0.52	0.1688	0.1848	3.829
789	25.8	0.53	0.1721	0.1825	3.855
790	25.83	0.52	0.1688	0.1843	3.819

791	25.86	0.51	0.1656	0.1861	3.782
792	25.9	0.52	0.1688	0.1838	3.809
793	25.93	0.53	0.1721	0.1816	3.836
794	25.96	0.53	0.1721	0.1814	3.831
795	26.	0.53	0.1721	0.1811	3.825
796	26.03	0.52	0.1688	0.1829	3.79
797	26.06	0.52	0.1688	0.1827	3.785
798	26.1	0.52	0.1688	0.1824	3.779
799	26.13	0.52	0.1688	0.1822	3.775
800	26.16	0.52	0.1688	0.182	3.771
801	26.2	0.52	0.1688	0.1817	3.765
802	26.23	0.52	0.1688	0.1815	3.761
803	26.26	0.52	0.1688	0.1813	3.756
804	26.3	0.51	0.1656	0.183	3.719
805	26.33	0.52	0.1688	0.1808	3.746
806	26.36	0.51	0.1656	0.1826	3.71
807	26.4	0.51	0.1656	0.1823	3.705
808	26.43	0.52	0.1688	0.1801	3.732
809	26.46	0.52	0.1688	0.1799	3.728
810	26.5	0.52	0.1688	0.1796	3.722
811	26.53	0.51	0.1656	0.1814	3.686
812	26.56	0.52	0.1688	0.1792	3.714
813	26.6	0.52	0.1688	0.179	3.708
814	26.63	0.52	0.1688	0.1788	3.704
815	26.66	0.51	0.1656	0.1805	3.668
816	26.7	0.51	0.1656	0.1802	3.663
817	26.73	0.51	0.1656	0.18	3.659
818	26.76	0.51	0.1656	0.1798	3.655
819	26.8	0.52	0.1688	0.1776	3.681
820	26.83	0.51	0.1656	0.1794	3.645

Arithmetic Means:

Hydraulic Conductivity	0.2884 feet/day
Transmissivity	8.651 ft2/day

Geometric Means:

Hydraulic Conductivity	0.2592 feet/day
Transmissivity	7.776 ft2/day

Sensitivity Analysis:

Hydraulic Conductivity	0.24 feet/day
Transmissivity	7.201 ft2/day

Burke Co. JR Design Hydrogeo 2016

Site Name:	John's River LF
Location:	Phase 4
Test Date:	1/12/2016
Client:	Burke County
Project Number:	277.1602.12

Well Label:	PZ-42 Rising Head 1
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	8.3e-002 feet
Effective Radius:	0.25 feet
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	0.1535 feet
Static Water Level:	0. feet
Water Table to Screen Bottom:	24. feet
Anisotropy Ratio:	1.
Time Adjustment:	6. Seconds

Test starts with trial 0
There are 541 time and drawdown measurements
Maximum head is 2.38 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-0.1	2.38	2.38	1.
2	3.33e-002	-6.67e-002	2.37	2.37	0.9958
3	6.67e-002	-3.33e-002	1.94	1.94	0.8151
4	0.1	0.	1.61	1.61	0.6765
5	0.1333	3.33e-002	1.59	1.59	0.6681
6	0.1667	6.67e-002	1.58	1.58	0.6639
7	0.2	0.1	1.59	1.59	0.6681
8	0.2333	0.1333	1.58	1.58	0.6639
9	0.2667	0.1667	1.57	1.57	0.6597
10	0.3	0.2	1.57	1.57	0.6597
11	0.3333	0.2333	1.56	1.56	0.6555
12	0.3667	0.2667	1.56	1.56	0.6555
13	0.4	0.3	1.55	1.55	0.6513
14	0.4333	0.3333	1.55	1.55	0.6513
15	0.4667	0.3667	1.53	1.53	0.6429
16	0.5	0.4	1.54	1.54	0.6471
17	0.5333	0.4333	1.53	1.53	0.6429
18	0.5667	0.4667	1.52	1.52	0.6387
19	0.6	0.5	1.51	1.51	0.6345
20	0.6333	0.5333	1.5	1.5	0.6303
21	0.6667	0.5667	1.5	1.5	0.6303
22	0.7	0.6	1.49	1.49	0.6261
23	0.7333	0.6333	1.49	1.49	0.6261
24	0.7667	0.6667	1.48	1.48	0.6218
25	0.8	0.7	1.47	1.47	0.6176
26	0.8333	0.7333	1.46	1.46	0.6134
27	0.8667	0.7667	1.46	1.46	0.6134
28	0.9	0.8	1.45	1.45	0.6092
29	0.9333	0.8333	1.46	1.46	0.6134
30	0.9667	0.8667	1.45	1.45	0.6092
31	1.	0.9	1.43	1.43	0.6008
32	1.033	0.933	1.44	1.44	0.605

33	1.067	0.967	1.42	1.42	0.5966
34	1.1	1.	1.42	1.42	0.5966
35	1.133	1.033	1.41	1.41	0.5924
36	1.167	1.067	1.42	1.42	0.5966
37	1.2	1.1	1.4	1.4	0.5882
38	1.233	1.133	1.39	1.39	0.584
39	1.267	1.167	1.38	1.38	0.5798
40	1.3	1.2	1.39	1.39	0.584
41	1.333	1.233	1.37	1.37	0.5756
42	1.367	1.267	1.37	1.37	0.5756
43	1.4	1.3	1.36	1.36	0.5714
44	1.433	1.333	1.36	1.36	0.5714
45	1.467	1.367	1.36	1.36	0.5714
46	1.5	1.4	1.35	1.35	0.5672
47	1.533	1.433	1.34	1.34	0.563
48	1.567	1.467	1.35	1.35	0.5672
49	1.6	1.5	1.34	1.34	0.563
50	1.633	1.533	1.34	1.34	0.563
51	1.667	1.567	1.33	1.33	0.5588
52	1.7	1.6	1.32	1.32	0.5546
53	1.733	1.633	1.31	1.31	0.5504
54	1.767	1.667	1.31	1.31	0.5504
55	1.8	1.7	1.3	1.3	0.5462
56	1.833	1.733	1.29	1.29	0.542
57	1.867	1.767	1.3	1.3	0.5462
58	1.9	1.8	1.29	1.29	0.542
59	1.933	1.833	1.29	1.29	0.542
60	1.967	1.867	1.28	1.28	0.5378
61	2.	1.9	1.28	1.28	0.5378
62	2.033	1.933	1.27	1.27	0.5336
63	2.067	1.967	1.27	1.27	0.5336
64	2.1	2.	1.26	1.26	0.5294
65	2.133	2.033	1.25	1.25	0.5252
66	2.167	2.067	1.25	1.25	0.5252
67	2.2	2.1	1.26	1.26	0.5294
68	2.233	2.133	1.24	1.24	0.521
69	2.267	2.167	1.23	1.23	0.5168
70	2.3	2.2	1.24	1.24	0.521
71	2.333	2.233	1.22	1.22	0.5126
72	2.367	2.267	1.22	1.22	0.5126
73	2.4	2.3	1.21	1.21	0.5084
74	2.433	2.333	1.22	1.22	0.5126
75	2.467	2.367	1.21	1.21	0.5084
76	2.5	2.4	1.2	1.2	0.5042
77	2.533	2.433	1.2	1.2	0.5042
78	2.567	2.467	1.19	1.19	0.5
79	2.6	2.5	1.2	1.2	0.5042
80	2.633	2.533	1.19	1.19	0.5
81	2.667	2.567	1.18	1.18	0.4958
82	2.7	2.6	1.18	1.18	0.4958
83	2.733	2.633	1.17	1.17	0.4916
84	2.767	2.667	1.16	1.16	0.4874
85	2.8	2.7	1.16	1.16	0.4874
86	2.833	2.733	1.16	1.16	0.4874
87	2.867	2.767	1.15	1.15	0.4832
88	2.9	2.8	1.14	1.14	0.479
89	2.933	2.833	1.14	1.14	0.479

90	2.967	2.867	1.14	1.14	0.479
91	3.	2.9	1.13	1.13	0.4748
92	3.033	2.933	1.13	1.13	0.4748
93	3.067	2.967	1.12	1.12	0.4706
94	3.1	3.	1.12	1.12	0.4706
95	3.133	3.033	1.11	1.11	0.4664
96	3.167	3.067	1.11	1.11	0.4664
97	3.2	3.1	1.11	1.11	0.4664
98	3.233	3.133	1.09	1.09	0.458
99	3.267	3.167	1.1	1.1	0.4622
100	3.3	3.2	1.1	1.1	0.4622
101	3.333	3.233	1.09	1.09	0.458
102	3.367	3.267	1.09	1.09	0.458
103	3.4	3.3	1.09	1.09	0.458
104	3.433	3.333	1.07	1.07	0.4496
105	3.467	3.367	1.08	1.08	0.4538
106	3.5	3.4	1.06	1.06	0.4454
107	3.533	3.433	1.07	1.07	0.4496
108	3.567	3.467	1.06	1.06	0.4454
109	3.6	3.5	1.06	1.06	0.4454
110	3.633	3.533	1.04	1.04	0.437
111	3.667	3.567	1.05	1.05	0.4412
112	3.7	3.6	1.04	1.04	0.437
113	3.733	3.633	1.03	1.03	0.4328
114	3.767	3.667	1.04	1.04	0.437
115	3.8	3.7	1.03	1.03	0.4328
116	3.833	3.733	1.03	1.03	0.4328
117	3.867	3.767	1.02	1.02	0.4286
118	3.9	3.8	1.01	1.01	0.4244
119	3.933	3.833	1.02	1.02	0.4286
120	3.967	3.867	1.	1.	0.4202
121	4.	3.9	1.	1.	0.4202
122	4.033	3.933	1.	1.	0.4202
123	4.067	3.967	0.99	0.99	0.416
124	4.1	4.	0.99	0.99	0.416
125	4.133	4.033	0.99	0.99	0.416
126	4.167	4.067	0.98	0.98	0.4118
127	4.2	4.1	0.97	0.97	0.4076
128	4.233	4.133	0.97	0.97	0.4076
129	4.267	4.167	0.98	0.98	0.4118
130	4.3	4.2	0.97	0.97	0.4076
131	4.333	4.233	0.97	0.97	0.4076
132	4.367	4.267	0.96	0.96	0.4034
133	4.4	4.3	0.96	0.96	0.4034
134	4.433	4.333	0.96	0.96	0.4034
135	4.467	4.367	0.96	0.96	0.4034
136	4.5	4.4	0.94	0.94	0.395
137	4.533	4.433	0.95	0.95	0.3992
138	4.567	4.467	0.95	0.95	0.3992
139	4.6	4.5	0.94	0.94	0.395
140	4.633	4.533	0.94	0.94	0.395
141	4.667	4.567	0.93	0.93	0.3908
142	4.7	4.6	0.91	0.91	0.3824
143	4.733	4.633	0.93	0.93	0.3908
144	4.767	4.667	0.91	0.91	0.3824
145	4.8	4.7	0.91	0.91	0.3824
146	4.833	4.733	0.92	0.92	0.3866

147	4.867	4.767	0.9	0.9	0.3782
148	4.9	4.8	0.89	0.89	0.3739
149	4.933	4.833	0.9	0.9	0.3782
150	4.967	4.867	0.9	0.9	0.3782
151	5.	4.9	0.9	0.9	0.3782
152	5.033	4.933	0.88	0.88	0.3697
153	5.067	4.967	0.88	0.88	0.3697
154	5.1	5.	0.88	0.88	0.3697
155	5.133	5.033	0.88	0.88	0.3697
156	5.167	5.067	0.88	0.88	0.3697
157	5.2	5.1	0.87	0.87	0.3655
158	5.233	5.133	0.87	0.87	0.3655
159	5.267	5.167	0.85	0.85	0.3571
160	5.3	5.2	0.87	0.87	0.3655
161	5.333	5.233	0.86	0.86	0.3613
162	5.367	5.267	0.86	0.86	0.3613
163	5.4	5.3	0.85	0.85	0.3571
164	5.433	5.333	0.85	0.85	0.3571
165	5.467	5.367	0.84	0.84	0.3529
166	5.5	5.4	0.85	0.85	0.3571
167	5.533	5.433	0.84	0.84	0.3529
168	5.567	5.467	0.84	0.84	0.3529
169	5.6	5.5	0.83	0.83	0.3487
170	5.633	5.533	0.82	0.82	0.3445
171	5.667	5.567	0.83	0.83	0.3487
172	5.7	5.6	0.83	0.83	0.3487
173	5.733	5.633	0.82	0.82	0.3445
174	5.767	5.667	0.81	0.81	0.3403
175	5.8	5.7	0.81	0.81	0.3403
176	5.833	5.733	0.81	0.81	0.3403
177	5.867	5.767	0.79	0.79	0.3319
178	5.9	5.8	0.8	0.8	0.3361
179	5.933	5.833	0.8	0.8	0.3361
180	5.967	5.867	0.79	0.79	0.3319
181	6.	5.9	0.79	0.79	0.3319
182	6.033	5.933	0.79	0.79	0.3319
183	6.067	5.967	0.78	0.78	0.3277
184	6.1	6.	0.78	0.78	0.3277
185	6.133	6.033	0.79	0.79	0.3319
186	6.167	6.067	0.77	0.77	0.3235
187	6.2	6.1	0.77	0.77	0.3235
188	6.233	6.133	0.77	0.77	0.3235
189	6.267	6.167	0.77	0.77	0.3235
190	6.3	6.2	0.76	0.76	0.3193
191	6.333	6.233	0.77	0.77	0.3235
192	6.367	6.267	0.76	0.76	0.3193
193	6.4	6.3	0.76	0.76	0.3193
194	6.433	6.333	0.75	0.75	0.3151
195	6.467	6.367	0.75	0.75	0.3151
196	6.5	6.4	0.74	0.74	0.3109
197	6.533	6.433	0.74	0.74	0.3109
198	6.567	6.467	0.74	0.74	0.3109
199	6.6	6.5	0.73	0.73	0.3067
200	6.633	6.533	0.73	0.73	0.3067
201	6.667	6.567	0.73	0.73	0.3067
202	6.7	6.6	0.73	0.73	0.3067
203	6.733	6.633	0.73	0.73	0.3067

204	6.767	6.667	0.72	0.72	0.3025
205	6.8	6.7	0.72	0.72	0.3025
206	6.833	6.733	0.72	0.72	0.3025
207	6.867	6.767	0.72	0.72	0.3025
208	6.9	6.8	0.71	0.71	0.2983
209	6.933	6.833	0.71	0.71	0.2983
210	6.967	6.867	0.71	0.71	0.2983
211	7.	6.9	0.71	0.71	0.2983
212	7.033	6.933	0.71	0.71	0.2983
213	7.067	6.967	0.7	0.7	0.2941
214	7.1	7.	0.7	0.7	0.2941
215	7.133	7.033	0.69	0.69	0.2899
216	7.167	7.067	0.69	0.69	0.2899
217	7.2	7.1	0.69	0.69	0.2899
218	7.233	7.133	0.69	0.69	0.2899
219	7.267	7.167	0.68	0.68	0.2857
220	7.3	7.2	0.68	0.68	0.2857
221	7.333	7.233	0.68	0.68	0.2857
222	7.367	7.267	0.67	0.67	0.2815
223	7.4	7.3	0.67	0.67	0.2815
224	7.433	7.333	0.68	0.68	0.2857
225	7.467	7.367	0.67	0.67	0.2815
226	7.5	7.4	0.66	0.66	0.2773
227	7.533	7.433	0.66	0.66	0.2773
228	7.567	7.467	0.66	0.66	0.2773
229	7.6	7.5	0.66	0.66	0.2773
230	7.633	7.533	0.66	0.66	0.2773
231	7.667	7.567	0.65	0.65	0.2731
232	7.7	7.6	0.65	0.65	0.2731
233	7.733	7.633	0.64	0.64	0.2689
234	7.767	7.667	0.64	0.64	0.2689
235	7.8	7.7	0.63	0.63	0.2647
236	7.833	7.733	0.65	0.65	0.2731
237	7.867	7.767	0.63	0.63	0.2647
238	7.9	7.8	0.63	0.63	0.2647
239	7.933	7.833	0.63	0.63	0.2647
240	7.967	7.867	0.62	0.62	0.2605
241	8.	7.9	0.63	0.63	0.2647
242	8.033	7.933	0.62	0.62	0.2605
243	8.067	7.967	0.62	0.62	0.2605
244	8.1	8.	0.62	0.62	0.2605
245	8.133	8.033	0.61	0.61	0.2563
246	8.167	8.067	0.61	0.61	0.2563
247	8.2	8.1	0.6	0.6	0.2521
248	8.233	8.133	0.6	0.6	0.2521
249	8.267	8.167	0.61	0.61	0.2563
250	8.3	8.2	0.6	0.6	0.2521
251	8.333	8.233	0.59	0.59	0.2479
252	8.367	8.267	0.59	0.59	0.2479
253	8.4	8.3	0.59	0.59	0.2479
254	8.433	8.333	0.59	0.59	0.2479
255	8.467	8.367	0.59	0.59	0.2479
256	8.5	8.4	0.59	0.59	0.2479
257	8.533	8.433	0.59	0.59	0.2479
258	8.567	8.467	0.57	0.57	0.2395
259	8.6	8.5	0.57	0.57	0.2395
260	8.633	8.533	0.58	0.58	0.2437

261	8.667	8.567	0.58	0.58	0.2437
262	8.7	8.6	0.57	0.57	0.2395
263	8.733	8.633	0.57	0.57	0.2395
264	8.767	8.667	0.56	0.56	0.2353
265	8.8	8.7	0.58	0.58	0.2437
266	8.833	8.733	0.57	0.57	0.2395
267	8.867	8.767	0.56	0.56	0.2353
268	8.9	8.8	0.55	0.55	0.2311
269	8.933	8.833	0.56	0.56	0.2353
270	8.967	8.867	0.55	0.55	0.2311
271	9.	8.9	0.55	0.55	0.2311
272	9.033	8.933	0.55	0.55	0.2311
273	9.067	8.967	0.54	0.54	0.2269
274	9.1	9.	0.55	0.55	0.2311
275	9.133	9.033	0.54	0.54	0.2269
276	9.167	9.067	0.54	0.54	0.2269
277	9.2	9.1	0.54	0.54	0.2269
278	9.233	9.133	0.53	0.53	0.2227
279	9.267	9.167	0.54	0.54	0.2269
280	9.3	9.2	0.53	0.53	0.2227
281	9.333	9.233	0.52	0.52	0.2185
282	9.367	9.267	0.52	0.52	0.2185
283	9.4	9.3	0.5	0.5	0.2101
284	9.433	9.333	0.53	0.53	0.2227
285	9.467	9.367	0.51	0.51	0.2143
286	9.5	9.4	0.52	0.52	0.2185
287	9.533	9.433	0.52	0.52	0.2185
288	9.567	9.467	0.5	0.5	0.2101
289	9.6	9.5	0.51	0.51	0.2143
290	9.633	9.533	0.51	0.51	0.2143
291	9.667	9.567	0.51	0.51	0.2143
292	9.7	9.6	0.51	0.51	0.2143
293	9.733	9.633	0.51	0.51	0.2143
294	9.767	9.667	0.49	0.49	0.2059
295	9.8	9.7	0.5	0.5	0.2101
296	9.833	9.733	0.5	0.5	0.2101
297	9.867	9.767	0.49	0.49	0.2059
298	9.9	9.8	0.49	0.49	0.2059
299	9.933	9.833	0.49	0.49	0.2059
300	9.967	9.867	0.48	0.48	0.2017
301	10.	9.9	0.49	0.49	0.2059
302	10.03	9.93	0.48	0.48	0.2017
303	10.07	9.97	0.48	0.48	0.2017
304	10.1	10.	0.48	0.48	0.2017
305	10.13	10.03	0.48	0.48	0.2017
306	10.17	10.07	0.47	0.47	0.1975
307	10.2	10.1	0.47	0.47	0.1975
308	10.23	10.13	0.47	0.47	0.1975
309	10.27	10.17	0.47	0.47	0.1975
310	10.3	10.2	0.47	0.47	0.1975
311	10.33	10.23	0.47	0.47	0.1975
312	10.37	10.27	0.46	0.46	0.1933
313	10.4	10.3	0.46	0.46	0.1933
314	10.43	10.33	0.46	0.46	0.1933
315	10.47	10.37	0.46	0.46	0.1933
316	10.5	10.4	0.45	0.45	0.1891
317	10.53	10.43	0.45	0.45	0.1891

318	10.57	10.47	0.45	0.45	0.1891
319	10.6	10.5	0.45	0.45	0.1891
320	10.63	10.53	0.44	0.44	0.1849
321	10.67	10.57	0.44	0.44	0.1849
322	10.7	10.6	0.45	0.45	0.1891
323	10.73	10.63	0.44	0.44	0.1849
324	10.77	10.67	0.44	0.44	0.1849
325	10.8	10.7	0.43	0.43	0.1807
326	10.83	10.73	0.43	0.43	0.1807
327	10.87	10.77	0.43	0.43	0.1807
328	10.9	10.8	0.43	0.43	0.1807
329	10.93	10.83	0.43	0.43	0.1807
330	10.97	10.87	0.43	0.43	0.1807
331	11.	10.9	0.43	0.43	0.1807
332	11.03	10.93	0.43	0.43	0.1807
333	11.07	10.97	0.42	0.42	0.1765
334	11.1	11.	0.42	0.42	0.1765
335	11.13	11.03	0.42	0.42	0.1765
336	11.17	11.07	0.41	0.41	0.1723
337	11.2	11.1	0.42	0.42	0.1765
338	11.23	11.13	0.41	0.41	0.1723
339	11.27	11.17	0.41	0.41	0.1723
340	11.3	11.2	0.41	0.41	0.1723
341	11.33	11.23	0.4	0.4	0.1681
342	11.37	11.27	0.41	0.41	0.1723
343	11.4	11.3	0.4	0.4	0.1681
344	11.43	11.33	0.41	0.41	0.1723
345	11.47	11.37	0.4	0.4	0.1681
346	11.5	11.4	0.4	0.4	0.1681
347	11.53	11.43	0.4	0.4	0.1681
348	11.57	11.47	0.39	0.39	0.1639
349	11.6	11.5	0.39	0.39	0.1639
350	11.63	11.53	0.39	0.39	0.1639
351	11.67	11.57	0.39	0.39	0.1639
352	11.7	11.6	0.38	0.38	0.1597
353	11.73	11.63	0.39	0.39	0.1639
354	11.77	11.67	0.38	0.38	0.1597
355	11.8	11.7	0.38	0.38	0.1597
356	11.83	11.73	0.38	0.38	0.1597
357	11.87	11.77	0.38	0.38	0.1597
358	11.9	11.8	0.37	0.37	0.1555
359	11.93	11.83	0.37	0.37	0.1555
360	11.97	11.87	0.37	0.37	0.1555
361	12.	11.9	0.38	0.38	0.1597
362	12.03	11.93	0.37	0.37	0.1555
363	12.07	11.97	0.37	0.37	0.1555
364	12.1	12.	0.37	0.37	0.1555
365	12.13	12.03	0.37	0.37	0.1555
366	12.17	12.07	0.36	0.36	0.1513
367	12.2	12.1	0.36	0.36	0.1513
368	12.23	12.13	0.37	0.37	0.1555
369	12.27	12.17	0.36	0.36	0.1513
370	12.3	12.2	0.35	0.35	0.1471
371	12.33	12.23	0.36	0.36	0.1513
372	12.37	12.27	0.35	0.35	0.1471
373	12.4	12.3	0.35	0.35	0.1471
374	12.43	12.33	0.34	0.34	0.1429

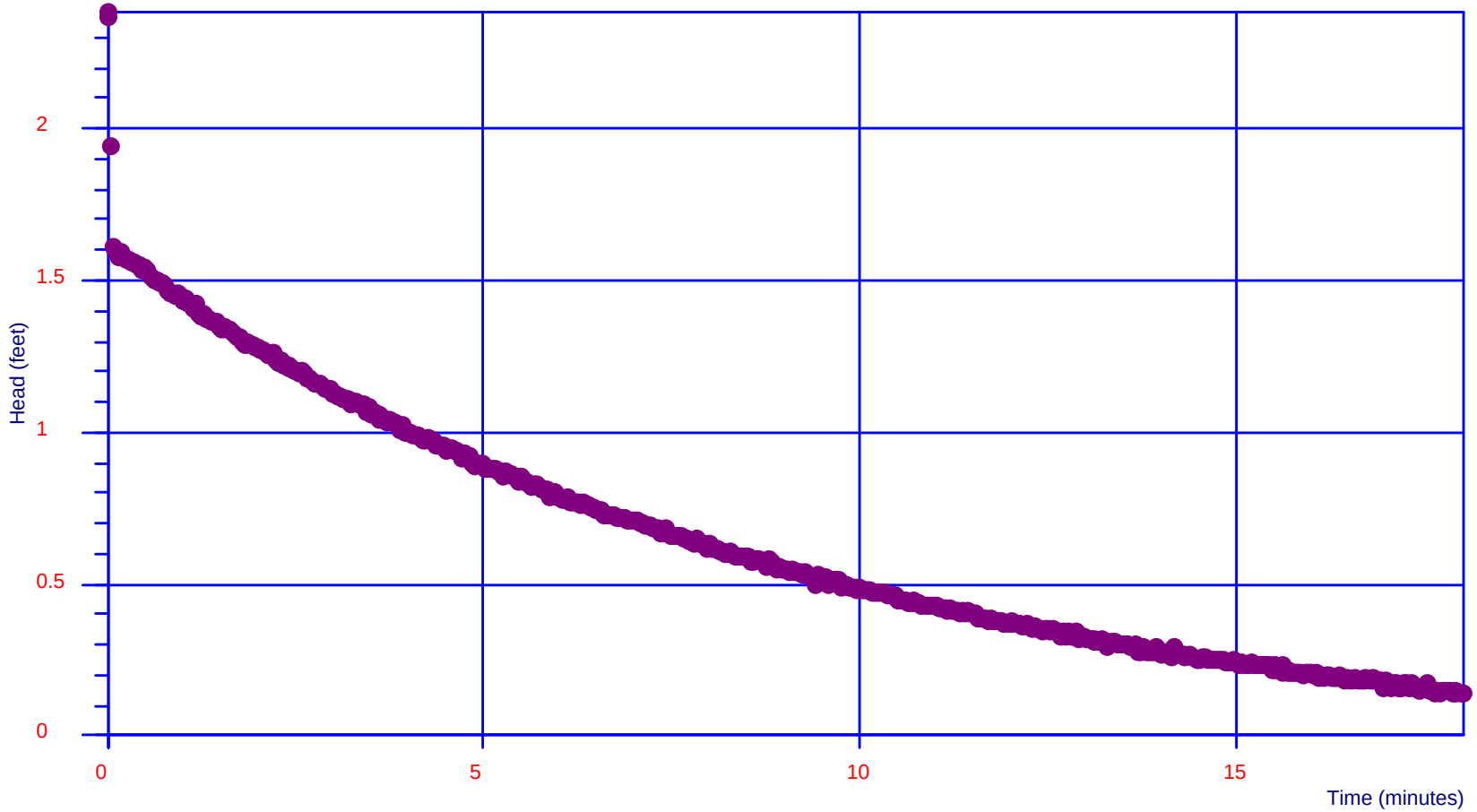
375	12.47	12.37	0.35	0.35	0.1471
376	12.5	12.4	0.35	0.35	0.1471
377	12.53	12.43	0.34	0.34	0.1429
378	12.57	12.47	0.35	0.35	0.1471
379	12.6	12.5	0.34	0.34	0.1429
380	12.63	12.53	0.34	0.34	0.1429
381	12.67	12.57	0.33	0.33	0.1387
382	12.7	12.6	0.34	0.34	0.1429
383	12.73	12.63	0.33	0.33	0.1387
384	12.77	12.67	0.34	0.34	0.1429
385	12.8	12.7	0.33	0.33	0.1387
386	12.83	12.73	0.33	0.33	0.1387
387	12.87	12.77	0.34	0.34	0.1429
388	12.9	12.8	0.32	0.32	0.1345
389	12.93	12.83	0.33	0.33	0.1387
390	12.97	12.87	0.33	0.33	0.1387
391	13.	12.9	0.32	0.32	0.1345
392	13.03	12.93	0.32	0.32	0.1345
393	13.07	12.97	0.32	0.32	0.1345
394	13.1	13.	0.32	0.32	0.1345
395	13.13	13.03	0.31	0.31	0.1303
396	13.17	13.07	0.31	0.31	0.1303
397	13.2	13.1	0.32	0.32	0.1345
398	13.23	13.13	0.31	0.31	0.1303
399	13.27	13.17	0.29	0.29	0.1218
400	13.3	13.2	0.31	0.31	0.1303
401	13.33	13.23	0.3	0.3	0.1261
402	13.37	13.27	0.31	0.31	0.1303
403	13.4	13.3	0.31	0.31	0.1303
404	13.43	13.33	0.3	0.3	0.1261
405	13.47	13.37	0.3	0.3	0.1261
406	13.5	13.4	0.3	0.3	0.1261
407	13.53	13.43	0.3	0.3	0.1261
408	13.57	13.47	0.3	0.3	0.1261
409	13.6	13.5	0.29	0.29	0.1218
410	13.63	13.53	0.29	0.29	0.1218
411	13.67	13.57	0.3	0.3	0.1261
412	13.7	13.6	0.28	0.28	0.1176
413	13.73	13.63	0.28	0.28	0.1176
414	13.77	13.67	0.29	0.29	0.1218
415	13.8	13.7	0.28	0.28	0.1176
416	13.83	13.73	0.28	0.28	0.1176
417	13.87	13.77	0.28	0.28	0.1176
418	13.9	13.8	0.28	0.28	0.1176
419	13.93	13.83	0.29	0.29	0.1218
420	13.97	13.87	0.28	0.28	0.1176
421	14.	13.9	0.27	0.27	0.1134
422	14.03	13.93	0.28	0.28	0.1176
423	14.07	13.97	0.27	0.27	0.1134
424	14.1	14.	0.27	0.27	0.1134
425	14.13	14.03	0.26	0.26	0.1092
426	14.17	14.07	0.29	0.29	0.1218
427	14.2	14.1	0.28	0.28	0.1176
428	14.23	14.13	0.27	0.27	0.1134
429	14.27	14.17	0.27	0.27	0.1134
430	14.3	14.2	0.27	0.27	0.1134
431	14.33	14.23	0.26	0.26	0.1092

432	14.37	14.27	0.27	0.27	0.1134
433	14.4	14.3	0.26	0.26	0.1092
434	14.43	14.33	0.26	0.26	0.1092
435	14.47	14.37	0.25	0.25	0.105
436	14.5	14.4	0.25	0.25	0.105
437	14.53	14.43	0.25	0.25	0.105
438	14.57	14.47	0.26	0.26	0.1092
439	14.6	14.5	0.26	0.26	0.1092
440	14.63	14.53	0.25	0.25	0.105
441	14.67	14.57	0.25	0.25	0.105
442	14.7	14.6	0.25	0.25	0.105
443	14.73	14.63	0.25	0.25	0.105
444	14.77	14.67	0.25	0.25	0.105
445	14.8	14.7	0.25	0.25	0.105
446	14.83	14.73	0.25	0.25	0.105
447	14.87	14.77	0.24	0.24	0.1008
448	14.9	14.8	0.24	0.24	0.1008
449	14.93	14.83	0.24	0.24	0.1008
450	14.97	14.87	0.25	0.25	0.105
451	15.	14.9	0.24	0.24	0.1008
452	15.03	14.93	0.23	0.23	9.664e-002
453	15.07	14.97	0.24	0.24	0.1008
454	15.1	15.	0.23	0.23	9.664e-002
455	15.13	15.03	0.23	0.23	9.664e-002
456	15.17	15.07	0.23	0.23	9.664e-002
457	15.2	15.1	0.24	0.24	0.1008
458	15.23	15.13	0.23	0.23	9.664e-002
459	15.27	15.17	0.23	0.23	9.664e-002
460	15.3	15.2	0.23	0.23	9.664e-002
461	15.33	15.23	0.23	0.23	9.664e-002
462	15.37	15.27	0.23	0.23	9.664e-002
463	15.4	15.3	0.23	0.23	9.664e-002
464	15.43	15.33	0.23	0.23	9.664e-002
465	15.47	15.37	0.22	0.22	9.244e-002
466	15.5	15.4	0.22	0.22	9.244e-002
467	15.53	15.43	0.23	0.23	9.664e-002
468	15.57	15.47	0.22	0.22	9.244e-002
469	15.6	15.5	0.21	0.21	8.824e-002
470	15.63	15.53	0.23	0.23	9.664e-002
471	15.67	15.57	0.22	0.22	9.244e-002
472	15.7	15.6	0.21	0.21	8.824e-002
473	15.73	15.63	0.21	0.21	8.824e-002
474	15.77	15.67	0.21	0.21	8.824e-002
475	15.8	15.7	0.21	0.21	8.824e-002
476	15.83	15.73	0.21	0.21	8.824e-002
477	15.87	15.77	0.21	0.21	8.824e-002
478	15.9	15.8	0.2	0.2	8.403e-002
479	15.93	15.83	0.21	0.21	8.824e-002
480	15.97	15.87	0.21	0.21	8.824e-002
481	16.	15.9	0.21	0.21	8.824e-002
482	16.03	15.93	0.2	0.2	8.403e-002
483	16.07	15.97	0.21	0.21	8.824e-002
484	16.1	16.	0.19	0.19	7.983e-002
485	16.13	16.03	0.2	0.2	8.403e-002
486	16.17	16.07	0.19	0.19	7.983e-002
487	16.2	16.1	0.2	0.2	8.403e-002
488	16.23	16.13	0.2	0.2	8.403e-002

489	16.27	16.17	0.19	0.19	7.983e-002
490	16.3	16.2	0.19	0.19	7.983e-002
491	16.33	16.23	0.19	0.19	7.983e-002
492	16.37	16.27	0.2	0.2	8.403e-002
493	16.4	16.3	0.19	0.19	7.983e-002
494	16.43	16.33	0.18	0.18	7.563e-002
495	16.47	16.37	0.19	0.19	7.983e-002
496	16.5	16.4	0.18	0.18	7.563e-002
497	16.53	16.43	0.18	0.18	7.563e-002
498	16.57	16.47	0.19	0.19	7.983e-002
499	16.6	16.5	0.18	0.18	7.563e-002
500	16.63	16.53	0.18	0.18	7.563e-002
501	16.67	16.57	0.18	0.18	7.563e-002
502	16.7	16.6	0.19	0.19	7.983e-002
503	16.73	16.63	0.18	0.18	7.563e-002
504	16.77	16.67	0.18	0.18	7.563e-002
505	16.8	16.7	0.18	0.18	7.563e-002
506	16.83	16.73	0.19	0.19	7.983e-002
507	16.87	16.77	0.18	0.18	7.563e-002
508	16.9	16.8	0.18	0.18	7.563e-002
509	16.93	16.83	0.18	0.18	7.563e-002
510	16.97	16.87	0.16	0.16	6.723e-002
511	17.	16.9	0.18	0.18	7.563e-002
512	17.03	16.93	0.17	0.17	7.143e-002
513	17.07	16.97	0.16	0.16	6.723e-002
514	17.1	17.	0.17	0.17	7.143e-002
515	17.13	17.03	0.17	0.17	7.143e-002
516	17.17	17.07	0.16	0.16	6.723e-002
517	17.2	17.1	0.16	0.16	6.723e-002
518	17.23	17.13	0.17	0.17	7.143e-002
519	17.27	17.17	0.17	0.17	7.143e-002
520	17.3	17.2	0.16	0.16	6.723e-002
521	17.33	17.23	0.17	0.17	7.143e-002
522	17.37	17.27	0.16	0.16	6.723e-002
523	17.4	17.3	0.16	0.16	6.723e-002
524	17.43	17.33	0.15	0.15	6.303e-002
525	17.47	17.37	0.16	0.16	6.723e-002
526	17.5	17.4	0.16	0.16	6.723e-002
527	17.53	17.43	0.17	0.17	7.143e-002
528	17.57	17.47	0.15	0.15	6.303e-002
529	17.6	17.5	0.15	0.15	6.303e-002
530	17.63	17.53	0.14	0.14	5.882e-002
531	17.67	17.57	0.15	0.15	6.303e-002
532	17.7	17.6	0.14	0.14	5.882e-002
533	17.73	17.63	0.15	0.15	6.303e-002
534	17.77	17.67	0.15	0.15	6.303e-002
535	17.8	17.7	0.15	0.15	6.303e-002
536	17.83	17.73	0.15	0.15	6.303e-002
537	17.87	17.77	0.14	0.14	5.882e-002
538	17.9	17.8	0.15	0.15	6.303e-002
539	17.93	17.83	0.14	0.14	5.882e-002
540	17.97	17.87	0.14	0.14	5.882e-002
541	18.	17.9	0.14	0.14	5.882e-002

Burke Co. JR Design Hydrogeo 2016 1/12/2016 **Arithmetic Graph**

John's River LF Phase 4 PZ-42 Rising Head 1



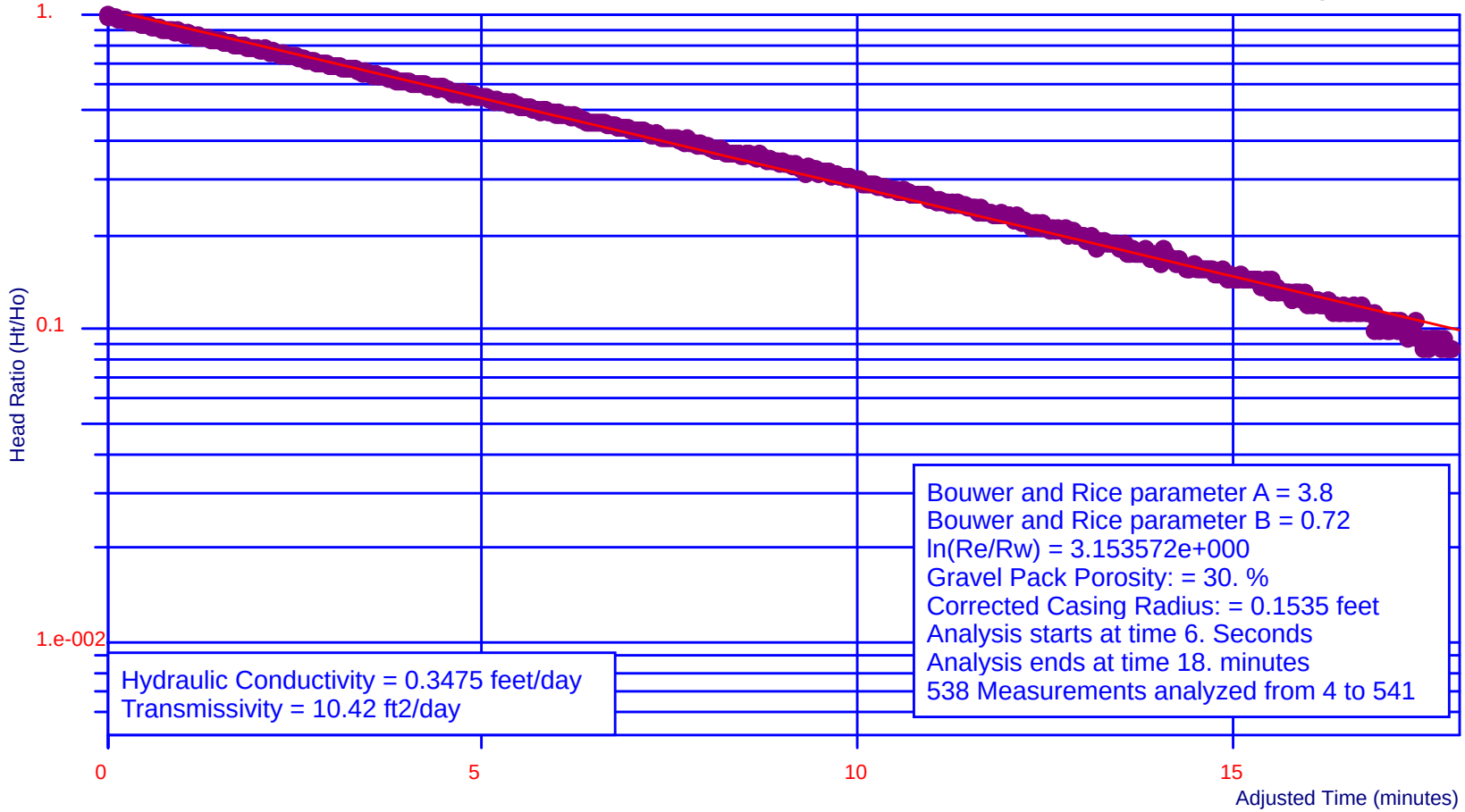
Project Number: 277.1602.12 for Burke County
Analysis by Starpoint Software

Burke Co. JR Design Hydrogeo 2016 1/12/2016

Bouwer and Rice Graph

John's River LF Phase 4

PZ-42 Rising Head 1



Ho is 1.61 feet at 6. Seconds

Project Number: 277.1602.12 for Burke County

Analysis by Starpoint Software

Bouwer and Rice Automatic Parameter Estimation

Burke Co. JR Design Hydrogeo 2016

Site Name:	John's River LF
Location:	Phase 4
Test Date:	1/12/2016
Client:	Burke County
Project Number:	277.1602.12

Well Label:	PZ-42 Rising Head 1
Aquifer Thickness:	30. feet
Screen Length:	20. feet
Casing Radius:	8.3e-002 feet
Effective Radius:	0.25 feet
Gravel Pack Porosity:	30. %
Corrected Casing Radius:	0.1535 feet
Bouwer and Rice Parameter A	3.8
Bouwer and Rice Parameter B	0.72
Radius of Influence of Test	5.855 feet

Trial	Adjusted Time (minutes)	Head (feet)	Head Ratio	Hyd. Con. (feet/day)	Flow to Well (Cubic Feet/Day)
4	0.	1.61	0.6765	--	
5	3.33e-002	1.59	0.6681	1.005	63.65
6	6.67e-002	1.58	0.6639	0.7547	47.51
7	0.1	1.59	0.6681	0.3345	21.19
8	0.1333	1.58	0.6639	0.3776	23.77
9	0.1667	1.57	0.6597	0.4039	25.27
10	0.2	1.57	0.6597	0.3366	21.06
11	0.2333	1.56	0.6555	0.3619	22.5
12	0.2667	1.56	0.6555	0.3166	19.68
13	0.3	1.55	0.6513	0.3388	20.93
14	0.3333	1.55	0.6513	0.3049	18.83
15	0.3667	1.53	0.6429	0.3719	22.68
16	0.4	1.54	0.6471	0.2974	18.25
17	0.4333	1.53	0.6429	0.3148	19.19
18	0.4667	1.52	0.6387	0.3299	19.98
19	0.5	1.51	0.6345	0.3432	20.65
20	0.5333	1.5	0.6303	0.3551	21.23
21	0.5667	1.5	0.6303	0.3342	19.98
22	0.6	1.49	0.6261	0.3455	20.51
23	0.6333	1.49	0.6261	0.3273	19.43
24	0.6667	1.48	0.6218	0.3379	19.93
25	0.7	1.47	0.6176	0.3478	20.37
26	0.7333	1.46	0.6134	0.3569	20.76
27	0.7667	1.46	0.6134	0.3414	19.86
28	0.8	1.45	0.6092	0.3501	20.23
29	0.8333	1.46	0.6134	0.3141	18.27
30	0.8667	1.45	0.6092	0.3232	18.67
31	0.9	1.43	0.6008	0.3525	20.09
32	0.933	1.44	0.605	0.3201	18.37
33	0.967	1.42	0.5966	0.3475	19.66
34	1.	1.42	0.5966	0.3361	19.02
35	1.033	1.41	0.5924	0.3436	19.31
36	1.067	1.42	0.5966	0.315	17.82
37	1.1	1.4	0.5882	0.34	18.97
38	1.133	1.39	0.584	0.347	19.22

39	1.167	1.38	0.5798	0.3535	19.44
40	1.2	1.39	0.584	0.3277	18.15
41	1.233	1.37	0.5756	0.3504	19.13
42	1.267	1.37	0.5756	0.341	18.61
43	1.3	1.36	0.5714	0.3474	18.83
44	1.333	1.36	0.5714	0.3388	18.36
45	1.367	1.36	0.5714	0.3304	17.9
46	1.4	1.35	0.5672	0.3367	18.11
47	1.433	1.34	0.563	0.3428	18.3
48	1.467	1.35	0.5672	0.3213	17.28
49	1.5	1.34	0.563	0.3275	17.49
50	1.533	1.34	0.563	0.3204	17.11
51	1.567	1.33	0.5588	0.3263	17.29
52	1.6	1.32	0.5546	0.3322	17.47
53	1.633	1.31	0.5504	0.3379	17.64
54	1.667	1.31	0.5504	0.331	17.28
55	1.7	1.3	0.5462	0.3367	17.44
56	1.733	1.29	0.542	0.3422	17.59
57	1.767	1.3	0.5462	0.3239	16.78
58	1.8	1.29	0.542	0.3294	16.94
59	1.833	1.29	0.542	0.3235	16.63
60	1.867	1.28	0.5378	0.3288	16.77
61	1.9	1.28	0.5378	0.3231	16.48
62	1.933	1.27	0.5336	0.3284	16.62
63	1.967	1.27	0.5336	0.3227	16.33
64	2.	1.26	0.5294	0.328	16.47
65	2.033	1.25	0.5252	0.3332	16.59
66	2.067	1.25	0.5252	0.3277	16.32
67	2.1	1.26	0.5294	0.3124	15.68
68	2.133	1.24	0.521	0.3276	16.19
69	2.167	1.23	0.5168	0.3325	16.3
70	2.2	1.24	0.521	0.3176	15.69
71	2.233	1.22	0.5126	0.3324	16.16
72	2.267	1.22	0.5126	0.3274	15.92
73	2.3	1.21	0.5084	0.3323	16.02
74	2.333	1.22	0.5126	0.3182	15.47
75	2.367	1.21	0.5084	0.3229	15.57
76	2.4	1.2	0.5042	0.3277	15.67
77	2.433	1.2	0.5042	0.3233	15.46
78	2.467	1.19	0.5	0.3279	15.55
79	2.5	1.2	0.5042	0.3146	15.04
80	2.533	1.19	0.5	0.3194	15.14
81	2.567	1.18	0.4958	0.3239	15.23
82	2.6	1.18	0.4958	0.3198	15.04
83	2.633	1.17	0.4916	0.3245	15.13
84	2.667	1.16	0.4874	0.3289	15.2
85	2.7	1.16	0.4874	0.3249	15.02
86	2.733	1.16	0.4874	0.321	14.84
87	2.767	1.15	0.4832	0.3254	14.91
88	2.8	1.14	0.479	0.3299	14.99
89	2.833	1.14	0.479	0.3261	14.81
90	2.867	1.14	0.479	0.3222	14.64
91	2.9	1.13	0.4748	0.3267	14.71
92	2.933	1.13	0.4748	0.323	14.54
93	2.967	1.12	0.4706	0.3273	14.61
94	3.	1.12	0.4706	0.3237	14.45
95	3.033	1.11	0.4664	0.3281	14.51

96	3.067	1.11	0.4664	0.3245	14.35
97	3.1	1.11	0.4664	0.321	14.2
98	3.133	1.09	0.458	0.3332	14.47
99	3.167	1.1	0.4622	0.3219	14.11
100	3.2	1.1	0.4622	0.3186	13.96
101	3.233	1.09	0.458	0.3229	14.02
102	3.267	1.09	0.458	0.3195	13.88
103	3.3	1.09	0.458	0.3163	13.74
104	3.333	1.07	0.4496	0.3281	13.99
105	3.367	1.08	0.4538	0.3173	13.66
106	3.4	1.06	0.4454	0.329	13.9
107	3.433	1.07	0.4496	0.3185	13.58
108	3.467	1.06	0.4454	0.3226	13.63
109	3.5	1.06	0.4454	0.3196	13.5
110	3.533	1.04	0.437	0.331	13.72
111	3.567	1.05	0.4412	0.3207	13.42
112	3.6	1.04	0.437	0.3249	13.46
113	3.633	1.03	0.4328	0.329	13.5
114	3.667	1.04	0.437	0.3189	13.22
115	3.7	1.03	0.4328	0.3231	13.26
116	3.733	1.03	0.4328	0.3202	13.14
117	3.767	1.02	0.4286	0.3243	13.18
118	3.8	1.01	0.4244	0.3284	13.22
119	3.833	1.02	0.4286	0.3187	12.95
120	3.867	1.	0.4202	0.3296	13.13
121	3.9	1.	0.4202	0.3268	13.02
122	3.933	1.	0.4202	0.324	12.91
123	3.967	0.99	0.416	0.328	12.94
124	4.	0.99	0.416	0.3253	12.83
125	4.033	0.99	0.416	0.3227	12.73
126	4.067	0.98	0.4118	0.3267	12.76
127	4.1	0.97	0.4076	0.3307	12.78
128	4.133	0.97	0.4076	0.3281	12.68
129	4.167	0.98	0.4118	0.3188	12.45
130	4.2	0.97	0.4076	0.3229	12.48
131	4.233	0.97	0.4076	0.3203	12.38
132	4.267	0.96	0.4034	0.3243	12.41
133	4.3	0.96	0.4034	0.3218	12.31
134	4.333	0.96	0.4034	0.3193	12.22
135	4.367	0.96	0.4034	0.3169	12.12
136	4.4	0.94	0.395	0.3273	12.26
137	4.433	0.95	0.3992	0.3185	12.06
138	4.467	0.95	0.3992	0.316	11.96
139	4.5	0.94	0.395	0.32	11.99
140	4.533	0.94	0.395	0.3177	11.9
141	4.567	0.93	0.3908	0.3216	11.92
142	4.6	0.91	0.3824	0.3319	12.04
143	4.633	0.93	0.3908	0.317	11.75
144	4.667	0.91	0.3824	0.3272	11.86
145	4.7	0.91	0.3824	0.3249	11.78
146	4.733	0.92	0.3866	0.3164	11.6
147	4.767	0.9	0.3782	0.3265	11.71
148	4.8	0.89	0.3739	0.3305	11.72
149	4.833	0.9	0.3782	0.322	11.55
150	4.867	0.9	0.3782	0.3198	11.47
151	4.9	0.9	0.3782	0.3176	11.39
152	4.933	0.88	0.3697	0.3277	11.49

153	4.967	0.88	0.3697	0.3255	11.41
154	5.	0.88	0.3697	0.3233	11.34
155	5.033	0.88	0.3697	0.3212	11.26
156	5.067	0.88	0.3697	0.319	11.19
157	5.1	0.87	0.3655	0.323	11.2
158	5.133	0.87	0.3655	0.3209	11.12
159	5.167	0.85	0.3571	0.3308	11.21
160	5.2	0.87	0.3655	0.3168	10.98
161	5.233	0.86	0.3613	0.3207	10.99
162	5.267	0.86	0.3613	0.3186	10.92
163	5.3	0.85	0.3571	0.3225	10.92
164	5.333	0.85	0.3571	0.3205	10.86
165	5.367	0.84	0.3529	0.3244	10.86
166	5.4	0.85	0.3571	0.3166	10.72
167	5.433	0.84	0.3529	0.3205	10.73
168	5.467	0.84	0.3529	0.3185	10.66
169	5.5	0.83	0.3487	0.3224	10.66
170	5.533	0.82	0.3445	0.3263	10.66
171	5.567	0.83	0.3487	0.3185	10.53
172	5.6	0.83	0.3487	0.3166	10.47
173	5.633	0.82	0.3445	0.3205	10.47
174	5.667	0.81	0.3403	0.3244	10.47
175	5.7	0.81	0.3403	0.3225	10.41
176	5.733	0.81	0.3403	0.3207	10.35
177	5.767	0.79	0.3319	0.3304	10.4
178	5.8	0.8	0.3361	0.3227	10.29
179	5.833	0.8	0.3361	0.3209	10.23
180	5.867	0.79	0.3319	0.3247	10.22
181	5.9	0.79	0.3319	0.3229	10.17
182	5.933	0.79	0.3319	0.3211	10.11
183	5.967	0.78	0.3277	0.325	10.1
184	6.	0.78	0.3277	0.3232	10.05
185	6.033	0.79	0.3319	0.3158	9.942
186	6.067	0.77	0.3235	0.3254	9.983
187	6.1	0.77	0.3235	0.3236	9.929
188	6.133	0.77	0.3235	0.3219	9.875
189	6.167	0.77	0.3235	0.3201	9.821
190	6.2	0.76	0.3193	0.324	9.813
191	6.233	0.77	0.3235	0.3167	9.717
192	6.267	0.76	0.3193	0.3206	9.708
193	6.3	0.76	0.3193	0.3189	9.657
194	6.333	0.75	0.3151	0.3228	9.647
195	6.367	0.75	0.3151	0.3211	9.596
196	6.4	0.74	0.3109	0.325	9.585
197	6.433	0.74	0.3109	0.3234	9.535
198	6.467	0.74	0.3109	0.3217	9.485
199	6.5	0.73	0.3067	0.3256	9.473
200	6.533	0.73	0.3067	0.324	9.425
201	6.567	0.73	0.3067	0.3223	9.376
202	6.6	0.73	0.3067	0.3207	9.329
203	6.633	0.73	0.3067	0.3191	9.283
204	6.667	0.72	0.3025	0.323	9.268
205	6.7	0.72	0.3025	0.3214	9.222
206	6.733	0.72	0.3025	0.3199	9.177
207	6.767	0.72	0.3025	0.3182	9.131
208	6.8	0.71	0.2983	0.3222	9.116
209	6.833	0.71	0.2983	0.3207	9.072

210	6.867	0.71	0.2983	0.3191	9.027
211	6.9	0.71	0.2983	0.3175	8.984
212	6.933	0.71	0.2983	0.316	8.941
213	6.967	0.7	0.2941	0.3199	8.924
214	7.	0.7	0.2941	0.3184	8.882
215	7.033	0.69	0.2899	0.3224	8.865
216	7.067	0.69	0.2899	0.3209	8.822
217	7.1	0.69	0.2899	0.3194	8.781
218	7.133	0.69	0.2899	0.3179	8.74
219	7.167	0.68	0.2857	0.3218	8.72
220	7.2	0.68	0.2857	0.3204	8.681
221	7.233	0.68	0.2857	0.3189	8.641
222	7.267	0.67	0.2815	0.3229	8.62
223	7.3	0.67	0.2815	0.3214	8.581
224	7.333	0.68	0.2857	0.3145	8.523
225	7.367	0.67	0.2815	0.3185	8.503
226	7.4	0.66	0.2773	0.3225	8.481
227	7.433	0.66	0.2773	0.3211	8.444
228	7.467	0.66	0.2773	0.3196	8.405
229	7.5	0.66	0.2773	0.3182	8.368
230	7.533	0.66	0.2773	0.3168	8.332
231	7.567	0.65	0.2731	0.3208	8.308
232	7.6	0.65	0.2731	0.3194	8.272
233	7.633	0.64	0.2689	0.3234	8.249
234	7.667	0.64	0.2689	0.322	8.212
235	7.7	0.63	0.2647	0.3261	8.186
236	7.733	0.65	0.2731	0.3139	8.13
237	7.767	0.63	0.2647	0.3233	8.116
238	7.8	0.63	0.2647	0.3219	8.081
239	7.833	0.63	0.2647	0.3206	8.047
240	7.867	0.62	0.2605	0.3246	8.02
241	7.9	0.63	0.2647	0.3178	7.979
242	7.933	0.62	0.2605	0.3219	7.953
243	7.967	0.62	0.2605	0.3205	7.919
244	8.	0.62	0.2605	0.3192	7.887
245	8.033	0.61	0.2563	0.3233	7.859
246	8.067	0.61	0.2563	0.322	7.826
247	8.1	0.6	0.2521	0.3261	7.797
248	8.133	0.6	0.2521	0.3248	7.765
249	8.167	0.61	0.2563	0.318	7.73
250	8.2	0.6	0.2521	0.3221	7.702
251	8.233	0.59	0.2479	0.3263	7.672
252	8.267	0.59	0.2479	0.325	7.64
253	8.3	0.59	0.2479	0.3237	7.61
254	8.333	0.59	0.2479	0.3224	7.58
255	8.367	0.59	0.2479	0.3211	7.549
256	8.4	0.59	0.2479	0.3198	7.519
257	8.433	0.59	0.2479	0.3186	7.49
258	8.467	0.57	0.2395	0.3282	7.454
259	8.5	0.57	0.2395	0.3269	7.425
260	8.533	0.58	0.2437	0.3202	7.4
261	8.567	0.58	0.2437	0.3189	7.371
262	8.6	0.57	0.2395	0.3231	7.339
263	8.633	0.57	0.2395	0.3219	7.311
264	8.667	0.56	0.2353	0.3261	7.276
265	8.7	0.58	0.2437	0.314	7.258
266	8.733	0.57	0.2395	0.3182	7.227

267	8.767	0.56	0.2353	0.3224	7.193
268	8.8	0.55	0.2311	0.3266	7.159
269	8.833	0.56	0.2353	0.32	7.14
270	8.867	0.55	0.2311	0.3242	7.104
271	8.9	0.55	0.2311	0.323	7.078
272	8.933	0.55	0.2311	0.3218	7.052
273	8.967	0.54	0.2269	0.326	7.015
274	9.	0.55	0.2311	0.3194	7.
275	9.033	0.54	0.2269	0.3236	6.964
276	9.067	0.54	0.2269	0.3224	6.938
277	9.1	0.54	0.2269	0.3213	6.913
278	9.133	0.53	0.2227	0.3256	6.876
279	9.167	0.54	0.2269	0.3189	6.862
280	9.2	0.53	0.2227	0.3232	6.826
281	9.233	0.52	0.2185	0.3276	6.788
282	9.267	0.52	0.2185	0.3264	6.763
283	9.3	0.5	0.2101	0.3365	6.704
284	9.333	0.53	0.2227	0.3186	6.729
285	9.367	0.51	0.2143	0.3284	6.675
286	9.4	0.52	0.2185	0.3218	6.667
287	9.433	0.52	0.2185	0.3206	6.644
288	9.467	0.5	0.2101	0.3306	6.586
289	9.5	0.51	0.2143	0.3238	6.581
290	9.533	0.51	0.2143	0.3227	6.558
291	9.567	0.51	0.2143	0.3216	6.535
292	9.6	0.51	0.2143	0.3205	6.513
293	9.633	0.51	0.2143	0.3194	6.49
294	9.667	0.49	0.2059	0.3293	6.43
295	9.7	0.5	0.2101	0.3226	6.428
296	9.733	0.5	0.2101	0.3215	6.406
297	9.767	0.49	0.2059	0.3259	6.364
298	9.8	0.49	0.2059	0.3248	6.343
299	9.833	0.49	0.2059	0.3238	6.321
300	9.867	0.48	0.2017	0.3282	6.278
301	9.9	0.49	0.2059	0.3216	6.279
302	9.93	0.48	0.2017	0.3261	6.238
303	9.97	0.48	0.2017	0.3248	6.213
304	10.	0.48	0.2017	0.3239	6.195
305	10.03	0.48	0.2017	0.3229	6.176
306	10.07	0.47	0.1975	0.3272	6.128
307	10.1	0.47	0.1975	0.3262	6.11
308	10.13	0.47	0.1975	0.3253	6.092
309	10.17	0.47	0.1975	0.324	6.068
310	10.2	0.47	0.1975	0.323	6.05
311	10.23	0.47	0.1975	0.3221	6.032
312	10.27	0.46	0.1933	0.3264	5.984
313	10.3	0.46	0.1933	0.3255	5.966
314	10.33	0.46	0.1933	0.3245	5.949
315	10.37	0.46	0.1933	0.3233	5.926
316	10.4	0.45	0.1891	0.328	5.882
317	10.43	0.45	0.1891	0.3271	5.865
318	10.47	0.45	0.1891	0.3258	5.843
319	10.5	0.45	0.1891	0.3249	5.826
320	10.53	0.44	0.1849	0.3297	5.78
321	10.57	0.44	0.1849	0.3284	5.758
322	10.6	0.45	0.1891	0.3218	5.771
323	10.63	0.44	0.1849	0.3266	5.726

324	10.67	0.44	0.1849	0.3254	5.704
325	10.7	0.43	0.1807	0.3302	5.658
326	10.73	0.43	0.1807	0.3293	5.642
327	10.77	0.43	0.1807	0.328	5.621
328	10.8	0.43	0.1807	0.3271	5.605
329	10.83	0.43	0.1807	0.3262	5.59
330	10.87	0.43	0.1807	0.325	5.569
331	10.9	0.43	0.1807	0.3241	5.554
332	10.93	0.43	0.1807	0.3232	5.539
333	10.97	0.42	0.1765	0.3278	5.486
334	11.	0.42	0.1765	0.3269	5.471
335	11.03	0.42	0.1765	0.326	5.456
336	11.07	0.41	0.1723	0.3307	5.402
337	11.1	0.42	0.1765	0.324	5.422
338	11.13	0.41	0.1723	0.3289	5.373
339	11.17	0.41	0.1723	0.3277	5.354
340	11.2	0.41	0.1723	0.3268	5.34
341	11.23	0.4	0.1681	0.3318	5.289
342	11.27	0.41	0.1723	0.3248	5.306
343	11.3	0.4	0.1681	0.3298	5.257
344	11.33	0.41	0.1723	0.3231	5.278
345	11.37	0.4	0.1681	0.3278	5.224
346	11.4	0.4	0.1681	0.3269	5.21
347	11.43	0.4	0.1681	0.326	5.197
348	11.47	0.39	0.1639	0.3308	5.141
349	11.5	0.39	0.1639	0.3299	5.128
350	11.53	0.39	0.1639	0.3291	5.114
351	11.57	0.39	0.1639	0.3279	5.097
352	11.6	0.38	0.1597	0.3331	5.044
353	11.63	0.39	0.1639	0.3263	5.07
354	11.67	0.38	0.1597	0.3311	5.013
355	11.7	0.38	0.1597	0.3302	5.001
356	11.73	0.38	0.1597	0.3294	4.988
357	11.77	0.38	0.1597	0.3283	4.971
358	11.8	0.37	0.1555	0.3335	4.917
359	11.83	0.37	0.1555	0.3326	4.904
360	11.87	0.37	0.1555	0.3315	4.888
361	11.9	0.38	0.1597	0.3247	4.917
362	11.93	0.37	0.1555	0.3299	4.863
363	11.97	0.37	0.1555	0.3288	4.847
364	12.	0.37	0.1555	0.3279	4.835
365	12.03	0.37	0.1555	0.3271	4.823
366	12.07	0.36	0.1513	0.3321	4.764
367	12.1	0.36	0.1513	0.3313	4.752
368	12.13	0.37	0.1555	0.3244	4.783
369	12.17	0.36	0.1513	0.3294	4.725
370	12.2	0.35	0.1471	0.3347	4.669
371	12.23	0.36	0.1513	0.3278	4.702
372	12.27	0.35	0.1471	0.3328	4.642
373	12.3	0.35	0.1471	0.332	4.631
374	12.33	0.34	0.1429	0.3375	4.573
375	12.37	0.35	0.1471	0.3301	4.605
376	12.4	0.35	0.1471	0.3293	4.593
377	12.43	0.34	0.1429	0.3348	4.536
378	12.47	0.35	0.1471	0.3275	4.568
379	12.5	0.34	0.1429	0.3329	4.511
380	12.53	0.34	0.1429	0.3321	4.5

381	12.57	0.33	0.1387	0.3374	4.437
382	12.6	0.34	0.1429	0.3303	4.475
383	12.63	0.33	0.1387	0.3358	4.416
384	12.67	0.34	0.1429	0.3285	4.45
385	12.7	0.33	0.1387	0.334	4.392
386	12.73	0.33	0.1387	0.3332	4.381
387	12.77	0.34	0.1429	0.3259	4.415
388	12.8	0.32	0.1345	0.3378	4.307
389	12.83	0.33	0.1387	0.3306	4.347
390	12.87	0.33	0.1387	0.3296	4.334
391	12.9	0.32	0.1345	0.3352	4.274
392	12.93	0.32	0.1345	0.3344	4.264
393	12.97	0.32	0.1345	0.3334	4.251
394	13.	0.32	0.1345	0.3326	4.241
395	13.03	0.31	0.1303	0.3384	4.18
396	13.07	0.31	0.1303	0.3373	4.167
397	13.1	0.32	0.1345	0.3301	4.209
398	13.13	0.31	0.1303	0.3358	4.148
399	13.17	0.29	0.1218	0.3483	4.025
400	13.2	0.31	0.1303	0.334	4.126
401	13.23	0.3	0.1261	0.3399	4.063
402	13.27	0.31	0.1303	0.3322	4.104
403	13.3	0.31	0.1303	0.3315	4.095
404	13.33	0.3	0.1261	0.3373	4.032
405	13.37	0.3	0.1261	0.3363	4.02
406	13.4	0.3	0.1261	0.3356	4.011
407	13.43	0.3	0.1261	0.3348	4.002
408	13.47	0.3	0.1261	0.3338	3.991
409	13.5	0.29	0.1218	0.3398	3.927
410	13.53	0.29	0.1218	0.339	3.918
411	13.57	0.3	0.1261	0.3314	3.961
412	13.6	0.28	0.1176	0.3442	3.84
413	13.63	0.28	0.1176	0.3434	3.832
414	13.67	0.29	0.1218	0.3356	3.878
415	13.7	0.28	0.1176	0.3417	3.812
416	13.73	0.28	0.1176	0.3409	3.804
417	13.77	0.28	0.1176	0.3399	3.793
418	13.8	0.28	0.1176	0.3392	3.785
419	13.83	0.29	0.1218	0.3317	3.833
420	13.87	0.28	0.1176	0.3375	3.766
421	13.9	0.27	0.1134	0.3438	3.699
422	13.93	0.28	0.1176	0.336	3.749
423	13.97	0.27	0.1134	0.342	3.68
424	14.	0.27	0.1134	0.3413	3.672
425	14.03	0.26	0.1092	0.3478	3.603
426	14.07	0.29	0.1218	0.326	3.768
427	14.1	0.28	0.1176	0.332	3.704
428	14.13	0.27	0.1134	0.3382	3.638
429	14.17	0.27	0.1134	0.3372	3.628
430	14.2	0.27	0.1134	0.3365	3.62
431	14.23	0.26	0.1092	0.3429	3.553
432	14.27	0.27	0.1134	0.3349	3.603
433	14.3	0.26	0.1092	0.3412	3.535
434	14.33	0.26	0.1092	0.3405	3.528
435	14.37	0.25	0.105	0.3469	3.455
436	14.4	0.25	0.105	0.3461	3.448
437	14.43	0.25	0.105	0.3454	3.441

438	14.47	0.26	0.1092	0.3372	3.494
439	14.5	0.26	0.1092	0.3365	3.486
440	14.53	0.25	0.105	0.343	3.417
441	14.57	0.25	0.105	0.3421	3.408
442	14.6	0.25	0.105	0.3414	3.401
443	14.63	0.25	0.105	0.3407	3.394
444	14.67	0.25	0.105	0.3398	3.385
445	14.7	0.25	0.105	0.3391	3.378
446	14.73	0.25	0.105	0.3384	3.371
447	14.77	0.24	0.1008	0.3449	3.298
448	14.8	0.24	0.1008	0.3442	3.291
449	14.83	0.24	0.1008	0.3435	3.285
450	14.87	0.25	0.105	0.3352	3.339
451	14.9	0.24	0.1008	0.3419	3.269
452	14.93	0.23	9.664e-002	0.3488	3.197
453	14.97	0.24	0.1008	0.3403	3.254
454	15.	0.23	9.664e-002	0.3472	3.182
455	15.03	0.23	9.664e-002	0.3465	3.175
456	15.07	0.23	9.664e-002	0.3456	3.167
457	15.1	0.24	0.1008	0.3373	3.226
458	15.13	0.23	9.664e-002	0.3442	3.154
459	15.17	0.23	9.664e-002	0.3433	3.146
460	15.2	0.23	9.664e-002	0.3426	3.14
461	15.23	0.23	9.664e-002	0.3419	3.134
462	15.27	0.23	9.664e-002	0.341	3.126
463	15.3	0.23	9.664e-002	0.3404	3.119
464	15.33	0.23	9.664e-002	0.3397	3.113
465	15.37	0.22	9.244e-002	0.3465	3.038
466	15.4	0.22	9.244e-002	0.3459	3.032
467	15.43	0.23	9.664e-002	0.3375	3.093
468	15.47	0.22	9.244e-002	0.3443	3.018
469	15.5	0.21	8.824e-002	0.3517	2.943
470	15.53	0.23	9.664e-002	0.3353	3.073
471	15.57	0.22	9.244e-002	0.3421	2.999
472	15.6	0.21	8.824e-002	0.3494	2.924
473	15.63	0.21	8.824e-002	0.3487	2.918
474	15.67	0.21	8.824e-002	0.3479	2.911
475	15.7	0.21	8.824e-002	0.3472	2.905
476	15.73	0.21	8.824e-002	0.3465	2.9
477	15.77	0.21	8.824e-002	0.3457	2.892
478	15.8	0.2	8.403e-002	0.3533	2.815
479	15.83	0.21	8.824e-002	0.3443	2.881
480	15.87	0.21	8.824e-002	0.3435	2.874
481	15.9	0.21	8.824e-002	0.3428	2.869
482	15.93	0.2	8.403e-002	0.3504	2.792
483	15.97	0.21	8.824e-002	0.3413	2.856
484	16.	0.19	7.983e-002	0.3574	2.706
485	16.03	0.2	8.403e-002	0.3482	2.775
486	16.07	0.19	7.983e-002	0.3559	2.694
487	16.1	0.2	8.403e-002	0.3467	2.763
488	16.13	0.2	8.403e-002	0.346	2.758
489	16.17	0.19	7.983e-002	0.3537	2.678
490	16.2	0.19	7.983e-002	0.353	2.673
491	16.23	0.19	7.983e-002	0.3524	2.668
492	16.27	0.2	8.403e-002	0.3431	2.734
493	16.3	0.19	7.983e-002	0.3508	2.656
494	16.33	0.18	7.563e-002	0.3591	2.575

495	16.37	0.19	7.983e-002	0.3493	2.645
496	16.4	0.18	7.563e-002	0.3575	2.564
497	16.43	0.18	7.563e-002	0.3569	2.56
498	16.47	0.19	7.983e-002	0.3472	2.629
499	16.5	0.18	7.563e-002	0.3554	2.549
500	16.53	0.18	7.563e-002	0.3547	2.544
501	16.57	0.18	7.563e-002	0.3539	2.538
502	16.6	0.19	7.983e-002	0.3445	2.608
503	16.63	0.18	7.563e-002	0.3526	2.529
504	16.67	0.18	7.563e-002	0.3517	2.523
505	16.7	0.18	7.563e-002	0.3511	2.518
506	16.73	0.19	7.983e-002	0.3418	2.588
507	16.77	0.18	7.563e-002	0.3496	2.508
508	16.8	0.18	7.563e-002	0.349	2.503
509	16.83	0.18	7.563e-002	0.3484	2.499
510	16.87	0.16	6.723e-002	0.3663	2.335
511	16.9	0.18	7.563e-002	0.347	2.489
512	16.93	0.17	7.143e-002	0.3554	2.407
513	16.97	0.16	6.723e-002	0.3641	2.321
514	17.	0.17	7.143e-002	0.3539	2.397
515	17.03	0.17	7.143e-002	0.3533	2.393
516	17.07	0.16	6.723e-002	0.362	2.308
517	17.1	0.16	6.723e-002	0.3613	2.304
518	17.13	0.17	7.143e-002	0.3512	2.379
519	17.17	0.17	7.143e-002	0.3504	2.374
520	17.2	0.16	6.723e-002	0.3592	2.29
521	17.23	0.17	7.143e-002	0.3492	2.365
522	17.27	0.16	6.723e-002	0.3578	2.281
523	17.3	0.16	6.723e-002	0.3571	2.277
524	17.33	0.15	6.303e-002	0.3665	2.191
525	17.37	0.16	6.723e-002	0.3557	2.268
526	17.4	0.16	6.723e-002	0.3551	2.264
527	17.43	0.17	7.143e-002	0.3452	2.338
528	17.47	0.15	6.303e-002	0.3636	2.173
529	17.5	0.15	6.303e-002	0.3629	2.169
530	17.53	0.14	5.882e-002	0.3728	2.08
531	17.57	0.15	6.303e-002	0.3615	2.161
532	17.6	0.14	5.882e-002	0.3714	2.072
533	17.63	0.15	6.303e-002	0.3603	2.153
534	17.67	0.15	6.303e-002	0.3594	2.148
535	17.7	0.15	6.303e-002	0.3588	2.145
536	17.73	0.15	6.303e-002	0.3582	2.141
537	17.77	0.14	5.882e-002	0.3678	2.052
538	17.8	0.15	6.303e-002	0.3568	2.133
539	17.83	0.14	5.882e-002	0.3666	2.045
540	17.87	0.14	5.882e-002	0.3658	2.04
541	17.9	0.14	5.882e-002	0.3651	2.037

Arithmetic Means:

Hydraulic Conductivity	0.3339 feet/day
Transmissivity	10.02 ft2/day

Geometric Means:

Hydraulic Conductivity	0.3328 feet/day
Transmissivity	9.983 ft2/day

Sensitivity Analysis:

Appendix D

ACOE Notification of Jurisdictional Determination

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID: 2015-02263 County: Burke U.S.G.S. Quad: NC-Morganton North

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner: Burke County / Chris Hollifield
Address: P.O. Box 1486
Morganton, NC 28680
Telephone Number: 828-438-5452

Size (acres): Approximately 6.1
Nearest Town: Morganton
Nearest Waterway: Catawba River
River Basin/ HUC: Catawba /05050001

Coordinates: 35.784118 °N, -81.645217 °W

Location description: The project area is Phase 2A and Phase 4 of a proposed expansion area located within the exisiting John's River Waste Management Facility located at 2500 Marsh Trail, Morganton, Burke County, North Carolina.

Indicate Which of the Following Apply:

A. Preliminary Determination

_ Based on preliminary information, there may be waters of the U.S. including wetlands on the above described project area. We strongly suggest you have this property inspected to determine the extent of Department of the Army (DA) jurisdiction. To be considered final, a jurisdictional determination must be verified by the Corps. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also, you may provide new information for further consideration by the Corps to reevaluate the JD.

B. Approved Determination

_ There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ There are waters of the U.S. including wetlands on the above described property subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ We strongly suggest you have the wetlands on your property delineated. Due to the size of your property and/or our present workload, the Corps may not be able to accomplish this wetland delineation in a timely manner. For a more timely delineation, you may wish to obtain a consultant. To be considered final, any delineation must be verified by the Corps.

_ The waters of the U.S. including wetlands on your project area have been delineated and the delineation has been verified by the Corps. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

_ The waters of the U.S. including wetlands have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on _____. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

X There are no waters of the U.S., to include wetlands, present on the above described project area which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our

published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management to determine their requirements.

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Tasha Alexander** at 828-271-7980, **ext. 226** or **tasha.l.alexander@usace.army.mil**.

C. Basis for Determination: There are no waters of the U.S. including wetlands within phase 2A or Phase 4.

D. Remarks: See overall site plan labeled John's River Waste Management Facility Burke County, North Carolina, Phase 1 C&D Landfill Expansion Study Map.

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B. above)

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Jason Steele, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by Dec. 28 2015.

It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: Tasha Alexander
Tasha Alexander

Issue Date of JD: **October 29, 2015** Expiration Date: **October 29, 2020**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete our Customer Satisfaction Survey, located online at http://regulatory.usacesurvey.com/.

Copy furnished:
Ron Heater, Joyce Engineering, Inc., 2211 W. Meadowview Road, Suite 101, Greensboro, NC 27407

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **Burke County / Chris Hollifield**	File Number: **SAW-2015-02263**	Date: **October 29, 2015**

Attached is:	See Section below
☐ INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
☐ PROFFERED PERMIT (Standard Permit or Letter of permission)	B
☐ PERMIT DENIAL	C
☒ APPROVED JURISDICTIONAL DETERMINATION	D
☐ PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the district engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: **District Engineer, Wilmington Regulatory Division,** **Attn: Tasha Alexander** **828-271-7980**	If you only have questions regarding the appeal process you may also contact: Mr. Jason Steele, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

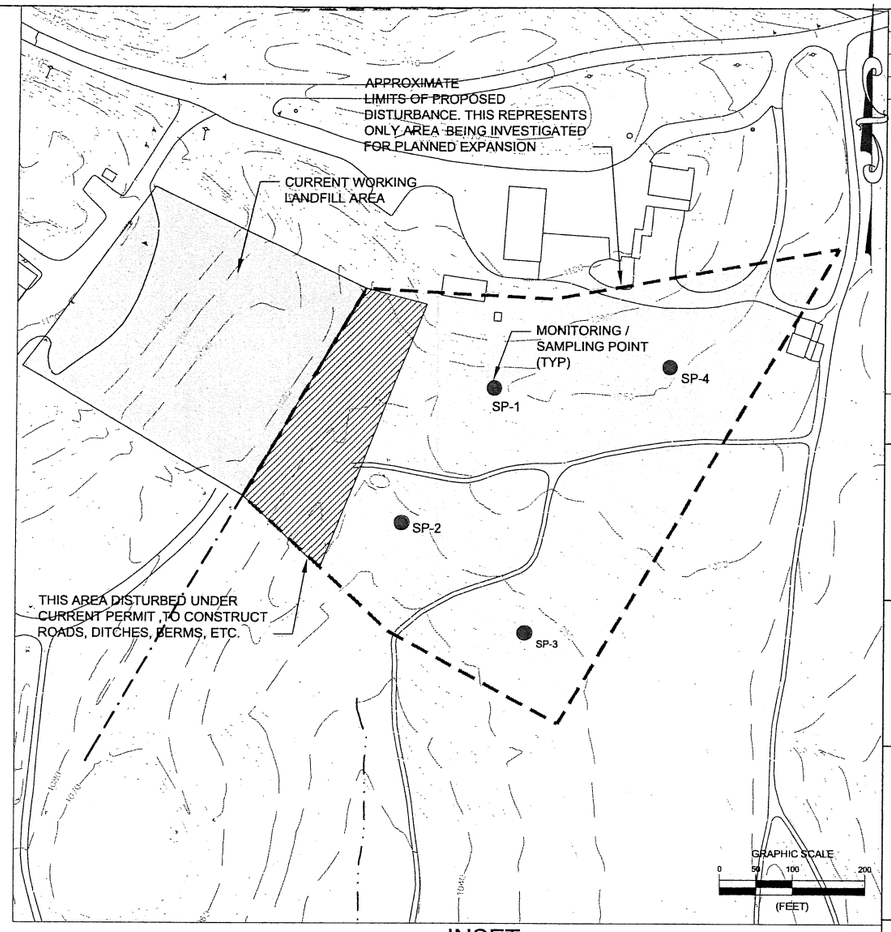
For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn.: Tasha Alexander, 69 Darlington Avenue, Wilmington, North Carolina 28403

For Permit denials, Proffered Permits and approved Jurisdictional Determinations send this form to:

Division Engineer, Commander, U.S. Army Engineer Division, South Atlantic, Attn: Mr. Jason Steele, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

OVERALL SITE PLAN



INSET VIEW

DATE	REVISIONS AND RECORD OF ISSUE	BY	CK	APP

DESIGNED RWH
DRAWN RWH
CHECKED GVB
APPROVED GVB
DATE 2015

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JOYCE ENGINEERING
2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0092
NC CORP LIC: C-0782

JOHN'S RIVER WASTE MANAGEMENT FACILITY
BURKE COUNTY, NORTH CAROLINA

PHASE 1 C&D LANDFILL EXPANSION
SITE STUDY MAP

PROJECT NO. 277

SCALE AS SHOWN

DRAWING NO. DWG-03