YIELD AND WATER QUALITY TESTING OF PROPOSED SUPPLEMENTAL WATER SUPPLY WELL BH2-I

for the

BEACON HILL SUBDIVISION
LOUDOUN COUNTY, VIRGINIA

Conducted for Loudoun Water

January 2016

Presented to:
Mr. Aaron Duke, P.E., BCC
Hazen and Sawyer

EMERY & GARRETT GROUNDWATER INVESTIGATIONS, LLC
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New England **Mid-Atlantic** **South Atlantic**

Emery & Garrett Groundwater Investigations, LLC

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January 25, 2015

Mr. Aaron Duke, P.E., BCC
Hazen and Sawyer
4035 Ridge Top Road, Suite 400
Fairfax, VA 22030

Dear Aaron,

Please find enclosed Emery & Garrett Groundwater Investigations, LLC's (EGGI's) report regarding the yield and quality testing of proposed Supplemental Water Supply Well BH2-I installed for the Beacon Hill Subdivision in Loudoun County, Virginia.

We hope you find the information contained herein responsive to your needs. If you have any questions concerning this material, please do not hesitate to contact us.

Best regards,

Peter J. Foster, P.G.
Hydrogeologist/Project Manager

James M. Emery, P.G.
President/CEO

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Conducted for Loudoun Water
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I. INTRODUCTION AND BACKGROUND

Emery & Garrett Groundwater Investigations, LLC (EGGI) has prepared the following hydrogeologic report for Loudoun Water regarding the yield and quality testing of proposed Supplemental Water Supply Well BH2-I . This Well is located approximately 1,000 feet from the end of Spectacular Bid Place in the Beacon Hill Subdivision, Loudoun County, Virginia (Figures 1 and 2). Groundwater resources obtained from Well BH2-I are intended to serve as an emergency back-up water supply and/or supplemental water source for the Beacon Hill Subdivision and/or other Loudoun Water customers, as needed.

The results of the yield assessment have determined that proposed Supplemental Water Supply Well BH2-I (hereafter called Well BH2-I) is capable of producing up to 158,400 gallons per day (gpd) or 110 gallons per minute (gpm) to meet emergency back-up or supplemental water supply needs for the Beacon Hill Subdivision or other water supply needs of Loudoun Water. In addition, the analytical results of the water quality testing indicate that the quality of groundwater withdrawn from the Well is very good. Treatment of the groundwater, or mixing with groundwater from other on-site Production Wells, will likely be required to reduce the concentrations of dissolved iron and manganese.

II. WELL DRILLING AND CONSTRUCTION OF WELL BH2-I

Singhas & Michael Corporation of Berryville, Virginia installed Well BH2-I using air-rotary drilling methods in April 1999. The water well completion report (GW-2 form) prepared by the driller is included in Appendix A. EGGI supervised the drilling operation and produced a hydrogeologic log for Well BH2-I (EGGI, 1999) (Appendix A). The results of the drilling program are summarized in Table I and the location of Well BH2-I is shown on Figures 1 and 2. The well drilling permit for Well BH2-I that was obtained from the Virginia Department of Health – Office of Drinking Water is also included in Appendix A.

Well BH2-I was initially drilled as a six-inch-diameter test well into the local bedrock formation, which consists of interbedded greenstone (metamorphosed basalt) and phyllite. Two significant water-bearing zones were intercepted within the Well at depths of 105-107 feet (60 gpm) and 390 feet (135 gpm). The airlift yield from the six-inch-diameter exploratory test well was 171 gpm[1] (Table I).

Well BH2-I was converted to an eight-inch-diameter Production Well during June 8-11, 1999. The completed Production Well (BH2-I) was constructed in accordance with Virginia Water Work's and Loudoun County regulations for public water supply wells (Class I Type construction). The final well construction process consisted of installing eight-inch-diameter steel casing to a depth of 118 feet, effectively sealing off groundwater from the shallow water-bearing zone located at 105-107 feet below ground surface. The annular space between the formation and the casing was then sealed with a full length cement pressure grout from 118 feet up to the ground surface. The original six-inch-diameter borehole was then reamed to a depth of 420 feet. ***A final airlift yield of 375 gpm was measured at the conclusion of converting the exploratory test boring to an eight-inch-diameter Production Well*** (Table I and Appendix A).

III. YIELD AND WATER QUALITY TESTING PROGRAM – REVIEW OF BACKGROUND CONDITIONS AND DESIGN OF PUMPING TEST

A. Introduction

The specific objectives of the yield and quality testing program conducted on Well BH2-I included the following:

- To determine the overall pumping yield capacity of Well BH2-I;
- To assess the availability and nature of recharge to the bedrock aquifer;
- To assess the quality of groundwater produced by Well BH2-I under extended pumping conditions;
- To assess the impact of pumping Well BH2-I on existing Production Wells BH2-C and BH2-H(alt);
- To assess potential off-site impacts to other local groundwater users[2]; and
- To provide basic hydrogeologic data needed to develop a Groundwater Use Operation Plan to promote the long-term management of groundwater resources withdrawn from within the Beacon Hill Subdivision.

B. Pumping Test Set-Up

Well BH2-I is a naturally flowing well (i.e., an artesian well). During the time period between the drilling of the Well and the pumping test program, an inflatable plug was installed

[1] Airlift tests involve using the drill rig to remove water from a well using an air compressor in order that a preliminary measurement of the rate of water produced from a well can be made. An accurate determination of sustainable yield was based upon a long-term pumping test, which is described in this Report.
[2] This was accomplished on a limited basis, due to the limited number of wells available to monitor during this testing program.

within the top of the eight-inch-well well casing to prevent the flow of water from the Well. The inflatable plug was removed from the Well five days prior to the start of the testing program.

Well BH2-I was tested using a submersible pump powered by a portable diesel generator. The discharge rate was controlled using a gate value and orifice weir (Figure 3). Volumetric measurements were collected using a stopwatch and calibrated bucket, which served to verify the pumping rate.

A spigot was provided on the discharge line to allow for the convenient collection of water samples and to minimize the risk of introducing contamination into the samples. Chlorine was added to Well BH2-I to disinfect it prior to the start of the pumping test.

Water levels measured during the test were recorded to within 0.01 feet, using both manual and automated monitoring equipment. Discharge water was piped approximately 100 feet into a flowing creek that was located down gradient of the Well.

C. Climatological Conditions

According to the meteorological station at the Washington Dulles Airport, a total of 0.28 inches of rainfall occurred in two separate precipitation events during the pumping test period (Figure 4). Rainfall totaling 0.54 inches was recorded both on-site and at the Dulles weather station during the day and evening prior to the start of the pumping test (Figure 4). No rainfall was recorded during the recovery period (Figure 4).

A recording barometer installed on-site recorded changes in barometric pressure due to atmospheric pressure changes throughout the pumping test program (Figure 5).

D. Selection of Monitoring Well Locations

In addition to monitoring the water level in Well BH2-I, three other existing Wells were monitored at the Beacon Hill Development, as described below (Figure 1):

- Existing Production Well BH2-C (which currently serves as one of two primary Community Water Supply Wells for the Beacon Hill Development);
- Exploratory Test Well BH2-D (an unused exploratory test well); and
- Well BEC-18 (an existing monitoring well located on an undeveloped parcel of land).

EGGI attempted to install a water level recorder in Well BH2-H(alt), which is one of the primary Community Water Supply Wells currently serving Beacon Hill. However, access into this Well was not possible due to the presence of a specialty well cap/pitless adaptor that prevented the Well from naturally flowing. In addition, an existing air line water level measurement tube that was originally installed in the Well could not be used as it was no longer functional.

An attempt was made to contact eight nearby domestic well owners via telephone to request permission to monitor their well(s). Despite numerous calls, EGGI's efforts were met with either negative responses to our requests or the homeowner could not be reached. Therefore, domestic wells were not monitored during this pumping test program. Although no off-site domestic wells were available for monitoring, EGGI utilized the available water level data collected in on-site monitoring wells to estimate the potential impact that pumping Well BH2-I may have on nearby domestic wells (Section IV, Part D).

IV. PUMPING TEST RESULTS - PROPOSED SUPPLEMENTAL WATER SUPPLY WELL BH2-I

A. Step Drawdown Pumping Test

A step drawdown test performed on Well BH2-I. This test consisted of three intervals during which the Well was pumped at the following progressively greater rates: 75, 125, and 175 gallons per minute (gpm) (Figure 6). At the conclusion of the final 175-gpm step, 114.36 feet of pumping-induced water level drawdown had occurred in the Well. The specific capacity of the Well at the end of the step drawdown test was 1.53 gpm/ft. This is considered a favorable value for a well drilled into a fractured bedrock aquifer.

The water level in the Well did not exhibit evidence of stabilization (leveling off) during any of the graduated rates of the step drawdown test, so it was considered unlikely that the highest pumping rate could be sustained for extended durations. In addition, because of the known hydraulic connection with existing Production Well BH2-C, there was concern that excessive pumping of Well BH2-I might negatively impact the availability of water resources from the existing Production Well. Therefore, a pumping rate of 110 gpm (158,400 gallons per day (gpd)) was selected for the long-term constant rate portion of the testing program.

B. Well BH2-I: Response to Long-Term Constant Rate Pumping

Well BH2-I was pumped continuously for 72 hours at a constant rate of 110 gpm (158,400 gpd). A total of 475,200 gallons of groundwater was withdrawn from the bedrock aquifer during the test (Table II). The water level response plots show that water level drawdown in the Well continued at a moderate rate for approximately the first 24 hours of the pumping period (Figures 7, 8, and 9). Following that time, the water level decline in Well BH2-I declined more slowly, indicating that the expanding cone of depression around the pumping well was intercepting additional recharge, offsetting a greater portion of the pumping withdrawals. Under long-term continuous pumping conditions, the cone of depression created by the pumping of Well BH2-I will likely continue to expand slightly in order to intercept additional recharge to offset the withdrawals from the Well.

The total drawdown in Well BH2-I at the end of pumping was only 108.63 feet and the specific capacity measured at the conclusion of the pumping test was 1.01 gallons per minute per foot of pumping-induced drawdown (gpm/ft) (Table II). This is considered by EGGI to be very favorable for a bedrock well. The highest significant water-bearing zone in Well BH2-I was

intercepted at 390 feet below ground surface (Table I). ***Thus, at the conclusion of the 72-hour pumping test, only 28% of the available drawdown above this water-bearing zone had been utilized.***

C. Recovery Test on Well BH2-I

In general, groundwater recharge to a bedrock aquifer is considered favorable when a well recovers fully during a post-pumping time interval equal to the length of the pumping period. The recovery of water level in Well BH2-I rapidly rose during the first 24 hours of the water level recovery period, until the Well began flowing once again. There was no way to measure the recovery of aquifer pressure (height of water above the well casing) because the temporary pumping system was not capable of preventing the Well from overflowing. Therefore, although the recovery of water levels in Well BH2-I was very favorable during the first day, full *"artesian head"* recovery could not be monitored.[3]

D. Response of the Monitoring Wells to the Pumping of Well BH2-I

Existing Production Well BH2-C is located 2,940 feet south-southwest from Well BH2-I (Figures 1 and 2). Water levels in Well BH2-C lowered 46.20 feet in response to the pumping of Well BH2-I during the 72-hour pumping test (Figures 10, 11, and Table III). Water level drawdown in Well BH2-C generally measures near 85 feet under "normal" daily combined pumping of Wells BH2-C and BH2-H(alt) to meet Beacon Hill's water supply needs, as observed during this monitoring program (Figure 11). If an additional 46 feet of drawdown were to occur in Well BH2-C, due to the simultaneous pumping of Well BH2-I, then the pumping water level in Well BH2-C would be approximately 190 feet below the top of the casing. The primary water-bearing zones in Well BH2-C are located at 258 and 330 feet below the top of the casing. Therefore, the simultaneous pumping of Wells BH2-C and BH2-I (on a limited basis) can be accomplished without causing adverse impacts. However, it is EGGI's professional opinion that the simultaneous use of the Wells BH2-C and BH2-I at fully-approved pumping rates should be managed or limited in a manner that will prevent off-site impacts from occurring (Section VI, Part B).

The water level in Exploratory Test Well BH2-D was lowered nearly nine feet in response to the pumping of Well BH2-I (Figure 12 and Table III). Well BH2-D is located 1,575 feet west-southwest from Well BH2-I.

No pumping-induced water level impact from the pumping of Well BH2-I was measured in Monitoring Well BEC-18 (Figure 13). The cyclical, daily water level variations observed in BEC-18 are however the result of the daily pumping of Production Well BH2-H(alt).

[3] It is important to note that the actual pre-pumping "water level" or potentiometric surface was actually above the well casing due to the artesian flow of Well BH2-I (Figure 9). Therefore, the final water level recovery would actually need to be measured to this level, but was not possible due to the Well flowing when it is uncapped.

Well BH2-H(alt) could not be monitored during this testing program but, during the original pumping test program, it was determined that it was ***not*** hydraulically connected to Well BH2-I (EGGI, 1999).

Although only a limited number of monitoring wells were available to observe water levels changes during the pumping test period, these data do provide insights into the potential for water level drawdown in other wells proximal to Well BH2-I (i.e., domestic wells located on private parcels northeast of Well BH2-I). The water level responses observed in Wells BH2-C and BH2-D suggest a strong heterogeneity to pumping responses in this area, which is typical for a fractured bedrock aquifer like the one that underlies Beacon Hill. Given the observed heterogeneities, pumping-induced water level impacts in domestic wells are expected to be negligible during limited use (i.e., emergency back-up use) of Well BH2-I. However, it is likely that water level drawdown of several 10's of feet could occur in domestic wells located within a few thousand feet northeast of Well BH2-I under *extended* pumping conditions (e.g., continuously pumping for more than three days a week at a time). It is not possible to accurately predict whether or not such water level impacts would be adverse to the use of these wells since they were not monitored during the pumping test and nothing is known about the depths of water-bearing zones in the wells. If Loudoun Water desires to pump Well BH2-I for extended periods (i.e., longer than 72 continuous hours without allowing for a period of recovery or on an average daily use of 8 to 12 hours per day), then EGGI recommends further attempts be made to gain permission to install long-term water level monitoring equipment in the domestic wells closest to Well BH2-I to evaluate the full potential for causing pumping-induced adverse water level drawdowns in these wells.

V. WATER QUALITY MONITORING PROGRAM

Groundwater samples collected from Well BH2-I shortly before the termination of the pumping test were submitted to the Division of Consolidated Laboratory Services (DCLS) in Richmond, Virginia, and National Testing Laboratories of Ypsilanti, Michigan for analyses of a full suite of drinking water quality parameters (Table IV and Appendix A). Twenty separate groundwater samples collected from Well BH2-I (taken at a minimum of one-hour intervals over the final 41 hours of pumping test period) were submitted to Joiner Micro Laboratories, Inc. of Warrenton, Virginia, for bacteriological analyses. In addition, a microscopic particulate analysis was performed on a composite sample collected from Well BH2-I by Analytical Services, Inc. of Williston, Vermont.

All of the analytical results available to date indicate that the water produced from Well BH2-I is of very good quality (Table IV and Appendix B). No water quality parameters exceed EPA Primary Drinking Water Maximum Contaminant Levels (PMCL). Iron and manganese are the only parameters that exceeded the EPA's Secondary Maximum Contaminant Level (SMCL). The 0.428 to 0.512 mg/l of iron that was detected in the groundwater from Well BH2-I is above the 0.3 mg/l SMCL for iron (Table IV and Appendix A). The concentration of manganese detected ranged from 0.224 to 0.231 mg/l and is above the 0.05 mg/l SMCL for manganese. Therefore, the water produced by Well BH2-I will likely need to be treated, or mixed/blended with water from other wells, to reduce the concentrations of these nuisance minerals to an acceptable level.

Styrene was detected in the water sample submitted to National Testing Laboratories at 0.002 mg/l, which is just slightly above the laboratory detection limit of 0.001 mg/l. This level of detection is below the EPA Primary Drinking Water Standard of 0.01 mg/l. It is important to note that no styrene was detected in the water sample collected in the sample submitted to the Virginia State Laboratory (Table IV and Appendix B). EGGI believes the detection of styrene in the sample submitted to National Testing Labs is the result of laboratory error since there is no other evidence to support the presence of this compound. EGGI recommends collecting another water sample when Well BH2-I is fitted with a permanent production pump.

Bacteriological results for Well BH2-I showed the presence of total coliform bacteria in 4 of 20 samples; the MPN value for each of the four samples was only 1 colony per 100 milliliters (Table IV and Appendix B). No E. coli bacteria were identified in Well BH2-I. These results are excellent. Based on these data, groundwater from Well BH2-I will not require disinfection.

The results of the MPA show the water has a Risk Rating of "Zero," according to the USEPA Consensus Method for Determining Groundwater Under the Direct Influence of Surface Water. This analysis confirms that the sample was free of organisms that would suggest a surface water influence on the groundwater.

Temperature, pH, oxidation/reduction potential, specific conductance, dissolved oxygen, hardness, sulfate, and iron were measured in the field throughout the pumping test (Table V). No significant trends or adverse levels of these parameters were documented in these data.

EGGI suggests that Loudoun Water have the groundwater chemistry evaluated by a water treatment specialist prior to making final decisions about treatment options.

VI. CONCLUSIONS/RECOMMENDATIONS FOR THE LONG-TERM MANAGEMENT OF SUPPLEMENTAL WATER SUPPLY WELL BH2-I

A. Summary

The performance and analysis of the pumping test on proposed Supplemental Production Well BH2-I has served to document the following:

- Well BH2-I was pumped continuously for a period of 72 hours at a constant withdrawal rate of 110 gpm (158,400 gpd). The total volume of groundwater withdrawn from the underlying bedrock aquifer during this groundwater testing program was 475,200 gallons.

- Pumping water levels continued to gradually decline near the end of the pumping period, with a final drawdown of 108.63 feet recorded after 72 hours of pumping. Water levels in Well BH2-I recovered to the point that the Well began overflowing within 24 hours after pumping had ceased.

- Water levels were monitored throughout the pumping test program in existing Production Well BH2-C, Exploratory Test Well BH2-D, and Monitoring Well BEC-18 (Figure 1 and Table III). Significant water level drawdown (46.20 feet) was observed in Well BH2-C during the pumping of Well BH2-I for 72 hours. It is EGGI's professional opinion that the long-term simultaneous use of the Wells BH2-C and BH2-I at fully-approved pumping rates may need to be restricted to avoid over pumping the aquifer (see the proposed Groundwater Operations Plan presented herein).

- The water produced from Well BH2-I is of very good quality. Bacteriological results for Well BH2-I showed the presence of total coliform bacteria in only 4 of 20 samples; the MPN value for these samples was 1 colony per 100 milliliters. No E. coli bacteria were identified in Well BH2-I. Based upon this information, disinfection of this water source will not be required.

- The Microscopic Particulate Analysis (MPA) results show that the water sampled is representative of groundwater and contains no organisms that suggest an influence from surface water.

- ***No water quality analysis results exceed EPA Primary Drinking Water Maximum Contaminant Levels (PMCL).*** Iron and manganese were the only parameters that exceeded the EPA's Secondary Maximum Contaminant Level (SMCL). The concentrations of iron and manganese that were detected in the groundwater from Well BH2-I ranged between 0.428-0.512 and 0.224-0.231 mg/l, respectively (Table IV and Appendix B). The SMCL for iron and manganese are 0.3 mg/l and 0.05, respectively. The water produced by Well BH2-I will likely require treatment, or mixing with groundwater from another well, to reduce/remove these Secondary Drinking Water parameters.

- Based upon the pumping test data collected and analyzed, it is EGGI's professional opinion that Well BH2-I can sustain a pumping rate of 110 gpm on a scheduled basis (e.g., three to five consecutive days of pumping followed by an amount of pumping water level recovery time when water levels recover at least 90%). If it is the desire of Loudoun Water to pump Well BH2-I on an extended long-term basis without recovery, then further evaluations are recommended to assess long-term potential impacts to domestic wells located northeast of Well BH2-I and to the simultaneous use of Production Well BH2-C.

B. Recommendations -- Proposed Groundwater Operation Plan

Based upon the results of this yield and quality testing program, EGGI believes that proposed Supplemental Water Supply Well BH2-I has met all the regulations set forth by the Virginia Department of Health, Office of Drinking Water, to serve as a public water supply well.

The following table provides EGGI's recommendations for pump depth setting and pumping rate.

Proposed Production Well Identification	Major Water-Bearing Zone (feet)	Recommended Pump Setting (feet)	Maximum Pumping Rate (gpm)
BH2-I	390	250	110

EGGI also offers the following recommendations:

- Well BH2-I can be pumped at a constant rate of 110 gpm to meet emergency back-up water supply needs of Beacon Hill and/or provide supplemental water supply for other Loudoun Water needs. This Well could be pumped for a period of three to five days continuously (total withdrawals of 475,200 gallons to 792,000 gallons) followed by a 24- to 48-hour period for water level recovery, such that water levels regain at least 90% from their pre-pumping levels. Alternatively, Well BH2-I could be pumped 8 to 12 hours per day (52,800 to 79,200 gpd) with the remaining portion of each day reserved for aquifer recovery. This recommended pumping schedule will serve to diminish the potential for creating pumping-induced adverse impacts to the domestic wells located northeast of Well BH2-I. It will also reduce the amount of interference drawdown between Wells BH2-I and BH2-C, if the Wells are pumped simultaneously.

- The water levels in Well BH2-I should be maintained 15 feet above the upper-most primary water-bearing zone (i.e., above 375 feet). This will prevent the cascading of water into the borehole. Preventing such cascading is critical for the long-term maintenance of the pumping well because it limits the introduction of oxygen into the groundwater in the water-bearing zone, which can lead to problems associated with iron bacteria growth and oxidation of minerals.

- Automated water level recording devices should be installed, properly maintained, and used to collect water levels every two hours in all three Production Wells (Wells BH2-C, BH2-H(alt), and Well BH2-I). Collection of such long-term monitoring data is the best means to establish and implement an effective Groundwater Use Management Plan.

- A water quality treatment specialist should review all of the water quality data (including the elevated levels of iron and manganese) collected from Well BH2-I to determine whether treatment is justified or desirable. Such a specialist would also advise Loudoun Water on the "best method" of water treatment for this Well.

- The final wellhead and well lot for Well BH2-I will need to be maintained in accordance with Virginia Office of Drinking Water well permits and the Commonwealth of Virginia Waterworks Regulations, 12 VAC 5-590-280 and 12 VAC 5-590-840. An all-weather access road to the Well must be provided. In addition, it is EGGI's recommendation that Well BH2-I remain outside of the designed pump house. In this way, a pump truck or drill rig may easily access the Well for the purpose of pump/equipment maintenance or well redevelopment, if needed.

VII. LIMITATIONS

EGGI has collected the technical data in accordance with the Virginia Department of Health requirements. It should be recognized that the groundwater testing program was limited to that which is presented in this report, and that the program was carried out during a period that may not be representative of the full range of climatological conditions that could be encountered at this site. The recommendations provided herein regarding the long-term yield and quality of this Well represents EGGI's professional opinion and do not constitute a warranty written or implied.

VIII. REFERENCES

Emery & Garrett Groundwater, Inc., November 1999, Groundwater Supply Development Program – Final Report, Pumping Tests on Community Water Supply Wells BH2-C and BH2-H(alt). Beacon Hill – Phase II Development Site, Loudoun County, Virginia.

FIGURES

FIGURE 1

Topographic Setting of the
Beacon Hill Project Site
Loudoun County, Virginia

Spectacular Bid Place

BH2-D

BH2-I

Bold Venture Drive

BEC-18

BH2-H (alt)

Old Waterford Road

BH2-C

Route 7

Legend

Well BH2-I

- Supplemental Community Water Supply Well

Pumping Test Monitoring Wells

- Community Water Supply Production Well
- Exploratory Test Well BH2-D
- Existing Monitoring Well
- Beacon Hill Subdivision Property Boundary
- Loudoun County Parcels

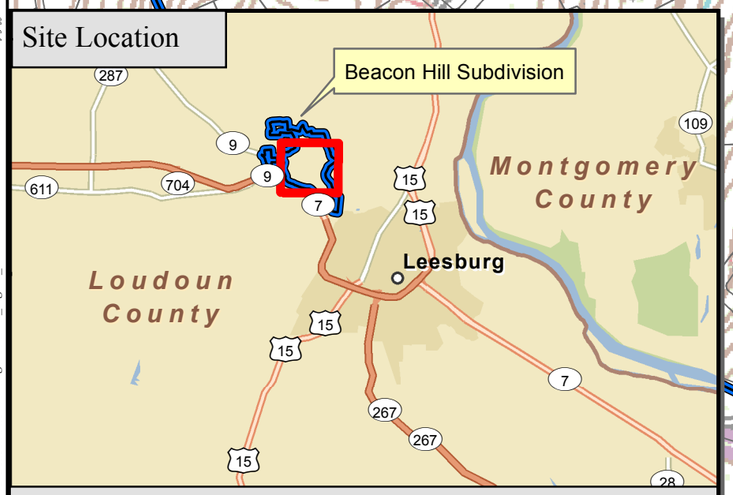
Topographic Contour Interval = 10 feet

N

Scale is 1:7,200
1 inch = 600 feet

0 75 150 300 Meters
0 300 600 1,200 Feet

Site Location



Red rectangle shows limits of detailed view

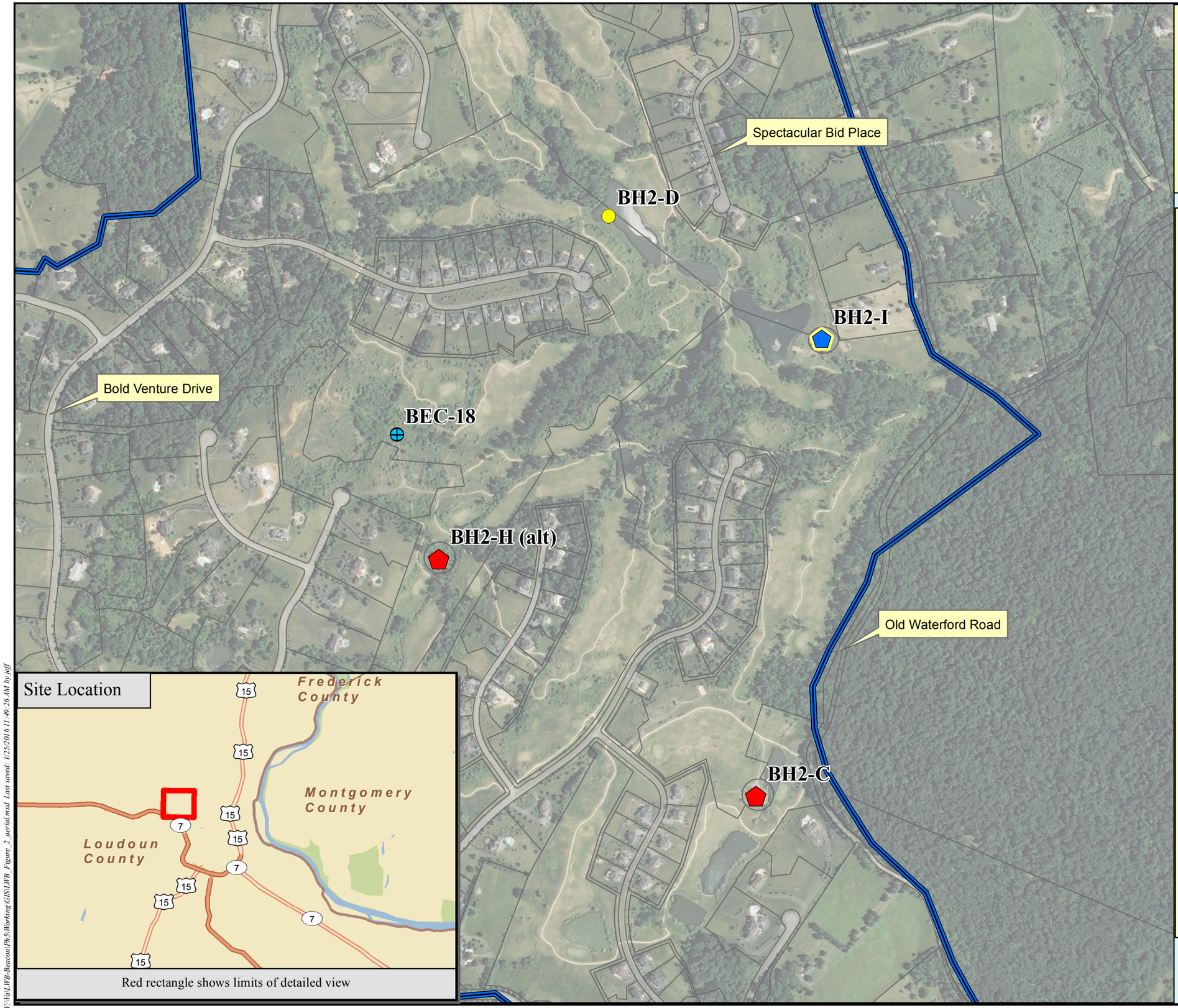
Emery & Garrett
Groundwater Investigations, LLC

FIGURE 1

V:\Vol.LWB-Beacon\Ph.5\Working\GIS\LWB_Figure_1.mxd Last saved: 1/25/2016 11:47:46 AM by jeff

FIGURE 2

Aerial Photograph of the
Beacon Hill Project Site
Loudoun County, Virginia



Legend

Well BH2-I

- Supplemental Community Water Supply Well

Pumping Test Monitoring Wells

- Community Water Supply Production Well
- Exploratory Test Well BH2-D
- Existing Monitoring Well
- Beacon Hill Subdivision Property Boundary
- Loudoun County Parcels

N

Scale is 1:7,200
1 inch = 600 feet

0 75 150 300 Meters
0 300 600 1,200 Feet

Emery & Garrett Groundwater Investigations, LLC

FIGURE 2

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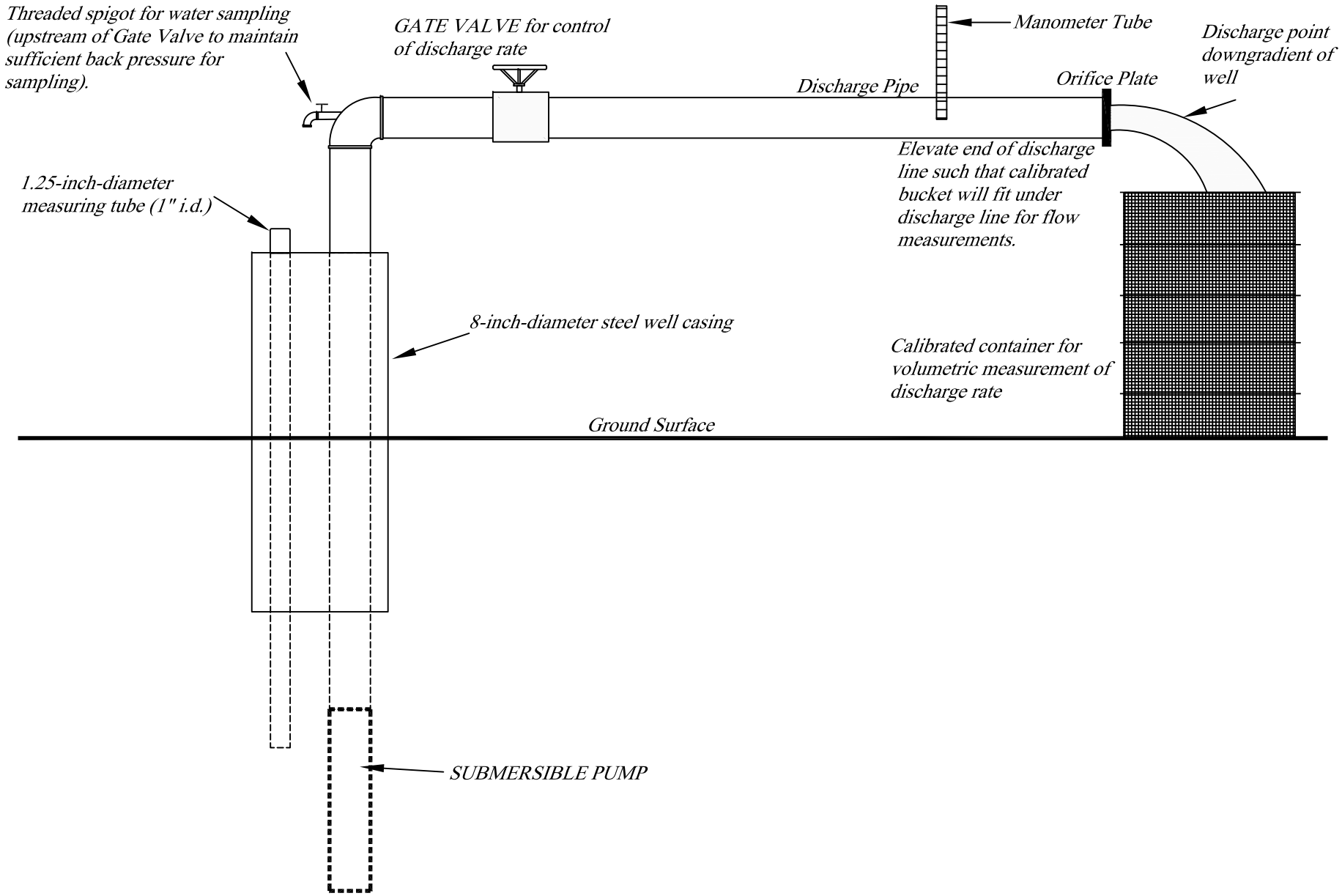
Figure 3

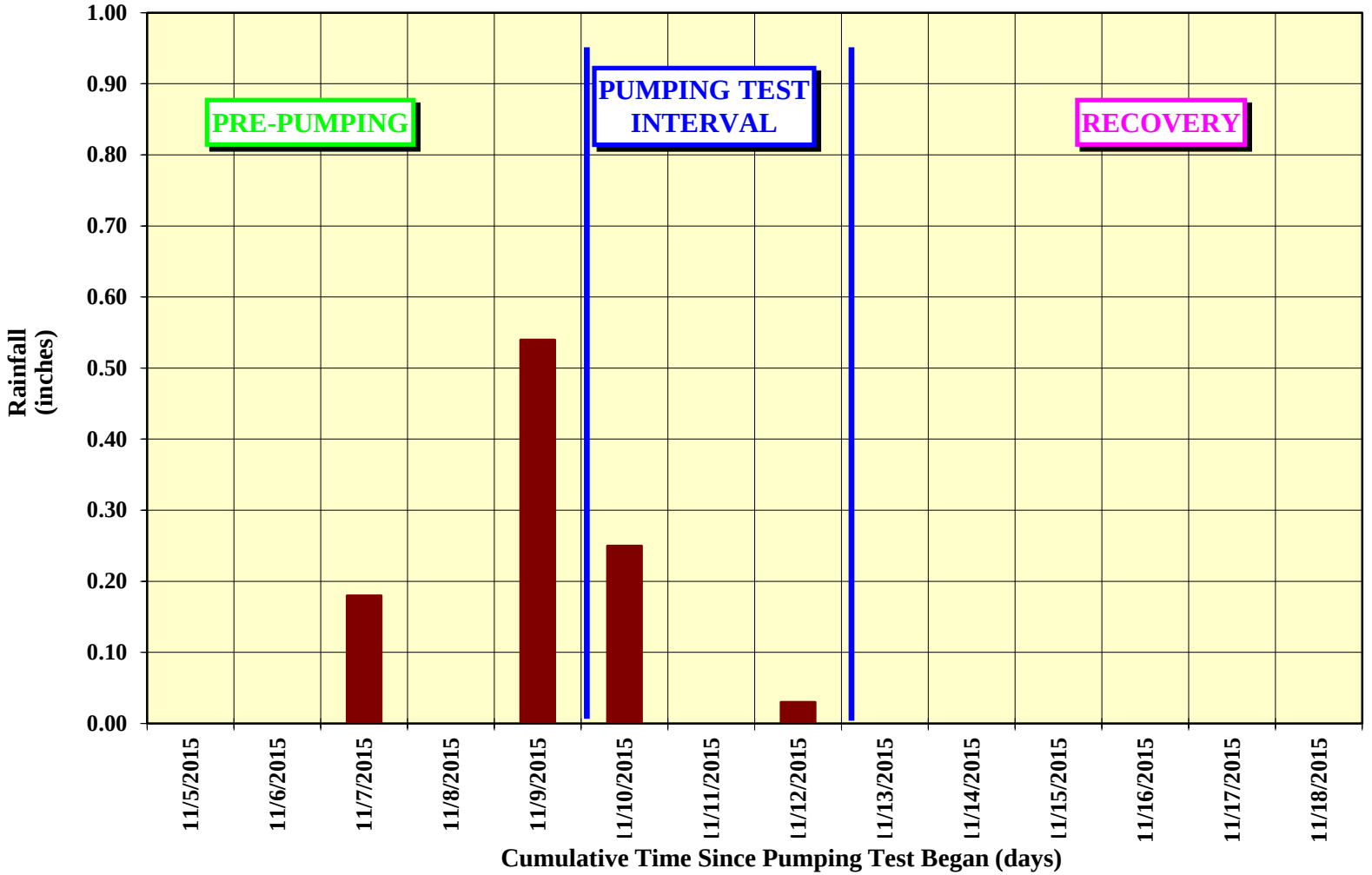
Schematic of the Wellhead Design for the Supplemental Water Supply Well BH2-I Pumping Test



Emery & Garrett Groundwater Investigations, LLC

FIGURE 3

Figure 4 - Rainfall as Reported at Washington Dulles Airport, Virginia

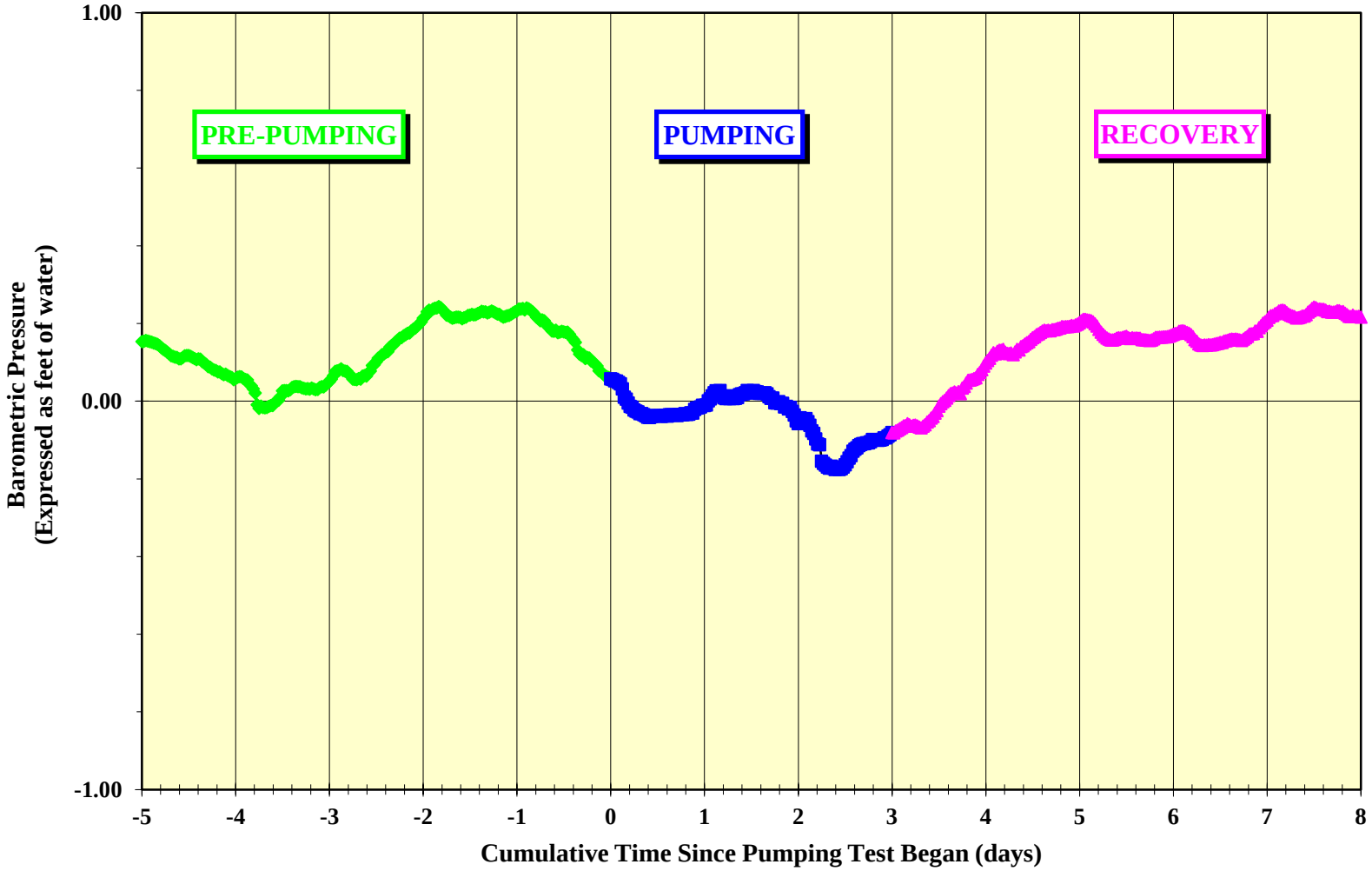


Plot of Rainfall versus Time for November 5 to November 18, 2015

Beacon Hill

Loudoun County, Virginia

Figure 5 -- Plot of Barometric Pressure Versus Time

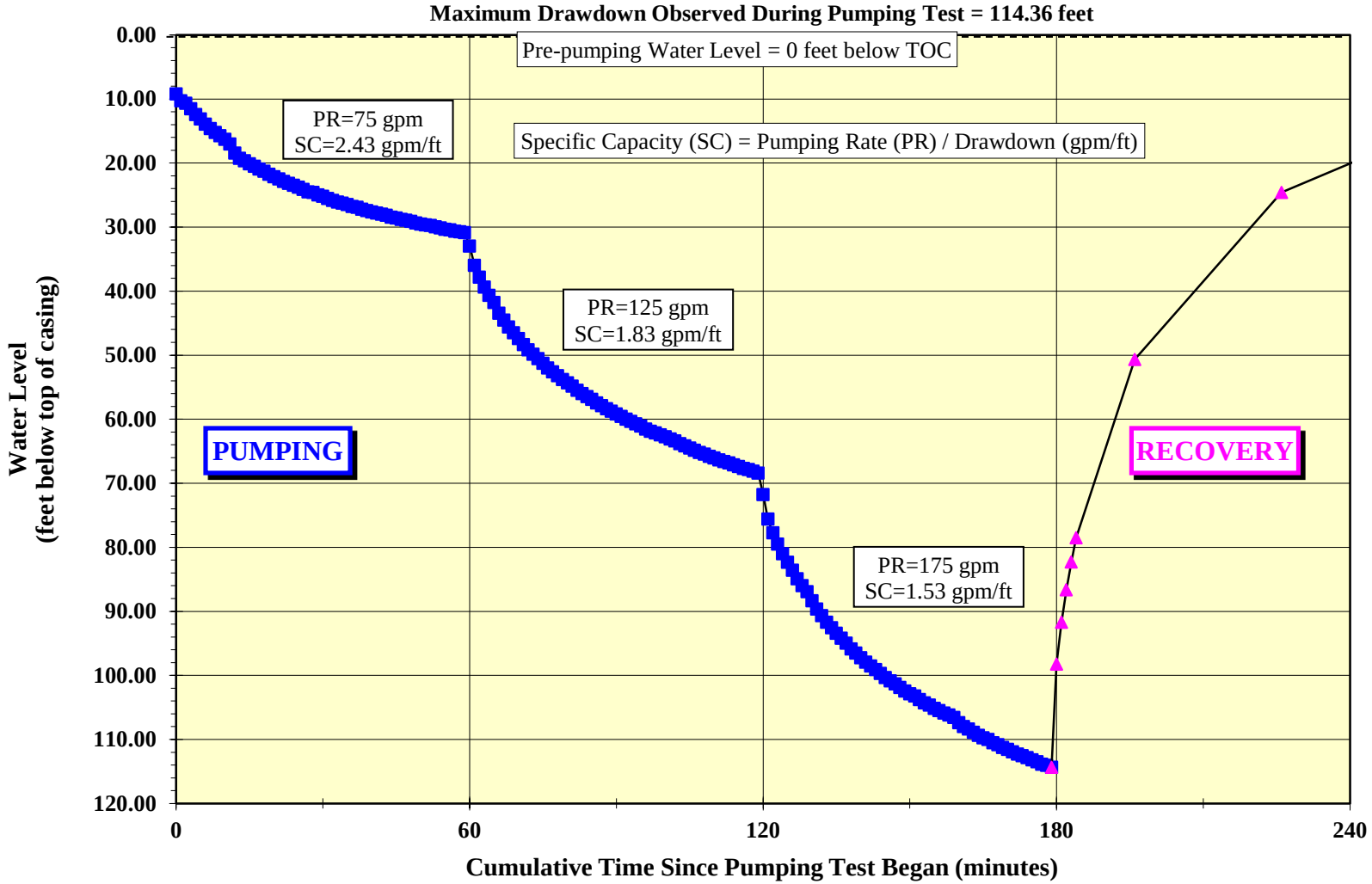


Plot of Barometric Pressure versus Time for November 5 to November 18, 2015

Beacon Hill

Loudoun County, Virginia

Figure 6 -- Step Drawdown Pumping Test for Supplemental Water Supply Well BH2-I

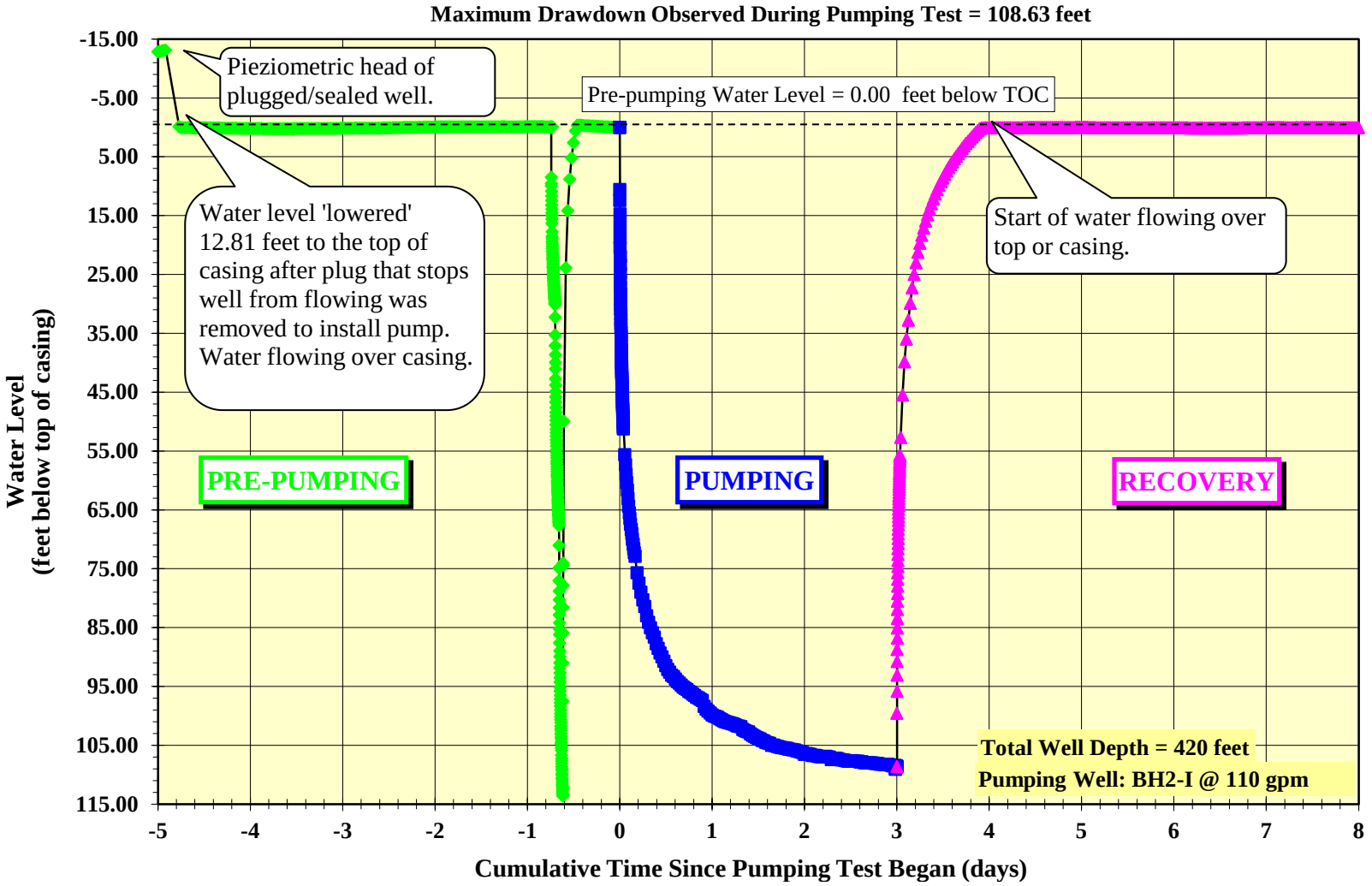


Plot of Water Level versus Time for November 9, 2015

Beacon Hill

Loudoun County, Virginia

Figure 7 -- Plot of Water Level Versus Arithmetic Time Scale for Supplemental Water Supply Well BH2-I

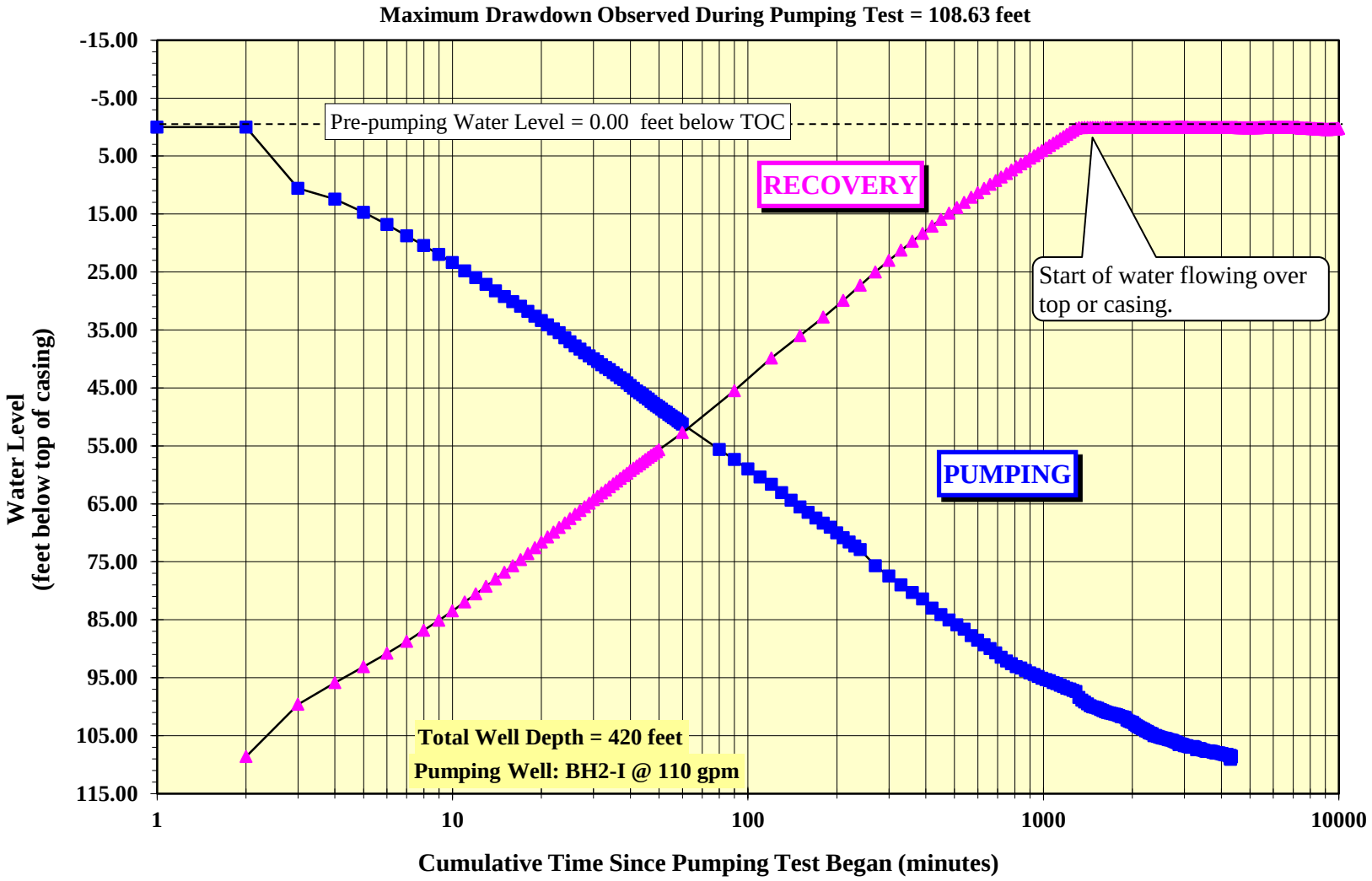


Plot of Water Level versus Time for November 5 to November 18, 2015

Beacon Hill

Loudoun County, Virginia

Figure 8 -- Plot of Water Level Versus Semi-Logarithmic Time Scale for Supplemental Water Supply Well BH2-I

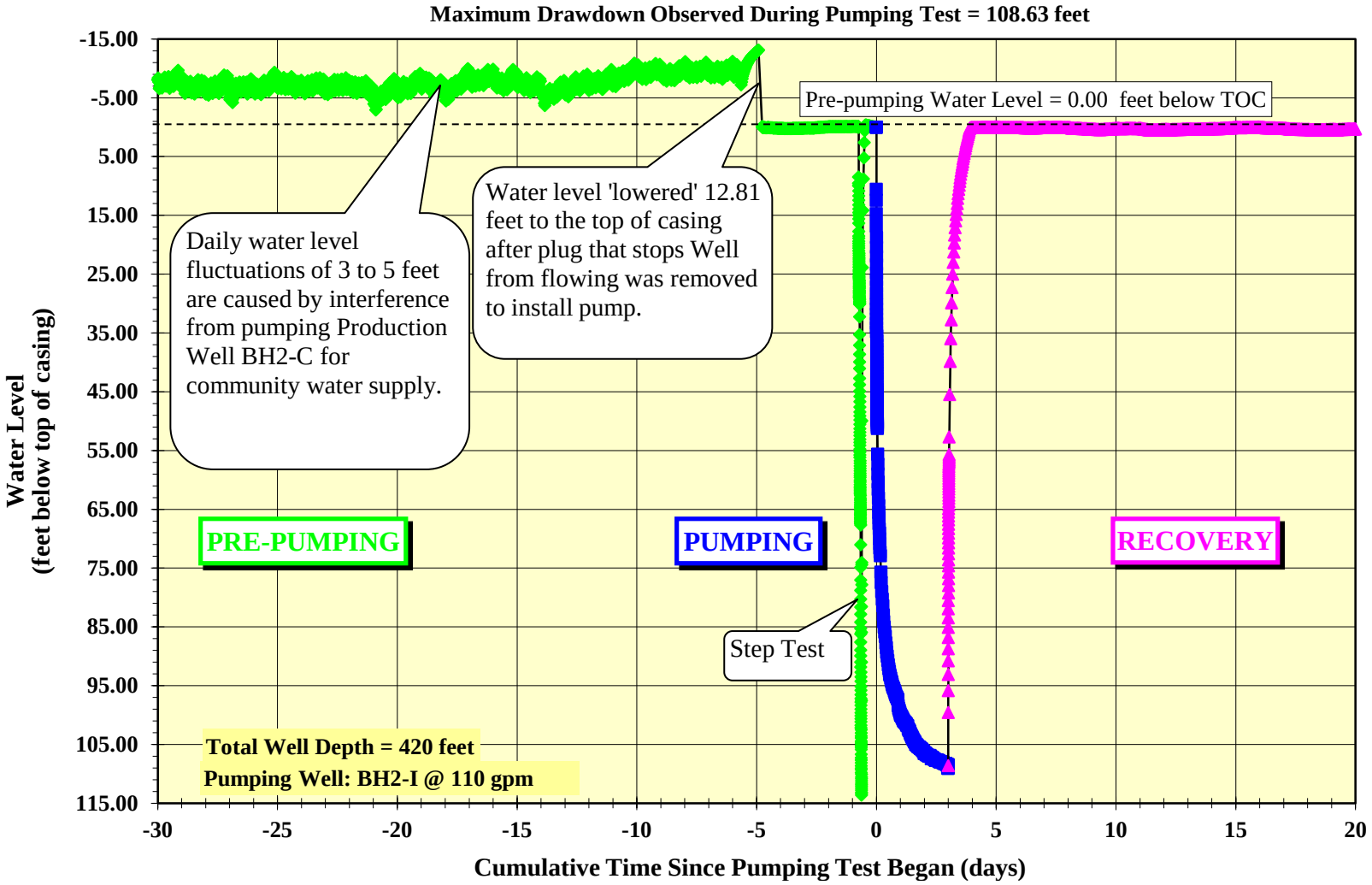


Plot of Water Level versus Logarithmic Time for Pumping and Recovery

Beacon Hill

Loudoun County, Virginia

Figure 9 -- Plot of Long-Term Water Level Data Versus Time for Supplemental Water Supply Well BH2-I

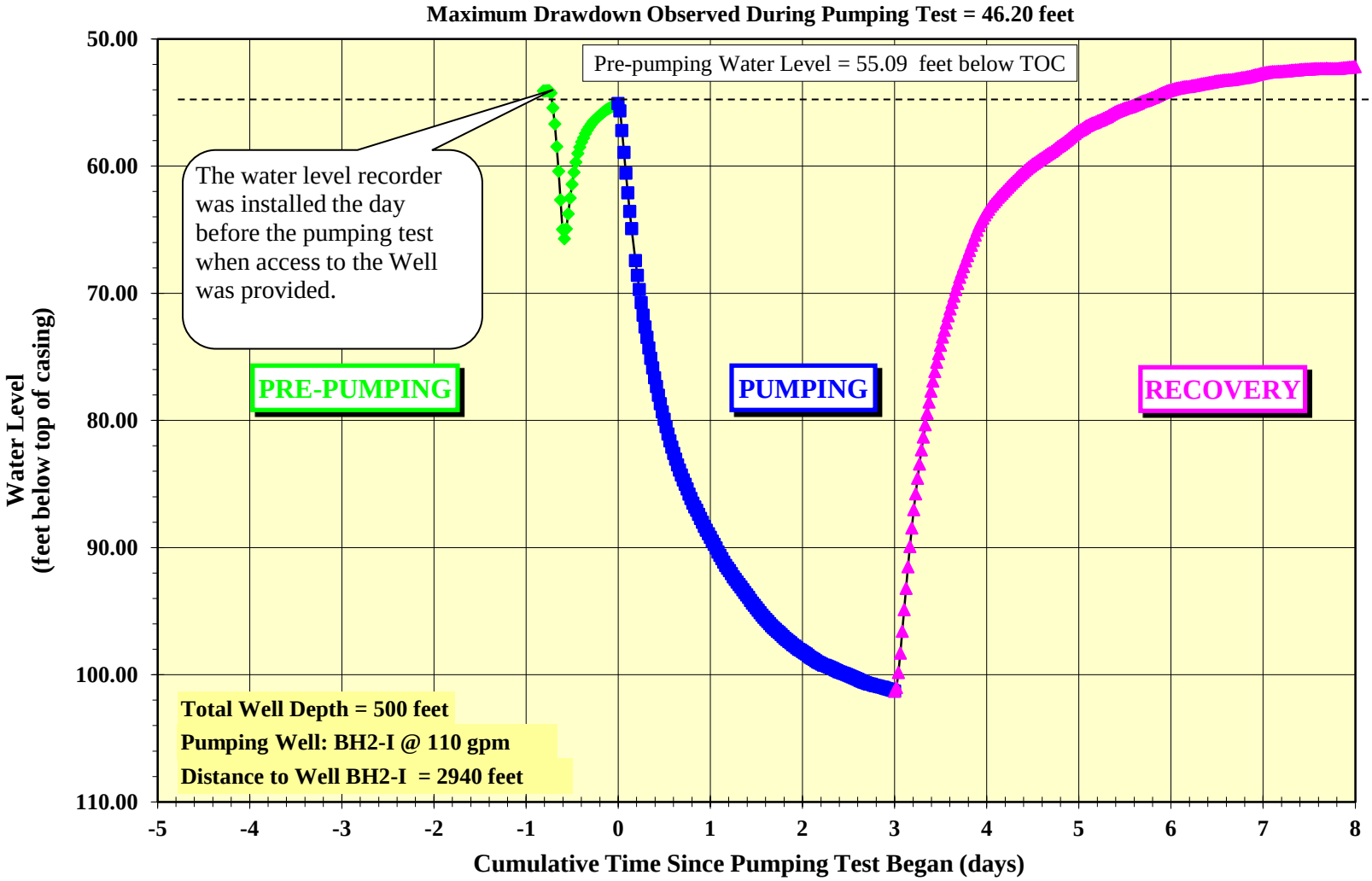


Plot of Water Level versus Time for October 11 to November 18, 2015

Beacon Hill

Loudoun County, Virginia

Figure 10 -- Plot of Water Level Versus Arithmetic Time Scale for Production Well BH2-C

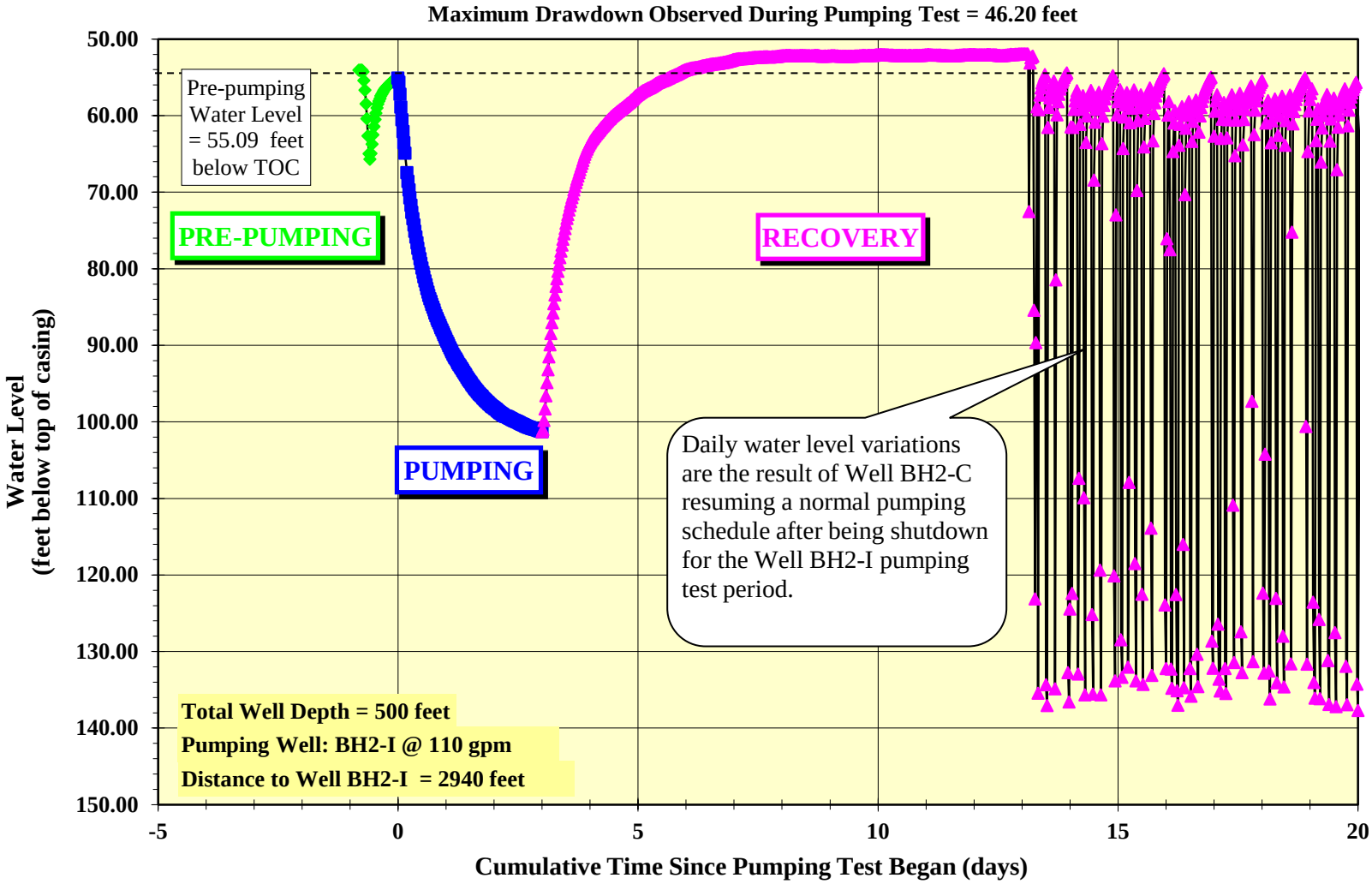


Plot of Water Level versus Time for November 5 to November 18, 2015

Beacon Hill

Loudoun County, Virginia

Figure 11 -- Plot of Water Level Versus Arithmetic Time Scale for Production Well BH2-C

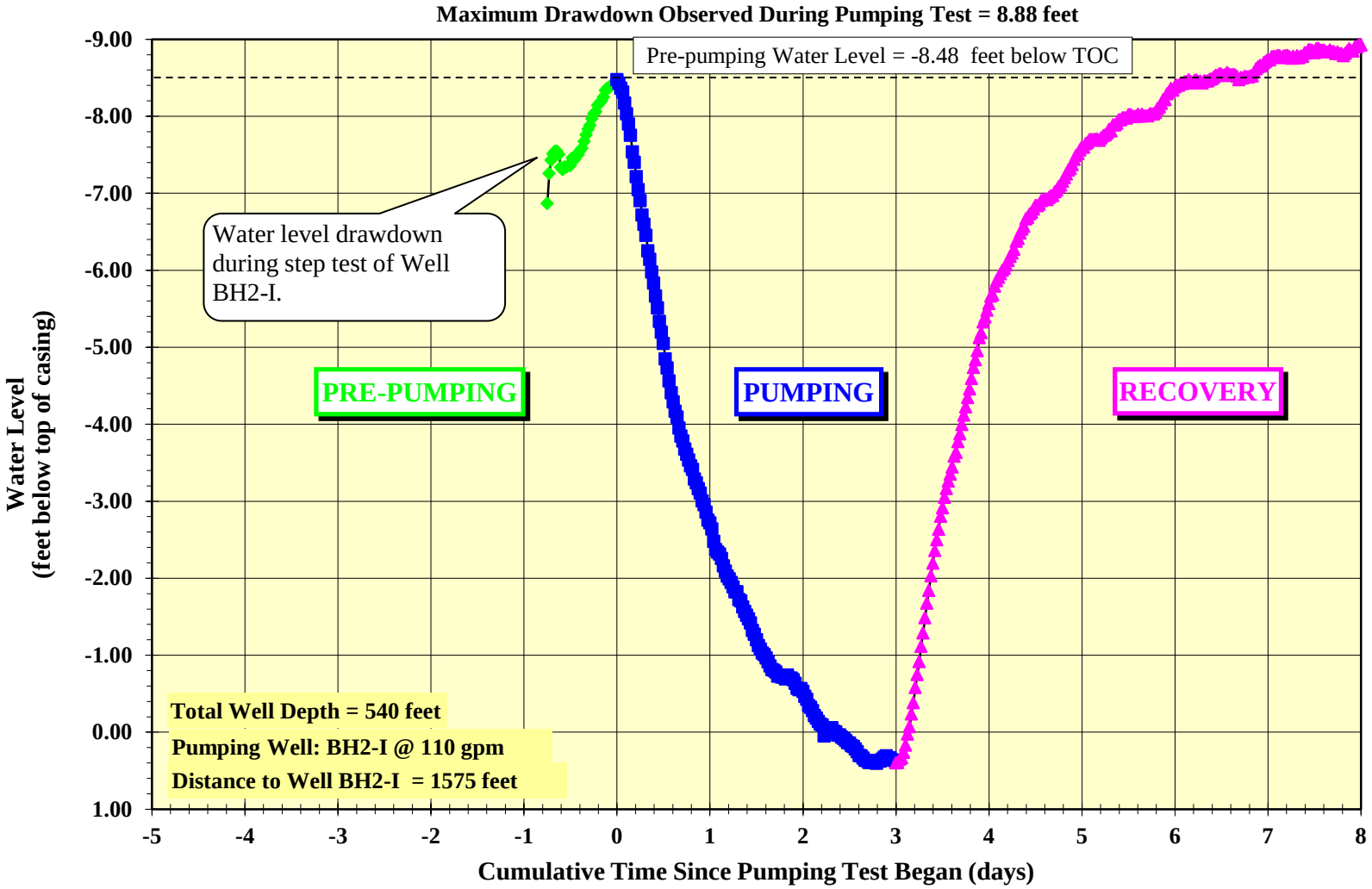


Plot of Water Level versus Time for November 5 to November 30, 2015

Beacon Hill

Loudoun County, Virginia

Figure 12 -- Plot of Water Level Versus Arithmetic Time Scale for Monitoring Well BH2-D

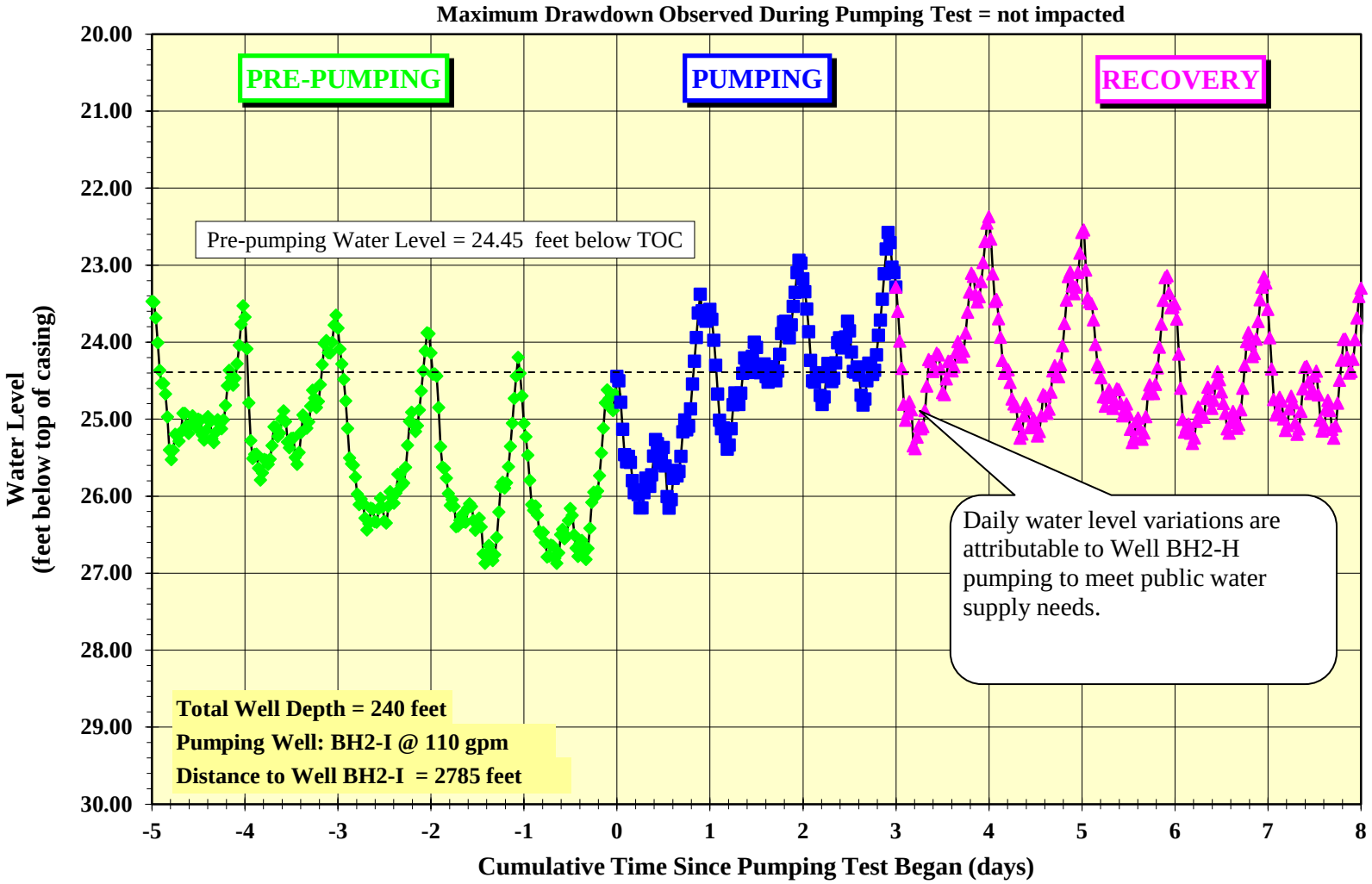


Plot of Water Level versus Time for November 5 to November 18, 2015

Beacon Hill

Loudoun County, Virginia

Figure 13 -- Plot of Water Level Versus Arithmetic Time Scale for Monitoring Well BEC-18



Plot of Water Level versus Time for November 5 to November 18, 2015

Beacon Hill

Loudoun County, Virginia

TABLES

TABLE I
Well Construction Information for
Proposed Supplemental Public Water Supply Well BH2-I
Beacon Hill Subdivision
Loudoun County, Virginia

Well ID	Date Drilled	Virginia State Plane HARN 83 North	Total Depth (feet)	Casing Depth (Diameter) (feet) (inches)	Depth to Bedrock (feet)	Water-Bearing Zones Depth (feet)	Water-Bearing Zones Airlift Yield (gpm)[1]	Airlift Yield[1] (gpm)
BH2-I	4/26/1999	N 7,102,534 E 11,742,182	420	118 (8-inch)	25	105-107 390	60 135	171 (6-inch) **375 (8-inch)**
BEC-18	9/14/1998	N 7,101,926 E 11,739,478	240	60 (6-inch)	40	200-220	10	10
BH2-C	4/27/1999- 4/28/1999	N 7,099,618 E 11,741,761	500	110 (8-inch)	20	80 258-260 330	6 18 79	96 (6-inch) **200 (8-inch)**
BH2-D	4/27/1999- 4/28/1999	N 7,103,320 E 11,740,828	540	42 (6-inch)	25	265 408 417	4 21 43	70

1 = Airlift tests involve using the drill rig to "airlift" the water out of the well during the drilling process such that a preliminary measurement of the rate of water produced from each well can be made. A more accurate determination of the pumping capacity of each well is determined by conducting a long-term pumping test.

TABLE II
Summary of Constant Rate Pumping Test for
Proposed Supplemental Public Water Supply Well BH2-I
Beacon Hill Subdivision
Loudoun County, Virginia

Well Name	Pre-Pumping Water Level (feet)	Start and Stop Time of Pumping Test (date, 24-hr. time)	Test Duration (hours)	Pumping Rate (gpm)	Maximum Drawdown (feet)	Total Volume Pumped (gallons)	Percent of Available Drawdown Used*	Final Specific Capacity** (gpm/ft)
Supplemental Public Water Supply Well BH2-I	0.00	11/10/15; 08:00 11/13/15; 08:00	72	110	108.63	475,200	28%	1.01
			Total=	**110.0**		**475,200**		

*The available drawdown for Well BH2-I was calculated by subtracting the pre-pumping water level from the depth of the first major water-bearing fracture at 390 feet below top of casing.

**The final specific capacity is calculated by dividing the final pumping rate by the maximum pumping drawdown.

TABLE III
Basic Information for Monitoring Well Locations
Selected For Constant Rate Pumping Test of
Proposed Supplemental Public Water Supply Well BH2-I
Beacon Hill Subdivision
Loudoun County, Virginia

Monitoring Locations Production Well	Well Depth (feet)	Well Yield (gpm)[1]	Well Type	Pre-Pumping Water Level (feet)	Maximum Drawdown Observed During Pumping Test (feet)	Distance to the Well BH2-I
BH2-I	420	375	Proposed Production Well	0.00	108.63	0
On-Site Monitoring Well						
BEC-18	240	10	Proposed Domestic Well	24.45	not impacted	2,785
BH2-C	500	200	Production Well	55.09	46.20	2,940
BH2-D	540	70	Exploratory Test Well	-8.48	8.88	1,575

1 = Well yields are based on airlift yield measurements during drilling. Airlift tests involve using the drill rig to "airlift" the water out of the well during the drilling process such that a preliminary measurement of the rate of water can be made.

TABLE IV
Results of Laboratory Analyses of Water Quality Samples for the Proposed Supplemental Public Water Supply Well BH2-I
Beacon Hill Subdivision
Loudoun County, Virginia

Well	Lab	Iron (mg/l)	Manganese (mg/l)	pH	Arsenic (mg/l)	Alkalinity (mg/l)	Chloride (mg/l)	Turbidity (ntu)	Hardness (mg/l)	Total Dissolved Solids (mg/l)	Sulfate (mg/l)	Nitrate (mg/l)	VOCs (mg/l)	SOCs (mg/l)
	MCL	***0.30***	***0.05***	***6.5-8.5***	***0.01***		***250***			***500***	***250***	***10***		
Supplemental Public Water Supply Well BH2-1	**VA ST**	**0.512**	**0.231**	6.6	ND	139	10.2	0.72	147	208	17.8	ND	ND	ND
	NTL	**0.428**	**0.224**	7.3	ND	110	7.9	3.5	150	150	16	ND	Styrene Detected*	ND

Well	Lab	Gross Alpha	Gross Beta	Radium 226 + 228
	MCL	***15 pC/l***	***50 pC/l***	***5 pC/l***
Supplemental Public Water Supply Well BH2-I	**VA ST**	Radiological Samples were collected but the laboratory analyses were not yet complete. They will be submitted upon completion to VDH.		

JOINER MICRO LABS
BACTERIOLOGICAL RESULTS: 20 samples were taken from Well BH2-I, at regular intervals, and subjected to MPN analysis.
Results are as follows:
Bacteriological Analysis-- No E. coli bacteria were detected in any of the 20 samples collected and analyzed. Sixteen of the 20 samples were absent for Total Coliform bacteria. Total Coliform was detected in four samples at 1.0 colonies per 100 milliliters.

Bold = values in both exceed EPA Standards.
ND = Non Detection
LAB CODES: VA ST = Virginia State Laboratory
NTL = National Testing Laboratories, Ltd.

*Styrene was detected in Well BH2-I in the water sample submitted to National Testing Laboratory, Ltd. at 0.002 mg/l. No Styrene was detected in the water sample submitted to the Virginia State Laboratory.

TABLE V
Results of Field Chemistry Monitoring for
Proposed Supplemental Public Water Supply Well BH2-I
Beacon Hill Subdivision
Loudoun County, Virginia

WELL ID	Date and Time of Sampling	Temperature (degrees C)	Specific Conductance (microsiemens)	Dissolved Oxygen (mg/l)	pH	Redox (millivolts)	Iron (mg/l)	Hardness (mg/l)	Sulfate (mg/l)
Public Water Supply Well	11/10/15; 13:30	14	328	1.82	6.98	-7.6	0.65	200	<50
BH2-I	11/10/15; 16:00	13.9	336	1.42	7.03	-8.7	0.63	180	<50
	11/11/15; 08:00	13.7	338	2.36	6.9	-2.5	0.63	180	<50
	11/11/15; 14:05	14.2	339	2.15	6.95	-5.1	0.68	200	<50
	11/12/15; 08:00	13.9	342	3.50	7.07	-13.1	0.66	200	<50
	11/12/15; 15:00	14.1	337	2.15	7.17	-17.3	0.65	200	<50
	11/13/15; 07:40	13.9	341	2.50	7.06	-12.1	0.65	180	<50

APPENDIX A

WELL PERMIT, HYDROGEOLOGIC WELL LOG, AND WATER WELL COMPLETION REPORT (GW-2)

COMMONWEALTH of VIRGINIA

Department of Health
Office of Water Programs

ENVIRONMENTAL ENGINEERING FIELD OFFICE
400 S. MAIN ST. - 2ND FLOOR
CULPEPER, VA 22701
PHONE: 540-829-7340
FAX: 540-829-7337

RECEIVED
APR 21 1999
BY:

APR 20 1999

SUBJECT: Loudoun County
Water - General (Beacon Hill)

Sandler at Beacon Hill, L.L.C.
c/o Odyssey Development, Inc.
1313 Dolley Madison Blvd., Suite 300
McLean, VA 22101

Dear Mr. Goldstein:

This is in reference to our April 13, 1999 inspection of fourteen well sites to serve the Beacon Hill Development. You have identified these sites as BH2-(A, B, B-alternate, C, D, E, F, F-alternate, G, G-alternate, H, H-alternate, I and J).

We have indicated our concern during the inspection that some sites are at low points and may be in the 100 year flood plain. However, you have assured us that if you choose to use these sites, that they shall meet all the requirements set forth in the Virginia *Waterworks Regulations*, Part III and that ponding will not occur in the well lots.

In accordance with 12 VAC 5-590-280 of the Commonwealth of Virginia *Waterworks Regulations*, this letter is to advise that the proposed well sites located northwest of the Town of Leesburg between Route 7/Route 9, and Route 698 as shown on the Emery & Garrett Beacon Hill Hydrogeologic maps, is approved by this Department for the construction of Class IIB (Class I per Loudoun County Ordinance) wells to be utilized as a public drinking water supply. The wells must be located at least 50 feet (100 feet per Loudoun County Ordinance) from all potential sources of contamination, property lines, right-of-way or easements on the property. The well lots must be graded to divert surface run-off from the wells and to prevent ponding on the well lots. In addition, an all-weather access road, public or private, must be provided to each well lot.

This approval is valid for a period of twelve months. If construction of the wells has not commenced by April 10, 2000, reinspection of the well lots will be required.

SUBJECT: Loudoun County
Water - General (Beacon Hill)

Following completion of construction of the wells, simultaneous yield and drawdown tests must be run for at least 48 hours. It is recommended that the required developmental chemical, radiological, and bacteriological samples be taken during the yield and drawdown test period. If you will be using the State Lab, please contact them at (804)786-3756 for containers and sampling instructions. If you will be using a certified private lab, please contact them for containers and any special sampling instructions. The requirements for construction and development of new wells are covered in the Commonwealth of Virginia ***Waterworks Regulations***, Part III, Article 2 (12 VAC 5-590-820, 830, 840), "Source Development."

After receipt of the results of the chemical, radiological, and bacteriological tests from the laboratory, plans and specifications for the wells and their appurtenances must be submitted to this office for review in accordance with 12 VAC 5-590-280, of the ***Waterworks Regulations***. The plans and specifications should also include a copy of the wells completion reports, a recorded plat of the well lots and a recorded dedication document for the well lots. The dedication document should clearly state that the well lots will be used only for the waterworks appurtenances as long as the lots are being used as part of the waterworks.

Upon receipt of the required information and documents, and after plans and specifications have been approved, a construction permit will be issued by the State Health Commissioner in accordance with 12 VAC 5-590-230 of the ***Waterworks Regulations***. The construction of pumping, treatment, and storage facilities should not be started until the construction permit has been issued.

If you have any questions, please contact me at this office.

Sincerely,

Melanie Williams
Environmental Inspector

MLW/jdc
CC: LCSA
Loudoun County Health Department
DEQ - Office of Water Resources Management
OWP – Central
o:\msw\dist8\beacon

STATUS OF WATERWORKS: Existing/(Proposed)	SUBJECT: Loudoun County
TYPE OF WATERWORKS: (Comm)/Non/NTNC	Water - Beacon Hill

OWNER INFORMATION	
Name:	Inspection date: 4/13/99
Address:	Inspected by: Melanie [illegible]
	Persons present: [illegible]
Telephone:	

WELL SITE CONFORMANCE WITH MANUAL OF PRACTICE

Well lot selection criteria	Well Name/Designation BH2-I	
Minimum 50 ft. to property lines	(Yes)/ No	Yes / No
All-weather access road available-	Yes /(No)	Yes / No
Minimum 50 ft. from sources of contamination:		
a. septic tank, pit privy, cesspool, barn yard, hog lot, etc.	(Yes)/ No	Yes / No
b. petroleum or chemical tank or lines	Yes / No	Yes / No
c. sewer line(s)	(Yes)/ No	Yes / No
d. well of unknown or inadequate construction	Yes / No	Yes / No
Minimum 50 ft. from surface runoff from sources of contamination shown as items a and b above	(Yes)/ No	Yes / No
Wellhead protected from 100 year flood	(Yes)/ No	Yes / No
wet areas; no flags to indicate clearly; need to look at maps		
Mark the box of the well site(s) to be approved.		

4-16-99 looked at maps; this well site is not in the 100 year flood.

WELLHEAD AREA VULNERABILITY ANALYSIS (For well sites that pass the above evaluation)

Are the following located in the wellhead area? (The wellhead area is 1000 ft. radius from the well)	For "yes" answers, attach a map showing the location of the well and the facility. Identify the facility by type, name, and address.		
a. landfills or dumps, service stations, dry cleaners, large or small machinery repair shops, electronic repair shops, paint shops, light/heavy industry, other wells. Indicate in blanks	Yes /(No)	Yes / No	
b. sinkholes	Yes /(No)	Yes / No	
Will geologic conditions direct contamination toward or away from the well:			
a. at the surface?	Yes / No	Yes / No	location at bottom of hill
b. at the subsurface?	Yes / No	Yes / No	over 50' from stream
Characterize the general land use as residential, industrial, livestock, crops, undeveloped, or other.	[illegible] residential		

INFORMATION FOR THE APPROVED WELL SITE(S)

Name	Geologic conditions	Lat/Long	*Dev. test req	Class
BH2 I		[illegible]	[illegible]	

This well site is approved.

*(1)Bacteriological, (2)Inorganic chemical, (3)Metals, (4)Nitrate-Nitrite, (5)VOCs, (6)Radiological, (7)SOCs

RECEIVED MAY 2 3 1999

COMMONWEALTH of VIRGINIA

Department of Health
Office of Water Programs

ENVIRONMENTAL ENGINEERING FIELD OFFICE
400 S. MAIN ST. - 2ND FLOOR
CULPEPER, VA 22701
PHONE: 540-829-7340
FAX: 540-829-7337

MAY 19 1999

SUBJECT: Loudoun County
Water - Beacon Hill Development

Mr. James M. Emery
Emery and Garrett Groundwater, Inc.
56 Main Street
P. O. Box 1578
Meredith, New Hampshire 03253

Dear Mr. ~~Emery~~ James:

Based upon the information that you have provided to this office in you letter of May 17, 1999, we agree that the wells do not need to be pumped simultaneously. The wells that are to be used as the community water supply are BH2-I, BH2-C, and BH2-H (Alt.) and do not need to be pumped simultaneously. These wells preliminary yields are of sufficient quantity and as you stated are separated by significant distances so as not to interfere with each other. The remaining wells BH2-D, BH2-B (Alt.), and BH2-H may be used as ground water monitoring wells or for irrigation purposes.

If you have any questions, please feel to contact this office.

Sincerely,

HRG

Hamid R. Golesorkhi
District Engineer

HRG/tjb
cc: Loudoun County Health Department
OWP - Central
O:/msw/lo/w/BeaconHillwells

RECEIVED APR 19 1999

Well/Water System Construction Permit

Page 1 Of 4

Loudoun County, Virginia
Division of Environmental Health
777-0234 Metro 478-8408

Health Department Identification Number 246 FIW 99 BH2I

Map Reference [3][3][ ][ ][ ][1][ ][ ][ ][ ][4][ ]

General Information

New ☒ Repair ☐ Abandonment ☐ Upgrade ☐ Well ID.# _____

Based on the application for a well/water supply system construction permit filed in accordance with Chapter 1040, Codified Ordinances, a construction permit is hereby issued to:

Owner Emery & Garrett Groundwater Inc. Telephone (603) 279-03253

Address P.O. Box 1578 Meredith, NH 03253

For a well/water system which is to be constructed on/at W. side of Rt. 698 approx. .15 mi. N of intersection with 776

Subdivision Beacon Hill Section/Block 38 (1) Lot 1

DESIGN

Water supply, existing: (describe) N/A

To be installed: class I Community

Cased and Grouted to Bedrock plus 10' or a minimum cased 100' Grouted 100' whichever is greater

Well Location See Page 2

I. If well yield as determined by 30 minute airlift test is less than 5 gallons per minute, a pumping test must be performed as follows:

A. Pump and related equipment shall be installed and the static water level measured.
B. Pumping shall begin at a rate of withdrawal greater than 5 GPM until water level drops to a point close to bottom of the well. N/A
C. At this point, the pump rate shall be adjusted so the water level remains constant.
D. Measure and record the volume of water discharge and water level (electric tape) at 15 minute intervals throughout the test.
E. Discharge water at least 50 feet from the well and sewage disposal area.
F. Interruption of pumping longer than 15 minutes shall require extending the pumping time that amount of time.

The well/water system is to be constructed as specified by the permit ☒ or attached plans and specifications ☐.

This water system construction permit is null and void if (a) conditions are changed from those shown on the application (b) conditions are changed from those shown on the construction permit.

NOTE: INSPECTION RESULTS

Water supply location: Satisfactory yes ☐ no ☐
Drillers Report (G.W.2) Received yes ☐ no ☐
Well Construction Approval yes ☐ no ☐
Sanitarian _____ Date _____
Well Driller _____ Lic # _____
Pump Installer _____ Lic # _____
Chemical Quality Data Received yes ☐ no ☐ N/A ☐
Pumping Data Received yes ☐ no ☐ N/A ☐
As built sketch on page _____
Bacteriological Sample Received yes ☐ no ☐
Water System Approved yes ☐ no ☐
Sanitarian Date

II. Criteria for approval of well and well yield are as follows:
The well must produce a:

A. Minimum of 1 gallon per minute for 6 continuous pumping hours after the well has been pumped out according to Part I, Sec. B of this permit.
B. The pump test can be terminated early and well yield considered adequate if:
   1. The well cannot be pumped out as stated in Part I B of this permit. N/A
   2. The Well yields 2.5 gpm or greater for 3 hours of continuous pumping after Part I B of this permit is completed.
C. Sufficient storage and yield may be considered for approval.
D. Person conducting the pump test shall collect a sample to be analyzed for constituents described in Codified Ordinances of Loudoun County Title 4, Chapter 1040, Appendix III.
E. Replacement wells are exempt from this requirement.

Date: 4-14-99 Issued by: _____ Sanitarian

Date: 4/15/99 Reviewed by: _____ Supervisory Sanitarian

This Construction Permit Valid until 4-14-2000

Original / Health Department Copy / Applicants Copy

TAX MAP NUMBER 3801 APPLICATION NUMBER 246 EW99

OWNER EGGT DATE 4-14-99

☐ SEWAGE DISPOSAL CONSTRUCTION PERMIT ☒ WATER SUPPLY CONSTRUCTION PERMIT - Drilled Well

LOC: _____/_____ LOC: _____/_____

This system is designed for a ____ bedroom house with a maximum use of _____ gallons per day.

Satisfactory bacteriological sample required prior to occupancy or well use.

Required source capacity _____ gallons per day.

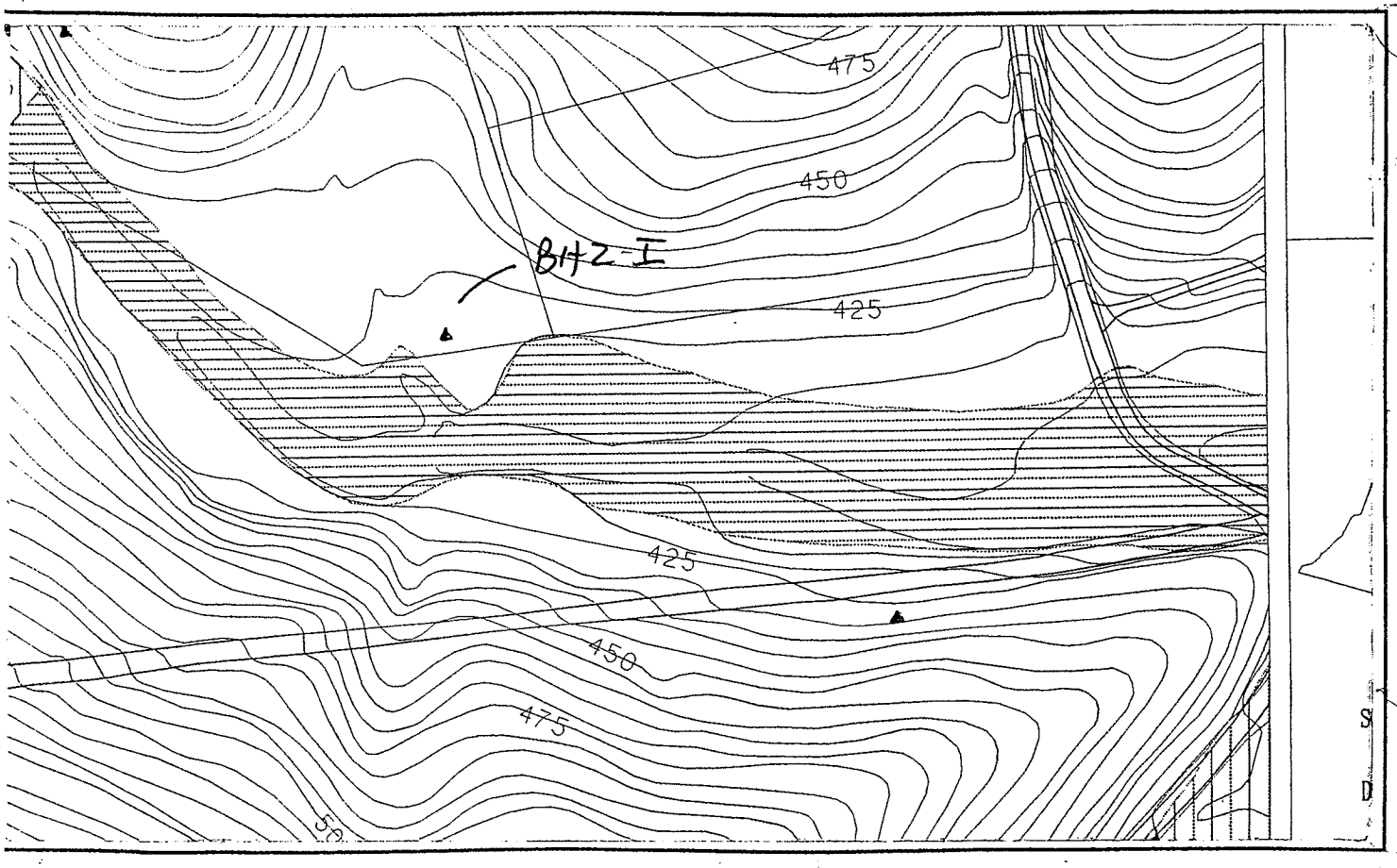
___ Class IIIb Private Minimum case and grout ____ feet.

___ Class IIIC Private Minimum case and grout 20 feet, or bedrock + 10 feet, whichever is greater.

X Class ~~III Other~~ I Community

SCALE 1" = 200' (1: 2400) PLANIMETRIC MAP 268

MAP SOURCE ☒ Loudoun County Photogrammetric Base Maps ☐ USGS 7-1/2 Minute Quadrangle Sheets, Enlarged



Health Department Identification Number 246 FTW 99

PAGE 3 OF 4

Schematic drawing of sewage disposal system and topographic features.

Show the lot lines of the building lot and building site, sketch of property showing any topographic features which may impact on the design of the system, all existing and/or proposed structures including sewage disposal systems and wells within 100 feet of sewage disposal system and reserve area. The schematic drawing of the sewage disposal system shall show sewer lines, pretreatment unit, pump station, conveyance system, and subsurface soil absorption system, reserve area, etc. When a nonpublic drinking water supply is to be located on the same lot show all sources of pollution within 100 feet.

☐ The information required above has been drawn on the attached copy of the sketch submitted with the application. Attach additional sheets as necessary to illustrate the design.

Test Well Requirements

1- Well is to be cased and Grouted to bedrock plus 10 feet or a minimum of 20 feet Whichever is Greater. This Grout is Temporary /see Final Production Well Req.

2- Grout Material Must Be Bentonite in order To Allow Redevelopment of The well at a Later Time.

3- Well Shall be Constructed (ie; casing raised above Flood prone zones) in a mAnner to prevent Surface infiltration.

4- A Drillers Report and inspection by This Department is required Prior To the Temporary Grouting procedure

5- A Locking Well Cap with Lock must be provided Until Well is redeveloped or abandoned.

6- Any well not scheduled For redevelopment as A production well must be properly Abandoned once all pumping tests are Done.

7- IF Well is to used as a Community Well/Water Supply Final Site Location Must be Approved by The STATE Health Dept/office of Water programs

Health Department Identification nber 246 FTW 99

Schematic drawing of sewage disposal system and topographic features.

Show the lot lines of the building lot and building site, sketch of property showing any topographic features which may impact on the design of the system, all existing and/or proposed structures including sewage disposal systems and wells within 100 feet of sewage disposal system and reserve area. The schematic drawing of the sewage disposal system shall show sewer lines, pretreatment unit, pump station, conveyance system, and subsurface soil absorption system, reserve area, etc. When a nonpublic drinking water supply is to be located on the same lot show all sources of pollution within 100 feet.

☐ The information required above has been drawn on the attached copy of the sketch submitted with the application. Attach additional sheets as necessary to illustrate the design.

Final Production Well Requirments

1- A minimum of 100' of Casing and Grout. Grout Material is TO Be Neat Cement or A Mixture of 6% Bentonite and Neat Cement.

2- Grouting Procedure must be observed by This Department.

3- A 100 Foot RADIUS Well LOT Must Be ESTABLISH - NO STRUCTURES or potential POLLUTION Sources MAY Be PLACED on The LOT unless They are Pumping and/or treatment FACILITIES

4- Pumping, treatment FACILITIES and Distribution System must be designed and STAMPED by A Professional Engineer.

5- A minimum 48 hour Safe yield Test (Pump) MUST Be performed and Submitted to This Department

6- 9 BACTERIOLOGICAL Samples and 1 full chemical ANALYSIS must be performed.

7- Well Site Location on This Permit is Approximate. Final Location must be surveyed and VA. Grid Co-ordinates Submited to This Department.

HYDROGEOLOGIC LOG FOR BH2-I
BEACON HILL DEVELOPMENT PROJECT PHASE II
LOUDOUN COUNTY, VIRGINIA

Project: *Beacon Hill Development Project Phase II & III*
Driller: *Singhas & Michael Corp.; Dave Cronk*
Geologist: *Fred Bickford*
Date Drilled: *4/26/99*
Drill Rig Type: *Air Rotary*
Well Diameter: *8"*

Casing Depth: *118'* **Casing Thickness:** *0.322"*
Depth Drilled: *420'*
Depth to bedrock: *25'*
Static Water Level: *flowing 18 gpm 4/27/99*
Air-lift Yield: *6"(171 gpm) 8"(375 gpm)*
Grout Type (Depth): *118' Portland*
Loudoun County Permit #: *246 FTW 99*

Depth (feet)	AIR-LIFT YIELD * (gpm)	Graphic Log	Descriptive Log
0	Casing		0'-20': Moderate yellowish-brown saprolite.
10			
20			25'-110': Dark greenish-gray fine-grained greenstone, poorly foliated; <<1% irregularly distributed pyrite.
30			
40			
50			
60			50'-60': Slight metallic look; graphite?
70			70'-90': Epidote veining, 10-25% of rock.
80			
90			
100			100'-110': Segregation of felsic and mafic minerals, streaky epidote veining.
110	60		**105'-107': Water-bearing zone: 60 gpm**. Drill hesitation; open space. 110'-120': Greenish-black, fine-grained chloritic phyllite, with strong foliation, pyrite-coated surfaces, and oxidized (rusty) surfaces.
120			
130			120'-240': Dark greenish-gray to greenish-black, fine-grained greenstone, with moderate foliation.
140			
150			150'-180': Mild epidote bleaching.
160			
170			
180			
190			
200			200'-210': 20% epidote.
210			
220			220'-230': Metallic look, nearly phyllitic; <<1% red hematite segregations.
230			
240	43		240'-250': Fine-grained epidosite.
250			250'-395': Dark greenish-gray, fine-grained greenstone, with moderate to poor foliation.
260			
270			
280			
290			
300			
310			310'-330': Felsic and mafic minerals segregated; <2% epidote.
320			
330			330'-340': Phyllitic sheen.
340	36		340': Blow-test yield 36 gpm; yield gradually diminished since 105-107' fracture.
350			
360			
370			370'-380': 5% epidote.

HYDROGEOLOGIC LOG FOR BH2-I
BEACON HILL DEVELOPMENT PROJECT PHASE II
LOUDOUN COUNTY, VIRGINIA

Project: *Beacon Hill Development Project Phase II & III*
Driller: *Singhas & Michael Corp.; Dave Cronk*
Geologist: *Fred Bickford*
Date Drilled: *4/26/99*
Drill Rig Type: *Air Rotary*
Well Diameter: *8"*

Casing Depth: *118'* **Casing Thickness:** *0.322"*
Depth Drilled: *420'*
Depth to bedrock: *25'*
Static Water Level: *flowing 18 gpm 4/27/99*
Air-lift Yield: *6"(171 gpm) 8"(375 gpm)*
Grout Type (Depth): *118' Portland*
Loudoun County Permit #: *246 FTW 99*

Depth (feet)	AIR-LIFT YIELD * (gpm)	Graphic Log	Descriptive Log
380 390 400	171		**390': Water-bearing zone: 135 gpm.** 390'-391': 2% epidote, <1% pyrite; segregation of felsic and mafic minerals. 395': Bottom of borehole; unable to operate hammer beyond this depth because of water volume.

Cuttings of bedrock collected at 10-foot intervals and at changes in lithology. * Yield determined during drilling of 6" test well.

LEGEND

SAPROLITE: Residual products of in-situ weathering of bedrock.

GREENSTONE: Dark greenish-gray to greenish-black, moderately to poorly foliated greenstone, +/- epidote, pyrite.

EPIDOSITE: Pale olive-green, fine- to medium-grained epidosite.

PHYLLITE: Greenish-black, fine-grained chloritic phyllite, strong foliation.

WATER-BEARING ZONE: Where yield of well increased.

COMMONWEALTH OF VIRGINIA
WATER WELL COMPLETION REPORT

• BWCM No. _____

(Certification of Completion/County Permit)

ter Control Board
11143
h Hamilton St.
, Va. 23230

SWCB Permit _____
County Permit 246 FTW 99

Certification of inspecting official:
This well does ____ does not ____
meet code/low requirements.
S. _____
Date _____
For Office Use

City Loudoun
County/City Stamp

r Plane Coordinates
____ N
____ E
te & Longitude
____ N
____ W
ap No. ____
on ____ ft.
n ____
y ____
assin ____
s ____
____
nalysis ____
est ____

• Owner Emery & Garrett Groundwater, Inc.
• Well Designation or Number BH2-1
Address P.O. Box 1578
Meredith, NH 03253
Phone 603-279-4425

• Drilling Contractor Singhas & Michael Corp.
Address 165 Lindey Lane
Berryville, VA 22611
Phone 540-955-3582

Tax Map I.D. No. 38 (1) A
Subdivision BEACON HILL
Section 38 (1)
Block ____
Lot A
Class Well: I yes , IIA ____
IIB ____ , IIIA ____ , IIIB ____
IIIC ____ IIID ____ IIIE ____

WELL LOCATION: W. side (feet/miles) of (direction) of 698 approx. .15 mil No of
and intersection (feet/miles) ____ (direction) of with 776
(If possible please include map showing location marked)

Date started 6/8/99 • Date completed 6/11/99 Type rig air rotary

TA: New ____ Reworked yes Deepened ____
th 420 ft.
Bedrock 30 ft.
(Also include reamed zones)
____ inches from 0 to 117 ft.
____ inches from 117 to 420 ft.
____ inches from ____ to ____ ft.
(I.D.) and material
____ inches from +1 to 178 ft.
terial steel
ker foot 28.55 or wall thickness .322 in.
____ inches from ____ to ____ ft.
terial ____
per foot ____ or wall thickness ____ in.
____ inches from ____ to ____ ft.
terial ____
per foot ____ or wall thickness ____ in.
and mesh for each zone (where applicable)
____ inches from ____ to ____ ft.
n size ____ Type ____
____ inches from ____ to ____ ft.
ize ____ Type ____
____ inches from ____ to ____ ft.
n size ____ Type ____
____ inches from ____ to ____ ft.
n size ____ Type ____
____ to ____ ft.
____ to ____ ft.
0 to 100 ft., Type pressure cement
____ to ____ ft., Type ____

2. WATER DATA • Water temperature 52 °F
• Static water level (unpumped level-measured) flowing ft.
• Stabilized measured pumping water level ____ ft.
• Stabilized yield 375 gpm after 3 hours
Natural Flow: Yes yes No ____ , flow rate: 17 gpm gpm
Comment on quality ____

3. WATER ZONES: From ____ To ____
From 390' To ____ . From ____ To ____
From ____ To ____ . From ____ To ____

4. USE DATA:
Type of use: Drinking yes , Livestock Watering ____
Irrigation ____ Food processing ____ , Household ____
Manufacturing ____ , Fire safety ____ , Cleaning ____
Recreation ____ , Aesthetic ____ , Cooling or heating ____
Injection ____ , Other community
• Type of facility: Domestic yes , Public water supply ____
Public institution ____ Farm ____ , Industry ____
Commercial ____ , Other ____

5. PUMP DATA: Type ____ • Rated H.P. ____
• Intake depth ____ • Capacity ____ at ____ head

6. WELLHEAD: Type well seal ____
Pressure tank ____ gal., Loc. ____
Sample tap ____ , Measurement port ____
Well vent ____ , Pressure relief valve ____
Gate valve ____ , Check valve (when required) ____
Electrical disconnect switch on power supply ____

7. DISINFECTION: Well disinfected ____ yes ____ no
Date ____ , Disinfectant used ____
Amount ____ , Hours used ____

8. ABANDONMENT (where applicable) • yes ____ no ____
Casing pulled yes ____ no ____ not applicable ____
Plugging grout From ____ to ____ material

BWCM No. _____

...er Emery and Garrett Groundwater, Inc.

246 FTW 99 38 (1) A BH2- I

tate law requires submitting to the Virginia State Water Control Board information about groundwater and wells for every well made in the State nded for water, or any other non-exempt well. This information must be submitted whether the well is completed, on standby, or abandoned. rmation required includes: an accurately and completely prepared water well completion report, full data from any aquifer pumping tests, drill ings taken at ten foot intervals (unless exemption is secured), the results of any chemical analyses, and copies of any geophysical logs. Quarterly- oage and use-reports are required from owners of public supply and industrial wells. County or State permits to drill may be required in some parts of state. Some counties require submission of a water well completion report. The Virginia State Health Department requires a water well completion rt for public supply wells.

DRILLERS LOG (use additional Sheets if necessary)

TH (feet) m	To	TYPE OF ROCK OR SOIL (color, material, fossils, hardness, etc.)	REMARKS (water, caving, cavities, broken, core, shot, (etc.)	11. Drilling Time (Min.)
	30'	overburden		
)'	420'	greenstone		
	390'	waterbearing formation	375 gpm	
		waterbearing formation		
		waterbearing formation		
		waterbearing formation		

12. DIAGRAM OF WELL CONSTRUCTION (with dimensions)

13. Well lot dedicated? _____ Size _____ ft. X _____ ft.; Well house? _____
Distance to nearest pollutant source _____ ft., Type _____
Distance to nearest property line _____ ft., Building _____ ft.

14. WATER SERVICE PIPE: Checked under _____ p.s.i. for _____ minutes. Pipe size _____ inches, Material _____
Installer _____
Date _____

15. I certify that the information contained herein is true and correct and that this well and/or system has been installed and constructed in accordance with the requirements for well construction as specified in compliance with appropriate county or independent city ordinances and the laws and rules of the Commonwealth of Virginia.

Signature _____ (Seal) Date 6/16/87
(Well driller or authorized person)

License No. W0014
Class B 2705-014285 EMW WWC

...ate Water Control Board Regional Offices

...ley Reg. Off.
...6 North Main Street
...O. Box 268
...lgewater, Va. 22812
...3-828-2595

...thwest Reg. Off.
...3 East Main Street
...O. Box 476
...ington, Va. 24210
...3-628-5183

...st Central Reg. Off.
...ecutive Park
...312 Peters Creek Road
...noke, Va. 24019
...-982-7417

Piedmont Reg. Off.
4010 West Broad Street
P. O. Box 6616
Richmond, Va. 23230
804-257-1006

Tidewater Reg. Off.
287 Pembroke Office Park
Suite 310 Pembroke No. 2
Va. Beach, Va. 23462
804-499-8742

Northern Virginia Reg. Off.
5515 Cherokee Avenue
Suite 404
Alexandria, Va. 22312
703-750-9111

APPENDIX B

WATER QUALITY RESULTS

Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 12/02/2015
DCLS LIMS #: E151002540

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 15:54	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-095 INORGANICS	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: CMORTON, Scientist Senior **DATE APPROVED:** 12/02/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 300.0					
	Chloride	10.2 mg/L		250	11/13/2015 22:55
	Fluoride	< 0.2 ppm	4	2	11/13/2015 22:55
	Sulfate	17.8 mg/L		250	11/13/2015 22:55
	Ortho Phosphate as P	< 0.05 mg/L			11/13/2015 22:55
SM 2320B/4500H+B					
	Alkalinity, Total	139 mg/L			11/17/2015 23:56
	pH @19.1 ºC	6.55 S.U.		6.5 - 8.5	11/17/2015 23:56
	PARAMETER QUALIFIER: Sample Held Beyond Normal Holding Time				
SM 2120 B					
	Color-PCU @ pH 6.9	< 5 PCU		15	11/13/2015 16:30
SM 2510B					
	Specific Conductance	344 µmhos/cm			11/24/2015 10:15
ASTM D6919/SM 2340 B					
	Calcium Hardness	88 mg/L			11/13/2015 17:19
	This is a calculated value from methods that are accredited.				
	** Lab not certified*				
	Hardness-Total	147 mg/L			11/13/2015 17:19
SM 2130 B					
	Turbidity	0.72 NTU			11/13/2015 16:19
SM 2340-C					

Explanation of Terms and Disclaimers

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 12/02/2015
DCLS LIMS #: E151002540

Test Results

APPROVED BY: CMORTON, Scientist Senior **DATE APPROVED:** 12/02/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
SM 2340-C					
	Total Dissolved Solids	208 mg/L		500	11/20/2015 12:40
SM 2330B					
	Aggressive Index	10.6 AI			12/01/2015 16:25

This is a calculated value from methods that are accredited.
** Lab not certified*

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 11/20/2015
DCLS LIMS #: E151002539

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 16:10	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-094 DW-METALS	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: MMOUER, Scientist Senior **DATE APPROVED:** 11/20/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 200.7					
	Barium	0.256 ppm	2		11/19/2015
	Iron	0.512 ppm		0.3	11/19/2015
	Sodium	7.38 ppm			11/19/2015
	Silver	< 0.01 ppm		0.10	11/19/2015
EPA 200.8					
	Beryllium	< 0.002 ppm	0.004		11/18/2015
	Aluminum	< 0.05 ppm		0.05 - 0.2	11/18/2015
	Chromium	< 0.01 ppm	0.1		11/18/2015
	Manganese	0.231 ppm		0.05	11/18/2015
	Nickel	< 0.01 ppm			11/18/2015
	Copper	< 0.010 ppm	1.3		11/18/2015
	Zinc	0.018 ppm		5	11/18/2015
	Arsenic	< 0.002 ppm	0.010		11/18/2015
	Selenium	< 0.01 ppm	0.05		11/18/2015
	Cadmium	< 0.002 ppm	0.005		11/18/2015
	Antimony	< 0.002 ppm	0.006		11/18/2015
	Mercury	< 0.0002 ppm	0.002		11/18/2015
	Thallium	< 0.002 ppm	0.002		11/18/2015
	Lead	< 0.002 ppm	0.015		11/18/2015

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 11/19/2015
DCLS LIMS #: E151002537

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 15:54	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-005 NITRITE	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: CMORTON, Scientist Senior **DATE APPROVED:** 11/19/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 300.0					
	Nitrite as N	< 0.05 mg/L			11/13/2015 22:55

Explanation of Terms and Disclaimers

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 12/07/2015
DCLS LIMS #: E151002533

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 16:10	**SAMPLE COMMENTS**	EVIDENCE OF COOLING
SAMPLING DATE	11/13/2015 07:00	**LOCATION**	WELL BH2-1
COLLECTED BY	P. FOSTER	**FACILITY**	WL003
SAMPLE MATRIX	DRINKING WATER	**COMPLIANCE**	N
ORDERED TEST	206-101 M524	**TYPE**	SP
PROJECT NAME	DW2015-Q4	**CATEGORY**	GE
		ORDER NUMBER	8377

Test Results

APPROVED BY: TPAYNE, Scientist Senior **DATE APPROVED:** 12/07/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 524.2					
	Vinyl Chloride	< 0.50 ppb	2		11/18/2015
	1,1-Dichloroethene	< 0.50 ppb	7		11/18/2015
	Methylene Chloride	< 0.50 ppb	5		11/18/2015
	trans-1,2-Dichloroethene	< 0.50 ppb	100		11/18/2015
	Methyl tert-Butyl Ether	< 5.0 ppb			11/18/2015
	cis-1,2-Dichloroethene	< 0.50 ppb	70		11/18/2015
	Chloroform	< 0.50 ppb			11/18/2015
	1,2-Dichloroethane	< 0.50 ppb	5		11/18/2015
	1,1,1-Trichloroethane	< 0.50 ppb	200		11/18/2015
	Carbon Tetrachloride	< 0.50 ppb	5		11/18/2015
	Benzene	< 0.50 ppb	5		11/18/2015
	1,2-Dichloropropane	< 0.50 ppb	5		11/18/2015
	Trichloroethene	< 0.50 ppb	5		11/18/2015
	Bromodichloromethane	< 0.50 ppb			11/18/2015
	1,1,2-Trichloroethane	< 0.50 ppb	5		11/18/2015
	Toluene	< 0.50 ppb	1000		11/18/2015
	Dibromochloromethane	< 0.50 ppb			11/18/2015
	Tetrachloroethylene	< 0.50 ppb	5		11/18/2015
	Chlorobenzene	< 0.50 ppb	100		11/18/2015
	Ethylbenzene	< 0.50 ppb	700		11/18/2015
	Bromoform	< 0.50 ppb			11/18/2015
	Styrene	< 0.50 ppb	100		11/18/2015

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 12/07/2015
DCLS LIMS #: E151002533

Test Results

APPROVED BY: TPAYNE, Scientist Senior **DATE APPROVED:** 12/07/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 524.2					
	p-Dichlorobenzene	< 0.50 ppb	75		11/18/2015
	o-Dichlorobenzene	< 0.50 ppb	600		11/18/2015
	1,2,4-Trichlorobenzene	< 0.50 ppb	70		11/18/2015
	Total Xylenes	< 0.50 ppb	10000		11/18/2015

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 11/30/2015
DCLS LIMS #: E151002531

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 16:10	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-104 M525	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: PLOGAN, Scientist Senior **DATE APPROVED:** 11/30/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 525.2					
	Hexachlorocyclopentadiene	< 0.5 ppb	50		11/20/2015
	Hexachlorobenzene	< 0.1 ppb	1		11/20/2015
	Simazine	< 0.5 ppb	4		11/20/2015
	Atrazine	< 0.5 ppb	3		11/20/2015
	Lindane	< 0.1 ppb	0.2		11/20/2015
	Alachlor	< 0.2 ppb	2		11/20/2015
	Heptachlor	< 0.1 ppb	0.4		11/20/2015
	Heptachlor epoxide	< 0.1 ppb	0.2		11/20/2015
	Endrin	< 0.5 ppb	2		11/20/2015
	Bis (2-ethylhexyl) adipate	< 1 ppb	400		11/20/2015
	Methoxychlor	< 0.2 ppb	40		11/20/2015
	Bis (2-ethylhexyl) phthalate	< 2 ppb	6		11/20/2015
	Benzo(a)pyrene	< 0.15 ppb	0.2		11/20/2015
	PARAMETER QUALIFIER: Blank spike recovery was less than the method acceptance limit. Detection level was raised for non-detects.				
	Chlordane	< 0.2 ppb	2		11/20/2015
	Toxaphene	< 1 ppb	3		11/20/2015
	Polychlorinated biphenyls	< 0.2 ppb	0.5		11/20/2015

Explanation of Terms and Disclaimers

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 11/18/2015
DCLS LIMS #: E151002532

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 16:10	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-048 DIQUAT	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: PLOGAN, Scientist Senior **DATE APPROVED:** 11/18/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 549.2					
	Diquat	< 5 ppb	20		11/17/2015

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 12/07/2015
DCLS LIMS #: E151002530

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 16:10	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-019 FUMIGANTS	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: TPAYNE, Scientist Senior **DATE APPROVED:** 12/07/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 551.1					
	1,2-Dibromoethane	< 0.02 ppb	0.05		11/30/2015
	1,2-Dibromo-3-chloropropane	< 0.02 ppb	0.2		11/30/2015

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 11/23/2015
DCLS LIMS #: E151002535

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 16:10	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-102 CARBAMATES	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: PLOGAN, Scientist Senior **DATE APPROVED:** 11/23/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 531.1					
	Oxamyl	< 2.0 ppb	200		11/19/2015
	Carbofuran	< 2.0 ppb	40		11/19/2015

Explanation of Terms and Disclaimers

PMCL is defined as the "Primary Maximum Contaminant Level." SMCL is defined as the "Secondary Maximum Contaminant Level". If blank, level not defined by EPA. Results denoted with an asterisk (*) indicate that the PMCL is exceeded. Test Results meet all requirements of NELAC. Non-NELAC accredited analyses noted by ^^. The results included on this report relate only to this specific sample and not to other samples tested from this sampling location.

Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 11/30/2015
DCLS LIMS #: E151002538

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 15:54	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-004 NO2/NO3	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: RLEWIS, Scientist Senior **DATE APPROVED:** 11/30/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 353.2					
	Nitrate + Nitrite	< 0.05 mg/L	10		11/24/2015 12:54

Explanation of Terms and Disclaimers

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 12/03/2015
DCLS LIMS #: E151002534

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 16:10	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-103 HERBICIDE	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: PLOGAN, Scientist Senior **DATE APPROVED:** 12/03/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
EPA 515.3					
	Dalapon	< 3.0 ppb	200		11/25/2015
	2,4-D	< 1.0 ppb	70		11/25/2015
	Pentachlorophenol	< 0.1 ppb	1		11/25/2015
	Silvex	< 1.0 ppb	50		11/25/2015
	Dinoseb	< 1.0 ppb	7		11/25/2015
	Picloram	< 1.0 ppb	500		11/25/2015

Explanation of Terms and Disclaimers

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Commonwealth of Virginia
Division of Consolidated Laboratory Services
600 North 5th St.
Richmond, Virginia 23219
804-648-4480

REPORT OF ANALYSIS

Report Date: 12/04/2015
DCLS LIMS #: E151002541

Mail To

BEACON HILL-LCSA - EMERY & GARRETT
932 EDWARDS FERRY RD #112
LEESBURG, VA 20176

ATTN: JEFF MARTS

PWSID 7600395
REGION 7

Sample Information

DATE RECEIVED	11/13/2015 15:54	**LOCATION**	WELL BH2-1
SAMPLING DATE	11/13/2015 07:00	**FACILITY**	WL003
COLLECTED BY	P. FOSTER	**COMPLIANCE**	N
SAMPLE MATRIX	DRINKING WATER	**TYPE**	SP
ORDERED TEST	206-012 CYANIDE	**CATEGORY**	GE
PROJECT NAME	DW2015-Q4	**ORDER NUMBER**	8377

Test Results

APPROVED BY: RLEWIS, Scientist Senior **DATE APPROVED:** 12/04/2015

METHOD	PARAMETER	RESULT	PMCL	SMCL	ANALYSIS DATE
SM 4500-CN-C+E					
	Cyanide	< 0.01 mg/L	0.2		11/24/2015 14:30

Explanation of Terms and Disclaimers

PMCL is defined as the "Primary Maximum Contaminant Level." SMCL is defined as the "Secondary Maximum Contaminant Level". If blank, level not defined by EPA. Results denoted with an asterisk (*) indicate that the PMCL is exceeded. Test Results meet all requirements of NELAC. Non-NELAC accredited analyses noted by ^^. The results included on this report relate only to this specific sample and not to other samples tested from this sampling location.

ANALYTICAL SERVICES, INC. (ASI)
Microbiological Testing, Research and Consulting

130 Allen Brook Ln., Williston, VT 05495 USA
1.800.723.4432 / 802.878.5138 Fax: 802.878.6765
www.analyticalservices.com

December 8, 2015

Daniel Tinkham
Emery & Garrett Groundwater
PO Box 1578
Meredith, NH 03253

Dear Daniel:

Enclosed please find the results of the Microscopic Particulate Analysis (MPA) performed on the sample received in our laboratory on November 12, 2015.

As previously discussed, the MPA sample was analyzed by CHD.

Thank you for using Analytical Services Inc. for your testing needs. If you have any questions or if we may be of service in the future, please do not hesitate to contact us at (800) 723-4432.

Sincerely,

ANALYTICAL SERVICES, INC.

Carolyn M. Fogg

Carolyn M. Fogg
Technical Director

CMF/cmf

ASI Project No.: 52182

ANALYSIS FOR WATERBORNE PARTICULATES

CH Diagnostic and Consulting Service, Inc.
512 5th Street, Berthoud, CO 80513
P: (970) 532-2078 F: (970) 532-3358

Invoice 20150828

Customer 20081756
Analytical Services, Inc.
130 Allen Brook Lane
Williston, VT 05495

Laboratory Information
Federal Express; 11/30/2015; 1130 Hrs; 13.2°C; Packed pellet
Results submitted by:
Laboratory Director 12/4/15

Sample Identification: 52182-01

Sample Information:

Sample Date & Time: 11/23/2015 **Sampler:** unrec.

Amount: 827.65 L **Filter Color:** N/A **Filter Type:**

Date/Time Eluted: **Centrifugate:** N/A

RESULTS OF MICROSCOPIC PARTICULATE ANALYSIS

Amount of sample assayed: 500 L

Amorphous Debris	clay (1-2 µm), silt (2-50 µm), inorganic precipitate, aggregates
Algae	ND
Diatoms	ND
Plant debris	ND
Rotifers	ND
Nematodes	ND
Pollen (pine)	ND
Ameba	ND
Ciliates	ND
Colorless Flagellates	ND
Crustaceans	ND
Other Arthropods	ND
Other	ND

Giardia and Coccidia are none detected (ND) by MPA unless reported under "Other".

This sample was analyzed for particulates following the Environmental Protection Agency Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA). 1992. USEPA, Port Orchard, WA, EPA 910/9-92-029. All limitations stated in the methods apply. If HV capsule or foam filter was received, method was modified by filtering sample through a Pall Envirochek™ HV capsule or IDEXX Filta-Max™ filter at the sample site. If *Giardia* and *Cryptosporidium* Analysis was also performed, particulate extraction was modified.

COMMENTS: Score: 0-Low Risk per EPA Consensus Method referenced above.
Date Analyzed: 12/4/2015
Amount Analyzed at 100x: 496.59 L
Amount Analyzed at 400x: 0.78 L (based on 10 random field counts)

ANALYTICAL SERVICES, INC.
Microbiological Testing, Research and Consulting

Client:	Emery & Garrett Groundwater	**Sampling Date:**	11/11/15
Address:	PO Box 1578	**Date Processed:**	11/12/15
	Meredith, NH 03253	**Analyst:**	DG
Client Sample ID:	BH2-I	**ASI Sample No.:**	52182-01

Section III.

Giardia and *Cryptosporidium*

Analytical Result	Analyte	Numbers/8.3x10^2 L	Number/ 100 L
Giardia	Empty *Giardia* cysts detected	ND	<0.12
	Giardia Cysts with Amorphous Structure detected	ND	<0.12
	Giardia Cysts with one Internal Structure detected	ND	<0.12
	Giardia Cysts with more than one Internal Structure detected	ND	<0.12
	Total IFA *Giardia* Count	ND	<0.12
Cryptosporidium	Empty *Cryptosporidium* Oocysts detected	ND	<0.12
	Cryptosporidium Oocysts with Amorphous Structure detected	ND	<0.12
	Cryptosporidium Oocysts with Internal Structure detected	ND	<0.12
	Total IFA *Cryptosporidium* Count	ND	<0.12

ND = None Detected

An aliquot of the MPA sample concentrate was purified, stained and examined using a modified version of Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/IFA (EPA-821-R-01-025). This method employs immunomagnetic separation to purify the sample, and an immunofluorescent dual monoclonal antibody stain that is specific for *Giardia* and *Cryptosporidium*. Positive and negative controls were stained and examined concurrently. Numbers are reported using significant figures.

Analytical Services, Inc.

Page ___ of ___

CHAIN OF CUSTODY RECORD

Ship to: Analytical Services, Inc., 130 Allen Brook Lane, Williston, VT 05495, Attn: Sample Management
Phone: 1-800-723-4432 or 802-878-5138 • Fax: 802-878-6765 *Web site: www.analyticalservices.com*

Submitted By: Emery & Garrett Groundwater P.O. Box 1578 • 56 Main St. Meredith, NH 03253 Phone: 603-279-4425 Fax: 603-279-8817	Report To: SAME Phone: ___ Fax: ___
Project Name: Beacon Hill Job Site: Loudoun County, Virginia P.O. Number:	Invoice To: SAME Phone: ___ Fax: ___

Sample Identification*	Sample Collection		Sample Matrix (check one)						Analysis Requested
	Date	Time	Water - Raw	Water - Finished	Waste Water	Biosolids	Soil/Sediment	Other	
BH2-I	11/4/15	1530	X						MPA

*Sample ID should match ID written on the sample containers and data sheets. Sample ID will appear on the report for identification.

Relinquished By (signature)	Date/Time	Received By (signature)	Date/Time
	11/4/15; 1530		11/12/15 0950

Field Comments:	Lab Comments:
	1.9 °C

White – To accompany samples • Yellow – Sampler Copy

77 W Lee St. #202
Warrenton, VA 20186
540-347-7212

JOINER MICRO
LABORATORIES, INC

joinermicrolab.com
info@joinermicrolab.com

CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-11-15/1500
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: JML Courier (Ian Lawton)
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-12-15/1405
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Non Detectable (tested in Lab)
DATE AND TIME OF SAMPLE ANALYSIS: 11-12-15/1552

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

◆MPN-Most Probable Number◆ < - Less than◆ > - Greater than◆

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

#460034

77 W Lee St. #202
Warrenton, VA 20186
540-347-7212

JOINER MICRO
LABORATORIES, INC

joinermicrolab.com
info@joinermicrolab.com

CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-11-15/1600
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: JML Courier (Ian Lawton)
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-12-15/1405
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-12-15/1552

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

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Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-11-15/1900
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: JML Courier (Ian Lawton)
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-12-15/1405
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-12-15/1552

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

♦MPN-Most Probable Number♦ < - Less than♦ > - Greater than♦

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

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Warrenton, VA 20186
540-347-7212

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

PROPERTY: Beacon Hill

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-11-15/2000
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: JML Courier (Ian Lawton)
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-12-15/1405
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Non Detectable (tested at Lab)
DATE AND TIME OF SAMPLE ANALYSIS: 11-12-15/1552

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM21 9223 B-2004 Colilert MPN

RESULTS: MPN 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*

This water sample **DOES NOT PASS** the minimum potable water test requirements established by the Virginia Department of Health.

◆MPN-Most Probable Number◆ < - Less than◆ > - Greater than◆

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/0600
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: JML Courier (Ian Lawton)
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-12-15/1405
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Non Detectable (tested at Lab)
DATE AND TIME OF SAMPLE ANALYSIS: 11-12-15/1552

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

♦MPN-Most Probable Number♦ < - Less than♦ > - Greater than♦

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

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540-347-7212

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/0700
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: JML Courier (Ian Lawton)
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-12-15/1405
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-12-15/1552

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

•MPN-Most Probable Number• < - Less than• > - Greater than•

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

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#460034

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Warrenton, VA 20186
540-347-7212

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/0800
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: JML Courier (Ian Lawton)
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-12-15/1405
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-12-15/1552

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

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Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/0900
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: JML Courier (Ian Lawton)
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-12-15/1405
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-12-15/1552

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

♦MPN-Most Probable Number♦ < - Less than♦ > - Greater than♦

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

PROPERTY: Beacon Hill

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/1000
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: JML Courier (Ian Lawton)
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-12-15/1405
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-12-15/1552

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM21 9223 B-2004 Colilert MPN

RESULTS: MPN 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*

This water sample **DOES NOT PASS** the minimum potable water test requirements established by the Virginia Department of Health.

◆MPN-Most Probable Number◆ < - Less than◆ > - Greater than◆

Certified by: Robyn Joiner

Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

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Warrenton, VA 20186
540-347-7212

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info@joinermicrolab.com

CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

PROPERTY: Beacon Hill

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/1100
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM21 9223 B-2004 Colilert MPN

RESULTS: MPN 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*

This water sample **DOES NOT PASS** the minimum potable water test requirements established by the Virginia Department of Health.

◆MPN-Most Probable Number◆ < - Less than◆ > - Greater than◆

Certified by: Robyn Joiner

Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

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Warrenton, VA 20186
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info@joinermicrolab.com

CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/1200
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

◆MPN-Most Probable Number◆ < - Less than◆ > - Greater than◆

Certified by:

Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

#460034

77 W Lee St. #202
Warrenton, VA 20186
540-347-7212

JOINER MICRO
LABORATORIES, INC

joinermicrolab.com
info@joinermicrolab.com

CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/1300
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

◆MPN-Most Probable Number◆ < - Less than◆ > - Greater than◆

Certified by:
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Lab Director
November 16, 2015

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/1400
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

•MPN-Most Probable Number• < - Less than• > - Greater than•

Certified by: Robyn Joiner
Robyn Joiner
Lab Director
November 16, 2015

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540-347-7212

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JML LAB ID # 140252

CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/1500
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

◆MPN-Most Probable Number◆ < - Less than◆ > - Greater than◆

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

#460034

77 W Lee St. #202
Warrenton, VA 20186
540-347-7212

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/1600
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

♦MPN-Most Probable Number♦ < - Less than♦ > - Greater than♦

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

#460034

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Warrenton, VA 20186
540-347-7212

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/1700
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

•MPN-Most Probable Number• < - Less than• > - Greater than•

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

#460034

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Warrenton, VA 20186
540-347-7212

JOINER MICRO
LABORATORIES, INC

joinermicrolab.com
info@joinermicrolab.com

JML LAB ID # 140255

CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-12-15/1800
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

♦MPN-Most Probable Number♦ < - Less than♦ > - Greater than♦

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

#460034

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Warrenton, VA 20186
540-347-7212

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LABORATORIES, INC

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info@joinermicrolab.com

CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-13-15/0600
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Non Detectable (tested at Lab)
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

•MPN-Most Probable Number• < - Less than• > - Greater than•

Certified by: Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

#460034

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Warrenton, VA 20186
540-347-7212

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LABORATORIES, INC

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info@joinermicrolab.com

CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-13-15/0700
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM21 9223 B-2004 Colilert MPN

RESULTS: MPN 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*

This water sample **DOES NOT PASS** the minimum potable water test requirements established by the Virginia Department of Health.

◆MPN-Most Probable Number◆ < - Less than◆ > - Greater than◆

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

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CERTIFICATE OF ANALYSIS

NAME: Emery & Garrett Groundwater **PROPERTY:** Beacon Hill
ADDRESS: 56 Main Street
P.O. Box 1578
Meredith, NH 03253-1578

SAMPLE SOURCE: Well
SAMPLE LOCATION: BH2-I
DATE AND TIME SAMPLE COLLECTED: 11-13-15/0800
SAMPLE COLLECTED BY: Peter Foster
SAMPLE RECEIVED FROM: EGGI Courier
DATE AND TIME SAMPLE RECEIVED IN LAB: 11-13-15/1304
SAMPLE CONTAINER: Sterile Plastic Container supplied by JML
CHLORINE SCREEN: Not Applicable
DATE AND TIME OF SAMPLE ANALYSIS: 11-13-15/1350

TESTS REQUESTED: TOTAL COLIFORM BACTERIA

METHOD OF ANALYSIS: SM 9223 B-2004 Colilert MPN

RESULTS: MPN < 1 /100 mL for Total Coliform Bacteria
MPN < 1 /100 mL for *E. coli*
This result indicates the absence of coliform bacteria.

This water sample **HAS PASSED** the minimum potable water test requirements established by the Virginia Department of Health.

•MPN-Most Probable Number• < - Less than• > - Greater than•

Certified by: _____
Robyn Joiner
Lab Director
November 16, 2015

NELAP ACCREDITED TNI LABORATORY

#460034

CHAIN OF CUSTODY RECORD

Joiner Micro Laboratories, Inc.
77 West Lee Street, #202
Warrenton, Virginia 20186
540-347-7212 Fax 540-347-1606

KEEP SAMPLES ON ICE

BILL TO: EGGI, Inc.
56 Main Street/PO Box 1578
Meredith, NH 03253-1578
Contact: Peter Foster
Phone: 703-297-7548

PROPERTY REFERENCE: Beacon Hill

Sample Type Code	Container Code	Preservation Code
DW-Drinking Water	P=Plastic	A= None
WW-Wastewater	G=Glass	B= H_2SO_4
S=Solid	A=Amber	C= NaOH
A= Aqueous	V=VOA Vial	D=HNO_3
		E=HCL
		F=Thio

Results are to be: Mailed ☐ or Picked up at lab ☐ or faxed ☐ _____ or Emailed ☒ peterfoster@eggi.com
(Data deliverables via Email will not be mailed unless requested)

SAMPLED BY
Print Name:
Signature:

ANALYSIS REQUESTED

Shaded areas for lab use only
Date 11-12-15 Analyst DB

Sample ID (Location)	Date/Time of Collection	Sample Type	Grab/Comp	Number of Containers	LL MPN		Lab ID #	Lab Tracking #	Container Volume (mL)	Container Type	Preservation on arrival	Lot # of Preservative	pH on Arrival (SU)	pH adjusted (SU)/ Preservation code	Lot # of Preservative	Comments (see below)
BH2-I	11/11/15/1500	DW	X	1	X		140233	140233	150	Pster	A	NA				
	1600			1			140234	140234								
	1900			1			140235	140235								
	2000			1			140236	140236								
	11/12/15; 0600			1			140237	140237								
	0700			1			140238	140238								
	0800			1			140239	140239								
	0900			1			140240	140240								
	1000			1			140241 ~~140234~~ 11-12-15 DB	140241	150	Pster						

Relinquished By: (Signature) 11/12/15; 1020
Relinquished By: (Signature) FL. — SAME COURIER 11-12-15 14:05 RCVD
Lab Receipt By: (Signature) DChapman — 11-12-15 14:05 RCV

Received By: (Signature)
Received By: (Signature)

Comments

Temp upon receipt 1.5 °C

CHAIN OF CUSTODY RECORD

Joiner Micro Laboratories, Inc.
77 West Lee Street, #202
Warrenton, Virginia 20186
540-347-7212 Fax 540-347-1606

KEEP SAMPLES ON ICE

BILL TO: EGGI, Inc.
56 Main Street/PO Box 1578
Meredith, NH 03253-1578
Contact: Peter Foster
Phone: 703-297-7548

PROPERTY REFERENCE: Beacon Hill

Sample Type Code	Container Code	Preservation Code
DW-Drinking Water	P=Plastic	A= None
WW-Wastewater	G=Glass	B= H_2SO_4
S=Solid	A=Amber	C= NaOH
A= Aqueous	V=VOA Vial	D=HNO_3
		E=HCL
		F=Thio

Results are to be: Mailed ☐ or Picked up at lab ☐ or faxed ☐ _____ or Emailed ☒ peterfoster@eggi.com (Data deliverables via Email will not be mailed unless requested)

SAMPLED BY
Print Name: Peter Foster
Signature:

ANALYSIS REQUESTED

Shaded areas for lab use only
Date 11-13-15 Analyst DB

Sample ID (Location)	Date/Time of Collection	Sample Type	Grab / Comp	Number of Containers	LL MPN		Lab ID #	Lab Tracking #	Container Volume (mL)	Container Type	Preservation on arrival	Lot # of Preservative	pH on Arrival (SU)	pH adjusted (SU)/ Preservation code	Lot # of Preservative	Comments (see below)
BH2-I	11/12/15; 11:00	DW		1	X		140248	140248	150	Pster	A	NA				
	12:00			1			140249	140249								
	1300			1			140250	140250								
	1400			1			140251	140251								
	1500			1			140252	140252								
	1600			1			140253	140253								
	1700			1			140254	140254								
	1800			1			140255	140255								
	11/13/15; 0600			1			140256	140256								
	0700			1			140257	140257								
	0800			1			140258	140258								

Relinquished By: (Signature) _____ 11/13/15; 1000
Received By: (Signature)
Relinquished By: (Signature) BOURIER 11-13-15 13:04 RCVD
Received By: (Signature)
Lab Receipt By: (Signature) 11-13-15 13:04 RCVD
Comments MCI
Temp upon receipt 1.0 °C

Informational Water Quality Report

Loudoun County

Client:
Beacon Hill

Ordered By:
Emery & Garrett Groundwater Investigations, LLC 56 Main Street PO Box 1578 Meredith, NH 03253

National Testing Laboratories, Ltd.
Quality Water Analysis
6571 Wilson Mills Rd
Cleveland, Ohio 44143
1-800-458-3330

Sample Number: 858870

Location:	BH2-I
Type of Water:	Well Water
Collection Date and Time:	11/13/2015 07:00
Received Date and Time:	11/16/2015 11:40
Date Completed:	11/24/2015

>72-hours pumping test
> metals not filtered

Definition and Legend

This informational water quality report compares the actual test result to national standards as defined in the EPA's Primary and Secondary Drinking Water Regulations.

Primary Standards:	Are expressed as the maximum contaminant level (MCL) which is the highest level of contaminant that is allowed in drinking water. MCLs are enforceable standards.
Secondary standards:	Are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor,or color) in drinking water. Individual states may choose to adopt them as enforceable standards.
Action levels:	Are defined in treatment techniques which are required processes intended to reduce the level of a contaminant in drinking water.
mg/L (ppm):	Unless otherwise indicated, results and standards are expressed as an amount in milligrams per liter or parts per million.
Minimum Detection Level (MDL):	The lowest level that the laboratory can detect a contaminant.
ND:	The contaminant was not detected above the minimum detection level.
NA:	The contaminant was not analyzed.


The contaminant was not detected in the sample above the minimum detection level.


The contaminant was detected at or above the minimum detection level, but not above the referenced standard.


The contaminant was detected above the standard, which is not an EPA enforceable MCL.


The contaminant was detected above the EPA enforceable MCL.


These results may be invalid.

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
			Microbiologicals			
	Total Coliform by P/A	No bacteria sample was submitted.				
			Inorganic Analytes - Metals			
✓	Aluminum	ND	mg/L	0.2	EPA Secondary	0.1
✓	Arsenic	ND	mg/L	0.010	EPA Primary	0.005
✓	Barium	ND	mg/L	2	EPA Primary	0.30
✓	Cadmium	ND	mg/L	0.005	EPA Primary	0.002
●	Calcium	37.1	mg/L	--		2.0
✓	Chromium	ND	mg/L	0.1	EPA Primary	0.010
✓	Copper	ND	mg/L	1.3	EPA Action Level	0.004
▲	Iron	0.428	mg/L	0.3	EPA Secondary	0.020
✓	Lead	ND	mg/L	0.015	EPA Action Level	0.002
●	Lithium	0.003	mg/L	--		0.001
●	Magnesium	14.78	mg/L	--		0.10
▲	Manganese	0.224	mg/L	0.05	EPA Secondary	0.004
✓	Mercury	ND	mg/L	0.002	EPA Primary	0.001
✓	Nickel	ND	mg/L	--		0.020
✓	Selenium	ND	mg/L	0.05	EPA Primary	0.020
✓	Silver	ND	mg/L	0.100	EPA Secondary	0.002
●	Sodium	8	mg/L	--		1
●	Strontium	0.114	mg/L	--		0.001
✓	Uranium	ND	mg/L	0.030	EPA Primary	0.001
●	Zinc	0.015	mg/L	5	EPA Secondary	0.004
			Physical Factors			
●	Alkalinity (Total as CaCO3)	110	mg/L	--		20
✓	Corrosivity	-0.491	SI	--		
✓	Foaming Agents	ND	mg/L	--		0.1
▲	Hardness	150	mg/L	100	NTL Internal	10

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	pH	7.3	pH Units	6.5 to 8.5	EPA Secondary	
●	Total Dissolved Solids	150	mg/L	500	EPA Secondary	20
▲	Turbidity	3.5	NTU	1.0	EPA Action Level	0.1
	Inorganic Analytes - Other					
✓	Bromide	ND	mg/L	--		0.5
●	Chloride	7.9	mg/L	250	EPA Secondary	5.0
✓	Fluoride	ND	mg/L	4.0	EPA Primary	0.5
✓	Nitrate as N	ND	mg/L	10	EPA Primary	0.5
✓	Nitrite as N	ND	mg/L	1	EPA Primary	0.5
●	Sulfate	16.0	mg/L	250	EPA Secondary	5.0
	Organic Analytes - Trihalomethanes					
✓	Bromodichloromethane	ND	mg/L	--		0.002
✓	Bromoform	ND	mg/L	--		0.004
✓	Chloroform	ND	mg/L	--		0.002
✓	Dibromochloromethane	ND	mg/L	--		0.004
✓	Total THMs	ND	mg/L	0.080	EPA Primary	0.002
	Organic Analytes - Volatiles					
✓	1,1,1,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,1-Trichloroethane	ND	mg/L	0.2	EPA Primary	0.001
✓	1,1,2,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,2-Trichloroethane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,1-Dichloroethane	ND	mg/L	--		0.002
✓	1,1-Dichloroethene	ND	mg/L	0.007	EPA Primary	0.001
✓	1,1-Dichloropropene	ND	mg/L	--		0.002
✓	1,2,3-Trichlorobenzene	ND	mg/L	--		0.002
✓	1,2,3-Trichloropropane	ND	mg/L	--		0.002
✓	1,2,4-Trichlorobenzene	ND	mg/L	0.07	EPA Primary	0.002
✓	1,2-Dichlorobenzene	ND	mg/L	0.6	EPA Primary	0.001

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	1,2-Dichloroethane	ND	mg/L	0.005	EPA Primary	0.001
✓	1,2-Dichloropropane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,3-Dichlorobenzene	ND	mg/L	--		0.001
✓	1,3-Dichloropropane	ND	mg/L	--		0.002
✓	1,4-Dichlorobenzene	ND	mg/L	0.075	EPA Primary	0.001
✓	2,2-Dichloropropane	ND	mg/L	--		0.002
✓	2-Chlorotoluene	ND	mg/L	--		0.001
✓	4-Chlorotoluene	ND	mg/L	--		0.001
✓	Acetone	ND	mg/L	--		0.01
✓	Benzene	ND	mg/L	0.005	EPA Primary	0.001
✓	Bromobenzene	ND	mg/L	--		0.002
✓	Bromomethane	ND	mg/L	--		0.002
✓	Carbon Tetrachloride	ND	mg/L	0.005	EPA Primary	0.001
✓	Chlorobenzene	ND	mg/L	0.1	EPA Primary	0.001
✓	Chloroethane	ND	mg/L	--		0.002
✓	Chloromethane	ND	mg/L	--		0.002
✓	cis-1,2-Dichloroethene	ND	mg/L	0.07	EPA Primary	0.002
✓	cis-1,3-Dichloropropene	ND	mg/L	--		0.002
✓	DBCP	ND	mg/L	--		0.001
✓	Dibromomethane	ND	mg/L	--		0.002
✓	Dichlorodifluoromethane	ND	mg/L	--		0.002
✓	Dichloromethane	ND	mg/L	0.005	EPA Primary	0.002
✓	EDB	ND	mg/L	--		0.001
✓	Ethylbenzene	ND	mg/L	0.7	EPA Primary	0.001
✓	Methyl Tert Butyl Ether	ND	mg/L	--		0.004
✓	Methyl-Ethyl Ketone	ND	mg/L	--		0.01
●	Styrene	0.002	mg/L	0.1	EPA Primary	0.001
✓	Tetrachloroethene	ND	mg/L	0.005	EPA Primary	0.002

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	Tetrahydrofuran	ND	mg/L	--		0.01
✓	Toluene	ND	mg/L	1	EPA Primary	0.001
✓	trans-1,2-Dichloroethene	ND	mg/L	0.1	EPA Primary	0.002
✓	trans-1,3-Dichloropropene	ND	mg/L	--		0.002
✓	Trichloroethene	ND	mg/L	0.005	EPA Primary	0.001
✓	Trichlorofluoromethane	ND	mg/L	--		0.002
✓	Vinyl Chloride	ND	mg/L	0.002	EPA Primary	0.001
✓	Xylenes (Total)	ND	mg/L	10	EPA Primary	0.001
	Organic Analytes - Others					
✓	2,4-D	ND	mg/L	0.07	EPA Primary	0.010
✓	Alachlor	ND	mg/L	0.002	EPA Primary	0.001
✓	Aldrin	ND	mg/L	--		0.002
✓	Atrazine	ND	mg/L	0.003	EPA Primary	0.002
✓	Chlordane	ND	mg/L	0.002	EPA Primary	0.001
✓	Dichloran	ND	mg/L	--		0.002
✓	Dieldrin	ND	mg/L	--		0.001
✓	Endrin	ND	mg/L	0.002	EPA Primary	0.0001
✓	Heptachlor	ND	mg/L	0.0004	EPA Primary	0.0004
✓	Heptachlor Epoxide	ND	mg/L	0.0002	EPA Primary	0.0001
✓	Hexachlorobenzene	ND	mg/L	0.001	EPA Primary	0.0005
✓	Hexachlorocyclopentadiene	ND	mg/L	0.05	EPA Primary	0.001
✓	Lindane	ND	mg/L	0.0002	EPA Primary	0.0002
✓	Methoxychlor	ND	mg/L	0.04	EPA Primary	0.002
✓	Pentachloronitrobenzene	ND	mg/L	--		0.002
✓	Silvex 2,4,5-TP	ND	mg/L	0.05	EPA Primary	0.005
✓	Simazine	ND	mg/L	0.004	EPA Primary	0.002
✓	Total PCBs	ND	mg/L	0.0005	EPA Primary	0.0005
✓	Toxaphene	ND	mg/L	0.003	EPA Primary	0.001

Status	Contaminant	Results	Units	National Standards	Min. Detection Level
✓	Trifluralin	ND	mg/L	--	0.002

We certify that the analyses performed for this report are accurate, and that the laboratory tests were conducted by methods approved by the U.S. Environmental Protection Agency or variations of these EPA methods.

These test results are intended to be used for informational purposes only and may not be used for regulatory compliance.

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