FINAL REPORT
In Support of the Large Groundwater Withdrawal Permit Application
for
Aquarion Water Company of New Hampshire
Well 22, Hampton, NH

Prepared For:
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Prepared by:

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Project No. 12217

April 1, 2019

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Large Production Wells and Wells for Large Community Water Systems

Drinking Water and Groundwater Bureau

Rule: Env-Dw 302

REPORT COVER PAGE

PROJECT NAME	AQUARION Well 22
PROJECT TOWN	Hampton, NH
PWS ID	1051010

APPLICANT (Project/Water System Owner)

Name	Aquarion Water Company of New Hampshire
Mailing Address	7 Scott Road, Hampton, NH 03842
Daytime Phone Number	603-926-3319
Email Address	cmcmorran@aquarionwater.com

WELL SITE OWNER (Property Owner)

Name	
Mailing Address	SAME AS ABOVE
Daytime Phone Number	
Email Address	

PROJECT CONTACT/REPORT PREPARER

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PUMPING TEST PERFORMER/CONTACT

Name	
Mailing Address	SAME AS ABOVE
Daytime Phone Number	
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SUBMITTAL INFORMATION

1. Project Type:
   - a. ____ New well(s) for New System
   - b. __X__ New well(s) for Existing System
   - c. ____ Replacement well(s) for Existing System
   - d. ____ Hydrofractured or Deepened well(s) for Existing System

2. Proposed permitted production volume in gallons per day: 1,224,000

REPORT CERTIFICATION STATEMENT

By signing this report, the signer certifies that the information contained in or otherwise submitted with this report is true, complete and not misleading to the best of the signer's knowledge and belief.

By signing this report, the signer understands that submission of false, incomplete or misleading information is grounds for:

- Not approving the report;
- Revoking any approval that is granted based on the information;
- Suspending or revoking the professional license held by the signer if the department is the licensing authority or referring the matter to the appropriate licensing authority for potential action against the professional license held by the signer if other than the department; and
- If the signer is acting as or on behalf of a listed engineer as defined in Env-C 502.10, debarring the listed engineer from the roster.

By signing this report, the signer understands that they are subject to the penalties specified in New Hampshire law, currently RSA 641:3, for making unsworn false statements.

By signing this report, the signer and applicant agree to comply with all applicable rules and conditions of the approval, if one is issued.

SIGNATURES

APPLICANT: Carl M McMorran, OPERATIONS MANAGER **DATE:** 4/1/2019

PRINTED NAME: Carl McMorran, Aquarion Water Company of New Hampshire

***REPORT PREPARER:** [signature] **DATE:** April 1, 2019

PRINTED NAME: David Niemeyer, Geosphere Environmental Management, Inc.

PROFESSIONAL LICENSE TYPE: NH Professional Geologist

PROFESSIONAL LICENSE NUMBER: 470

**This cover page must bear the stamp or seal of the NH-licensed Professional Engineer (P.E.) or Professional Geologist (P.G.) who prepared the report.*

For additional information contact NHDES' Community Well Siting program manager at (603) 271-8866.

LARGE GROUNDWATER WITHDRAWAL PERMIT APPLICATION NOTIFICATION FORM

NOTICE OF SUBMITTAL TO THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

PROJECT LOCATION

Site Name and Owner (if different than Applicant)	AQUARION Well 22
Address	Little River Road, Hampton, NH
Tax Map/Lot Number	Map 165 / Block 1
Municipality(s) in Potential Impact Area	Hampton, North Hampton
Community Water Supplier(s) in Potential Impact Area	
	Aquarion Water Co. of NH

APPLICANT

Name	Carl McMorran
Affiliation	Aquarion Water Company
Mailing Address	7 Scott Road, Hampton, NH 03842
Phone Number	(603) 926-3319
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APPLICATION PREPARER (provide imprint of professional license stamp)

Name	David Niemeyer, P.G.
Company Name	Geosphere Environmental Management, Inc.
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Phone Number	(603) 773-0075 ext. 12
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*Notice to application preparer: Provide copies of certified mail receipts to NHDES immediately following each submittal.

For additional information contact Christine Bowman at (603) 271-8866 or christine.bowman@des.nh.gov or Stephen Roy at (603) 271-3918 or stephen.roy@des.nh.gov .

SUBMITTAL INFORMATION

SUBMITTAL TYPE **DATED:** _____

- ☐ Preliminary Application
- ☐ Preliminary Application – Supplemental Information
- ☒ Final Report
- ☐ Final Report – Supplemental Information
- ☐ Permit Renewal Application
- ☐ Other: _____

PROJECT TYPE

- ☒ Public Water Supply
- ☐ Bottled/Bulk Water Supply
- ☐ Irrigation Water Supply
- ☐ Process Water Supply
- ☐ Other: _____

1. Type of proposed water source: __x__ Bedrock well(s), ____ Overburden well(s), ____ Spring
2. Number of proposed water sources: __1__
3. Proposed cumulative withdrawal volume in gallons per day: 1.224×10^6

Project Summary: (please provide a brief description of your proposed project in the space below)

AQUARION is seeking a Large Groundwater Withdrawal Permit for a new bedrock public water supply well in Hampton, NH. A pumping test was performed in accordance with Env-Wq 403.16 and Env-Dw 302.19. Well 22 was pumped at 850 gpm for 27 days. Well 22 is located approximately 120 feet from AQUARION's Well 7, a sand and gravel packed public water supply well which yields over 500 gpm. Aquarion Water Company provides drinking water to Hampton, North Hampton, and parts of Rye NH.

NOTE: Per RSA 485-C:21, the deadline to request a public hearing for this project is fifteen (15) days following receipt of the Preliminary Application or Final Report. See the attached NHDES fact sheet WD-DWGB-22-15 regarding the permitting process.

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ATTACHMENT

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1.0 INTRODUCTION

This Final Report is submitted in support of Aquarion Water Company of New Hampshire's (Aquarion) application for a Large Groundwater Withdrawal Permit for Well 22, initiated in March 2017, from the New Hampshire Department of Environmental Services (NHDES). The following information is provided, as required by NHDES Administrative Rules ENV-Wq 403.20 and ENV-Dw 302.29.

Large Groundwater Withdrawal Permit Applicant:	Aquarion Water Co. of New Hampshire c/o Carl McMorran, Operations Manager 7 Scott Road Hampton, NH 03842 (603) 926-3319 CMcMorran@aquarionwater.com http://www.aquarion.com/NH/
Well Site:	Aquarion Well 22, Little River Road, Hampton, NH Map 165 – Block 1
Permitted Production Volume Requested:	1,224,000 gallons per day (gpd)
Owner of Water System:	(Same as above)
Owner of the Well Site:	(Same as above)
Responsible for Implementing the Wellhead Protection Program:	(Same as above)
Project Contacts:	Mr. David Niemeyer, P.G. New Hampshire Professional Geologist (#470) Dr. Raymond Talkington, Ph.D., P.G., C.P.G. Cert. Professional Geologist (AIPG #7935, NH #86) Geosphere Environmental Management, Inc. 51 Portsmouth Avenue Exeter, NH 03833 (603) 773-0075 x 12

Persons Served by the System: The proposed groundwater withdrawal source is a bedrock well identified as Aquarion Well 22. It will provide a new source of water to Aquarion's public water system which services customers connected to its water distribution system in Hampton, North Hampton and Rye (Jenness Beach area), New Hampshire. Aquarion plans to utilize the well as a new source of supply to meet current and future system requirements.

This Final Report was prepared in accordance with NHDES Rules Part Env-Wq 403: Large Groundwater Withdrawals, and Part Env-Dw 302: Large Production Wells and Wells for Large Community Water Systems. Env-Wq 403 establishes procedures and standards for development of a large groundwater withdrawal, defined in RSA 485-C:2, IX-a as: "any withdrawal from groundwater of 57,600 gallons or more of water in any 24-hour period at a single property or place of business except withdrawals associated with short-term use". Env-Dw 302.03 (g) defines a large production well as "a production well having a permitted production volume of equal to or greater than 57,600 gallons or more of water in any 24-hour period." Based on a proposed production volume of approximately 1.2 million gallons per day (MGD), Well 22 meets the criteria established by NHDES for a Large Groundwater Production Well.

A preliminary conceptual hydrogeologic model (CHM) was developed for the proposed withdrawal and submitted to the NHDES as Section 4.0 in the *Preliminary Report and Large Groundwater Withdrawal Permit Application* (hereafter, "Preliminary Report") prepared by Geosphere Environmental Management, Inc. (GEOSPHERE) dated March 24, 2017. A proposal to conduct a pumping test, designed to obtain additional data as required by Env-Wq 403.11 and Env-Dw 302.14, was included in Section 7.0 of the Preliminary Report. Supplemental GEOSPHERE correspondence with NHDES, dated April 20, 2017, November 7, 2018 and March 9, 2018, support the original application and are considered addenda to the Permit Application. Following NHDES approval of the permit application November 28, 2017, and the securing of agreements with local private well owners to monitor their wells, the withdrawal program (i.e., long-term pumping test), consisting of antecedent, pumping, and recovery phases of a pumping test, was conducted from June 13 to July 20, 2018.

1.1 Site Description

Aquarion's Well 22 is located in a rural, primarily residential and wooded area half-way between the downtown Hampton area on Route 1 area and Hampton's North Beach area on Route 1A (see **Figure 1** for Site Locus). Well 22, as well as Aquarion's Well 7, an existing sand and gravel production well, are located on Map 165/Block 1 in Hampton, NH, at the end of Bonnie Lane, off Little River Road in Hampton, NH. This 12.1 acre lot is comprised primarily of undeveloped forest, and is developed with a pump house/treatment building containing Well 7, an asphalt paved and gravel entrance driveway, an emergency propane storage tank, and overhead and underground utilities necessary for the operation and distribution of the water supply (see **Figure 2** for Map and Lot Detail).

1.2 Site Setting

The site is located in an area of Hampton zoned for residential use; site abutters and neighboring properties are residential or undeveloped forest. The closest developed properties to Well 22 consist of single-family homes on Little River Road, McCarron Drive, and Springhead Lane. In total, eighteen (18) single-family residential properties are located within a 900-foot radius from Well 22.

Bonnie Lane and the parcel identified as Map 165/Lot 2 adjoin the Site to the southwest. Map 165/Lot 2 is approximately 6 acres, and is a wooded, undeveloped property owned by the Town

of Hampton. Map 164/Lot 13 adjoins the Town's lot to the south; it is a 0.83 acre wooded lot that was acquired by Aquarion in 2016 (see **Figure 2**).

A residential condominium complex (Sea Oaks, 400 High St.) abuts the parcel to the east, approximately 1,500 from Well 22 (see **Figure 2**). According to the Town of Hampton DPW, streets in the vicinity of the Site, namely: Little River Road, McCarron Drive, Ward Lane, Taylor Street and Springhead Lane, are all improved with separate municipal sewer and storm drainage utilities. The Sea Oaks condominiums are also served by municipal sewer. The presence of municipal sewer utilities throughout the Site area reduces the potential for water quality impacts associated with septic systems and leach fields in the area, which might otherwise pose a wellhead protection area concern.

The closest significant commercial or industrial properties are located approximately one mile from Well 22 in any direction: U.S. Route 1, approximately 1.3 miles to the west; US Route 1A, approximately 1 mile to the east; and the former Hampton landfill, currently the Hampton Public Works Department and Wastewater Treatment Plant, 1 mile to the south.

The Site is located within the Town of Hampton's Aquifer Protection district; zoning in the Aquifer Protection district limits development and activities to those with the least risk of impact to the aquifer resource.

The topography of well site slopes downward in the southeasterly direction, with elevations ranging from approximately 50 feet above vertical datum (AVD, North American Vertical Datum, 1988) on the west side of the property, to approximately 30 feet AVD on the east side of the property. Surface water runoff on the property flows to the southeast towards wetlands and a stream at the southeastern-most portion of the parcel approximately 1,200 feet from Well 22. The stream flows to the southwest, beneath High Street, before turning east and discharging into Meadow Pond, a tidally-influenced pond located approximately 3,300 feet southeast of Well 22 (see **Figures 1 and 3**).

Based on a review of the Town of Hampton Flood Emergency Management Act (FEMA) maps, provided as Appendix G of the Preliminary Report, Well 22 is not located within the 100-year flood plain associated with any nearby surface water body. The nearest mapped 100-year flood plain boundary, approximately 1,500 feet southeast of the Site, is Dow's River which drains to Meadow Pond, the back-barrier salt marsh behind (west of) Hampton Beach. Wetlands mapping of the Site in August 2017 identified wetlands vegetation no closer than 400 feet from Well 22. The national wetlands inventory (NWI) data layer (NH GRANIT / U.S. Fish and Wildlife Service), as well as wetlands flagging locations delineating field-determined wetlands areas within 1,000 feet of Well 22 are shown on **Figure 3**. Wetland flagging was performed by Michael Seekamp of Seekamp Environmental Consulting, Inc. in Kingston, NH (NH Certified Wetlands Scientist #169).

Well 22 is not located within 50 feet from the normal high water line of any surface water, nor is it located within 50 feet of any wetlands that are inundated with water for more than 30 continuous days.

1.3 Site History and Ownership

Aquarion's predecessor, Hampton Water Works Co, (HWWC) installed Well 7 in 1950. The property has been used continuously as a water source/distribution facility since 1950.

A review of historical USGS topographic maps dating to the 1890s reveals no historical development of the parcel, or its general area, prior to the installation of Well 7. The abutting Map 165 Lot 2 was similarly undeveloped for the period 1890-1950; it has been under the ownership of the Town of Hampton since 1992. Residential development of the area was limited to High Street and the area of Little River Road near the intersection with High Street until the late 1950s. Residential growth in the immediate site area began in the late 1950s and continued through the 1960s and 1970s.

Aquarion Water Company of NH acquired HWWC in 2001 and took ownership and control of the operation of all HWWC infrastructures.

1.4 Description of Intended Use

Well 22 is a bedrock groundwater supply well that will provide a new source of groundwater to Aquarion's public water system. Aquarion plans to utilize groundwater from the well to meet current and future system requirements. Additional water source capacity is sought due to current and anticipated future predicted growth and development within the Aquarion service area, as well as to provide diversification of public water sources, which will increase resiliency to the water system during drought conditions.

Well 7 is a NHDES-approved public water supply (PWS) well that has been in operation from the Site since 1950. Well logs describe Well 7 as being a 46 foot deep, 24-inch diameter, gravel-packed well installed in the unconsolidated overburden material (i.e., sand and gravel aquifer) which overlies the bedrock. Well 7 is constructed with a 15 foot screen of transite and stainless steel (see **Appendix B)**. Alternatively, Well 22 is a 560 foot deep bedrock well which is located approximately 160 feet northwest of Well 7, see **Figure 2**. Well 22 was installed in October 2012.

Aquarion operates seven (7) water supply wells in the preliminary Potential Impact Area (PIA) identified in the 2017 Preliminary Report and LGW Application. Aquarion additionally utilizes nine water supply wells in the region, which are *outside* the preliminary Potential Impact Area (see **Figure 4**). These current withdrawals are summarized in **Table 1**, attached. Based on the NHDES water well database, an additional 50 private wells are estimated to withdraw groundwater from the PIA.

2.0 LONG-TERM PUMPING TEST

2.1 Introduction

The NHDES-approved long-term pumping test ("withdrawal test") on Well 22 was conducted from June 13 to July 20, 2018 in accordance with the Design of the Withdrawal Testing Program (Section 7 of the Preliminary Report, March 24, 2017), and modifications outlined in GEOSPHERE's correspondence to NHDES dated April 20, 2017, November 7, 2018 and March 9, 2018. The test consisted of an antecedent phase (7 days), a minimum pumping phase of 14 days, extended to 27 days, and a recovery phase (3 days). Monitoring point descriptions and locations are summarized in **Table 2**.

Previous short-term pumping tests and water quality analyses conducted in 2012 and 2016 were summarized in the Preliminary Report. Data from these tests supported Aquarion's request for, and NHDES' approval of discharging water from Well 22 throughout the pumping test into Aquarion's distribution system. Water pumped from Well 22 was treated on-site using the Well 7 pH adjustment and chlorination treatment system prior to discharge into the distribution system. Management of discharge water in this way served three purposes: 1) to prevent infiltration of the discharged water into the ground, potentially artificially recharging the shallow and/or bedrock aquifers near Well 22 and interfering with the pumping test results; 2) to eliminate the effects of the discharged groundwater on nearby surface waters being monitored during the test; and 3) replacing source water from Well 7, one of Aquarion's largest producer of drinking water, which was shut down for the entire duration of the 37 day pumping test. This was particularly critical for meeting demand, as the test was performed at the onset of the summer high water demand season.

Groundwater and surface water levels were monitored at on-and off-site monitoring points prior to (antecedent), during (pumping) and after (recovery) the pumping portion of the test.

Monitoring of water levels at all monitoring points commenced at least 7 days prior to the start of pumping at Well 22 and continued for approximately 70 hours (3 days) after the shutdown of Well 22. In the case of most of the private wells and monitoring points, pressure transducer/data logger instruments were installed in April 2018 and began collecting water level data, far in advance of the June 13 antecedent period start date. Water level data from the period prior to June 13 was collected and retained. For the purposes of this report, data tabulated and graphed begins with the official antecedent start date of June 13, 2018.

As indicated above, groundwater withdrawal from Well 7 was suspended throughout the entire 37-day pumping test (antecedent, pumping, and recovery periods) from June 13 to July 20, 2018. Groundwater withdrawals from Aquarion's other wells (overburden production Wells 6, 8A, 9, 11) and bedrock Wells 20 and 21 continued routinely throughout the test – turning on and off as demand required, unless repairs or maintenance were being conducted. Water levels and pumping rates for all of Aquarion's production wells are continuously monitored and recorded every minute by Aquarion's SCADA system.

Well 7 has historically served as a primary water source for Aquarion, accounting for 21% of Aquarion's production from within the PIA in 2016. As noted above, because Well 7 was shut down during the pumping test; the groundwater pumped from Well 22 was a critical addition into the Aquarion water distribution system during the high demand summer testing period.

2.2 Pumping Equipment and Monitoring Procedures

Groundwater was extracted from Well 22 using a Grundfos 3-phase, 100 horse-power (60 Hz) submersible pump set to a depth of 215 feet below ground surface (bgs). The depth of the pump intake is above the uppermost water-bearing fracture zone ('critical pumping level'), identified during previous investigations to be 219 feet bgs.

The discharge rate of the pump was regulated by a variable frequency drive (VFD) which was electrically powered by and connected to the Well 7 pump station power service (supplied by Unitil). A new 4-inch Badger Meter® electromagnetic flow meter was installed to continuously monitor the discharge rate of the Well 22 pumping system. The flow meter was newly manufactured and was factory-calibrated on February 27, 2018 by the manufacturer, Badger Meter. A calibration report for the flow meter is included in **Appendix E**.

Discharge flow rates were displayed on an electronic panel on the VFD and were recorded by Aquarion's SCADA system every 15 minutes. Manual recording of the discharge was conducted every minute for the first 10 minutes, and at least every 10 minutes for the first hour.

As will be discussed further below, the final pumping rate was limited by the capacity of the pumping test equipment and hydraulic backpressures within the distribution system, as described further below, not by the sustainable or safe yield of the well, which exceeds the pumping rate (see Section 2.5.1).

The pumping test equipment was installed with a sampling port which allowed collection of water samples for sampling/analysis and monitoring of the water quality using in-field pH, salinity and specific conductivity meters, and to observe changes in color and odor during the course of pumping. Water quality monitoring is described in detail in Section 2.6.

Adjustment Period June 20 – June 23, 2018

The pumping phase of test began at 10 am on Wednesday June 20, 2018. The first two days of the pumping phase constituted a pumping rate adjustment period: during the first hour of the test, the equipment was "ramped up" to a discharge rate of 650 gpm and was allowed to equilibrate for period of 27 hours. Approximately five (5) hours into the equilibration period, the pumping rate dropped to a low of approximately 350 gpm due to resistance from backpressure effects within the Aquarion distribution system. The condition lasted for about 20 minutes, as technicians worked to identify the source of and relieve system backpressures, before the pumping rate returned to 650 gpm. During the 650 gpm adjustment step, backpressures were observed to be sporadic, of brief duration, and widely spaced. The VFD controlled the discharge during this 27-hour step at an average discharge rate of 645.8 gpm.

Backpressure Effects

System pressures were closely monitored throughout the remainder of the pumping test; the backpressure effect was observed again intermittently throughout the duration of the pumping phase of the program (the timing of which coincided with Aquarion's highest periods of demand), growing more frequent and for longer durations as the testing continued.

A pattern of backpressure effects, reducing the flow rate by approximately 1%, was observed almost every evening. According to Aquarion, late evening hours are a time when the distribution system is adjusted, as consumer demand drops and booster pumps engage in order to fill storage tanks to a sustainable level. Changes in system dynamics also affect frictional head loss effects which can play a part in backpressures observed at the Well 22 discharge point.

750 gpm Flow Rate

After the water level was observed to equilibrate at the 650 gpm flow rate, the discharge rate was increased to 750 gpm at 1:15 pm on June 21, 2018. The pumping rate was held at 750 gpm for 45 hours. During the 750 gpm adjustment step, backpressures were observed to be minimal and sporadic. The VFD controlled the discharge during this 45-hour step at an average rate of 750.2 gpm.

A review of the SCADA-logged discharge rate data reveals that the SCADA unit failed to capture flow rate data for two episodes on June 22: a 3-hour period between 8:45 and 11:45 am, and a 1.25-hour period between 12:15 and 1:30 pm. A flow rate of 745 gpm was recorded manually at 10 am on June 22, and a second reading of 754 gpm was recorded manually at 2 pm on that date. The episode was not noticed at the time, and the cause for the malfunction was not determined. However, the SCADA system automatically backfilled these time intervals with the value of the last measured data point prior to these lapses.

850 gpm Flow Rate

The pumping rate was increased from 750 to 850 gpm on June 23rd, 72 hours after pumping was initiated. During the first 10 days after the pumping test was increased to 850 gpm (6/23/18 to 7/2/18), the VFD controlled the discharge at an average flow rate of 848 gpm.

850 gpm Flow Rate – Middle Phase

During the middle phase of the 850 gpm pumping test (7/2/18 – 7/13/18), increased frequency and duration of backpressure episodes were observed during daytime periods as well as in the previously-observed evening periods. The discharge rate became reduced during these episodes, but remained within 1% of 850 gpm.

Intermittently and for very brief periods, backpressures reduced the discharge by more than 1% of the nominal 850 gpm flow rate. The pumping rate was reduced by less than 5% for very brief periods, on July 5, 7 and 8. Similar to the episode observed early in the pumping test, the pumping rate was reduced to 755 gpm (reduction of 9%) over a 90 minute period on 7/10/18 as a

result of backpressure effects within the Aquarion distribution system. Because the electrical service and pump were operating at their maximum capacities, the VFD could not boost power to the pump to overcome these periodic backpressure episodes. The average pumping rate for Well 22 during this middle phase was 835 gpm.

850 gpm Flow Rate – Late Phase

During the last 72 hours of the pumping test (July 13 – 17, 2018), backpressure effects and subsequent pumping rate reductions of about 1% of 850 gpm were observed on a nearly continuous basis. Occasionally, backpressures reduced the pumping rate by greater than 1%, with a maximum reduced flow rate of 6.9% (791 gpm) recorded just before pumping test shutdown on July 17, 2018. The consistent backpressure effects are attributed to the higher summer demands on the system. Because of the backpressure effects, the Well 22 pumping rate averaged 828 gpm during the last 3 days of pumping. An average of 829 gpm was recorded for the last 7 days of the 27 day pumping test.

The period of early to mid-July coincides with some of Aquarion's highest water demand days of the year – with the number of summer residents and visitors often at its peak. The daily total water demand on Aquarion's system during the pumping and recovery phases of the pumping test (June 20-July 20, 2018) was 91.2 million gallons, an average of 3 MGD.

Total Discharge Volume:

The total discharge from the pumping test was determined in two ways: 1) a direct reading from the digital totalizer on the electromagnetic flow meter, which recorded the total discharge volume for the pumping test to be 32,115,543 gallons; and 2) calculations from the SCADA-logged pumping rate and discharge values. Since the SCADA system captured and logged data in 15 minute intervals, each data point was multiplied by a factor of 15 to calculate the total discharge. As noted above, the flow rate varied throughout the test due to the limits of the equipment and periodic backpressure conditions within the distribution system. However, in general, flow rates stayed within 1% of the nominal 850 gpm target. The calculated total discharge from Well 22 based on SCADA system data was 31,949,082 gallons, 166,461 gallons greater than the totalizer on the electromagnetic flow meter. These numbers reflect a difference of 0.5% between totalizer and calculations from pumping rates.

The limits of the electrical capacity and equipment reduced the flow rate from Well 22 from the potentially sustainable flow rate of 940 gpm, proposed in the Preliminary Report, to the *nominal* pumping test flow rate of 850 gpm.

Groundwater extracted during the pumping test was discharged directly into the Aquarion distribution system in order to prevent any impacts to the monitoring locations as a result of induced infiltration. The 31.95 million gallons of groundwater extracted from Well 22 constitutes 50% of the total groundwater extracted from the Potentially Impacted Area, and 35% of Aquarion's total system-wide production for the period June 20-July 20, 2018. Discharge volumes from other Aquarion wells pumped during the pumping test are summarized in **Table 3**.

Due to the system backpressures described above, during the last 7 days of the test, the total extraction rate from Well 22 averaged 828.75 gpm. Detailed flow measurement records are included in the data tables provided in **Appendix E**. The average flow rates as calculated for the pumping test are summarized below.

Summary of Well 22 Pump Test - Pumping Rate Averages (gpm)

Average Pumping Rate - 6/20/18 – 7/17/18 (including step-ups)	824.6
Average Pumping Rate - 7/23/18 8:00 am to 7/17/18 10:45 am	838.6
Average Pumping Rate final 7 days of pumping - 7/9/18 to 7/17/18	829.8
Average Pumping Rate day 8 through day 14 - 6/27/18 00:00 - 7/3/18 23:45	845.6

2.3 Monitoring Program

GEOSPHERE conducted an extensive monitoring program to assess the effects of pumping Well 22. The on-site monitoring program included monitoring the water level in the bedrock, and sand and gravel (overburden) aquifers, as well as wetlands on the Site and in the immediate site vicinity through the use of three (3) existing wells and a newly-installed piezometer/staff gauge network. The network was comprised of seven (7) monitoring points that were installed to monitor surface water and/or shallow groundwater response during the pumping test in nearby wetland areas. These monitoring points consisted of three (3) wetland piezometers/staff gauge couplets, and one stand-alone piezometer.

Off-site, the water levels in six (6) Aquarion production wells and three (3) Aquarion observation wells were monitored. Additionally, water levels in privately-owned wells at 20 off-site properties were monitored. The selection of private wells was approved by NHDES. **Table 4** lists each monitoring location and summarizes the monitoring schedule conducted at each monitoring point.

2.3.1 On-Site Monitoring

2.3.1.1 Existing Wells on Site

The water level in three existing wells at the Site: bedrock Well 22, existing sand and gravel public water supply Well 7, and overburden monitoring well 7-OBS, were monitored throughout the pumping test, including antecedent, pumping and recovery phases.

<u>Well 22</u>

Groundwater levels were monitored continuously, with data logged at 1-minute intervals at Well 22 using a pressure transducer/datalogger instrument installed within a polyethylene stilling tube in Well 22. Supplemental to the pressure-transducer/datalogger, hand measurements were

collected using an electronic water level indicator dropped into the same stilling tube as the pressure transducer. The pressure transducer at Well 22 was installed on June 11, 2018 and monitored groundwater levels at Well 22 continuously for approximately 48 hours. Data collection was interrupted on June 13, when pump installers removed the instrument to install and test the pump equipment. Antecedent monitoring of Well 22 resumed on June 14, 2018 with continuous monitoring of water levels through the end of the recovery period on July 20, 2018. A linear graph of the transducer data is included in **Appendix D**.

Other On-site Wells

Groundwater elevations were monitored in on-site wells 7-Obs and Aquarion's Well 7. Both wells are located approximately 120 feet southeast of Well 22 and are screened within the sand and gravel aquifer. These wells were selected to monitor the effects of pumping and evaluate the potential for hydraulic connection between the bedrock and overburden aquifers.

Well 7-Obs is a 2-inch diameter monitoring well installed to a depth of 19.9 feet bgs and located 8 feet from production Well 7. During the pumping test (antecedent, pumping, and recovery phases) changes in water levels at 7-Obs were monitored using a pressure transducer/datalogger which recorded data at one-minute intervals. A well log for 7-Obs is not available. Water level data for 7-Obs are illustrated on graphs included in **Appendix D**, and tabulated in **Appendix G**.

Aquarion Well 7 was offline during the entire long-term pumping test. Well 7 is equipped with a water level transducer integrated into Aquarion's SCADA system. While the SCADA system continuously records data (every 1-2 minutes), the data presented in this Final Report was reduced to 15 minute intervals. The well installation log for Well 7 is included in **Appendix B**. SCADA-generated data for production Well 7 and other nearby Aquarion Production Wells are included in **Appendix E**.

The monitoring point locations were identified by GEOSPHERE using Global Position System and LiDAR technology, as described in Section 2.3.3, and are shown in **Figure 3**.

2.3.1.2 Wetlands Piezometers

Four (4) piezometers (PZ-1 through PZ-4) and accompanying (unvented) *Rugged Troll 100* pressure transducer/datalogger instruments were manually-installed by GEOSPHERE technicians into shallow wetland areas at the Site in April 2018.

PZ-1 is located in the extensive wetland area at the southeastern boundary of the parcel boundary. This wetland comprises the nearest surface waters to Well 22 (as seen on the USGS topographic map) and represents the headwaters of a small stream which flows south beneath High Street and then east where it discharges into Meadow Pond, a tidally-influenced surface water body located west of North Beach in Hampton (see **Figure 3**). PZ-2, recommended by NHDES, is located east of the Well 22, in or near wetlands located downgradient of a culvert discharge pipe on the Hunter Drive cul-de-sac. These wetlands drain northeastward, into Old Millpond. PZ-3 and PZ-4 are located 857 feet and 417 feet southeast of Well 22, respectively. PZ-3 was placed in or near wetlands containing seasonal, land-locked surface water, however this area went dry early into the

pumping test. PZ-4 was placed in the closest mapped wetlands located within 1,000 feet of Well 22. Piezometer locations are identified on **Figure 3**.

The screened intervals for the piezometers were designed to penetrate wetlands materials only. Each piezometer was constructed of a 2 foot length of 1.25-inch diameter, 0.020-inch slot, wire-wound stainless steel screen threaded to a compatible 5 foot galvanized steel riser. The piezometers were installed by driving the pointed screen into the subsurface with a hand sledge or slide hammer. Piezometers were driven to maximum depths ranging from 3.12 feet to 4.08 feet bgs. No soil or water samples were collected by GEOSPHERE personnel during the piezometer and staff gauge installation activities. All monitoring point construction details, including piezometers, are summarized in **Table 5**.

2.3.1.3 Staff Gauges

In April 2018, three (3) staff gauges (SG-1, SG-2 and SG-3) were manually installed by GEOSPHERE technicians into wetland areas adjacent to the corresponding piezometers (e.g., PZ-1/SG-1, etc.). Each staff gauge was attached to a metal fence post. Each post was manually driven into shallow wetland soils to depths sufficient to allow the staff gauge to intercept the wetland surface water. Staff gauge locations are illustrated on **Figure 3**.

A staff gauge was not installed adjacent to PZ-4, as no standing water was observed at the time of the installation of PZ-4 in April 2018, or during the course of the pumping test.

Staff Gauges SG-1 and SG-2 were equipped with non-vented, *Rugged Troll 100* pressure transducer/datalogger instruments in June 2018. Although standing surface water was present at SG-3 in April when SG-3 was installed, all surface water in the land-locked wetland area near SG-3 had disappeared (i.e., by evaporation, transpiration, and/or infiltration) by June, when dataloggers were deployed. Therefore, SG-3 was not equipped with a datalogger and surface water levels were discontinued when SG-3 went dry.

2.3.1.4 On-site Monitoring Point Locations and Elevations

After installation, piezometer and staff gauge locations were determined and mapped using Global Position System (GPS) technology to sub 3-meter accuracy. Top-of-casing (toc) elevations for monitoring points were calculated using Light Detection and Ranging (LiDAR) ground surface elevation data obtained through NH GRANIT and in-field measurements of the height of casing above ground surface by GEOSPHERE technicians. Elevations are included with the monitoring point construction details, summarized in **Table 5**.

The location and elevation of Well 22 was surveyed by James Verra and Associates, Inc. of Portsmouth, NH; James Verra, NH Licensed Land Surveyor. Well 22 was surveyed to NAD 1983 and NAVD 1988 coordinates. The results were as follows:

Center of the 10-inch diameter well casing: 162,184.3 feet N; 1,212,590.1 feet E (NAD 1983)
Top of 10-inch diameter well casing: 39.6 feet (NAVD 1988)
Ground elevation at 10-inch diameter well casing: 37.4 feet (NAVD 1988)

2.3.2 Off-Site Monitoring

Private Wells

In accordance with Env-Wq 403.11(j) and Env-Dw 302.11(h), a search of records held by Aquarion, NHDES and the Town of Hampton, and multiple windshield surveys were conducted by GEOSPHERE were performed to identify all water users (groundwater and surface water) located within: a) 1,000 feet of Well 22; and b) within 1,000 feet of the maximum extent of the cone of depression (as estimated in the Preliminary Report). As a result of inventory and selection and outreach efforts, 20 representative private wells located between 600 and 10,000 feet from Well 22 were included in the monitoring program. A discussion of the inventorying and recruitment effort and other details of the private well monitoring program are included in Section 2.4.

AQUARION Wells

In addition to the private well monitoring, monitoring of water levels at selected off-site, Aquarion-owned wells was performed throughout the pumping test. The off-site Aquarion wells included in the monitoring program are described below. Water levels in each of these wells were continuously monitored during the pumping test, as described below.

2.3.2.1 Off-Site Aquarion Production Wells

Two bedrock PWS-production wells (Well 20 and Well 21), and four (4) sand and gravel PWS-production wells (Wells 6, 8A, 9, and 11) are located within the Potential Impact Area (PIA) delineated in the Preliminary Report. These wells are located approximately 5,500 – 6,600 feet north-northwest of the Site (see **Figure 4)**. Construction details for these wells are summarized in **Table 5**.

Water levels in each of these wells were continuously monitored during the pumping test. As with Well 7, these production wells are equipped with water level transducers integrated into Aquarion's SCADA system. The SCADA system archives water table and flow rate data from each production well at 15-minute intervals, which are tabulated in **Appendix E**.

During the pumping test, all production wells *except* the aforementioned Well 7 and Well 21, were operational. The operational wells were cycled on and off to meet the customer demand. As mentioned above, Well 7 was not utilized during this period so that the potential hydraulic connection between the bedrock and overburden aquifers could be monitored. Well 21 was undergoing maintenance activities and was out of service throughout the pumping test. Flow rate and water table data from Well 7, Well 22 and other off-site Aquarion production wells within the PIA were logged by the SCADA system and presented herein at 15 minute intervals; these data are tabulated in **Appendix E**.

2.3.2.2 Off-Site Aquarion Observation Wells

One off-site Aquarion overburden observation well (OBS-1) and one off-site bedrock observation well ('Ambient well') were included in the monitoring program. OBS-1 and the Ambient well were monitored continuously using pressure transducers/data loggers which recorded water levels at one-minute intervals.

In addition, static water table elevations from two Aquarion bedrock observation wells, SB-1 and SB-7, are referenced in the calculation of regional groundwater regime contours. Monthly monitoring of these wells is performed for Aquarion as part of its existing wellhead management program. These observation wells are located more than 6500 feet northwest of Well 22, and were not continuously monitored during the Well 22 pumping test. However, static water table measurements from SB-1 and SB-7 are referenced in the baseline calculation of regional groundwater contours.

OBS-1

Monitoring well OBS-1 was installed by Aquarion at the property located 500 feet north of the Site (see **Figure 3**). OBS-1 was selected for monitoring to assess water levels drawdown in overburden materials in the area north of the Site. OBS-1 was installed on the property by Aquarion under an agreement with the developer of McCarron Drive. Access to the well is managed under an easement. The OBS-1 pilot hole was drilled to the bedrock interface, approximately 44 bgs. Subsurface materials at OBS-1 were described as dense sand and gravel with silt and clay. A 2-in diameter PVC monitoring well, with slotted screen was installed in OBS-1 (see Well Log, **Appendix B)**. A water level pressure transducer/datalogger was installed in OBS-1 to monitor changes in groundwater elevations as a result of pumping at Well 22. A barometric pressure (only) datalogger was also installed at OBS-1 to measure barometric pressure to allow for water level corrections to be made to non-vented transducer data to account for barometric pressure changes.

Ambient Well

An Aquarion bedrock observation well located 11,973 feet northwest of Well 22 (Ambient well / RW-4) was selected as the Ambient well and served to provide baseline bedrock aquifer water levels in an area interpreted to be outside the influence of the Aquarion PWS production wells and outside the influence of the Well 22 pumping test. The Ambient well is located on Aquarion property near its water storage tank at the intersection of Route 101 and Route 27 (see **Figure 5**). The Ambient well was selected to monitor the natural fluctuation in the water table in the bedrock aquifer at a distance expected to be outside the influence of pumping from Well 22. The well is used by Aquarion as an observation well only. The well is not equipped with a pump; it is not used for groundwater extraction. The Driller's Log for RW-4 is included in **Appendix B**.

2.3.3 Off-site Monitoring Point Locations and Elevations

Off-site monitoring locations were determined and mapped using Global Position System (GPS) technology to sub 3-meter accuracy. Top-of-casing (toc) elevations for monitoring points were calculated using Light Detection and Ranging (LiDAR) ground surface elevation data obtained through NH GRANIT and in-field measurements of the height of casing above ground surface by GEOSPHERE technicians. Elevations are included with the monitoring point construction details, summarized in **Table 5**.

Locations of Aquarion PWS Wells were previously surveyed by a NH-licensed land surveyor. Documentation of surveyed coordinates and elevations of these wellheads was obtained from Aquarion; the wells are illustrated on **Figure 4**.

2.3.4 Meteorological Data Collection

Aquarion personnel collect precipitation and temperature data daily at the weather station located at their Mill Road distribution facility; this station is identified as NOAA Cooperative Station 27-6070-02. The station has reported precipitation, snowfall and snow depth measurements into the NOAA system since August 2003. Meteorological data collected during the pumping test included precipitation and barometric pressure, which were collected during the antecedent, pumping and recovery portions of the test.

The precipitation measurements for June 2018, totaling 4.24 inches, are 1.13 inches lower than the station average for the period 2003-2015. The reported precipitation measurement for July of 3.30 inches is 0.68 inches lower than the station average of 3.98 inches. Records of the climatological observations for the entirety of the pumping test are provided in **Appendix A**.

Atmospheric barometric pressure data was collected using a barometric pressure transducer/data logger ('baro logger') installed at the same location as the Ambient well. Data from this logger served two purposes: tracking barometric pressure meteorologically, and to adjust measurements logged by the non-vented pressure transducers installed in the piezometers and at two staff gauges (SG-1 and SG-2).

Barometric pressure readings were logged each minute by the baro logger, to correspond to the minute-based water level measurements logged by the non-vented transducers. Data collected at the piezometers and staff gauges SG-1 and SG-2 were corrected using the barometric pressure data collected [All other transducers used during the monitoring program were vented transducers; pressure (and thus, water level) measurements at these transducers do not require correction for changes in atmospheric pressure.]

Daily barometric readings collected by the baro logger at 8:00 am on each day of the pumping test are included in **Appendix A**. Minute-interval barometric data are included with the water level measurements in **Appendix G**.

2.4 Selection of Residential and Ambient Wells

As noted above, in accordance with Env-Wq 403.11(j) and Env-Dw 302.11(h), an exhaustive search of records held by Aquarion, NHDES and the Town of Hampton, and multiple windshield surveys conducted by GEOSPHERE, were performed to identify all water users (groundwater and surface water) located within: a) 1,000 feet of the Well 22; and b) within 1,000 feet of the maximum extent of the cone of depression (as estimated in the Preliminary Report, i.e., within 5,000 feet of Well 22). A resulting inventory of 126 water users within the general vicinity (2+ mile radius) was developed and submitted to NHDES in November 2017. Once the inventory list was created, wells were selected for inclusion in the monitoring program based on distance, location, construction, and use. Of those inventoried, GEOSPHERE recommended that water levels be monitored in twenty (20) representative private wells, including the six (6) private wells located within a 1,000 foot radius of Well 22. In response to public comments and NHDES request, GEOSPHERE and NHDES agreed that water quality at an additional 11 wells be monitored for changes in salinity, if possible, in an effort to assess the potential for water quality impacts from saltwater intrusion at Well 22 and private well users.

Upon approval of the selected private wells for monitoring by NHDES, GEOSPHERE made multiple efforts to contact the property owners of the selected wells, through certified mail and telephone outreach, to obtain permission to access and monitor their wells during the pumping test.

On November 14, 20017, an initial set of mailings, including a transmittal letter with a well questionnaire, was mailed to each of the identified private well owners. The private well owner questionnaire pertained to the construction, age, and use of their well, in addition to information about water quality and quantity concerns. Copies of a sample outreach letter and well questionnaire, and completed questionnaires from monitoring program participants are provided in **Appendix C**. Between November and April 2018, at least five iterations of phone calls and mailings were conducted to reach out to the owners of identified wells, ascertain the accessibility of the wells, and obtain permission to access and monitor groundwater levels in the wells.

In many cases, inventoried wells were reported by well owners to not exist or to have been decommissioned. In other cases, no response from the well owner was received after multiple letters and telephone calls. In only one case did the well owner refuse participation in the monitoring program.

When, despite efforts, contact could not be made, or when a well was reported not to exist, GEOSPHERE returned to the inventory and substituted the originally-selected well with another well, attempting to replicate (as much as feasible) the originally-selected well's location and distance from Well 22. At each iteration, the substitute well was approved by the NHDES project manager prior to outreach to the well/property owner. After five (5) iterations of letters and phone calls over a five-month period, GEOSPHERE secured permission to collect water quality samples and/or monitor water levels from 20 private wells located between 600 and 10,000 feet from Well 22. Sixteen (16) of these wells are located within 4,600 feet of Well 22. Approval to perform salinity monitoring was obtained at seven (7) of the 20 wells. A table of the private wells selected and approved for monitoring, and a table of private well owners approached and removed

from consideration for monitoring are provided in **Appendix C**. Details regarding address, Town Map/Lot, chemical monitoring, and selection/replacement of NHDES-requested locations are provided in these tables.

Information supplied by well owners was used to supplement GEOSPHERE's in-field observations, and Well Construction Log information available through the NH Water Well Board and NHDES OneStop. Well Logs obtained during this research are included in **Appendix B**. The final list of private wells included in the monitoring program, and a summary of their use, type and construction details, is included in **Table 5**. **Figure 5** presents a plan of all monitoring locations, including the 20 private wells selected for monitoring, and distinguishes those private wells which are bedrock wells, from those that are screened within the overburden materials.

Four (4) private wells included in the monitoring program were located greater than one mile (5,300 feet) from Well 22. The (bedrock) supply well at 3 Hilda Drive, located 5,700 feet southwest of Well 22, was monitored to assess water quality changes that might result due to its location proximal to the closed Hampton landfill, approximately 1 mile south of Well 22. The (bedrock) supply well at 81 Landing Road, located 8,100 feet southwest of Well 22, was monitored to assess tidal influences and the potential for saltwater intrusion. The (bedrock) supply well at 53 Winnacunnet Road, located 5,975 feet west-southwest of Well 22, was monitored to evaluate water level responses near the commercial/industrial Route 1 area of Hampton, and if necessary, water quality impacts.

The (bedrock) domestic water supply well at 110 Mill Rd, located 10,158 feet (1.9 miles) northeast of the Site, was monitored at the request of the homeowner.

The address, construction details and location relative to Well 22, of private wells and the Ambient well included in the monitoring program are summarized in **Table 5**. Copies of the completed questionnaires submitted to private well owners and returned to GEOSPHERE are included in **Appendix C**.

2.5 Pumping Test Analysis

Based on the water levels measured by the pressure transducers deployed at the monitoring locations, which are converted to depth of water from the top of the casing (TOC) at each well, or height of water above the bottom of the gauge (BOG), static (non-pumping) water levels and water elevations were established for each monitoring point prior to the start of the pumping phase of the pumping test on June 20, 2018, at 10:00 am (see **Table 6**).

Included in **Table 6** are the following, necessary for the analysis of the effects of pumping at all monitoring locations and for projecting long-term impacts:

- Depth (and calculated elevations) of water at the beginning (static) and the end of the pumping phase (i.e., shut down);
- Maximum observed drawdown (static level minus level at shut down) at shut down;
- An assessment, based on review of the time versus drawdown graphs in **Appendix D** as to whether the drawdowns are in response to the pumping of Well 22;

- Projected depth to water, elevation, and drawdown values at 180 days, shown in semi-log graphs in **Appendix D**, and determined by extending water level trends to 180 days, where response to pumping is identified;
- Corrected projected depth to water values where precipitation effects had effects on the water level trends, and whether or not the effects of precipitation on observed water levels were significant enough to make any corrections for precipitation.

Time versus Drawdown graphs for all monitoring locations where dataloggers were deployed by GEOSPHERE are presented in **Appendix D**. These include all the monitoring locations identified in **Table 5** and **Table 6**, with the exception of SG-3 where water levels ran dry by the beginning of the pumping phase, and Aquarion's permitted water supply wells, which showed no response to the pumping. Well 7 is the exception, however, and response to pumping of Well 22 at Well 7 is shown in the drawdown graphs for monitoring well 7-OBS, located 8 feet from Well 7. Linear graphs present water levels during the entire course of the pumping test. Key dates and times are presented, and the start of the pumping phase and the end of the pumping phase are delineated with vertical lines on each linear graph. Where a response to pumping of Well 22 is identified, semi-log graphs present the drawdown data beginning at the start of pumping and projected trends to 180 days of pumping.

2.5.1 Well 22 Pumping, Stabilization, and Recovery

As described in Section 2.2, the pumping of Well 22 began at 10:00 am on Wednesday June 20, 2018, at an initial pumping rate of 650 gpm. The discharge rate was increased to 750 gpm at 1:15 pm on June 21, 2018 and was held at that rate for 45 hours. The pumping rate was increased from 750 to 850 gpm on June 23rd, 72 hours after pumping was initiated. During the first 10 days after the pumping test was stepped up to a flow rate of 850 gpm, (6/23/18 to 7/2/18) the VFD controlled the system flow rate at an average of 848 gpm. During the middle phase of the 850 gpm pumping step (7/2/18 – 7/13/18) increased frequency and duration of backpressure episodes were observed during daytime periods as well as in the previously-observed evening periods, episodically reducing the system flow rate, but nevertheless staying within 1% of 850 gpm. In the last 72 hours of the pumping test (July 13 – 17, 2018) backpressure effects reducing the flow rate by about 1% of 850 gpm were observed in the system on a nearly continuous basis.

An average of 829 gpm was recorded for the last 7 days of the 27-day pumping period, however, the reduction in pumping rate was the result of backpressure effects associated with Aquarion's distribution system operations, and the high demand in mid-July. For the originally designed and approved minimum pumping period of 14 days, the average pumping rate for Well 22 for day 7 through day 14 (July 4) was 845 gpm (see Summary Table in Section 2.2). The proposed permitted production volume (PPV) for which a permit is being sought is 1,224,000 gpd (850 gpm)(1.224 MGD). Further discussion of the sustainable yield or "safe yield" of Well 22 is provided below.

As described above and demonstrated in **Appendix E**, fluctuations in the pumping rate were less than 1%. As shown in the semi-log drawdown graph for Well 22 in **Appendix D**, the water levels in Well 22 were not projected to depths below the critical level of 219 feet below the top of casing

(btoc). Approval to shut down the pumping phase of the pumping test was received by NHDES personnel prior to shutting down Well 22 on July 17, at 11:01 am.

Using the approximate pumping rate of 850 gpm, and the observed maximum drawdown of 171 feet in Well 22, a specific capacity of 4.97 gpm/foot is calculated. The available water (AW) height in Well 22 is 219 feet (critical depth of water bearing fracture) minus 5.7 feet (static level) = 213.3 feet. The safe yield (SY) for Well 22 is obtained by multiplying 213.3 feet x 4.97 gpm/foot = 1,060 gpm, or 1.527 MGD. The SY of 1.527 MGD represents the pumping rate at which Well 22 can be pumped without water levels falling below the upper-most water bearing fracture (a depth of 219 feet).

The recovery of water levels in Well 22 after shutdown was rapid, indicating significant recharge and flow of groundwater into Well 22 after 27 days of pumping. The water level in Well 22 had recovered approximately 90% by midnight on July 18, approximately 13 hours after shutting down the pumping test.

Utilizing a USGS Aquifer Analysis Program based on the Cooper-Jacob Recovery Method (Open File Report 02-197), GEOSPHERE performed an analysis of the water levels during recovery of Well 22. As indicated in the spreadsheet output for the program, enclosed in **Appendix F**, derivative curve matching of the data using this program resulted in an estimate of the Transmissivity (T) of the bedrock aquifer of 1,000 ft^2/day. This represents a transmissivity or "ability to transmit water" that is comparable to low-quality sand or gravel aquifer, which is quite impressive for a bedrock well; the 1,000 ft^2/day value of transmissivity is the value used to delineate the transition to poorly transmissive materials, such as glacial till (see Transmissivity layers on **Figures 10-12**).

2.5.2 Ambient Well

The purpose of the Ambient well is to provide water level data during the course of the pumping test that is representative of bedrock aquifer conditions unaffected by the pumping test, for analysis purposes, and to allow for corrections to the stabilization criteria for the pumping well prior to shutdown, where appropriate. Aquarion's bedrock monitoring well RW-4 is in an area far enough outside the PIA that the effects of pumping of Well 22 were not anticipated (see **Figure 5**). The groundwater elevation at the Ambient well was observed to decline by 1.82 feet over the pumping period (see **Table 6**). No drawdown effect is evident in the time-drawdown graph for the Ambient well (**Appendix D**), therefore the decline in water level is interpreted to be the result of natural, seasonal effects. Typically, groundwater levels will steadily decrease during the entire late spring through fall period, with only minor increases as a result of precipitation. Seasonal high elevations of groundwater are typically observed in spring, following snow melt and precipitation effects, and seasonal lows are observed in late summer and fall as a result of the effects of transpiration (root uptake of groundwater) and irrigation effects during the growing season, and lower precipitation inputs.

Corrections to the stabilization criteria for Well 22 as a result of Ambient bedrock conditions prior to shutdown were not necessary. Review of drawdowns observed in the bedrock monitoring locations, including private wells, indicates that where no response to pumping of Well 22 was

observed, natural drawdowns of up to 1.93 feet (maximum) were measured during the pumping phase of the pumping test. This is consistent with the water level decline observed in the Ambient well.

2.5.3 Precipitation

Total precipitation of 0.22 inches was recorded during the antecedent period. Precipitation occurred on four dates during the antecedent period; daily precipitation measurements ranged from 0.01 inch/day to 0.09 inch/day, and averaged 0.03 inch/day over the 7 day period. The recorded rainfall is significantly below the normal historical daily June precipitation of 0.18 inch/day, as recorded in the NOAA log (see **Appendix A** for precipitation data). The time-drawdown graphs indicate that the small precipitation measured during the antecedent period had no significant or measurable effect on the groundwater levels at the various monitoring points (see **Appendix D**).

Rainfall during the pumping test measured 3.32 inches (averaged over 27 days = 0.12 in/day), which is below the historical daily June/July mean precipitation of 0.15 in/day, as recorded in the NOAA log (**Appendix A**). The time-drawdown graphs presented in **Appendix D** indicate that the precipitation that occurred during the pumping phase had no measurable effect on the groundwater levels in any of the groundwater monitoring locations, with the exception of PZ-1. Groundwater levels at PZ-1 and surface water levels at SG-1 showed no response to pumping of Well 22 (see **Table 6**).

A rain event occurred within the first 3 hours of the recovery period. As indicated by the precipitation data obtained from Pease AirForce Base Portsmouth (PSM)(see **Appendix A**), 0.59 inches of rain fell at approximately 1:00 pm on July 17. A total of 1.24 inches of precipitation was measured (recorded for July 18, 2018) in North Hampton within 21 hours following the pumping test shut-down (see **Appendix A**). Because of this event, responses to precipitation at monitoring points susceptible to precipitation may appear to be a "recovery" response to the shutdown of Well 22, when in fact, they are not (see PZ-1 and SG-1 time-drawdown graphs, **Appendix D**).

2.5.4 Effects of Pumping on Water Levels

2.5.4.1 Static (Non-Pumping) Groundwater Elevations in Bedrock

Based on the measured static depth to groundwater collected prior to the pumping phase of the pumping test, the calculated groundwater elevations (see **Table 6)**, representing static/non-pumping conditions, were contoured using a best-fit solution from several computer analyses to generate a groundwater elevation contour plan (**Figure 6**) for all bedrock monitoring locations. The static depth to water under certain conditions, such as a private well undergoing daily pumping, may not have been the data point collected exactly on June 20 at 10:00, when Well 22 started pumping, but rather the best fit depth representing static, non-pumping conditions prior to the start, as shown on the linear time versus drawdown graphs in **Appendix D**. In order to provide a more comprehensive groundwater contour map, select water level data from bedrock observation wells SB-1 and SB-7 located at Aquarion's Mill Road facility were utilized. These

wells are monitored monthly, by hand, and data loggers were not installed. As noted in **Table 6**, water levels from these two wells were collected as close as possible to the start date and the end of pumping date.

As shown on **Figure 6** and **Table 6**, non-pumping groundwater elevations range from 60.89 feet above mean sea level (asl)(or, above vertical datum [avd], NAVD 1988) at the Ambient well to 7.34 feet asl at 81 Landing Road. The interpolated or inferred regional groundwater flow direction is, as expected, in a general southeasterly direction, towards the Hampton River tidal estuary to the south, and the Atlantic Ocean off North Beach, Hampton to the east. The calculated hydraulic gradient in the vicinity of Well 22, between 83 Little River Road and 12 Springhead Lane is approximately 0.01.

2.5.4.2 Bedrock Groundwater Elevations During Pumping

As shown in **Table 6**, maximum measured drawdowns of those bedrock wells affected by the pumping of Well 22 ranged from 164.33 feet in Well 22 to 10.14 feet at 7 Springhead Lane at or near the time of shutdown. Ten (10) of the twenty (20) private wells monitored during the test showed responses to pumping; all of these wells are located less than 4,600 feet from Well 22. The maximum drawdowns observed in these wells are shown contoured on **Figure 7** and display a cone of depression (COD) that is oblong, stretching almost 5,000 feet southwest of Well 22 beyond 31 Windmill Lane (27.61 feet drawdown) and at almost 5,000 feet northeast of Well 22 beyond 206 Woodland Road (17.21 feet drawdown). Bedrock wells showing no response to pumping are shown on **Figure 7** as zero (0) values and help define the oblong shape and maximum extent of the observed COD.

Figure 8 presents the groundwater elevations observed in all bedrock monitoring wells, including SB-1 and SB-7, at or near the time of pump shutdown, representing maximum pumping conditions. The highest groundwater elevation was at the Ambient well (59.07 feet asl) and the lowest, aside from Well 22 (-137.17 feet asl), was again, observed at 81 Landing Road (6.75 feet asl). In general, regional groundwater flow directions remained unchanged; however radial groundwater flow towards Well 22, as a result of pumping, is evident within the 5,000 foot COD.

Figure 9 presents the projected 180-day groundwater elevations (assuming continuous pumping with no precipitation) obtained from the semi-log graphs in **Appendix D** for all bedrock monitoring wells showing a response to pumping, as shown in **Table 6**. For the bedrock wells that showed no response to pumping, groundwater elevations observed at the time of Well 22 shut down were utilized. In general, regional groundwater flow directions remained unchanged and radial groundwater flow towards Well 22, as a result of pumping, is evident within the 5,000 foot COD. Additional drawdowns as a result of projecting to 180 days averaged approximately 8 feet in the private bedrock wells which responded to pumping, ranging from 2.48 feet at 82 Woodland Road, to 15.97 feet at 10 Spinghead Lane.

No responses to pumping of Well 22 were observed at six (6) of the private bedrock wells monitored during the pumping test. No responses to pumping of Well 22 were observed at Aquarion's two bedrock water supply wells (Wells 20 and 21) or the nearby bedrock observations wells (SB-1, SB-7).

2.5.4.3 Static (Non-Pumping) Overburden Groundwater Elevations

Figure 10 presents a groundwater elevation contour plan for the measured static depth to groundwater collected prior to the pumping phase of the test for the overburden monitoring locations, including: OBS-1, 7-OBS, PZ-1 through PZ-4, and the three private wells screened in the overburden materials. In order to provide a more comprehensive groundwater contour map, select water level data from two of Aquarion's public water supply wells (Well 9, Well 11) were also utilized.

As shown on **Figure 10** and **Table 6**, non-pumping groundwater elevations range from 57.66 feet asl at 78 Little River Road to 10.15 feet asl at 23 Esker Drive, with a general southeasterly direction of flow in the area of Well 22. The distribution of the sand and gravel overburden aquifer, as shown on **Figure 10** as Aquifer Transmissivity, and local topographic features play a more significant role in overburden groundwater flow than regional geology. The inferred northeasterly and southwesterly directions of groundwater flow in the area of 78 Little River Road are partly the result of topographic relief, as groundwater in the overburden flows from high water elevations at higher topography, towards lower water elevations at lower topography. However, active pumping of Aquarion's water supply wells to the north (sand and gravel Wells 9 and 11, and bedrock Well 21) during the pumping test are likely drawing down groundwater levels and creating flow in that direction, also.

2.5.4.4 Overburden Groundwater Elevations During Pumping

As shown in **Table 6**, drawdown in the overburden and/or sand and gravel aquifer was observed during the pumping at 7-OBS (maximum drawdown of 3.26 feet), located 169 feet from Well 22, OBS-1 (12.64 feet), located 485 feet from Well 22, PZ-3 (> 2.81 feet), located 857 feet from Well 22, and PZ-4 (0.53 feet), located 417 feet from Well 22. PZ-1 and PZ-2 showed no response to pumping. The maximum drawdowns observed in these wells are shown contoured on **Figure 11**. No effect from pumping was observed at the three private overburden wells, located 2600 to 4369 feet from Well 22, which were given zero drawdown values for contouring drawdown (see **Figure 11)**. Water levels at these wells were observed to decline 0.56 feet (23 Esker Dr.), 0.61 feet (321 Winnacunnet Rd.), and 1.5 feet (78 Little River Rd.) during the pumping period, however the time-drawdown graphs for these wells indicate that the decrease in water levels are attributable to seasonal affects, as demonstrated by comparison to the Ambient well data and the lack of typical drawdown and recovery responses observed in wells located closer to Well 22 that were affected during pumping (see **Appendix D**).

Water levels at PZ-2, located near the Hunter Drive cul-de-sac, did not respond to the pumping test. However, water levels rose slightly (0.04 feet) in response to precipitation events which occurred during the pumping test. A review of the graph shows PZ-2 also did not respond to seasonal groundwater declines observed at other shallow groundwater monitoring points. A review of the aquifer map included on **Figure 4** shows the location of PZ-2 outside the mapped sand and gravel aquifer deposit. The lower transmissivity soils (till) observed at OBS-1 substantiate the map (see **Appendix B** for a boring log of OBS-1).

PZ-3 appears to have been impacted by sediment entering the screened interval of the piezometer. The data plot indicates that the water table responded quickly to precipitation events on June 25 and 29. It is believed that as the water table dropped below the top of the screened interval of the piezometer, wet sediment (muck/organic clay) infiltrated the screen and settled at the bottom of the piezometer. Over time, the transducer's pressure measurements, which are converted to apparent water levels, appear to have been affected by the introduction of sediment into the piezometer screen and surrounding the device. Transducer readings appear to have recovered temporarily when water levels recovered from the precipitation events of June 25 and June 29. However, when the water table reached its lowest measured point on July 3, sufficient sediment appears to have seeped into the piezometer to entrap the transducer probe (see Graph PZ-3 in **Appendix D**). This is substantiated by the fact that when GEOSPHERE removed the piezometer at the completion of the recovery period, the screened interval was observed to be completely filled with sediment (muck/organic clay).

Figure 12 presents the groundwater elevations observed in all overburden monitoring wells, including Aquarion's Wells 9 and 11, at or near the time of pump shutdown, representing maximum pumping conditions. Groundwater elevations range from 56.16 feet asl at 78 Little River Road to 9.59 feet asl at 23 Esker Drive, with a general southeasterly flow direction. In general, regional groundwater flow directions remained unchanged; however groundwater contour changes in close proximity of Well 22 (i.e., less than 2,000 feet) indicate radial groundwater flow towards Well 22, as a result of pumping, is evident. Limited data are available for depicting the extent of drawdown and direction of flow near Well 22 due to the limited number of shallow overburden monitoring points. As shown in **Table 6**, projecting to 180 days of continuous pumping without precipitation, maximum observed drawdowns are anticipated to increase from 3.26 feet to 7.15 feet in 7-OBS, 12.64 feet to 19.34 feet in OBS-1, >2.81 feet to >5 feet in PZ-3, and 0.53 feet to 4.23 feet in PZ-4. These projected drawdowns are not significantly greater than the observed natural/seasonal downward trends observed at monitoring locations that showed no response to pumping. PZ-1, which did not respond to pumping, projects a maximum observed drawdown from 3.53 feet on July 17, 2018 to over 7 feet of drawdown 180 days later. The effects of seasonal decreases in all monitoring locations were not removed from the 180-day projections, and therefore, the 180-day projected values are considered to be conservative. The larger drawdowns observed at OBS-1, as indicated by the apparent cone of depression centered on OBS-1 (see **Figure 11**) can be attributed to the fact that no shallow monitoring point was installed in close proximity to Well 22. Drawdowns in the overburden aquifer at Well 22 are expected to be equal to or greater than those observed at OBS-1. However, a geologic boundary condition may be contributing to the drawdown observed at OBS-1. OBS-1 was drilled into and installed in glacial till deposits of low transmissivity that rest immediately above bedrock (see Boring Log in **Appendix B**). A reduction in groundwater recharge at this location, from reduced precipitation infiltration through dense till deposits, as well as reduced recharge from the bedrock aquifer below, will account for these additional drawdowns.

2.5.4.5 Surface Water Elevations During Pumping

Surface water drawdown effects at SG-1 and SG-2 on the order of 0.5 feet were observed. The drawdown signature of the SG-1 data plot is similar to that of PZ-1. No typical response to pumping, or to recovery after the end of pumping is observed (see graphs in **Appendix D**).

Therefore, these drawdown effects are likely attributable to seasonal declines due to evapotranspiration, and not the result of the pumping of Well 22. As discussed earlier, surface waters at SG-3 decreased naturally (decrease of greater than 0.49 feet) between when the staff gauge was installed in April, 2018 and the start of the antecedent period on June 20, 2018, when the area was completely dry.

2.6 Water Quality Monitoring

In accordance with the Preliminary Report, and subsequent approvals by NHDES, GEOSPHERE executed a water quality monitoring program before, during and after the pumping test. The water monitoring program included:

- Daily onsite monitoring of water quality at Well 22, for odor, pH, color, conductivity, and salinity;
- Daily onsite monitoring at seven (7) private wells selected by NHDES for salinity to monitor for potential saltwater intrusion effects;
- Water quality analyses by NH-certified laboratories for the minimum required samples collected at Well 22 (start, mid-point, end of pumping test) for the complete suite of water quality parameters required by Env-Dw 302.15;
- Additional water quality samples collected from Well 22 for analysis of per- and poly-fluorinated alkyl substances (PFAS), at Aquarion's request, to monitor for threats to the public water supply;
- PFAS and VOC sampling and analysis from private wells, selected by NHDES, during the latter half of the pumping period, provided that the well(s) exhibit drawdown effects from the pumping of Well 22.

2.6.1 Water Quality Monitoring

Well 22

GEOSPHERE technicians used calibrated, hand-held water quality monitoring devices to conduct daily monitoring of salinity and specific conductivity at Well 22 before, during and after the pumping test. On June 19, 2018, GEOSPHERE used a disposable bailer to collect a baseline water sample at Well 22 for salinity and specific conductivity.

GEOSPHERE used a factory-calibrated Oakton CTSTestr50™ hand-held Salinity/ Conductivity/TDS meter to monitor salinity/conductivity changes at Well 22 and selected private wells. At the commencement of monitoring, and throughout the pumping test, the instrument's calibration was checked by GEOSPHERE technicians using a 1413 µS standard.

The baseline measurements at Well 22 were as follows:

6/19/18	Result
Salinity (parts per thousand)	0.03
Specific Conductivity (µS)	584

From June 22 through the end of the pumping test, technicians utilized a hand-held Horiba pH Sensor S010 pH meter to monitor changes in dissolved hydrogen ions as an indicator of changing water quality at Well 22. Instrument readings of pH throughout the pumping test ranged from 7.7 to 8.5 and averaged 8.26. In the last 14 days of the pumping test, the pH ranged from 8.3 to 8.5 and averaged 8.35, which compares favorably with the laboratory pH measured 8.23 in the sample collected at the end of the pumping test. Field Observation logs, including pH and salinity measurements are included in **Appendix J.**

Salinity, measured as a function of specific conductivity ranged from 0.1 to 0.3 parts-per-thousand (ppt), and averaged 0.21 ppt (see **Table 7**). Seawater typically measures 35 ppt. Specific conductivity measurements ranged from 255 µS at the beginning of the test, to 509 µS on Day 23 of pumping. Specific conductivity at Well 22 averaged 456 µS. Laboratory analysis for samples from Well 22 was conducted on samples collected at the beginning and middle period of the pumping test; the laboratory reported results of 350 and 450 uS on the samples, respectively (see **Table 8**). Laboratory analysis for specific conductivity was not performed on the sample at the end of the pumping test (specific conductivity is not regulated by NHDES or the EPA; field measurement of specific conductivity at the end of the pumping test was 471 µS. Well 22 Field Observation logs, including pH and salinity measurements are included in **Appendix J.**

In addition to monitoring water quality using field instrumentation, technicians monitoring the pumping test also routinely logged their physical observations of water sample odor and color. Observations are included in the Field Observation Logs in **Appendix J**. Throughout the test, the water was observed to be clear, with no obvious changes in translucency or color. The log indicates the observation of a slight H_2S odor in the early phases of the pumping test (Days 3, 4 and 7). The H_2S odor was not reported after Day 7 of pumping, see notes in **Appendix J**. Analysis for H_2S was not included in the laboratory testing suite.

Private Wells

In accordance with the NHDES-approved pumping test monitoring program, GEOSPHERE technicians collected daily salinity measurements in water sampled from seven (7) of the private wells approved for monitoring. The purpose of the salinity monitoring was to evaluate changes in water chemistry that might result from salt water intrusion, or hydraulic connections with contaminant plumes (former Hampton Landfill) and as an indicator of changing water quality in the aquifer which might be tied to the pumping test.

Similar to the monitoring results at Well 22, the salinity results at the private wells ranged from 0.00 to 0.40 and varied very little throughout the test. Salinity monitoring data are summarized in **Table 7**, **Figure 16**, and tabulated in **Appendix J**.

2.6.2 Well 22 Sampling and Analysis

Groundwater samples from Well 22 were collected for laboratory analysis at three sampling events, as prescribed by NHDES: at the beginning, anticipated middle, and end of the pumping test. Because the pumping test was extended beyond the proposed 14 days, the "Mid Test"

sample collected on June 27, 2018 represents conditions on Day 8, not Day 14, the true mid-point of the pumping test. To monitor for the presence of per- and poly-fluorinated alkyl substances (PFAS) during the pumping test, additional samples were collected on Day 3 and Day 5 for PFAS analysis. A summary of the Well 22 sampling protocol is outlined below:

- Beginning (June 20, 2018, within the first hour of pumping)
  Analyses: VOCs, EPA Secondary Parameters and per- and poly-fluoroalkyl substances (PFAS);

- Day 3 (June 22, 2018) & Day 5 (June 25, 2018)
  Analysis: PFAS

- Mid-point (June 27, 2018)(after 7 days of pumping)
  Analyses: VOCs, EPA Secondary Parameters and PFAS;

- End (July 17, 2018)(after 27 days of pumping, within 3 hours of pump shutdown)
  Submitted for the full SDWA compliance suite: VOCs, Synthetic organic compounds (SOCs), polychlorinated biphenyls (PCBs), Radionuclides, metals, coliform, EPA Secondary Parameters and PFAS.

The groundwater samples were delivered to Eastern Analytical, Inc. of Concord, NH, a New Hampshire-certified laboratory, for analysis (for some parameters, Eastern Analytical subcontracted to other NH-certified laboratories, see **Appendix H** for details). Samples for PFAS analysis were submitted to Eurofins Lancaster Laboratories Environmental, Lancaster, PA for analysis. Water quality analysis results are summarized in **Table 8.** The laboratory chemical analysis reports for Well 22 are provided in **Appendix H**.

In general, the water quality results reported from the three sampling events are excellent; most chemical constituents were not detected above laboratory reporting limits, and natural-occurring parameters were detected at low concentrations. With the exception of arsenic, a naturally-occurring element present in bedrock throughout New England, all detected compounds concentrations were below the New Hampshire Maximum Contaminant Level (NH MCL) drinking water standards for public water supplies.

Arsenic

In 2012 and 2016, arsenic was detected at concentrations of 0.006 mg/l and 0.003 mg/l in Well 22, respectively. A concentration of 0.023 mg/l arsenic was detected in the last sample collected from Well 22 on July 17, 2018. This value exceeds the current New Hampshire Maximum Contaminant Level (MCL) of 0.010 mg/l. Treatment to reduce the arsenic concentration to below the MCL may be necessary, however, compliance with the MCL is determined on the basis of a running annual average where monitoring is done quarterly or annually, and from the point of entry to the water system. Aquarion is currently reviewing treatment options and will be conducting additional sampling and analysis, as necessary, to demonstrate compliance with the MCL.

VOCs

In accordance with NHDES requirements, groundwater samples collected from Well 22 at the beginning, the (proposed) mid-point, and the end of the pumping test, were analyzed for VOCs via EPA Method 524.2. The laboratory reported the presence of toluene (1.8 µg/l) at Well 22 on Day 1 of the pumping test. No other VOCs were reported in the samples collected from Well 22 (see **Table 8)**. The laboratory analysis reports are included in **Appendix H**. The presence of toluene is attributed to the use of electrical tape for securing the temporary pumping test equipment within Well 22.

PFAS

Groundwater samples collected from Well 22 on Day 1, Day 3, Day 5, the (proposed) mid-point, and the end of the pumping test, were analyzed for PFAS. Samples were collected from the sampling port following NHDES protocols and were submitted to Eurofins Lancaster Laboratories Environmental, Lancaster, PA, for analysis of 26 PFAS analytes via EPA Method 537 ver. 1.1, modified, reported in units of nanograms per liter (ng/l) equivalent to parts-per-trillion. **Table 8** summarizes the PFAS analytical results for the Well 22 samples. The laboratory analysis reports are included in **Appendix H.**

Of the 26 PFAS compounds analyzed, only one was detected above the laboratory reporting limit: perfluorooctanoic acid (PFOA) was detected at concentrations of 0.88 ng/l and 1.6 ng/l on June 27 (sample actually collected one day earlier on June 26) and July 17, respectively (see **Table 8**). The PFAS concentrations reported by the laboratory are all well below the current and applicable U.S. EPA Health Advisory Levels for public water systems (70 ng/l for PFOA + PFOS).

2.6.3 Private Well Sampling and Analysis

NHDES required that PFAS and VOC samples be collected from select private wells during the second half of the pumping period if a hydraulic connection to pumping Well 22 was observed (as evidenced by water level drawdown during pumping). **Table 9** summarizes the water quality analysis results for the private well samples. The laboratory analysis reports are provided in **Appendix I**.

VOCs

Only one private well of the list of private wells selected by NHDES for mid-test VOC analysis exhibited drawdown effects during the pumping phase: Well #41212, a private irrigation well located at the residential property at 31 Windmill Lane. This private bedrock irrigation well is located approximately 4,000 feet west-southwest of Well 22 and is situated between the commercial/industrial area of US Route 1 and Well 22 (see **Figure 5**). On July 2, 2018, a water sample was collected from a sampling port on the storage tank to the irrigation system and was submitted to Eastern Analytical, Inc. of Concord, NH, for analysis of VOCs via EPA Method 524.2. As indicated in the attached laboratory report and summarized in **Table 9**, no VOCs were detected in the private well sampled.

PFAS

Only one private well from the list of private wells selected by NHDES for mid-test PFAS analysis showed drawdown effects during the pumping phase: Well #56222, a bedrock potable water/geothermal well located at the residential property at 206 Woodland Road. This well is located approximately 4,600 feet northeast of Well 22 (see **Figure 5**). On July 2, 2018, a water sample was collected from a sampling port on the storage tank for the geothermal system, following NHDES protocol for sampling PFAS, and submitted to Eurofins Lancaster Laboratories Environmental, Lancaster, PA for analysis of 26 PFAS analytes via EPA Method 537 ver. 1.1, modified. As indicated in the attached laboratory report and summarized in **Table 9**, 6 PFAS compounds were detected at concentrations greater than the laboratory reporting limit, including 8.2 ng/l of perfluorooctane sulfonate (PFOS) and 6.8 ng/l of perfluoro-octanoic acid (PFOA). The PFAS concentrations reported by the laboratory are all well below the current and applicable U.S. EPA Health Advisory Levels for public water systems (70 ng/l for PFOA + PFOS).

3.0 CONCEPTUAL HYDROLOGIC MODEL REFINEMENT (ENV-WQ 403.17, ENV-DW 302.21)

A preliminary **Conceptual Hydrologic Model** (CHM) was developed in the Preliminary Report as a working hypothesis to describe each of the components of the hydrologic regime relative to Well 22. According to Env-Wq 403.17, Env-Dw 302.21, data generated by the pumping test should be used to refine the CHM and the **Potential Impact Area** (PIA). The components of the CHM include the following:

1) Description of the geology of the region;
2) Estimate of the PIA for the withdrawal, including the maximum extent of the cone of depression for the withdrawal, the recharge area for the withdrawal, and the downgradient area of the withdrawal;
3) Description of the hydrogeologic cycle for the PIA;
4) Development of a water budget for the PIA; and
5) A comprehensive description of the groundwater flow regime for the withdrawal.

Based on the results of the pumping test, described above, and the results of downhole geophysical data logging conducted within the borehole of Well 22, described below, refinements to the components to the CHM are as follows:

1) Geology: The only recent refinement to the understanding of the geology was the confirmation of the nature of the fractures intersecting Well 22 following the downhole geophysical assessment report, as described below;
2) Potential Impact Area: Based on the results and observed effects of the pumping test, the PIA and the COD were refined, as described below;
3) Hydrologic Cycle: No changes;

4) Water Budget: The only change to the water budget is the proposed pumping rate / Permitted Production Volume for Well 22. Due to the constraints of the pumping equipment (i.e., electrical supply, VFD), and the pressures within the Aquarion distribution system, Well 22 was pumped at rates less than 950 gpm, as originally proposed. The requested Permitted Production Volume (PPV) is 850 gpm. The effect on the water budget is described below;
5) The groundwater flow regime, including bedrock groundwater flow, overburden groundwater flow, and the effects/changes in groundwater flow observed during the long-term pumping is described in detail in Section 2.

3.1 Downhole Geophysical Assessment of Well 22

Hager-Richter Geoscience, Inc. (Hager-Richter) performed downhole geophysical logging of Well 22 on September 29, 2018 (see **Appendix K**). The report presents the following characteristics of the open borehole of Well 22 from the casing to the bottom of the borehole: caliper (diameter), optical televiewer (OTV, and image), acoustical televiewer (ATV, and image), temperature, and conductivity. Using these, Hager-Richter Geoscience identified the azimuth (strike/direction, 0-360 degrees, true north) and dip angle (0-90 degrees from horizontal) of fractures/structures within the open borehole, as well as those that are potentially water-bearing (possibly hydraulically transmissive). As shown in summary plots on page 33 and 34, a total of 486 structural features were identified. The total mean azimuth (strike direction) was 73 degrees (east-northeast) and the total mean dip angle was 43 degrees. One hundred thirty-five (135) fractures were identified as potentially water-bearing, with a mean strike direction of 91 degrees (east-west) and a mean dip angle of 34 degrees. The mean orientation of all fractures (east-northeast) and of the water-bearing fractures (east) are consistent with and the likely reason why the greatest drawdowns observed in the bedrock wells during the pumping test were in the northeasterly and southwesterly directions from Well 22.

3.2 Refinement of the Potential Impact Area

Env-Wq 403.17 and Env-Dw 302.21 require the refinement of the CHM including the boundaries of the Potential Impact Area and Wellhead Protection Area based on the results of the pumping test. The Potential Impact Area is the area where water resources may be adversely impacted by Well 22 operating continuously for 180-days at maximum volumes without recharge from rainfall or snowmelt.

3.2.1 Cone of Depression

The **Cone of Depression** (COD) is defined in Env-Dw 302.03 as the "depression in the potentiometric surface of a body of groundwater that develops around a well from which water is being withdrawn and corresponds to the zone of influence of the withdrawal". For the Preliminary Report, a default 4,000-foot radius was chosen as the basis of a preliminary COD for Well 22, given that insufficient data was available to calculate the COD. Based on the presence of mapped lineaments (fractures) extending beyond 4,000 feet from the area surrounding Well 22, and the fact that groundwater transport in the bedrock is determined by the orientations, frequency, and hydraulic connectivity of water-filled fractures in the rock, it was estimated that

the COD would likely extend beyond the preliminary COD in some areas. For this reason, the preliminary PIA and WHPA were extended 1,000 feet or more beyond the preliminary COD in some areas (see **Figure 4**).

Figure 7, attached, presents the maximum observed drawdown observed in the bedrock wells monitored during the pumping test. Zero drawdown values representing where no drawdowns in groundwater levels (i.e., potentiometric surface depressions) were observed as a result of the pumping of Well 22, are also shown on **Figure 7**. The nearest bedrock monitoring location to Well 22 which showed no response to pumping was the private bedrock well located at 83 Little River Road, 1,700 feet to the northwest. The farthest bedrock monitoring locations to Well 22 which showed responses to pumping were the private bedrock wells located at 31 Windmill Lane (3,940 feet to the west-southwest), 206 Woodland Road (4,597 feet to the northeast), and 83 Little River Road (1,700 feet to the northwest). The shape of the COD appears oblong, stretching northeast-southwest slightly beyond the private wells mentioned above, and constrained to lesser distances to the northwest and the southeast. Because the observed drawdowns were constrained to the distances above, the Revised COD is defined as a 5,000 foot radius around Well 22 (see **Figure 7**).

By plotting the observed drawdown values against distance from Well 22, "zero drawdown" distances can be calculated for certain directions where sufficient data points are established. **Appendix F** presents Distance vs. Drawdown graphs for both the maximum drawdowns observed during the pumping test, and the projected 180-day drawdowns for private bedrock wells that are aligned in a certain direction from Well 22, as well as Well 22. Only those directions that provide a minimum of 3 data points (not including Well 22) are graphed. Review of the graphs indicates the following calculated zero-drawdown distances from Well 22:

Calculated Zero Drawdown Distances

Direction from Well 22	Using Maximum Observed Drawdown	Using 180-day Projected Drawdown
North (N)	3,480 feet	3,910 feet
South-Southeast (SSE)	1,700 feet	3,320 feet

While sufficient data points were not available to plot in other directions, is clear from the drawdowns observed in the northeasterly and west-southwesterly directions that the zero-drawdown distances in these direction are, at a minimum, 3,940 feet and 4,597 feet, respectively. The greater drawdowns observed in bedrock wells in these directions are the result of predominant northeast/southwest trending geologic structural features, such as fractures and foliations in the rock, which are hydraulically connected. The bedrock geology displayed in **Figure 13** and **Figure 14** clearly identifies geologic features with these orientations. In addition, the Hager-Richter Geophysical Assessment Report contained in **Appendix K** and described in more detail in Section 3.1 of this report, identifies an abundance of water-filled fractures intercepting the borehole of Well 22 that are oriented in an east-west (90 degree azimuth, or strike) direction and a northeast-southwest direction.

The above calculated projections of drawdowns beyond observed drawdown distances, however, is speculative, given that groundwater flow in bedrock does not extend or flow uniformly or equally in any direction, given that fractures are not continuous, not uniformly transmissive (allowing water flow), and are often bounded or truncated by other fractures or bedrock features which create low- or no-flow boundaries. In addition, zero-drawdown calculations are more predictive in more homogeneous aquifers, such as sand or gravel deposits. A zero-drawdown distance of approximately 5,000 feet, representing an additional 400 feet to 1,000 feet beyond any drawdown observed during the pumping test is a more realistic estimate of the maximum extent of the COD.

3.2.2 Recharge Area

The recharge area for Well 22 was estimated based on several factors including the characteristics of the topography of the area, the surficial and bedrock geology of the site vicinity, and the locations and alignments of mapped lineaments indicative of bedrock fractures. The recharge area was extended in the upgradient direction to the adjacent watershed boundary to the northeast in order to incorporate recharge areas to the mapped lineaments (both GEOSPHERE and USGS) that were observed to extend beyond the watershed boundary and that emanate from the Well 22 withdrawal location (see **Figure 4** for the Preliminary WHPA/recharge area). The total area of the recharge area is approximately 4.10 sq. mi. This recharge area now coincides with the Proposed WHPA.

3.2.3 Wellhead Protection Area

The boundaries of the maximum extents of the COD and recharge area are crucial in the development of the WHPA for a pumping well. Typically, the WHPA boundary is coincident with the maximum extent of the recharge area for a pumping well, which in turn, is developed based on the COD for the pumping well. Therefore, the maximum extent of the recharge area for the withdrawal forms the boundary of the WHPA. According to RSA 485-C: XVIII, the WHPA is defined as "the surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield."

Since the WHPA coincides with the maximum extent of the recharge area for a pumping well, the WHPA represents a conservative hydrologic boundary which will enhance the proactive protection of groundwater in the vicinity of Well 22 by the applicant and the community. **Figure 15** presents the Recharge Area coincident with the Proposed WHPA.

3.2.4 Potential Impact Area

Based on the results of the pumping test, the Revised PIA coincides with the Preliminary Recharge Area, and the Preliminary WHPA. This area can be described as:

a. The area representing the 5,000 foot radius / Cone of Depression (COD) surrounding Well 22, including all identified FTA and VLF fractures/lineaments the immediate vicinity of Well 22, but not including tidal/brackish waters, such as Meadow Pond;
b. An area to the north, beyond the sub-basin in which Well 22 is located, incorporating intersections of mapped USGS lineaments that extend greater than 5,000 feet from Well 22, and the watershed above the lineaments that is presumed to be the recharge area for the lineaments that extend in the northeastern direction from the site.

The Revised PIA boundary is presented on **Figure 15** and is anticipated to provide maximum protection for Well 22.

3.2.5 Revised Water Budget for Study Area

A detailed water budget for the proposed recharge area was provided in the Preliminary Report. The only change to the water budget is a reduction in the proposed Permitted Production Volume (PPV), from 1.35 MGD (940 gpm) to 1.224 MGD (850 gpm)(447 MGY). The proposed recharge area remains the same and coincides with the PIA. The ratio of remaining yearly recharge (after existing water users) to the maximum proposed yearly production volume is 2.3:

$(1.03 \times 10^9) / (4.47 \times 10^8) = 2.3$

Thus, the annual recharge volume is 2.3 times greater than the proposed permitted production volume. With this surplus of groundwater, the proposed groundwater withdrawals should not adversely impact the water budget within the Potential Impact Area.

4.0 ESTIMATE OF THE EFFECTS OF THE WITHDRAWAL ON WATER RESOURCES AND USES (ENV-WQ 403.19)

The estimate of the effects of the withdrawal on water resources and users in PIA is based on the revised conceptual hydrologic model, including the estimated maximum extent of the cone of depression under pumping conditions, the geology and hydrology associated with the PIA, and the results of the pumping test.

4.1 Bedrock Aquifer / Private Well Users

As discussed in **S**ection 2 of this report, and presented in **Table 6**, drawdowns in groundwater levels were measured in private bedrock wells located within the observed COD as depicted in **Figure 7**. Maximum drawdowns in the range of 13 to 27 feet were measured in private bedrock wells located along presumed fractures oriented northeast-southwest, at distances of up to 4,600 feet from Well 22. Maximum drawdowns in the range of 10 to 17 feet were measured in private bedrock wells located to the north and to the south of Well 22, at distances of up to 1,500 feet from Well 22. After projecting the effects of the pumping of Well 22 to 180 days with no inputs from precipitation (see semi-log graphs in **Appendix D**, and **Table 6**), the maximum observed drawdowns of 10-27 feet in the wells affected by pumping are projected to be in the range of 30-50 feet. These projected drawdowns are not expected to cause or represent adverse impacts to water users within the COD. The five private bedrock wells affected by pumping that are used for drinking water (206 Woodland Road, and 7, 8, 10, and 12 Springhead Lane) have wells that have drilled to depths of 180 to 400 feet deep, and static water levels of 6-10 feet deep, thus, allowing drawdowns of available water greater than 50 feet without any anticipated adverse effects. No reports of adverse impacts to private wells were reported at any time during the pumping test.

The remaining bedrock wells affected by pumping are either irrigation wells (31 Windmill Lane, 82 Woodland Road, 11 Bear Path, with well depths of 380 feet, unknown, and 160 feet, respectively), a 175 foot-deep geothermal well (195 Woodland Road), or are not used. The effects to these wells were not adverse. Any future effects or impacts to these wells are not likely to be adverse.

Saltwater Intrusion

As discussed in Section 2.6.1, daily salinity monitoring was conducted at Well 22 and at 7 select private wells to evaluate for the potential intrusion of saltwater during pumping. The salinity results showed that no effects of saltwater intrusion were observed during the pumping test.

An evaluation was conducted by GEOSPHERE to estimate the depths of the freshwater/saltwater interface below each of the private wells monitored during the pumping test. By applying a principle that states that the depth to the interface is a function of the elevation of the groundwater surface (water table) above sea level (h), GEOSPHERE estimated that the depth to freshwater/saltwater interface (z) during non-pumping conditions ranges from approximately 300 feet below sea level at a private well located in close proximity to the tidal salt marsh, to over

2,000 feet below sea level at the higher elevation locations. This evaluation is provided in **Appendix M**. Based on this evaluation, the likelihood of saltwater intrusion impacts to Well 22 or private wells within the Potential Impact Area is extremely low.

4.2 Overburden Aquifer / Water Users

As discussed in Section 2 of this report, and presented in **Table 6**, drawdowns observed in three private sand and gravel wells (2 irrigation wells at 321 Winnacunnet Rd. and 23 Esker Dr., and one unused well at 78 Little River Rd.) over the course of the pumping test were attributed to ambient, natural conditions, and not to the effects of the pumping of Well 22. Drawdowns in the overburden aquifer as a result of pumping were only measured in OBS-1 and 7-OBS, located in close proximity to Well 22 (see **Figure 11**). Projected drawdowns to 180 days with no inputs from precipitation (see semi-log graphs in **Appendix D**, and **Table 6**) are anticipated to be in the range of 7-19 feet within the overburden aquifer, at close proximity to Well 22. It is likely that the effects of pumping on the overburden aquifer will be attributed more to the pumping of Aquarion's Well 7, which draws directly from the aquifer, than the pumping of Well 22. Overall, effects of pumping on this aquifer as a result of the pumping of Well 22 are not expected to be adverse; no reports of adverse impacts to shallow wells in the vicinity of Well 22 occurred during the pumping test.

4.3 Wetlands

The projected effects of long-term pumping of Well 22 on the nearby wetlands are not anticipated to be significant. Two wetlands piezometers, PZ-3 and PZ-4, located 417 feet and 857 feet southeast of Well 22, showed signs of response to pumping. Maximum drawdowns of 0.53 feet and > 2.81 feet (went dry) were observed (see **Table 6**, and **Figure 11**). Projected drawdowns to 180 days with no inputs from precipitation (see semi-log graphs in **Appendix D**, and **Table 6**) are anticipated to be in the range of 4 - >10 feet, about ½ the drawdown anticipated for the overburden aquifer at close proximity to Well 22.

It is anticipated that the effects on wetlands will be most attributed to the following factors: precipitation (or lack thereof), evaporation, transpiration from vegetation, aquifer effects from pumping of Well 7, and the effects of pumping of Well 22. Based upon similar conditions observed at Aquarion's Wells 20 and 21, where both bedrock and overburden aquifers are being pumped, and the effects of pumping on the nearby wetlands have been monitored for over 16 years, the projected effects of long-term pumping of Well 22 on the nearby wetlands are not anticipated to be adverse.

4.4 Surface Waters

No adverse impacts to surface waters were observed or are expected as a result of long-term pumping of Well 22. No responses to pumping were observed at staff gauges SG-1 or SG-2, located approximately 1,700 feet south-southeast and 1,300 feet southeast of Well 22, the closest areas containing surface waters.

5.0 WELLHEAD PROTECTION PROGRAM, WATER RESOURCE AND USE INVENTORY UPDATE

In accordance with Env-Ws 302.24 and 302.25, a contamination control program and wellhead protection program is required as part of the application, to include an updated contaminant source inventory (in accordance with Env-Wq 403.10, and water resource and use inventory in accordance with Env-Wq 403.11).

The Aquifer Protection Districts for the Towns of Hampton and North Hampton, established by zoning ordinance and inclusive of zoning restrictions, are designed to protect, preserve and maintain existing and potential groundwater supplies and the groundwater recharge areas to known aquifers. These Districts are delineated by the Town of North Hampton's sand and gravel aquifer boundaries as represented by Transmissivity values of greater than 1,000 ft^2/day, and buffer zones surrounding Aquarion's public water supplies within the Town of Hampton.

The District boundaries of the Towns of Hampton and North Hampton are, in fact, subsets of a larger Wellhead Protection Area (WHPA) established for all of Aquarion's public water supply wells in the Seacoast Area, including Rye, NH. **Figure 15** presents the existing WHPA for Aquarion's water supplies, as well as the proposed WHPA for Well 22. The majority of the proposed Well 22 WHPA lies within the existing WHPA, with the exception of areas to the southwest and northeast of Well 22 (see **Figure 15**). Upon NHDES' approval to operate Well 22 as a Large Groundwater Withdrawal, Aquarion will recommend to the Town of Hampton that the WHPA be expanded to accommodate those areas identified as potential recharge areas to Well 22 that are not currently within the existing WHPA.

A NHDES-approved contamination control and wellhead protection program has been in place for Aquarion's existing water supplies since 2010. The program includes an inventory update and detailed review of all potential contaminant sources (PCS) in the established Wellhead Protection Area, which is conducted every three years. Aquarion completed its last PCS inspection in 2016 and the 2019 inspection program is currently underway.

Potential Contaminant Source Inventory

A Potential Contaminant Source (PCS) database inventory review for the preliminary PIA was performed in March 2017 in conjunction with the preparation of the Preliminary report. In December 2018 the database query was updated. The 2018 NHDES-generated PCS Inventory / Map is included in **Appendix L.**

A comparison of the 2017 and 2018 PCS Inventory Maps found the addition of only one known contaminant source (KCS) to the proposed WHPA: Don's Mobil at 20 Lafayette Road, North Hampton is listed as an inactive RCRA generator. GEOSPHERE reviewed the NHDES OneStop Database for Don's Mobil and learned that Don's Mobil was a Small Quantity Generator of RCRA Hazardous materials from 1993 through November 2017 when it was listed inactive. Don's Mobil is also the site of leaking USTs dating back to 1995 and has been under active remediation since. A Groundwater Management Permit was issued in 2006 due to groundwater contamination which exceeded ambient groundwater quality standards. According to OneStop

groundwater at all on-site monitoring wells met AGQS standards in June 2018. Continued monitoring is on-going to evaluate for seasonal effects. Don's Mobil is at the northwest tip of the Well 22 proposed WHPA; the conditions at this facility are not considered to be a significant threat to Well 22 or be influenced by the pumping of Well 22, particularly because the observed Cone of Depression (COD) falls within a 5,000 foot radius of Well 22, as shown in **Figure 15**.

GEOPSHERE compared the proposed Well 22 WHPA with the data from the 2016 WHPA Survey submitted by Aquarion. A review of the two datasets reveals three (3) sites in the Well 22 WHPA that were not included in the 2016 survey:

- Fairpoint Communications, 169 Winnacunnet Road, a RCRA generator declassified in 2003;

- Hampton Rod & Gun Club 189 Atlantic Avenue, North Hampton, being investigated for lead impacts to soil and water from shooting activities; and

- Carrigg Property, 173 Atlantic Avenue, North Hampton, where oil contamination from a fuel oil tank leak to a dirt basement was reported in 2012. The spill was cleaned up with NHDES oversight and closed in November 2012, no AGQS violations were documented.

Based on this review, these three additional PCSs are not considered to pose a significant threat to or be influenced by the pumping of Well 22.

Aquarion's 2019 Wellhead Protection Area program will be modified to incorporate the expansion areas of the wellhead protection area to accommodate the areas of the Well 22 WHPA that were not included in 2016 in the upcoming WHPA PCS inspection project.

Water Resource User Inventory

In a letter to NHDES dated November 2017, GEOSPHERE described the water user inventory conducted for the Well 22 area. Specifically, GEOSPHERE extended the boundary for the water user inventory 1,000 feet outside the Preliminary Wellhead Protection Area / Recharge Area established in the Preliminary Report. This inventory was based on: the NHDES-provided private well database (NHDES Water User Inventory Map); an Aquarion-provided list of properties within their service area that are not listed as customers; and other NHDES, Aquarion and GEOSPHERE well logs and records.

Similar to the PCS Inventory, GEOSPHERE performed an updated query of the NHDES Water User Inventory databases in December 2018 and compared the map generated in 2017 with the 2018 map. Since the preliminary PIA and proposed WHPA areas are the same, the comparison of the two datasets is straight-forward, and revealed no new documented water users in the Well 22 WHPA. No new users have been identified by Aquarion or the other information sources listed above. The 2018 NHDES-generated Water User Inventory / Map is included in **Appendix L.**

6.0 CONTAMINATION CONTROL PROGRAM

Aquarion maintains a wellhead protection program as described in Section 5. Aquarion's existing contamination control program is designed to help protect the bedrock and overburden source waters that provide drinking water to the residents of Hampton, North Hampton, and Jenness Beach area of Rye. Although no adverse impacts were observed or are anticipated to occur as a result of the long-term pumping of Well 22, Aquarion intends to continue to implement contamination control procedures in order to protect the water supplies. These controls consist of the following:

1. A Best Management Practices program comprised of inspections, information mailings, and communications with all commercial potential contamination sources within the WHPA to inform and provide guidance to help prevent and control releases of hazardous materials;
2. A voluntary groundwater monitoring program consisting of the sampling and laboratory analysis of various groundwater and source water monitoring locations to identify threats to the water supplies and to monitor concentrations of contaminants that pose a threat to the water supplies;
3. Where necessary, treatment of source waters to meet water quality standards set forth by NHDES, the State of New Hampshire, or the United States government;
4. Any other procedures as recommended or required by the regulatory community.

7.0 SANITARY PROTECTION RADIUS AND WAIVER REQUEST

The proposed 400 foot sanitary protection radius (SPR) is shown on **Figure 2** and **Figure 3**. Approximately 50% of the SPR is comprised of Map 165 Lots 1 and 2, currently owned by Aquarion and the Town of Hampton, respectively. The remainder of the SPR encompasses portions of: Map 147/Blocks 14, 19, and 23; Map 164/Block 3A, Map 148/Block 3/Lots 2, 3 and 4. Aquarion has retained the services of a NH-registered land surveyor to perform a professional land survey of the SPR to confirm the SPR boundary and ownership of the parcels which lie within a 400 foot radius of Well 22. Easements are currently in place for Map 148/Block 3/Lots 2, 3 and 4. Aquarion is currently in negotiations with the owners of the remaining parcels to obtain easements or legal control of the land within the SPR not currently owned by the Town of Hampton or by Aquarion. The purpose of obtaining easements, covenants, or legal control or ownership of the land within the SPR is to maintain the area in a natural state for the protection of the water supply.

For the portions of private land within the SPR that Aquarion has not yet (or may not) obtained easements, covenants or similar legal control, Aquarion hereby requests a Waiver of the requirements of Env-Dw 302.10(d-f) in accordance with Env-Wq 403.37. This Waiver is being requested for the foreseeable future, or until control of the land is obtained. For the land within the SPR that Aquarion does not have or cannot gain control, the alternatives that will be implemented are the following, in order be as protective of public health and the environment,

including groundwater quality and quantity, as adhering to the rule: 1) Aquarion currently performs Potential Contamination Source (PCS) surveys of the Wellhead Protection Areas for all of Aquarion's public water supplies, every three years, in accordance with required Best Management Practices. This includes performing interviews and inspections of PCSs, and educating the general public of the need to properly store, use, and dispose of any hazardous materials that represent a risk to the drinking waters of the State of New Hampshire; 2) Aquarion performs a rigorous groundwater quality sampling and analysis program, including groundwater monitoring of overburden and bedrock wells, to proactively monitor groundwater quality in area upgradient of its public water supply wells; 3) Aquarion is prepared and is committed to providing the highest quality of groundwater to the public, and will perform treatment, as necessary, to meet or exceed New Hampshire and Federal drinking water quality standards; and 4) The aquifer protection bylaws established in the Town of Hampton provides the necessary protection of the Wellhead Protection Areas in Hampton, including the SPR of Well 22.

Aquarion takes very seriously the protection of the water supplies of the State of New Hampshire. The above alternatives are, in Aquarion's opinion, sufficient to meet the intent of RSA 485:3 and 485-C, protect the public water supplies, and prevent adverse impacts to public health and the environment. The denial of Well 22 would most certainly impact Aquarion's ability to adequately meet the demands of future populations of residents relying on the drinking water system and infrastructure maintained and operated by the Aquarion Water Company of New Hampshire.

8.0 CONSTRUCTION DESIGN (ENV-DW 302.26)

Well 22 was installed in accordance with Env-Ws 302.26; well construction complies with RSA 482-B, We 100 et seq. A copy of the well construction log for Well 22 can be found in **Appendix B**.

9.0 REFERENCES

Water User Inventory Map for Hampton and North Hampton, NH Potential Impact Area, New Hampshire Department of Environmental Services (NHDES), December 2018.

Potential Contamination Source Inventory Map for Hampton/North Hampton Potential Impact Area, NHDES, December 2018.

Hampton Aerial Photo Quadrangle (1210001600), 1-foot color, UNH GRANIT.

Topographic Quadrangle Map for Hampton, NH, United States Geologic Survey, 1987, Scale 1:24,000. Contour interval = 3 meters.

Borehole Geophysical Logging-Data Report, Aquarion Well 22, Little River Road, Hampton, NH, Hager-Richter Geoscience, November 2018.

Bedrock Geologic Map of New Hampshire, John Lyons, et al, 1997.

The Geology of the Seacoast Region, New Hampshire, Robert F. Novotny, 1969.

Geosphere Environmental Management, Inc., "Preliminary Report and Large Groundwater Withdrawal Permit Application, March 24, 2017 - Aquarion Water Company of New Hampshire Well 22, Hampton, NH."

Geosphere Environmental Management, Inc., April 20, 2017, "Response to (NHDES) Letter dated April 7, 2017."

Geosphere Environmental Management, Inc., November 7, 2017, "Response to (NHDES) Letter dated August 3, 2017."

Tighe & Bond, "Aquarion New Hampshire Supply/Demand Analysis," Technical Memorandum, May 18, 2017.

Documentation of Spreadsheets for the Analysis of Aquifer-Test and Slug-Test Data, U.S. Department of the Interior, U.S. Geological Survey, Open-File Report 02–197, Halford, K.J., and Kuniansky, E.L., 2002.

TABLES

Table 1

Current and Projected Future Aquarion Water Needs

Aquarion Well 22 Long Term Pumping Test

Aquarion Water Company of New Hampshire - Hampton, NH

Local Groundwater Withdrawals			***Current Demand***				***Projected Demand to 2040 †***		
Well ID (Type)	Year Brought Into Service	Established Safe Yield / Permitted Production Volume† (MGY)	***Average Daily*** Production Volume (GPD)	***Maximum Daily*** Production Volume (GPD)††	***Minimum Daily*** Production Volume (GPD)	***Average Annual*** Production Volume (MGY)	***Average Daily*** Production Volume (MGD)	***Maximum Daily*** Production Volume (MGD)	***Average Annual*** Production Volume (MGY)
*Outside Potential Impact Area** **AQUARION Wells:**			*(calculated from annual avg)*	2016 data from NHDES		*(2007-2016 average)*			
Well 5A (S&G)	2008	52.56	59,835	130,406	0	21.84			
Well 10 (S&G)	1963	183.96	243,574	371,626	0	88.90			
Well 12 (S&G)	1978	88.30	185,654	194,982	0	67.76			
Well 13B (Bedrock)	2004	73.58	54,793	163,472	0	20.00			
Well 14 (S&G)	1989	52.56	43,031	163,175	0	15.71			
Well 16 (S&G)	1998	127.20	180,259	151,536	0	65.79			
Well 17 (Bedrock)‡	1997		30,587	98,667	0	11.16			
Well 18 (Bedrock)‡	1997		76,614	178,090	0	27.96			
Well 19 (Bedrock)	1997	105.12	68,581	179,770	0	25.03			
Subtotal *AQUARION* GW Withdrawal outside PIA		**683.28**	**942,927**	**1,631,724**	--	**344.17**	Data not available for individual wells, see total projected demand volumes†, below		
*Inside Potential Impact Area** **AQUARION Wells:**		*From Tighe and Bond 2017 and PR 2017*	*(calculated from annual avg 2007-2016)*	2016 data		*(2007-2016 average)*			
Well 6 (S&G)	1937	157.68	179,132	428,289	0	65.38			
Well 7 (S&G)	1950	183.96	299,531	821,394	0	109.33			
Well 8A (S&G)	2002	90.40	121,492	196,721	0	44.34			
Well 9 (S&G)	1957	89.30	254,600	594,153	0	92.93			
Well 11 (S&G)	1967	225.00	355,458	877,018	0	129.74			
Well 20 (Bedrock)	2003	190.22	42,194	154,406	0	15.40			
Well 21 (Bedrock)	2003		81,797	136,565	0	29.86			
Subtotal *AQUARION* GW Withdrawal in PIA		**936.56**	**1,334,204**	**3,208,546**	--	**486.98**			
Total *AQUARION* GW Withdrawal‡		**1619.84**	**2.03 MGD****	**4,200,000 ††**	--	***831.15***	**2.21**	**4.24**	**806.65**
Other Users in PIA:		*estimated 2017*							
50 private wells @ 600 gpd x 365/yr	*varies*	*unknown*	*30,000*	*unknown*		*10.95*	*30,000*	*unknown*	*10.95*
*SubTotal Estimated GW Withdrawal **in PIA***			1,364,204			497.93	--	--	--
Proposed Maximum Withdrawal - Well 22 (Bedrock)		850 gpm	n/a				500 gpm	850 gpm	500 gpm
	2019	446.76	n/a	n/a	n/a	n/a	720,000 gpd	1,224,000	262,800,000
Maximum Potential GW Withdrawal in PIA		*1383.32*							
Maximum Potential AQUARION GW Withdrawal		***2066.60***							

Notes:

MGD = Millions of gallons per day; MGY = Millions of gallons per year; GPD = Gallons per Day

*Potential Impact Area established in Preliminary Report, March 2017

†Data from Tighe&Bond Technical Memorandum dated May 18, 2017

‡Due to pumping interferences between Wells 16, 17, and 18, only the volume from Well 16 is included in the total (conservative). (Tighe&Bond Technical Memorandum, 2017).

††Maximum Daily Production Rate for individual wells reported to NHDES; sum of maximum production at each well does not reflect maximum 24 hr Demand, reported by Aquarion to be 4.2 MGD

**2016 figures from Tighe & Bond Technical Memorandum, 2017)

TABLE 2
Summary of Monitoring Points and Locations Relative to Well 22
Aquarion Well 22 Long Term Pumping Test
Aquarion Water Company of New Hampshire - Hampton, NH

Monitoring Point ID	Well Type	Water Resource	Distance/Direction from Well 22 (feet)
Aquarion / Monitoring Wells			
Well 22 (Pumping)	Proposed Public Water Supply	Bedrock	0 / -
Well 7 (off)	Public Water Supply Well	Sand & Gravel	169 / SSE
7-OBS Well	Observation Well	Sand & Gravel	169 / SE
Piezometer (PZ-1)	Observation Point	Wetland	1,353 / SSE
Piezometer (PZ-2)	Observation Point	Wetland	1,700 / E
Piezometer (PZ-3)	Observation Point	Wetland	857 / SE
Piezometer (PZ-4)	Observation Point	Wetland	417 / SE
Staff Gauge (SG-1)	Staff Gauge	Surface Water	1,359 / NE
Staff Gauge (SG-2)	Staff Gauge	Surface Water	1,727 / E
Staff Gauge (SG-3)	Staff Gauge	Surface Water	839 / SE
OBS-1	Observation Well	Till	500 / N
SB -1	Observation Well	Bedrock	6,646 / NNW
SB-7	Observation Well	Bedrock	7,046 / NNW
Wells 6, 8A, 9, 11	Public Water Supply Well	Sand & Gravel	5,953-6,630 / NW
Well, 20, 21	Public Water Supply Well	Bedrock	6,400, 6,420 / NNW
RW #4 (Ambient Well)	Observation Well	Bedrock	11,973 / NW
Private Wells			
82 Woodland Road	Irrigation Well	Bedrock	600 / N
10 Springhead Lane	DW/Irrigation Well	Bedrock	676 / S
8 Springhead Lane	DW/Irrigation Well	Bedrock	695 / SSE
12 Springhead Lane	DW/Irrigation Well	Bedrock	790 / SSE
7 Springhead Lane	DW/Irrigation Well	Bedrock	844 / S
117 Little River Road	Former DW Well, Unused	Bedrock	971 / NW
11 Bear Path	Irrigation Well	Bedrock	1,516 / N
83 Little River Road	DW/Irrigation Well	Bedrock	1,700 / NW
78 Little River Road	Original Dug Well, Unused	Sand & Gravel	2,600 / NW
38 Edgewood Drive	Irrigation Well	Bedrock	3,773 / SW
23 Esker Drive	Irrigation Well (DPt)	Sand & Gravel	3,782 / SSE
31 Windmill Lane	Irrigation Well	Bedrock	3,940 / WSW
195 Woodland Road	Geothermal Well	Bedrock	4,159 / NE
321 Winnacunnet Road	Irrigation Well	Sand & Gravel	4,369 / WSW
59 Edgewood Drive	Irrigation Well	Bedrock	4,450 / SW
206 Woodland Road	DW/Geothermal Well	Bedrock	4,597 / NE
3 Hilda Drive	Irrigation Well	Bedrock	5,710 / SW
53 Winnacunnet Road	Irrigation Well	(Flowing) Bedrock	5,975 / WSW
81 Landing Road	DW Well, Unused	Bedrock	8,135 / SW
110 Mill Road	DW/Irrigation Well	Bedrock	10,158 / NNE

Notes: DW = Domestic/Drinking Water DPt = Driven Point

TABLE 3
Aquarion Water Company of New Hampshire Production Data, June 20 - July 20, 2018
Aquarion Well 22 Long Term Pumping Test
Aquarion Water Company of New Hampshire - Hampton, NH

Production Wells WITHIN Potential Impact Area (PIA)

Water Supply Well ID	**Well 6 (s)**	**Well 7 (s)**	**Well 8A (s)**	**Well 9 (s)**	**Well 11 (s)**	**Well 20 (b)**	**Well 21 (b)**	**Well 22 (b)**	
Est Average Pumping Rate (gpm)	115.7	0.0	115.1	229.6	295.3	92.8	0.0	824.6	**Total PIA Production**
Est Total Gals Pumped	4,340,912	-	4,317,262	8,617,944	11,084,626	3,480,411	-	31,949,082	**63,957,803**
% of TOTAL production	4.76%	0%	4.73%	9.45%	12.15%	3.81%	0%	35.02%	**69.92%**
% of PIA production	6.80%	0.00%	6.77%	13.51%	17.38%	5.46%	0.00%	50.08%	**100%**

Production Wells OUTSIDE Potential Impact Area (PIA)

Water Supply Well ID	**Well 5a (s)**	**Well 10 (s)**	**Well 12 (s)**	**Well 13B (b)**	**Well 14 (s)**	**Well 16 (s)**	**Well 17 (b)**	**Well 18 (b)**	**Well 19 (b)**	
Est Average Pumping Rate (gpm)	52.0	203.1	128.0	86.2	42.3	114.0	10.5	64.7	31.0	**Total Produced**
Est Total Gals Pumped	1,948,625	7,618,667	4,801,489	3,233,602	1,587,808	4,276,011	392,708	2,427,621	1,162,369	**91,239,136**
% of TOTAL production	2.14%	8.35%	5.26%	3.54%	1.74%	4.69%	0.43%	2.66%	1.27%	30.08%
% of PIA production	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes:
(s) - sand & gravel production well
(b) - bedrock production well
Production data derived from Aquarion SCADA system

TABLE 4
Summary of Monitoring Points and Data Collection Intervals
Aquarion Well 22 Long Term Pumping Test
Aquarion Water Company of New Hampshire - Hampton, NH

Monitoring Point ID	Water Level Monitoring Method	Frequency of Water Level Monitoring	Comments / Operating Schedule (PWS)	Well Type	Water Resource	Distance/Direction from Well 22 (feet)
Aquarion / Monitoring Wells						
Well 22 (Pumping)	Pressure Transducer/ WLI	One minute intervals	Constant pumping for 27 Days	Proposed Public Water Supply	Bedrock	0 / -
Well 7 (off)	SCADA	One hour intervals*	Offline 6/13/18 thru 7/19/18	Public Water Supply Well	Sand & Gravel	169 / SSE
7-OBS Well	Pressure Transducer/ WLI	One hour intervals*		Observation Well	Sand & Gravel	169 / SE
Piezometer (PZ-1)	Pressure Transducer/ WLI	One hour intervals*		Observation Well	Wetland	1,353 / SSE
Staff Gauge (SG-1)	Gauge	Once daily		Staff Gauge	Surface Water	1,359 / NE
Piezometer (PZ-2)	Pressure Transducer/ WLI	One hour intervals*		Observation Well	Wetland	1,700 / E
Staff Gauge (SG-2)	Gauge	Once daily		Staff Gauge	Surface Water	1,727 / E
Piezometer (PZ-3)	Pressure Transducer/ WLI	One hour intervals*		Observation Well	Wetland	857 / SE
Staff Gauge (SG-3)	Gauge	Once daily		Staff Gauge	Surface Water	839 / SE
Piezometer (PZ-4)	Pressure Transducer/ WLI	One hour intervals*		Observation Well	Wetland	417 / SE
OBS-1	Pressure Transducer/ WLI	One hour intervals*		Observation Well	Till	500 / N
AMBIENT RW#4	Pressure Transducer	One minute intervals		Observation Well	Bedrock	11,973 / NW
Wells 6, 8A, 9, 11	SCADA	One hour intervals	Regular pumping operation	Public Water Supply Well	Sand & Gravel	5,953 - 6,630 / NW
Well, 20, 21	SCADA	One hour intervals	Regular pumping operation	Public Water Supply Well	Bedrock	6,400 - 6,420 / NNW
Private Wells						
82 Woodland Road	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	Irrigation Well	Bedrock	600 / N
10 Springhead Lane	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	DW/Irrigation Well	Bedrock	676 / S
8 Springhead Lane	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	DW/Irrigation Well	Bedrock	695 / SSE
12 Springhead Lane	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	DW/Irrigation Well	Bedrock	790 / SSE
7 Springhead Lane	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	DW/Irrigation Well	Bedrock	844 / S
117 Little River Road	Pressure Transducer/ WLI	One minute intervals†	Not operated, pump inactive	Former DW Well, Unused	Bedrock	971 / NW
11 Bear Path	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	Irrigation Well	Bedrock	1,516 / N
83 Little River Road	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	DW/Irrigation Well	Bedrock	1,700 / NW
78 Little River Road	Pressure Transducer/ WLI	One minute intervals†	Not operated, well unused	Original Dug Well, Unused	Sand & Gravel	2,600 / NW
38 Edgewood Drive	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	Irrigation Well	Bedrock	3,773 / SW
23 Esker Drive	Pressure Transducer/ WLI	One minute intervals†	Not operated, well unused	Irrigation Well (DPt)	Sand & Gravel	3,782 / SSE
31 Windmill Lane	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	Irrigation Well	Bedrock	3,940 / WSW
195 Woodland Road	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	Geothermal Well	Bedrock	4,159 / NE
321 Winnacunnet Road	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	Irrigation Well	Sand & Gravel	4,369 / WSW
59 Edgewood Drive	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	Irrigation Well	Bedrock	4,450 / SW
206 Woodland Road	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	DW/Geothermal Well	Bedrock	4,597 / NE
3 Hilda Drive	n/a Salinity Monitoring	Daily	Regular pumping operation	Irrigation Well	Bedrock	5,710 / SW
53 Winnacunnet Road	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	Irrigation Well	(Flowing) Bedrock	5,975 / WSW
81 Landing Road	Pressure Transducer/ WLI	One minute intervals†	Not operated, pump inactive	DW Well, Unused	Bedrock	8,135 / SW
110 Mill Road	Pressure Transducer/ WLI	One minute intervals†	Regular pumping operation	DW/Irrigation Well	Bedrock	10,158 / NNE

Notes:
DW = Domestic Water Irr = Irrigation Geo= Geothermal DPt = Driven Point
* Manual water level measurements at these monitoring points were collected once-daily as backup to the transducer/data collectors.
† Manual water level measurements at these private wells were collected at the time of transducer installation and removal, and periodically during the aquifer test period as backup to the transducer/data collectors.

TABLE 5
Monitoring Point Construction Summary, page 1 of 2
Aquarion Well 22 Long Term Pumping Test
Aquarion Water Company of New Hampshire - Hampton, NH

Production Well ID	Distance from Well 22 (ft.)	Direction from Well 22 (ft.)	TOC Elev. (ft. asl)	Ground Elev. (ft. asl)	Riser Height Above Ground (ft.)	Well Depth (ft. bgs)	Well Construction	Screened Interval (ft. bgs)		Screen Length (ft.)	Screen Elevation (ft. asl)		Installed By	Date Installed
								From	To		Top	Bottom		
Well 22	0	NA	39.60	37.40	2.20	560.00	10" open borehole to 320 ft bgs. 8" open borehole to 560 ft bgs. 10" casing depth 67 ft bgs.	NA	NA	NA	NA	NA	Viera Artesian Well Co.	10/1/2012 - 10/9/2012
Well 21	6,400	NNW	62.17	60.17	2.00	647.00	10" open borehole. Casing depth: 68 ft bgs.	NA	NA	NA	NA	NA	Clear Water Artesian Well Co.	8/24/2001 - 8/30/2001
Well 20	6,420	NNW	58.83	56.83	2.00	607.00	8" open borehole. Casing depth: 21 ft bgs.	NA	NA	NA	NA	NA	Clear Water Artesian Well Co.	8/21/2001 - 8/23/2001
Well 11	5,953	NW	70.42	Unknown	Unknown	63.00	18 in. x 24-in. gravel packed, stainless steel screen	53.00	68.00	15.00	17.42	2.42	D.L. Maher Co.	1967
Well 9	5,550	NW	70.9	Unknown	Unknown	50.00	24 in. x 54 in. gravel packed, stainless steel screen	35.00	50.00	15.00	35.90	20.90	D.L. Maher Co.	1957
Well 8A	6,630	NW	65.97	Unknown	Unknown	40.00	12 in. gravel packed, stainless steel screen	34.00	40.00	6.00	31.97	25.97	D.L. Maher Co.	4/8/2002
Well 6	6,618	NW	67.63	Unknown	Unknown	49.00	18 in. gravel packed, stainless steel screen	39.50	47.00	7.50	28.13	20.63	Unknown	1937

Observation Well ID	Distance from Well 22 (ft.)	Direction from Well 22 (ft.)	TOC Elev. (ft. asl)	Ground Elev. (ft. asl)	Riser Height Above Ground (ft.)	Well Depth (ft. bgs)	Monitoring Well Construction	Screened Interval of Pipe (ft. bgs)		Screen Length (ft.)	Screen Elevation (ft. asl)		Depth to Bedrock (ft. bgs)	Installed By	Date Installed
								From	To		Top	Bottom			
7-OBS	169	SSE	37.28	35.76	1.52	20.1	2.5" SP	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
OBS-1	485	NNE	44.43	43.07	1.36	44.0	2" PVC	34.0	44.0	10.00	9.07	-0.93	40.0	CDS	07/27/16
SB-1	6,646	NNW	55.68	55.58	0.10	423.0	6.5" Open Hole	NA	NA	NA	NA	NA	8.0	D.L Maher Co.	8/17/94 - 8/30/94
SB-7	7,046	NNW	58.01	57.21	0.80	218.0	6.5" Open Hole	NA	NA	NA	NA	NA	38.0	D.L Maher Co.	2/7/95 - 2/9/95
RW #4 (Ambient Well)	11,973	NW	63.95	62.39	1.56	863.0	6" Open Hole	NA	NA	NA	NA	NA	63.0	D.L Maher Co.	12/07/05

Piezometer ID	Distance from Well 22 (ft.)	Direction from Well 22 (ft.)	TOC Elev. (ft. asl)	Ground Elev. (ft. asl)	Riser Height Above Ground (ft.)	Well Depth (ft. bgs)	Monitoring Well Construction	Screened Interval of Pipe (ft. bgs)		Screen Length (ft.)	Screen Elevation (ft. asl)		Installed By	Date Installed
								From	To		Top	Bottom		
PZ-1	1,353	SSE	13.45	10.10	3.35	3.65	1.25" SP	1.65	3.65	2.00	8.45	6.45	GEO	04/20/18
PZ-2	1,700	E	20.10	17.11	2.99	4.01	1.25" SP	2.01	4.01	2.00	15.10	13.10	GEO	04/30/18
PZ-3	857	SE	31.91	28.03	3.88	3.12	1.25" SP	1.12	3.12	2.00	26.91	24.91	GEO	04/20/18
PZ-4	417	SE	31.47	28.55	2.92	4.08	1.25 " SP	2.08	4.08	2.00	26.47	24.47	GEO	04/20/18

Staff Gauge ID	Distance from Well 22 (ft.)	Direction from Well 22 (ft.)	Ground Elev. (ft. asl)	Gauge Elev. (3.0ft mark) (ft. asl)	Installed By	Date Installed
SG-1	1,359	SSE	10.14	13.14	GEO	04/17/18
SG-2	1,727	E	15.93	18.93	GEO	04/30/18
SG-3	839	SE	27.53	30.53	GEO	04/17/18

see notes on page 2 of 2

TABLE 5
Monitoring Point Construction Summary, page 2 of 2
Aquarion Well 22 Long Term Pumping Test
Aquarion Water Company of New Hampshire - Hampton, NH

Private Well ID	Address	Well Type	Well Use	Type of monitoring	Distance from Well 22 (ft.)	Direction from Well 22 (ft.)	TOC Elevation (ft. asl)	Ground Elevation (ft. asl)	Casing Height Above Ground (ft.)	Top of Stilling Well Elevation (ft. asl)	Stilling Well Height Above Ground (ft.)	Well Material	Total Depth (ft.)	Casing Length (ft.)	Screen	Bedrock Depth (ft. bgs)	Bedrock Elevation (ft. asl)	Installed By:	Date Installed
56858	195 Woodland Road	BR	GEO	WATER LEVEL	4,159	NE	45.53	43.57	1.96	NA	NA	6" STEEL	175.00	40.00	NA	9.0	34.6	SKILLINGS	4/9/2010
41212	31 Windmill Lane	BR	IRR	WATER LEVEL SALINITY	3,940	WSW	56.04	54.89	1.15	56.01	1.12	6" STEEL	380.00	89.00	NA	42.0	12.9	CLEARWATER	5/14/2003
A-71	82 Woodland Road	BR	IRR	WATER LEVEL	600	N	52.83	52.46	0.37	52.80	0.34	Unknown	Unknown	Unknown	NA	Unknown	Unknown	Unknown	Unknown
12524	117 Little River Road	BR	Not Used	WATER LEVEL	971	NW	66.29	66.29	0.0	66.20	-0.09	6" STEEL	160.00	31.00	NA	19.0	47.3	HANNA	7/30/1987
56222	206 Woodland Road	BR	GEO/DW	WATER LEVEL	4,597	NE	38.63	37.18	1.45	38.63	1.45	6" STEEL	400.00	Unknown	NA	Unknown	Unknown	CAPITAL	10/7/2009
A-42	321 Winnacunnet Road	SG	IRR	WATER LEVEL SALINITY	4,369	WSW	56.24	56.24	0.0	56.15	-0.09	4" PVC	75.00	70.00	4 in. diameter 70-75 feet bgs	Unknown-shallow well	not encountered	DUBE & SON	5/24/2018
12755	59 Edgewood Drive	BR	IRR	WATER LEVEL SALINITY	4,450	SW	37.09	36.14	0.95	37.05	0.91	6" STEEL	120.00	81.00	NA	65.0	-28.9	HANNA	6/11/1996
A-41	53 Winnacunnet Road	BR	IRR	WATER LEVEL SALINITY	5,975	WSW	33.36	32.04	1.32	33.36	1.32	Unknown	Unknown	Unknown	NA	Unknown	Unknown	Unknown	Unknown
A-4	23 Esker Drive	SG	IRR	WATER LEVEL	3,782	SSE	16.95	16.95	0.0	NA	NA	1.25" STEEL	10.52	Driven Point	NA	Unknown - driven well point	not encountered	Homeowner	c. 1998
A-76	12 Springhead Lane	BR	DW	WATER LEVEL	790	SSE	34.71	33.88	0.83	NA	NA	6" STEEL	> 200	Unknown	NA	Unknown	Unknown	Unknown	1998
A-77	110 Mill Road	BR	DW	WATER LEVEL	10,158	NNE	61.51	61.51	0.0	61.51	0	6" STEEL	97.00	Unknown	NA	Unknown	Unknown	Unknown	<1994
52755	81 Landing Road	BR	Not Used	WATER LEVEL	8,135	SW	8.33	7.01	1.32	8.33	1.32	6" STEEL	250.00	87.00	NA	65.0	-58.0	BUXTON	7/14/1987
A-22	78 Little River Road	SG	Not Used	WATER LEVEL	2,600	NW	69.94	67.69	2.25	69.94	2.25	Unknown	Unknown	Dug Well	NA	Unknown - Dug Well	Unknown	Unknown	Unknown
A-74	8 Springhead Lane	BR	DW	WATER LEVEL	695	SSE	40.09	37.42	2.67	40.03	2.61	6" STEEL	220.00	80.00	NA	67.0	-29.6	GOODWIN	8/1/1998
A-75	10 Springhead Lane	BR	DW	WATER LEVEL	676	S	37.32	35.27	2.05	37.29	2.02	6" STEEL	>200	Unknown	NA	Unknown	Unknown	Unknown	Unknown
12685	11 Bear Path	BR	IRR	WATER LEVEL	1,516	N	57.71	55.61	2.10	57.71	2.1	6" STEEL	160.00	17.00	NA	8.0	47.6	HANNA	9/11/1995
GEM-6	83 Little River Road	BR	DW	WATER LEVEL	1,700	NW	73.45	72.48	0.97	73.45	0.97	6" STEEL	Unknown	Unknown	NA	Unknown	Unknown	Unknown	Unknown
41213	38 Edgewood Drive	BR	IRR	WATER LEVEL SALINITY	3,773	SW	34.51	34.51	0.0	34.42	-0.09	6" STEEL	180.00	80.00	NA	67.0	-32.5	CLEARWATER	9/15/2002
A-73	7 Springhead Lane	BR	DW	WATER LEVEL	844	S	39.57	38.00	1.57	39.57	1.57	6" STEEL	180.00	Unknown	NA	Unknown	Unknown	So Maine Pump	1998
43	3 Hilda Drive	BR	IRR	SALINITY	5,700	SW	NA	NA	NA	NA	NA	6" STEEL	325.00	92.00	NA	80.0	Unknown	TASKERS	3/28/1996

Notes:

asl = above sea level

bgs = below ground surface

All elevations are in feet above sea level (asl) based on the North American Vertical Datum 1988 (NAVD88).

Elevation values extracted from LiDAR created in 2011 as part of The Northeast Project and accessed from NH GRANIT

Private Well construction details derived from Well Completion Logs filed by well driller with the NH Water Well Board. Aquarion Monitoring Point and Production Well construction details obtained from logs on file with Aquarion Water Company of New Hampshire.

Piezometers and Stream Gauges installed by Geosphere Environmental Management, Inc.

TOC = Top of PVC casing or iron steel casing (water level measurement point)

TOG = Top of staff gauge - 3 ft. mark, BOG = Bottom of staff gauge - 0 ft. mark

NA= Information not available or not necessary

GEO = Geosphere Environmental Management, Inc. of Exeter, NH

CDS = Crawford Drilling Services of Westminster, MA

SG = Staff Gauge, 3-foot gauge set in standing surface water

SP = Steel Pipe riser connected to stainless steel-wound screen

TABLE 6, page 1 of 2
Groundwater Elevation Data
Aquarion Well 22 Long Term Pumping Test
Aquarion Water Company of New Hampshire - Hampton, NH

Production Well Point ID	Well Type	Well Use	TOC Elev. (ft. AVD)	Static Depth to Water 6/20/2018 10:00am (ft. btoc)	Static Groundwater Elev. (ft. AVD)	Depth to Water at Shut Down † 7/17/2018 11:01am (ft. btoc)	Groundwater Elevation at Shut Down (ft. AVD)	Maximum Drawdown at Shut Down (ft.)	Drawdown Effect due to Pumping?	Projected Depth to Water at 180 Days (ft. btoc)	Projected Groundwater Elevation at 180 Days (ft. AVD)	Projected Drawdown at 180 Days (ft.)	Correction Needed for Precipitation Effects?
Well 22	BR	PWS	39.60	12.44	27.16	176.77	-137.17	164.33	Yes	191.66	-152.06	179.22	No (no effects)
Well 21	BR	PWS	62.17	46.50	15.67	45.90	16.27	R* (0.60)	No	NR	NR	NR	NR
Well 20	BR	PWS	58.83	159.40	-100.57	157.60	-98.77	R* (1.80)	No	NR	NR	NR	NR
Well 11	SG	PWS	70.42	36.10	34.32	34.40	36.02	R* (1.70)	No	NR	NR	NR	NR
Well 9	SG	PWS	70.90	19.60	51.30	19.50	51.40	R* (0.10)	No	NR	NR	NR	NR
Well 8A	SG	PWS	65.97	22.90	43.07	24.10	41.87	1.20	No	NR	NR	NR	NR
Well 6	SG	PWS	67.63	42.40	25.23	44.60	23.03	2.20	No	NR	NR	NR	NR
Observation Wells													
OBS-1	OB	MW	44.43	10.05	34.38	22.69	21.74	12.64	Yes	29.39	15.04	19.34	No (negligible effects)
7-OBS	SG	MW	37.28	4.58	32.70	7.84	29.44	3.26	Yes	11.73	25.55	7.15	No (negligible effects)
SB-1	BR	MW	55.68	10.23	45.45	11.24	44.44	1.01	No	NR	NR	NR	NR
SB-7	BR	MW	58.01	6.33	51.68	7.61	50.40	1.28	No	NR	NR	NR	NR
RW #4 (Ambient Well)	BR	MW	63.95	3.06	60.89	4.88	59.07	1.82	No	NR	NR	NR	NR

Piezometers

Piezometer ID	TOC Elev. (ft. AVD)	Static Water Level Height 4/20/2018 (ft. above BOG)	Static Depth to Water 6/20/2018 10:00am (ft. btoc)	Static Groundwater Elevation (ft. AVD)	Depth to Water at Shut Down 7/17/2018 11:01am (ft. btoc)	Groundwater Elevation at Shut Down (ft. AVD)	Maximum Drawdown at Shut Down (ft.)	Drawdown Effect due to Pumping?	Projected Depth to Water at 180 Days (ft. btoc)	Projected Depth to water at 180 days (corrected for no precip) (ft. btoc)
PZ-1	13.45	3.22	2.96	10.49	3.53	9.92	0.57	No	NR	NR
PZ-2	20.10	3.56*	2.92	17.18	2.88	17.22	R* (0.04)	No	NR	NR
PZ-3	31.91	3.33	3.57	28.34	> 6.38 (dry)	< 25.53	> 2.81	Yes	> 5 (est)	> 10 (est)
PZ-4	31.47	2.79	2.63	28.84	3.16	28.31	0.53	Yes	4.23	4.23 (neglig. effects)

*installed 4/30/2018

Staff Gauges

Staff Gauge ID	Ground Elev. (ft. AVD)	Gauge Elevation (3.0ft mark) (ft. AVD)	Static Water Level Height 4/20/2018 (ft. above BOG)	Static Water Level Height 6/20/2018 10:00am (ft. above BOG)	Static Water Level Elevation 6/20/2018 10:00am (ft. AVD)	Water Level at Shut Down 7/17/2018 11:01am (ft. above BOG)	Water Level Elevation at Shut Down (ft. AVD)	Maximum Drawdown at Shut Down (ft.)	Drawdown Effect due to Pumping?
SG-1	10.14	13.14	1.00	0.79	10.93	0.22	10.36	0.57	No
SG-2	15.93	18.93	0.37*	0.56	16.49	0.00	15.93	0.56	No
SG-3	27.53	30.53	0.49	DRY	N/A	DRY	NA	NA	NA

*installed 4/30/2018

Notes on page 2 of 2

TABLE 6, page 2 of 2
Groundwater Elevation Data
Aquarion Well 22 Long Term Pumping Test
Aquarion Water Company of New Hampshire - Hampton, NH

Private Wells

Well Address	Well Type	Well Use	TOC Elev. (ft. AVD)	Static Depth to Water 6/20/2018 10:00am (ft. btoc)	Static Groundwater Elevation (ft. AVD)	Depth to Water at Shut Down† 7/17/2018 11:01am (ft. btoc)	Groundwater Elevation at Shut Down (ft. AVD)	Drawdown at Shut Down (ft.)	Drawdown Effect Due To Pumping	Projected Depth to Water at 180 Days* (ft. btoc)	Projected GW Elevation at 180 Days (ft. AVD)	Projected Drawdown at 180 Days (ft.)	Correction Needed for Precipitation Effects?
195 Woodland Road	BR	GEO	45.53	12.73	32.80	25.75	19.78	13.02	Yes	30.97	14.56	18.24	No (no effects)
31 Windmill Lane	BR	IRR	56.04	20.42	35.62	48.03	8.01	27.61	Yes	56.21	-0.17	35.79	No (no effects)
82 Woodland Road	BR	IRR	52.83	13.98	38.85	30.97	21.86	16.99	Yes	33.45	19.38	19.47	No (no effects)
117 Little River Road	BR	Not Used	66.29	17.28	49.01	29.42	36.87	12.14	Yes	32.29	34.00	15.01	No (no effects)
206 Woodland Road	BR	GEO/DW	38.63	6.32	32.31	23.53	15.1	17.21	Yes	31.64	6.99	25.32	No (no effects)
321 Winnacunnet Road	SG	IRR	56.24	23.91	32.33	24.52	31.72	0.61	No	NR	NR	NR	NR
59 Edgewood Drive	BR	IRR	37.09	17.6	19.49	19.01	18.08	1.41	No	NR	NR	NR	NR
53 Winnacunnet Road	BR	IRR	33.36	0.09	33.27	0.43	32.93	0.34	No	NR	NR	NR	NR
23 Esker Drive	SG	IRR	16.95	6.8	10.15	7.36	9.59	0.56	No	NR	NR	NR	NR
12 Springhead Lane	BR	DW	34.71	10.4	24.31	22.03	12.68	11.63	Yes	33.68	1.03	23.28	No (no effects)
110 Mill Road	BR	DW	61.51	17.54	43.97	18.32	43.19	0.78	No	NR	NR	NR	NR
81 Landing Road	BR	Not Used	8.33	0.99	7.34	1.58	6.75	0.59	No	NR	NR	NR	NR
78 Little River Road	SG	Not Used	69.94	12.28	57.66	13.78	56.16	1.5	No	NR	NR	NR	NR
8 Springhead Lane	BR	DW	40.09	7.86	32.23	23.22	16.87	15.36	Yes	31.71	8.38	23.85	No (no effects)
10 Springhead Lane	BR	DW	37.32	9.71	27.61	27.19	10.13	17.48	Yes	43.16	-5.84	33.45	No (no effects)
11 Bear Path	BR	IRR	57.71	20.4	37.31	31.83	25.88	11.43	Yes	38.07	19.64	17.67	No (no effects)
83 Little River Road	BR	DW	73.45	24.48	48.97	26.41	47.04	1.93	No	NR	NR	NR	NR
38 Edgewood Drive	BR	IRR	34.51	15.07	19.44	16.61	17.9	1.54	No	NR	NR	NR	NR
7 Springhead Lane	BR	DW	39.57	14.08	25.49	24.22	15.35	10.14	Yes	34.16	5.41	20.08	No (no effects)

Notes:
Elevation survey of Well 22 conducted by James Verra & Associates, Inc. July 18, 2018
Static Water Level Height for all wells was collected using pressure transducers
Static depth to water and depth to water at "shut down"; measurement for **SB-1 and SB-7** taken on June 26, 2018 and July 31, 2018, respectively.
† = In cases where the water level in a production well or a private well was under the influence of its own pump at or about the time of Shut Down, the lowest water level prior to pumping/response on the morning of 07/17/18 was used.
For Well 22, the lowest water level was observed on July 16 at 5:28 PM.
* = 180 day projected depth to water was calculated from the equation of the trendline of late pumping stage, log-based water level measurements, where x= 180 days; see graphs for line equations
Ground elevation values for all other monitoring points acquired through LiDAR extraction using datasets from NH GRANIT. Vertical datum: North American Vertical Datum 1988 (NAVD1988)
R* = Water level rose during the course of the pumping phase by the value shown ( )

AVD	=	Above Vertical Datum	PWS	=	Public Water Supply
btoc	=	Below top of casing	MW	=	Monitoring Well
TOC	=	Top of casing	GEO	=	Geothermal Well
BOG	=	Bottom of staff gauge - 0.00 ft. mark	IRR	=	Irrigation Well
NA	=	Not available or no data	DW	=	Domestic Water (Drinking/Irrigation)
NR	=	No response to pumping	BR	=	Bedrock Well
Est.	=	Estimated	SG	=	Sand and Gravel Well
DRY	=	Water level dropped below transducer or p	OB	=	Overburden Well

TABLE 7
Summary of Salinity Monitoring Data
Aquarion Well 22 Long Term Pumping Test
Aquarion Water Company of New Hampshire - Hampton, NH

Well ID (Location)	Salinity Measurement (ppt)			Well Type	Water Resource	Distance/Direction from Well 22
	High	Low	Average			
Aquarion Well						
Well 22 (Pumping)	0.30	0.10	0.21	Proposed Public Water Supply	Bedrock	0 / -
Private Wells						
10 Springhead Lane	0.20	0.20	0.20	DW / Irrigation Well	Bedrock	676 / S
38 Edgewood Drive	0.30	0.20	0.22	Irrigation Well	Bedrock	3,773 / SW
23 Esker Drive	0.10	0.00	0.025	Irrigation Well (DPt)	Sand & Gravel	3,782 / SSE
31 Windmill Lane	0.20	0.20	0.20	Irrigation Well	Bedrock	3,940 / WSW
321 Winnacunnet	0.40	0.30	0.30	Irrigation Well	Sand & Gravel	4,369 / WSW
59 Edgewood Dr	0.40	0.30	0.31	Irrigation Well	Bedrock	4,450 / SW
3 Hilda Dr	0.40	0.20	0.30	Irrigation Well	Bedrock	5,710 / SW

For comparison, seawater typically measures 35 ppt.

Notes:
ppt = parts per thousand
DW = Domestic Water Irr=Irrigation DPt = Driven Point
Daily salinity measurements were collected using a factory-calibrated Oakton CTSTestr50™ hand-held Salinity/Conductivity/TDS meter.
The factory calibration was verified by Geosphere technicians on 06/19/18.
Instrument calibration was checked routinely throughout the pumping test.

TABLE 8
Summary of Water Quality Analysis Results - Well 22
Aquarion Well 22 Long-Term Pumping Test
Aquarion Water Company of New Hampshire - Hampton, NH

Compound	Units	Results 6/20/18 Day 1	*Results 6/22/18 Day 3	*Results 6/24/18 Day 5	Results 6/26/18 Mid-test	Results 7/17/18 Shut-Down
Bacterialogicals						
Total Coliform	MPN/100ml	NS	NS	NS	NS	<1
E. Coli	MPN/100ml	NS	NS	NS	NS	<1
Inorganics						
Fluoride	mg/L	NA	NS	NS	NA	**0.40**
Cyanide	mg/L	NA	NS	NS	NA	<0.02
Nitrite	N, mg/L	<0.5	NS	NS	<0.5	<0.5
Nitrate	N, mg/L	NA	NS	NS	NA	<0.5
Total Dissolved Solids (TDS)	mg/L	NA	NS	NS	NA	**300**
Total Metals						
Antimony	mg/L	NA	NS	NS	NA	<0.001
Arsenic	mg/L	NA	NS	NS	NA	**0.023**
Barium	mg/L	NA	NS	NS	NA	**0.0090**
Beryllium	mg/L	NA	NS	NS	NA	<0.001
Cadmium	mg/L	NA	NS	NS	NA	<0.001
Calcium	mg/L	NA	NS	NS	**61**	**0.86**
Chromium	mg/L	NA	NS	NS	NA	<0.001
Copper	mg/L	NA	NS	NS	NA	**0.0066**
Iron	mg/L	**0.27**	NS	NS	**0.056**	**0.068**
Lead	mg/L	NA	NS	NS	NA	<0.001
Magnesium	mg/L	NA	NS	NS	**0.41**	**0.53**
Manganese	mg/L	**0.016**	NS	NS	**0.024**	**0.031**
Mercury	mg/L	NA	NS	NS	NA	**0.0001**
Nickel	mg/L	NA	NS	NS	NA	<0.001
Selenium	mg/L	NA	NS	NS	NA	<0.001
Sodium	mg/L	**71**	NS	NS	**87**	**98**
Thallium	mg/L	NA	NS	NS	NA	<0.001
Zinc	mg/L	NA	NS	NS	NA	**0.019**
VOCs - Volatile Organic Compounds						
1, 4 - Dioxane	ug/l	NA	NS	NS	NA	<0.25
1, 2 - Dibromoethane (EDB)	ug/l	<0.5	NS	NS	<0.5	<0.5
1,2-Dibromo-3-chloropropane (DBCP)	ug/l	<0.5	NS	NS	<0.5	<0.5
Toluene	ug/l	**1.8**	NS	NS	<0.5	<0.5
All other VOCs	ug/l	ND	NS	NS	ND	ND
SOCs - Synthetic Organic Compounds						
SOCs	ug/l	NS	NS	NS	NS	ND
SOC - Chlorinated Herbicides (Method 515.4)						
Pentachlorophenol	ug/l	NS	NS	NS	NS	<1
2,4-D	ug/l	NS	NS	NS	NS	<5
2,4,5-TP (Silvex)	ug/l	NS	NS	NS	NS	<5
Picloram	ug/l	NS	NS	NS	NS	<5
Dinoseb	ug/l	NS	NS	NS	NS	<5
SOC - Chlorinated Pesticides (Method 505)						
Chlordane	ug/l	NS	NS	NS	NS	<0.5
Toxaphene	ug/l	NS	NS	NS	NS	<2
N-Methylcarbamoyloximes (Method 531.2)						
Aldicarb	ug/l	NS	NS	NS	NS	<0.5
Aldicarb Sulfone	ug/l	NS	NS	NS	NS	<0.5
Aldicarb Sulfoxide	ug/l	NS	NS	NS	NS	<0.5
Carbaryl	ug/l	NS	NS	NS	NS	<0.5
Carbofuran	ug/l	NS	NS	NS	NS	<0.5
3-Hydroxycarbofuran	ug/l	NS	NS	NS	NS	<0.5
Methiocarb	ug/l	NS	NS	NS	NS	<0.5
Methomyl	ug/l	NS	NS	NS	NS	<0.5
Oxamyl	ug/l	NS	NS	NS	NS	<0.5
Propoxur	ug/l	NS	NS	NS	NS	<0.5
Glyphosate	ug/L	NS	NS	NS	NS	<4.2
PCBs						
PCBs	ug/l	NS	NS	NS	NS	ND
Radionuclides						
Gross Alpha	pCi/l	NS	NS	NS	NS	**1.5 ± 0.9**
Radium 226	pCi/l	NS	NS	NS	NS	**0.6 ± 0.4**
Radium 228	pCi/l	NS	NS	NS	NS	0.0 ± 0.4
Radon	pCi/l	NS	NS	NS	NS	**2,138**
Uranium	ug/L	NS	NS	NS	NS	<0.1
PFAS						
perfluorooctanoic acid (PFOA)	ng/l	**< 0.85**	**< 0.85**	**< 0.85**	**0.88**	**1.6**
perfluoro-octane sulfonate (PFOS)	ng/l	ND	**< 1.7**	**< 1.7**	**< 1.7**	**< 1.7**
perfluorononanoic acid	ng/l	ND	ND	ND	ND	ND
perfluorodecanoic acid	ng/l	ND	ND	ND	ND	ND
perfluoroundecanoic acid	ng/l	ND	ND	ND	ND	ND
perfluorododecanoic acid	ng/l	ND	ND	ND	ND	ND
perfluorotridecanoic acid	ng/l	ND	ND	ND	ND	ND
perfluorotetradecanoic acid	ng/l	ND	ND	ND	ND	ND
perfluorohexanoic acid	ng/l	ND	ND	ND	ND	**< 1.7**
perfluoroheptanoic acid	ng/l	ND	ND	ND	ND	**< 0.85**
perfluorobutane sulfonate	ng/l	ND	ND	ND	**< 0.85**	**< 0.85**
perfluorohexane sulfonate	ng/l	**< 1.7**	**< 1.7**	**< 1.7**	**< 1.7**	**< 1.7**
6:2 fluorotelomersulfonate	ng/l	ND	ND	ND	ND	ND
8:2 fluorotelomersulfonate	ng/l	ND	ND	ND	ND	ND
Perfluorobutanoic acid (PFBA)	ng/l	ND	ND	ND	ND	ND
Perfluorodecanesulfonate (PFDS)	ng/l	ND	ND	ND	ND	ND
Perfluoroheptanesulfonate (PFHpS)	ng/l	ND	ND	ND	ND	ND
Perfluorohexadecanoic acid	ng/l	ND	ND	ND	ND	ND
Perfluorooctanesulfonamide	ng/l	ND	ND	ND	ND	ND
Perfluoropentanoic acid	ng/l	ND	ND	ND	ND	ND
N-ethyl perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ng/l	ND	ND	ND	ND	ND
N-ethylperfluoro-1-octanesulfonamide (NEtPFOSA)	ng/l	ND	ND	ND	ND	ND
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol (NEtPFOSAE)	ng/l	ND	ND	ND	ND	ND
N-methylperfluoro-1-octanesulfonamide (NMePFOSA)	ng/l	ND	ND	ND	ND	ND
N-methyl perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ng/l	ND	ND	ND	ND	ND
2-(N-methylperfluoro-1-octanesulfonamido)-ethanol (NMePFOSAE)	ng/l	ND	ND	ND	ND	ND
Secondary Contaminants						
Alkalinity Total (CaCO3)	mg/L	NA	NS	NS	NA	**92**
Aluminum	mg/L	NA	NS	NS	NA	<0.05
Color	Pt/Co	NA	NS	NS	NA	<5
Copper	mg/L	NA	NS	NS	NA	**0.0066**
Specific Conductivity	umhos/cm	**350**	NS	NS	**450**	**471** (f)
Langelier Corrosivity	LSI	NA	NS	NS	NA	**-1.25**
Fluoride	mg/L	NA	NS	NS	NA	**0.40**
MBAS ("Foaming Agents")	mg/L	NA	NS	NS	NA	<0.05
Hardness (CaCO3)	mg/L	**2**	NS	NS	**3.1**	**4.3**
Methyl-tertiary butyl ether	ug/L	NA	NS	NS	NA	<0.05
Odor	TON	NA	NS	NS	NA	<1
pH	SU	NA	NS	NS	**8.1** (f)	**8.23**
Silver	mg/L	NA	NS	NS	NA	<0.001
Sulfate	mg/l	NA	NS	NS	NA	**32**
Sulfide	mg/l	NA	NS	NS	NA	<0.05

Notes:
ND = Not detected at or above laboratory detection limit
NA = Not analyzed
NS = Not sampled
< = Less than the Limit of Quantitation or Reporting Level shown
mg/l = milligrams/liter, (parts per million)
ug/L = micrograms/liter (parts per billion)
ng/L = nanograms/liter (parts per trillion)
Pt/Co = Platinum/Cobalt Scale
TON = Threshold Odor Number
* = Additional samples collected voluntarily by Aquarion
Bold = detected above laboratory detection limit
(f) - measurement collected using field instrumentation, not lab analyzed
Selected VOCs and SOCs are listed, refer to Appendix K for a complete analyte list.

TABLE 9

PFAS & VOC Results for Selected Residential Wells per NHDES

Aquarion Well 22 Long-Term Pumping Test

Aquarion Water Company of New Hampshire

Street Address	Sampling Date	Well Type	Sample ID	Results Units	PFOS	PFOA	PFOS+PFOA	Total PFAS	6:2 fluorotelomersulfonate	8:2 fluorotelomersulfonate	N-ethyl perfluorooctanesulfonamido acetic Acid (NEtFOSAA)	N-ethylperfluoro-1-octanesulfonamide (NEtPFOSA)	2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol (NEtPFOSAE)	N-methyl perfluorooctanesulfonamido acetic Acid (NMeFOSAA)	N-methylperfluoro-1-octanesulfonamide (NMePFOSA)	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol (NMePFOSAE)	Perfluorobutanesulfonate (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecanesulfonate (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoA)	Perfluoroheptanesulfonate (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexadecanoic acid	Perfluorohexanesulfonate (PFHxS)	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid (PFNA)	Perfluorooctanesulfonamide	Perfluoropentanoic acid	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	EPA Method 524.2 VOCs
31 Windmill Lane	7/2/2018	Irrigation	31 Windmill Ln Mid	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND
206 Woodland Road	7/2/2018	DW/Geothermal	206 Woodland Mid	NG/L	8.2	6.8	15.0	24.7	ND	ND	ND	ND	ND	ND	ND	ND	1.6	ND	ND	ND	ND	ND	1.6	ND	3.8	2.7	ND	ND	< 5.1	ND	ND	ND	NS

Notes:

= Detected compound

ND = Not detected at or above laboratory detection limit

VOCs = Volatile Organic Compounds

PFAS = Per- and Poly-fluorinated Alkyl Substances

NS = Not sampled

NA = Not analyzed

< = Less than the Limit of Quantitation or Reporting Level shown

Total PFAS does not include J values

FIGURES

Legend

- New Source Bedrock Well #22
- Sand and Gravel PWS Well #7
- Wellfield Location

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 2,000 ft.

0 1,000 2,000 4,000 6,000 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

FIGURE 1

SITE LOCUS

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINALRpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.

N
W E
S

0 100 200 300 400 Feet

Approximate Scale: 1 in. = 200 ft.

Legend

- New Source Bedrock Well #22
- Sand and Gravel PWS Well #7
- 400ft Sanitary Protective Radius (SPR)
- Aquarion Property
- SPR Abutting Parcels

AQUARION Water Company
Stewards of the Environment™

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

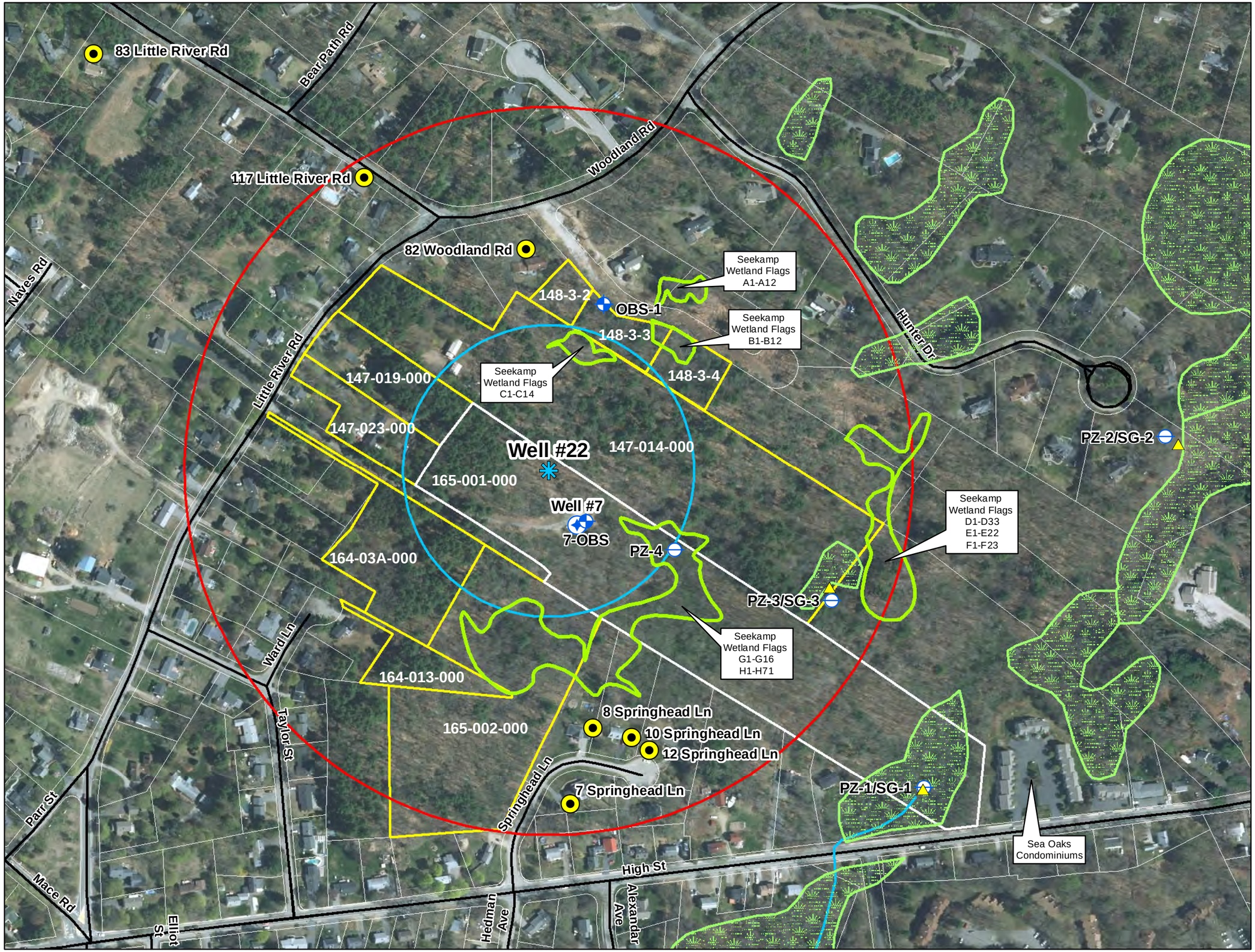
FIGURE 2

MAP AND LOT DETAIL WITH SANITARY PROTECTIVE RADIUS

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.



N
W E
S

0 100 200 300 400 500 Feet

Approx. Scale 1 in. = 250 ft.

Legend

- Well #22
- Aquarion PWS Well #7
- Residential Monitoring Well
- Overburden Observation Well
- Staff Gauge
- Piezometer
- Wetland Areas Delineated by Seekamp Environmental Consulting
- NWI Wetlands
- 400ft SPR
- 1000ft Buffer
- Aquarion Property
- SPR Abutting Parcels

AQUARION Water Company
Stewards of the Environment™

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

FIGURE 3

WELL 22 SITE PLAN WITH WETLANDS

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.

Well #16
Well #19
Well #17
Well #18
Well #13B
Well #12
Well #10
Well #5A
Well #14
Well #8A
Well #20
Well #6
Well #21
Well #11
Well #9
Well #22
Well #7

Existing Aquarion Water Company Wellhead Protection Area

Preliminary Wellhead Protection Area/ Recharge Area

Preliminary Potential Impact Area

Legend

- Well #22
- Aquarion Water Supply Wells
- Preliminary WHPA
- Preliminary Potential Impact Area
- Existing Aquarion Water Company WHPA
- 4000ft Cone of Depression
- FTA Lineaments
- USGS Lineaments

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in. = 3,500 ft.

0 — 3,500 — 7,000 — 10,500 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

FIGURE 4

PRELIMINARY POTENTIAL IMPACT AREA AND WELLHEAD PROTECTION/RECHARGE AREA

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
LB & MK 4/19/17	Ray Talkington 4/19/17	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.

Legend

- Well #22
- Aquarion Water Supply Wells
- Staff Gauge
- Piezometer
- Bedrock Observation Well
- Overburden Observation Well
- Preliminary WHPA
- Preliminary Potential Impact Area

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 2,000 ft.

0 1,000 2,000 4,000 6,000 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

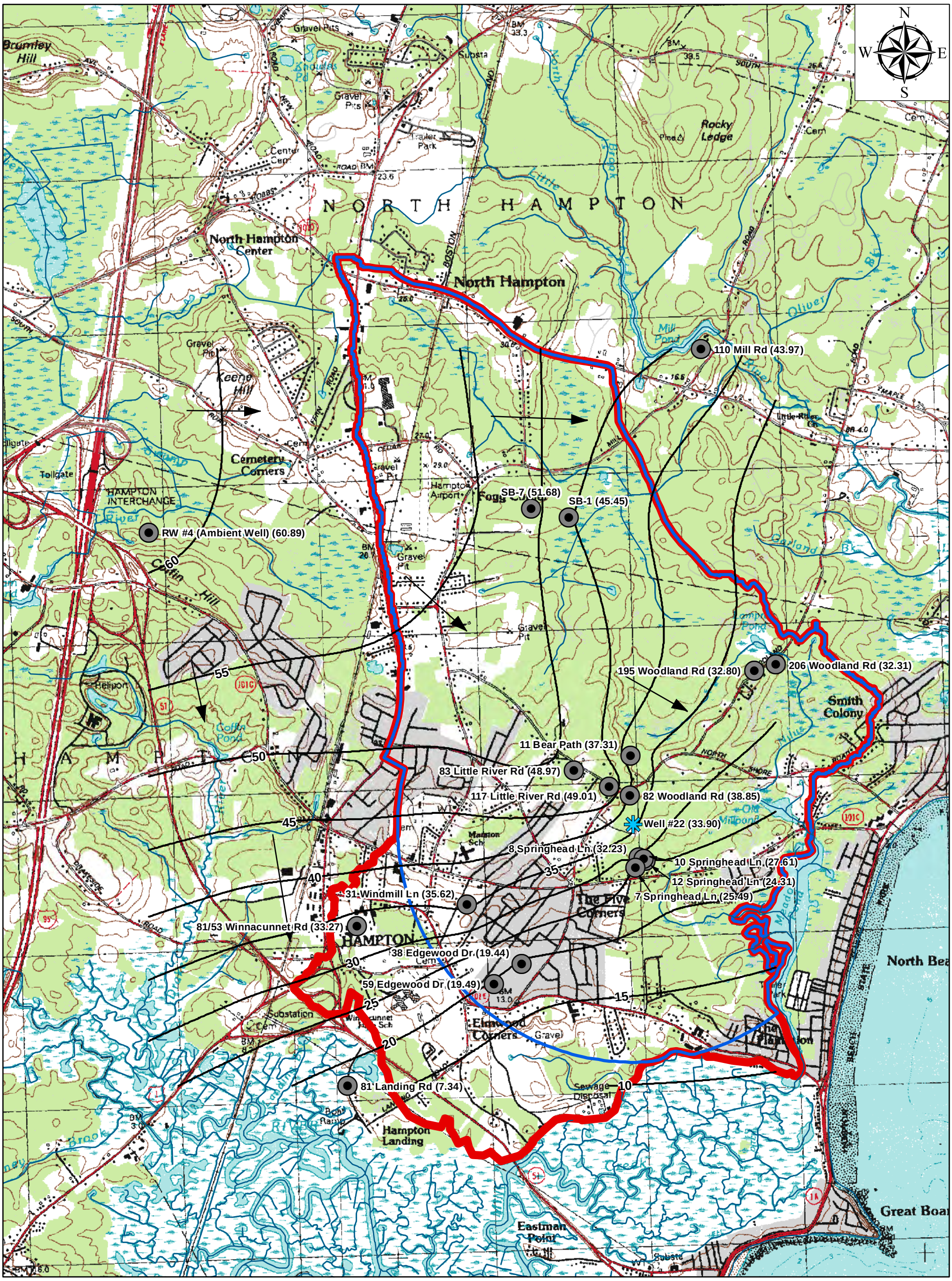
FIGURE 5

PLAN OF MONITORING POINTS

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.



Legend

- Well #22
- Bedrock Observation Well
- (25.49) Groundwater Elevation (ft. asl.)
- Groundwater Elevation Contour (5ft. Interval)
- Groundwater Flow Direction
- Preliminary WHPA
- Preliminary Potential Impact Area

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 2,000 ft.

0 1,000 2,000 4,000 6,000 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

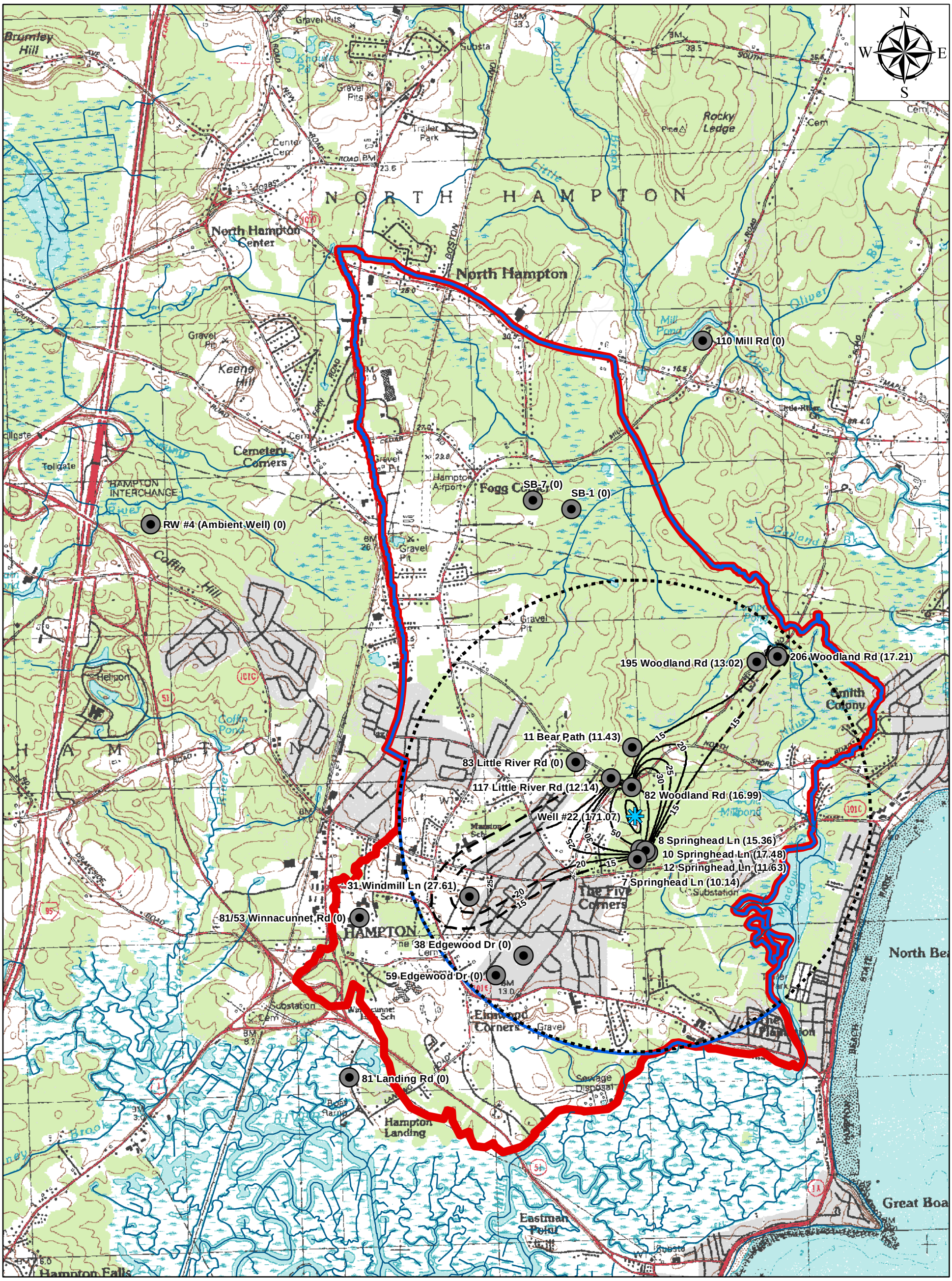
FIGURE 6

GROUNDWATER ELEVATION IN BEDROCK WELLS
NON-PUMPING CONDITIONS
(End of Antecedent Period - 6/20/2018)

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.



Legend

- Well #22
- Bedrock Observation Well
- (15.36) Drawdown in Feet
- Computer Generated Drawdown Contour (feet below initial water level)
- Interpolated (Hand Generated) Drawdown Contour
- 5000ft Cone of Depression
- Preliminary WHPA
- Preliminary Potential Impact Area

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 2,000 ft.

0 1,000 2,000 4,000 6,000 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

FIGURE 7

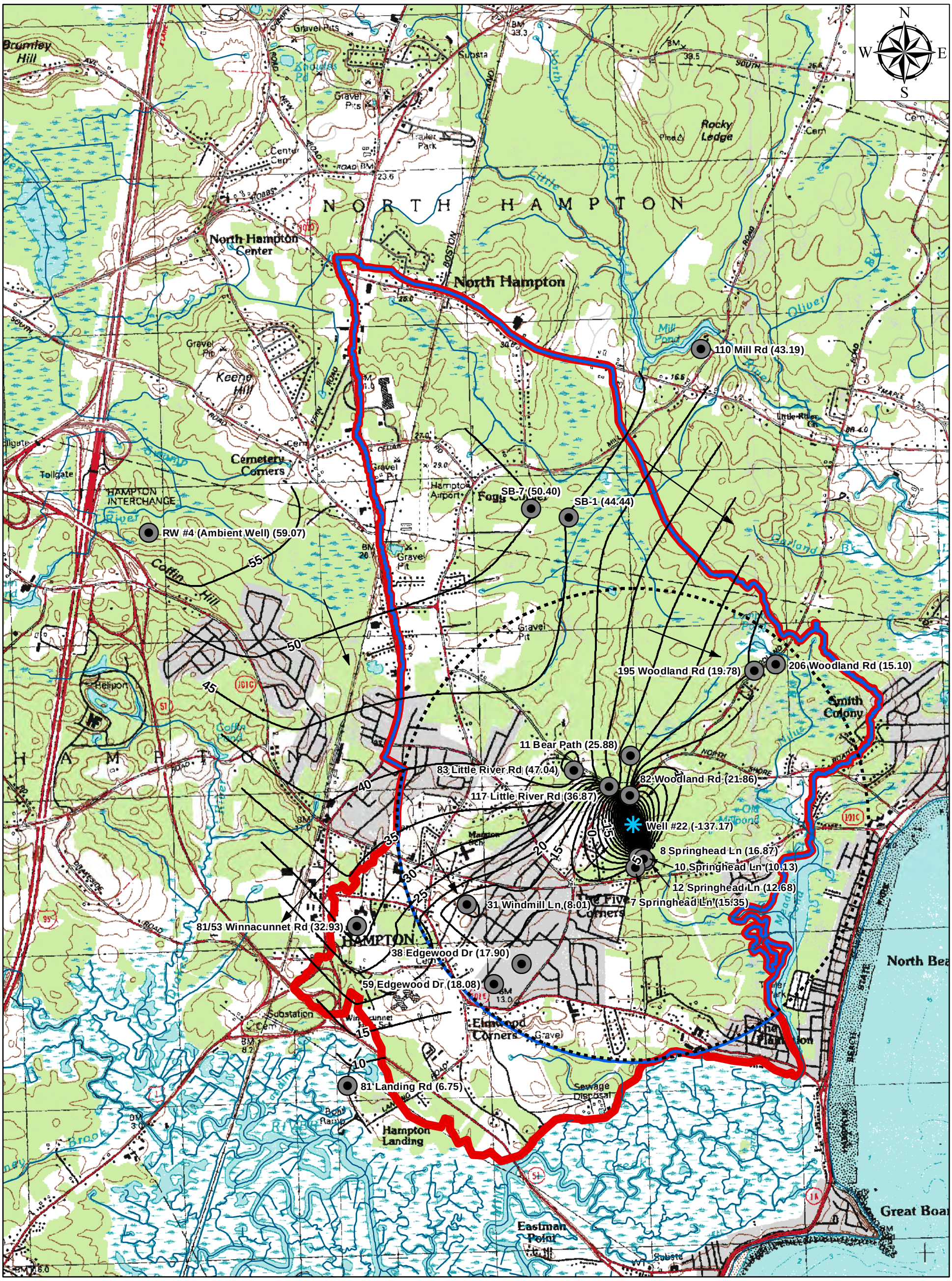
MAXIMUM OBSERVED DRAWDOWN IN BEDROCK WELLS
(End of Pumping Period - 7/17/2018)

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.

Drawdown values calculated at end of pumping test on 7/17/2018 at 11:01AM.



Legend

- Well #22
- Bedrock Observation Well
- (15.57) Groundwater Elevation (ft. asl.)
- Groundwater Elevation Contour (5ft. Interval)
- Groundwater Flow Direction
- 5000ft Cone of Depression
- Preliminary WHPA
- Preliminary Potential Impact Area

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 2,000 ft.

0 1,000 2,000 4,000 6,000 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

FIGURE 8

GROUNDWATER ELEVATION IN BEDROCK WELLS PUMPING CONDITIONS
(End of Pumping Period - 7/17/2018)

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.

Legend

- Well #22
- Bedrock Observation Well
- (15.36) 180-Day Projected Groundwater Elevation (ft. asl.)
- (NR 17.90) Groundwater Elevation of Non-Responsive Wells (ft. asl.)
- Groundwater Flow Direction
- Groundwater Elevation Contour (5ft. Interval)
- Preliminary WHPA
- Preliminary Potential Impact Area

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 2,000 ft.

0 1,000 2,000 4,000 6,000 Feet

180-day groundwater elevation contours drawn using projected values of wells showing response to pumping.
Groundwater elevation values at end of pumping test (7/17/18 11:01 AM) used for non-responding wells.

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

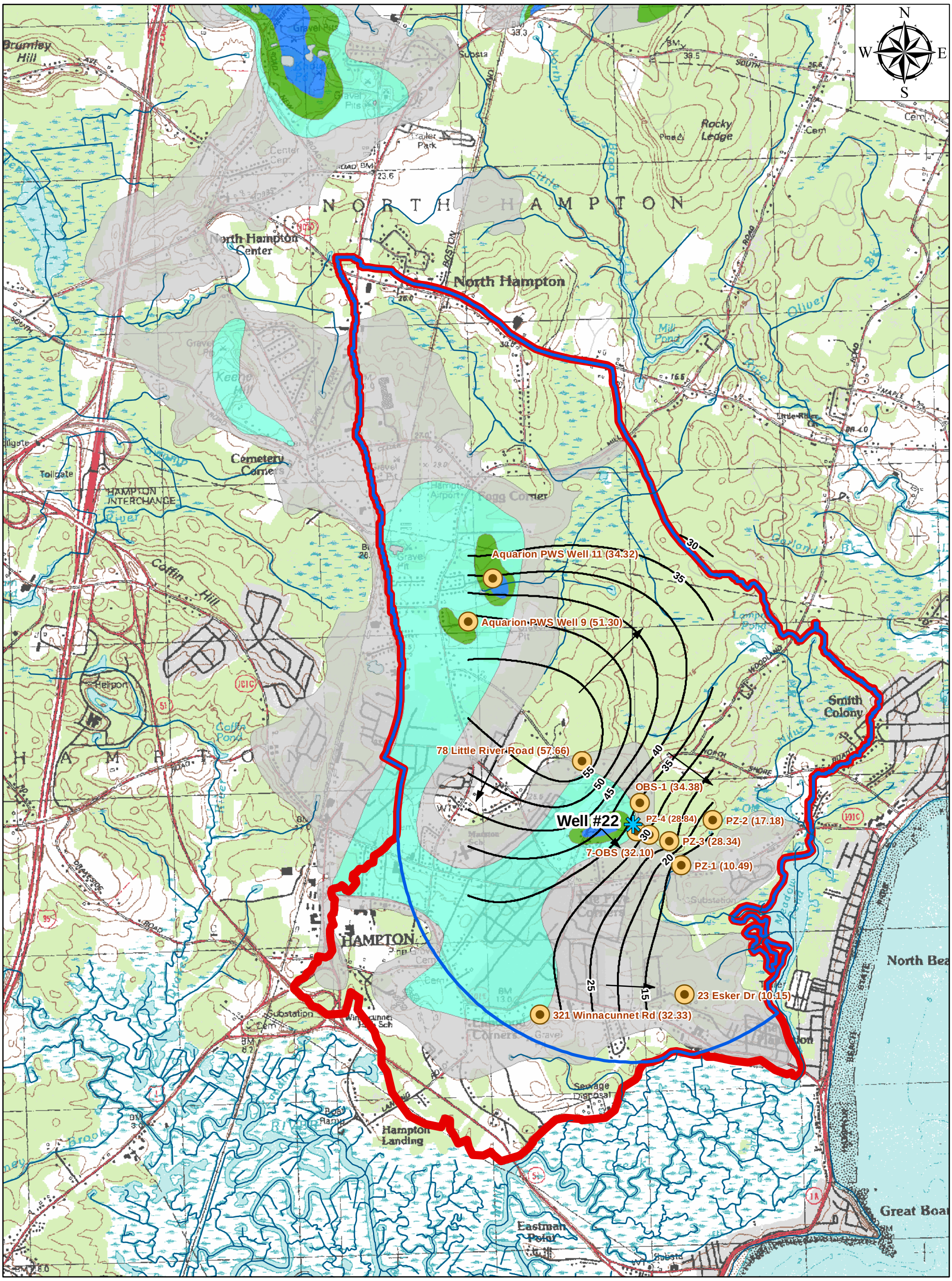
FIGURE 9

GROUNDWATER ELEVATION IN BEDROCK WELLS PROJECTED 180-DAY CONDITIONS

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.



Legend

- Well #22
- Overburden Observation Well
- (34.48) Groundwater Elevation (ft. asl.)
- Groundwater Elevation Contour (5ft. Interval)
- Groundwater Flow Direction
- Preliminary WHPA
- Preliminary Potential Impact Area

Aquifer Transmissivity
Feet Squared per Day

- <1000
- 1000-2000
- 2001-4000
- >4000

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 2,000 ft.

0 1,000 2,000 4,000 6,000 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

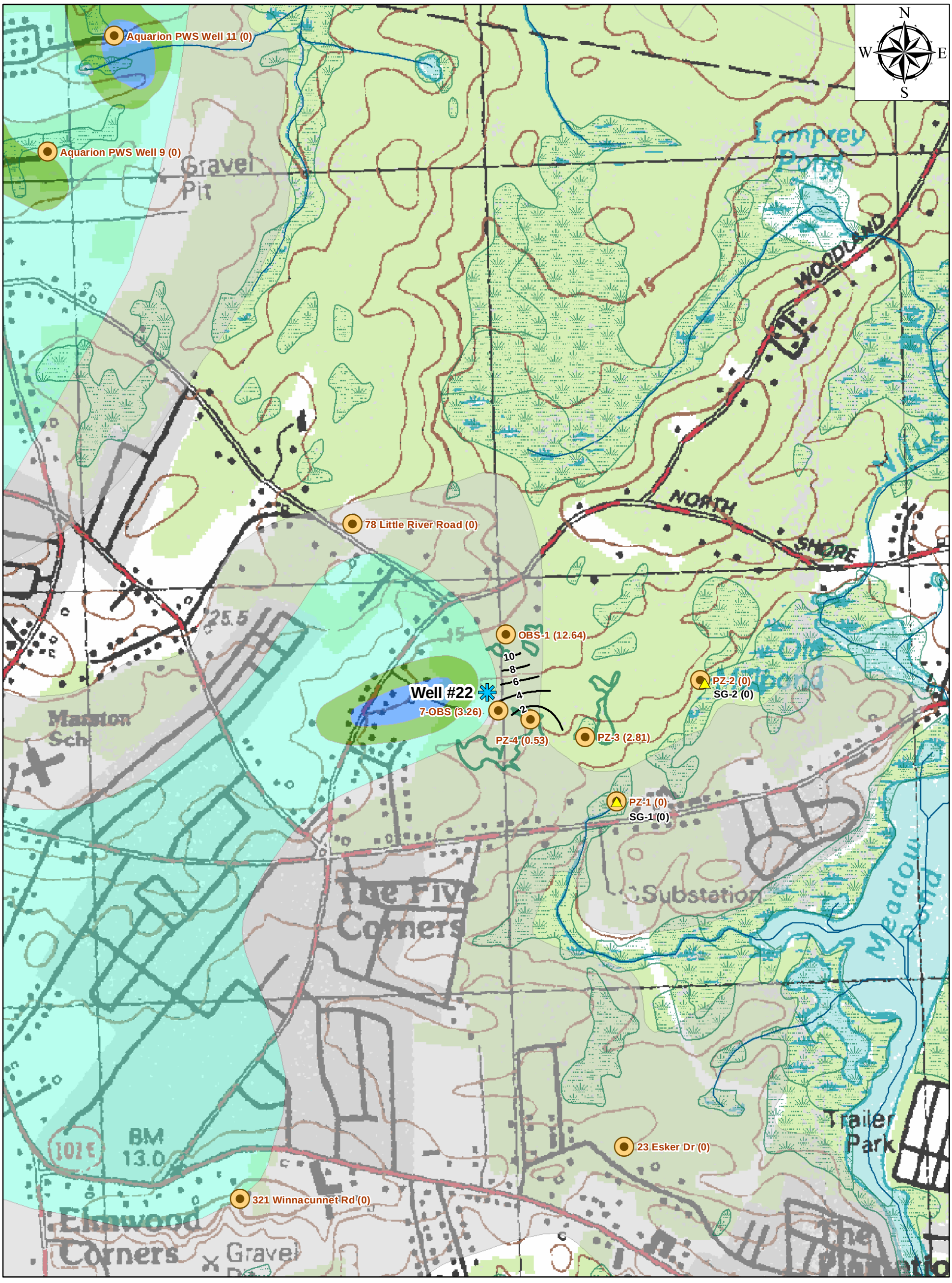
FIGURE 10

GROUNDWATER ELEVATION IN OVERBURDEN WELLS NON-PUMPING CONDITIONS (End of Antecedent Period - 6/20/2018)

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.



Legend

- Well #22
- Overburden Observation Well
- Staff Gauge
- Drawdown Contour (feet below initial water level)
- (3.26) Drawdown in Feet
- Wetland Areas Delineated by Seekamp Environmental Consulting
- NWI Wetlands

Aquifer Transmissivity
Feet Squared per Day

- <1000
- 1000-2000
- 2001-4000
- >4000

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 750 ft.

0 375 750 1,500 2,250 3,000 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

FIGURE 11

MAXIMUM OBSERVED DRAWDOWN IN OVERBURDEN WELLS
(End of Pumping Period - 7/17/2018)

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.

Drawdown values calculated at end of pumping test on 7/17/2018 at 11:01AM.

N
W E
S

NORTH HAMPTON

North Hampton Center

North Hampton

Cemetery Corners

HAMPTON

Hampton Landing

Hampton Airport

Fogg Corner

Rocky Ledge

Smith Colony

Eastman Point

Aquarion PWS Well 11 (36.02)

Aquarion PWS Well 9 (51.40)

78 Little River Road (56.16)

OBS-1 (21.74)

7-OBS (29.44)

Well #22

PZ-2 (17.22)

PZ-3 (25.53)

PZ-4 (28.31)

PZ-1 (9.92)

23 Esker Dr (9.59)

321 Winnacunnet Rd (31.72)

55 50 45 40 35 30 25 30 20 15 10

Legend

- Well #22
- Overburden Observation Well
- (28.31) Groundwater Elevation (ft. asl.)
- Groudwater Elevation Contour (5ft. Interval)
- Groundwater Flow Direction
- Preliminary WHPA
- Preliminary Potential Impact Area

Aquifer Transmissivity
Feet Squared per Day

- <1000
- 1000-2000
- 2001-4000
- >4000

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 2,000 ft.

0 1,000 2,000 4,000 6,000 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

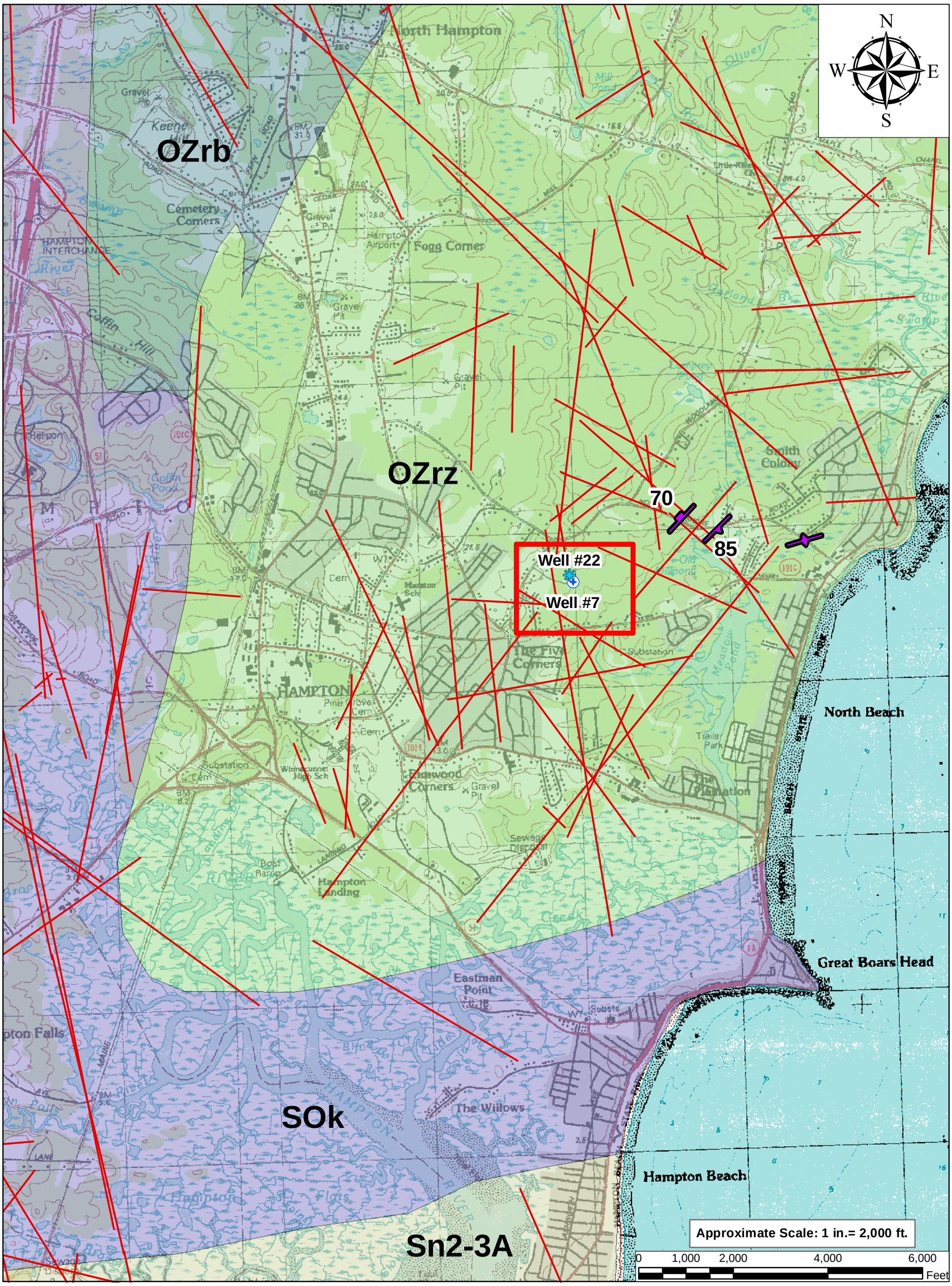
FIGURE 12

GROUNDWATER ELEVATION IN OVERBURDEN WELLS - PUMPING CONDITIONS (End of Pumping Period - 7/17/2018)

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.



Legend

- New Source Bedrock Well #22
- Sand and Gravel PWS Well #7
- Wellfield Location
- USGS Lineaments

Bedrock Formation

OZrb	Breakfast Hill Granite
OZrz	Rye Complex
SOk	Kittery Formation
Sn2-3A	Newburyport Complex

AQUARION Water Company
Stewards of the Environment™

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

FIGURE 13

AREA BEDROCK GEOLOGY WITH USGS LINEAMENTS

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire

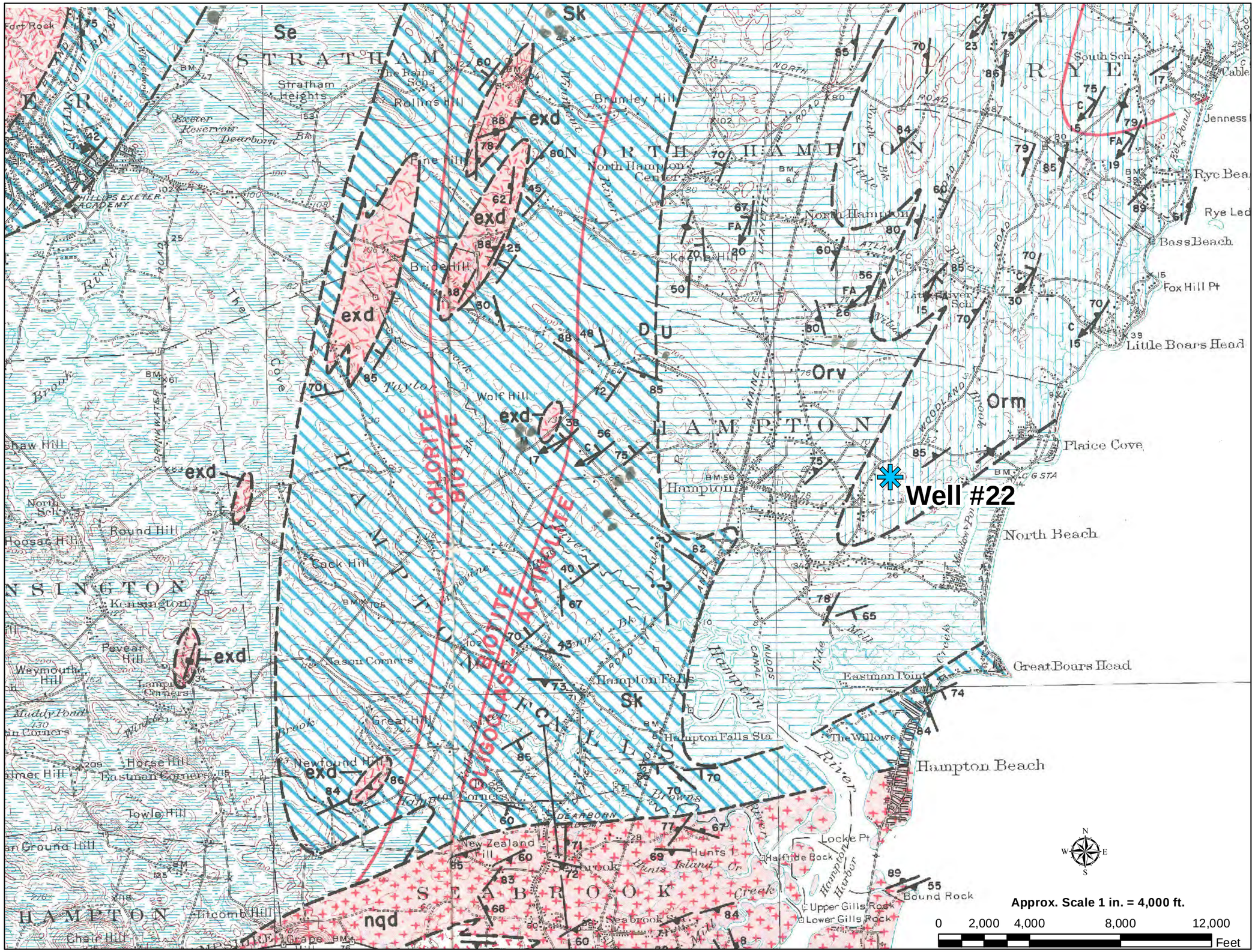
CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/5/2018	Ray Talkington 12/5/2018	12217-Aquarion Well 22\FIGURES\FINALRpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.

Foliation
85 = Dip angle

Vertical Foliation

Strike Orientation
Joint



Bedrock Formation

- Sb — Berwick Formation
- Se — Eliot Formation
- exd — Exeter Diorite
- gr — Granite and Pigmatite
- Sk — Kittery Formation
- Dl — Littleton Formation
- nqd — Newburyport Quartz Diorite
- pqm — Porphorytic Quartz Monzonite
- qm — Quartz Monzonite
- Orv — Rye Formation Upper Metavolcanic Member
- Orm — Rye Formation Lower Metasedimentary Member

CONTACTS

Approximate ..... Projected

FAULTS

U — — — ?— —?— — D

Dashed where approximate; queried where doubtful
U: Upthrown side
D: Downthrown side

STRUCTURAL SYMBOLS

60 Inclined / Vertical — Strike and dip of bedding

70 Inclined / Vertical — Strike and dip of foliation in metamorphic and plutonic rocks

50 Inclined — Strike and dip of cleavage

Inclined / Vertical — Strike and dip of joints

16 — Bearing and plunge of minor structures
FA. Small fold axes
M. Mineral alignment
C. Crinkles or corrugations
CB. Cleavage-bedding intersections

AQUARION Water Company
Stewards of the Environment™

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

FIGURE 14

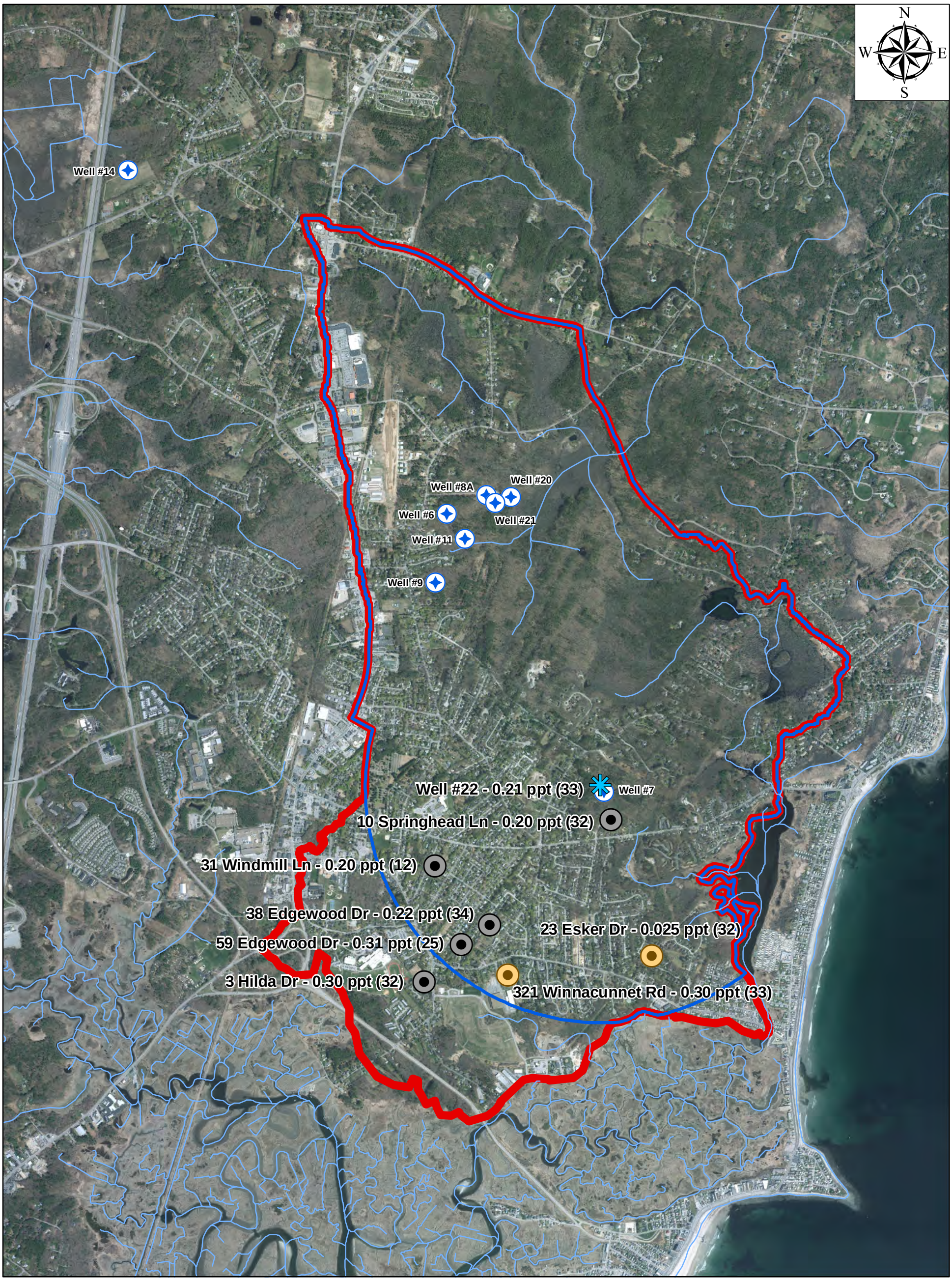
GEOLOGIC MAP of the SEACOAST REGION by R. N. Novotny, 1968

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 12/17/2018	Ray Talkington 12/17/2018	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: Novotny, R.F., 1968, "The Geology of the Seacoast Region, New Hampshire, New Hampshire Department of Resources and Economic Development.

Well #14
Well #8A
Well #20
Well #6
Well #21
Well #11
Well #9
Well #22
Well #7
Revised Potential Impact Area and
Wellhead Protection Area/Recharge Area
Existing
Aquarion Water Company
Wellhead Protection Area
NORTH HAMPTON
North Hampton
North Hampton Center
Cemetery Corners
HAMPTON INTERCHANGE
HAMPTON
The Five Corners
Hampton Corner
Hampton Landing
Eastman Point
Smith Colony
North Beach
Great Boars Head
Rocky Ledge
Little Brook
Oliver Mill Pond
Meadow Pond
Coffin Hill
Coffin Pond
Hampton Falls
Seabrook
Hampton
Substation
Sewage Disposal
Boat Ramp
Trailer Park
Gravel Pit
Keene Road
Woodland Road
Ocean Boulevard
Winnacunnet High Sch
Hampton Sch
Cem
Pine Grove Cem
Old Millpond
Mill Pond
Mill Brook
Blind Creek
Taylor River
Eastman Creek
Creek
Brook
Pine
Rocky Ledge
Trailer Park
Gravel Pit
Keene
Cemetery Corners
Hampton Interchange
River
Coffin Hill
Coffin Pond
Hampton Falls
Seabrook
Hampton
Substation
Sewage Disposal
Boat Ramp



Legend

- Overburden Monitoring Well
  0.25 = average salinity concentration in parts per thousand
  (31) = number of samples collected
- Bedrock Monitoring Well
  0.25 = average salinity concentration in parts per thousand
  (31) = number of samples collected
- Well #22
- Aquarion Water Supply Wells
- Preliminary WHPA
- Potential Impact Area

AQUARION Water Company
Stewards of the Environment™

Approximate Scale: 1 in.= 2,000 ft.

0 1,000 2,000 4,000 6,000 Feet

GEOSPHERE ENVIRONMENTAL MANAGEMENT INC.

FIGURE 16

SALINITY MONITORING RESULTS

New Source Bedrock Well 22
Aquarion Water Company of New Hampshire
Hampton, NH

CREATED BY:	CHECKED BY:	PROJECT:
Matt Krapf 1/4/2019	Ray Talkington 1/4/2019	12217-Aquarion Well 22\FIGURES\FINAL Rpt

Data Source: NH GRANIT GIS Clearinghouse; USGS Quad Hampton, NH, 1985. 1:24,000, 3 meter contour interval.

Appendix A

Climatological Records

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 11/30/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 60 ft. Lat: 42.9588° N Lon: -70.8227° W

Station: **NORTH HAMPTON, NH US USC00276070**

Observation Time Temperature: Unknown Observation Time Precipitation: 0700

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	06	01																
2018	06	02																
2018	06	03																
2018	06	04																
2018	06	05																
2018	06	06																
2018	06	07																
2018	06	08																
2018	06	09																
2018	06	10																
2018	06	11																
2018	06	12																
2018	06	13				0.00		0.0		0.0								
2018	06	14				0.07		0.0		0.0								
2018	06	15				0.09		0.0		0.0								
2018	06	16				0.01		0.0		0.0								
2018	06	17				0.00		0.0		0.0								
2018	06	18				0.00		0.0		0.0								
2018	06	19				0.05		0.0		0.0								
2018	06	20				0.00		0.0		0.0								
2018	06	21				0.00		0.0		0.0								
2018	06	22				0.00		0.0		0.0								
2018	06	23				0.00		0.0		0.0								
2018	06	24				0.15		0.0		0.0								
2018	06	25				1.17		0.0		0.0								
2018	06	26				0.13		0.0		0.0								
2018	06	27				0.00		0.0		0.0								
2018	06	28				0.45		0.0		0.0								
2018	06	29				1.14		0.0		0.0								
2018	06	30				0.00		0.0		0.0								
		Summary				3.26		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 11/30/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 60 ft. Lat: 42.9588° N Lon: -70.8227° W

Station: **NORTH HAMPTON, NH US USC00276070**

Observation Time Temperature: Unknown Observation Time Precipitation: 0700

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	07	01				0.00		0.0		0.0								
2018	07	02				0.00		0.0		0.0								
2018	07	03				0.00		0.0		0.0								
2018	07	04				0.00		0.0		0.0								
2018	07	05				0.00		0.0		0.0								
2018	07	06				0.00		0.0		0.0								
2018	07	07				0.10		0.0		0.0								
2018	07	08				0.00		0.0		0.0								
2018	07	09				0.00		0.0		0.0								
2018	07	10				0.00		0.0		0.0								
2018	07	11				0.01		0.0		0.0								
2018	07	12				0.00		0.0		0.0								
2018	07	13				0.00		0.0		0.0								
2018	07	14				0.00		0.0		0.0								
2018	07	15				0.17		0.0		0.0								
2018	07	16				0.00		0.0		0.0								
2018	07	17				0.00		0.0		0.0								
2018	07	18				1.24		0.0		0.0								
2018	07	19				0.00		0.0		0.0								
2018	07	20				0.00		0.0		0.0								
2018	07	21																
2018	07	22																
2018	07	23																
2018	07	24																
2018	07	25																
2018	07	26																
2018	07	27																
2018	07	28																
2018	07	29																
2018	07	30																
2018	07	31																
		Summary				1.52		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

Climatological Data for NORTH HAMPTON, NH
Station ID 27-6070-02
June - July 2018

Date	Precipitation	
6/13/2018	0	
6/14/2018	0.07	
6/15/2018	0.09	
6/16/2018	0.01	antecedent period
6/17/2018	0	total: 0.22
6/18/2018	0	
6/19/2018	0.05	
6/20/2018	0	
6/21/2018	0	
6/22/2018	0	
6/23/2018	0	
6/24/2018	0.15	
6/25/2018	1.17	
6/26/2018	0.13	
6/27/2018	0	
6/28/2018	0.45	
6/29/2018	1.14	
6/30/2018	0	pumping period
7/1/2018	0	total: 3.32
7/2/2018	0	
7/3/2018	0	
7/4/2018	0	
7/5/2018	0	
7/6/2018	0	
7/7/2018	0.1	
7/8/2018	0	
7/9/2018	0	
7/10/2018	0	
7/11/2018	0.01	
7/12/2018	0	
7/13/2018	0	
7/14/2018	0	
7/15/2018	0.17	
7/16/2018	0	
7/17/2018	0	
7/18/2018	1.24	recovery period
7/19/2018	0	total: 1.24
7/20/2018	0	

Observations for each day cover the 24 hours ending at the time given below:

(Local Standard Time).

Precipitation : 7am

Hourly Precipitation Data* July 16, 2018 - July 20, 2018

Pease AirForce Base Portsmouth (PSM)

Aquarion Well 22 Long Term Pumping Test

Aquarion Water Company of New Hampshire - Hampton, NH

Station	Date Time	Precip
PSM	7/16/2018 0:56	0
PSM	7/16/2018 1:56	0
PSM	7/16/2018 2:56	0
PSM	7/16/2018 3:56	0
PSM	7/16/2018 4:56	0
PSM	7/16/2018 5:56	0
PSM	7/16/2018 6:56	0
PSM	7/16/2018 7:16	0
PSM	7/16/2018 7:40	0
PSM	7/16/2018 7:56	0
PSM	7/16/2018 8:15	0
PSM	7/16/2018 8:30	0
PSM	7/16/2018 8:56	0
PSM	7/16/2018 9:25	0
PSM	7/16/2018 9:45	0
PSM	7/16/2018 9:56	0
PSM	7/16/2018 10:15	0
PSM	7/16/2018 10:56	0
PSM	7/16/2018 11:36	0
PSM	7/16/2018 11:56	0
PSM	7/16/2018 12:56	0
PSM	7/16/2018 13:56	0
PSM	7/16/2018 14:56	0
PSM	7/16/2018 15:56	0
PSM	7/16/2018 16:56	0
PSM	7/16/2018 17:56	0
PSM	7/16/2018 18:56	0
PSM	7/16/2018 19:12	0
PSM	7/16/2018 19:25	0
PSM	7/16/2018 19:38	0
PSM	7/16/2018 19:56	0
PSM	7/16/2018 20:06	0
PSM	7/16/2018 20:12	0
PSM	7/16/2018 20:56	0
PSM	7/16/2018 21:56	0
PSM	7/16/2018 22:24	0
PSM	7/16/2018 22:56	0
PSM	7/16/2018 23:56	0
24 hour total		0

Station	Date Time	Precip
PSM	7/17/2018 0:08	0
PSM	7/17/2018 0:56	0
PSM	7/17/2018 1:56	0
PSM	7/17/2018 2:31	0
PSM	7/17/2018 2:56	0
PSM	7/17/2018 3:56	0
PSM	7/17/2018 4:56	0
PSM	7/17/2018 5:05	0
PSM	7/17/2018 5:56	0
PSM	7/17/2018 6:12	0
PSM	7/17/2018 6:56	0
PSM	7/17/2018 7:56	0
PSM	7/17/2018 8:56	0
PSM	7/17/2018 9:56	0
PSM	7/17/2018 10:56	0
PSM	7/17/2018 11:56	0
PSM	7/17/2018 12:10	0
PSM	7/17/2018 12:20	0
PSM	7/17/2018 12:33	0
PSM	7/17/2018 12:36	0
PSM	7/17/2018 12:46	0
PSM	7/17/2018 12:56	0.59
PSM	7/17/2018 13:07	0
PSM	7/17/2018 13:38	0
PSM	7/17/2018 13:44	0
PSM	7/17/2018 13:56	0.31
PSM	7/17/2018 14:08	0
PSM	7/17/2018 14:42	0
PSM	7/17/2018 14:56	0.08
PSM	7/17/2018 15:56	0.13
PSM	7/17/2018 16:37	0
PSM	7/17/2018 16:47	0
PSM	7/17/2018 16:56	0.15
PSM	7/17/2018 17:10	0
PSM	7/17/2018 17:47	0
PSM	7/17/2018 17:56	0.19
PSM	7/17/2018 18:03	0
PSM	7/17/2018 18:30	0
PSM	7/17/2018 18:45	0
PSM	7/17/2018 18:56	0.19
PSM	7/17/2018 19:25	0
PSM	7/17/2018 19:56	0.05
PSM	7/17/2018 20:30	0
PSM	7/17/2018 20:56	0
PSM	7/17/2018 21:46	0
PSM	7/17/2018 21:56	0
PSM	7/17/2018 22:28	0
PSM	7/17/2018 22:56	0.03
PSM	7/17/2018 23:16	0
PSM	7/17/2018 23:56	0
24 hour total		1.69
noon - 7 pm		1.64

Station	Date Time	Precip
PSM	7/18/2018 0:56	0
PSM	7/18/2018 1:56	0
PSM	7/18/2018 2:41	0
PSM	7/18/2018 2:56	0
PSM	7/18/2018 3:56	0
PSM	7/18/2018 4:21	0
PSM	7/18/2018 4:56	0
PSM	7/18/2018 5:11	0
PSM	7/18/2018 5:14	0
PSM	7/18/2018 5:38	0
PSM	7/18/2018 5:56	0
PSM	7/18/2018 6:08	0
PSM	7/18/2018 6:56	0
PSM	7/18/2018 7:56	0
PSM	7/18/2018 8:56	0
PSM	7/18/2018 9:56	0
PSM	7/18/2018 10:56	0
PSM	7/18/2018 11:56	0
PSM	7/18/2018 12:56	0
PSM	7/18/2018 13:56	0
PSM	7/18/2018 14:56	0
PSM	7/18/2018 15:56	0
PSM	7/18/2018 16:56	0
PSM	7/18/2018 17:56	0
PSM	7/18/2018 18:56	0
PSM	7/18/2018 19:56	0
PSM	7/18/2018 20:56	0
PSM	7/18/2018 21:56	0
PSM	7/18/2018 22:56	0
PSM	7/18/2018 23:56	0
24 hour total		0

Station	Date Time	Precip
PSM	7/19/2018 0:56	0
PSM	7/19/2018 1:56	0
PSM	7/19/2018 2:56	0
PSM	7/19/2018 3:56	0
PSM	7/19/2018 4:56	0
PSM	7/19/2018 5:56	0
PSM	7/19/2018 6:56	0
PSM	7/19/2018 7:56	0
PSM	7/19/2018 8:56	0
PSM	7/19/2018 9:56	0
PSM	7/19/2018 10:56	0
PSM	7/19/2018 11:56	0
PSM	7/19/2018 12:56	0
PSM	7/19/2018 13:56	0
PSM	7/19/2018 14:56	0
PSM	7/19/2018 15:56	0
PSM	7/19/2018 16:56	0
PSM	7/19/2018 17:56	0
PSM	7/19/2018 18:56	0
PSM	7/19/2018 19:56	0
PSM	7/19/2018 20:56	0
PSM	7/19/2018 21:56	0
PSM	7/19/2018 22:56	0
PSM	7/19/2018 23:56	0
24 hour total		0

Station	Date Time	Precip
PSM	7/20/2018 0:56	0
PSM	7/20/2018 1:56	0
PSM	7/20/2018 2:56	0
PSM	7/20/2018 3:56	0
PSM	7/20/2018 4:56	0
PSM	7/20/2018 5:56	0
PSM	7/20/2018 6:56	0
PSM	7/20/2018 7:56	0
PSM	7/20/2018 8:56	0
PSM	7/20/2018 9:56	0
PSM	7/20/2018 10:56	0
PSM	7/20/2018 11:56	0
PSM	7/20/2018 12:56	0
PSM	7/20/2018 13:56	0
PSM	7/20/2018 14:56	0
PSM	7/20/2018 15:56	0
PSM	7/20/2018 16:56	0
PSM	7/20/2018 17:56	0
PSM	7/20/2018 18:56	0
PSM	7/20/2018 19:56	0
PSM	7/20/2018 20:56	0
PSM	7/20/2018 21:56	0
PSM	7/20/2018 22:56	0
PSM	7/20/2018 23:56	0
24 hour total		0

*Accumulation for the hour marked at 00:56

Monthly Total Precipitation for NORTH HAMPTON, NH

Year	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Annual
2003	M	-	M	-	M	-	M	-	M	-	M	-	M	-	M	27	4.09	0	5.87	0	M	28	5.07	1	M
2004	M	18	1.41	0	M	14	M	18	5.69	0	3.34	0	3.13	0	7.80	0	6.64	0	2.65	0	3.30	1	5.51	0	M
2005	4.57	0	3.89	0	6.12	0	4.66	0	8.68	0	2.49	0	2.87	0	1.97	0	2.42	0	13.87	0	4.19	0	4.56	0	60.29
2006	4.56	0	3.10	0	0.63	0	3.73	0	20.77	0	11.04	0	6.34	0	4.32	0	3.38	0	5.57	0	7.19	0	3.27	0	73.90
2007	3.12	0	3.07	0	5.07	0	9.27	0	4.56	0	3.35	0	3.41	0	1.04	0	2.36	0	4.11	0	3.88	0	6.19	0	49.43
2008	4.23	0	9.04	0	6.42	0	3.94	0	1.28	0	5.63	0	6.36	0	4.24	0	10.15	0	3.08	0	3.28	0	7.32	0	64.97
2009	4.74	0	2.94	0	3.54	0	4.94	0	4.67	0	6.58	0	7.55	0	5.57	0	1.81	0	5.91	0	5.62	0	5.25	0	59.12
2010	3.33	0	5.05	0	17.56	0	2.33	0	4.28	0	2.07	0	4.34	0	7.37	0	2.03	0	5.72	0	5.32	0	3.23	0	62.63
2011	4.71	0	4.46	0	3.46	0	5.52	0	5.40	0	5.15	0	1.07	0	8.22	0	4.18	0	10.23	0	3.01	0	3.75	0	59.16
2012	3.59	0	1.18	0	3.34	0	4.13	0	4.08	0	6.55	0	1.24	0	5.68	0	3.31	0	4.27	0	0.77	0	7.65	0	45.79
2013	1.42	0	5.35	0	3.27	0	2.51	0	4.82	0	8.47	0	4.01	0	2.51	0	4.39	0	0.65	0	2.77	0	4.32	0	44.49
2014	3.40	0	6.19	0	4.65	0	2.90	0	3.35	0	2.97	0	6.95	0	3.89	0	2.10	0	6.10	0	4.49	0	9.79	0	56.78
2015	4.76	0	4.13	0	2.61	0	3.73	0	0.62	0	9.23	0	2.46	0	4.10	0	3.82	0	4.89	0	2.78	0	5.68	0	48.81
2016	2.32	0	4.28	0	5.14	0	2.19	0	2.31	0	3.60	0	3.88	0	2.42	0	1.62	0	8.34	0	3.65	0	4.98	0	44.73
2017	3.79	0	4.41	0	3.27	0	7.78	0	7.08	0	5.91	0	2.78	0	3.36	0	4.12	0	4.31	0	2.10	0	3.76	0	52.67
2018	3.05	0	4.34	0	4.93	0	6.31	0	2.88	0	4.24	0	3.30	0	4.93	0	7.38	0	5.01	0	M	30	M	31	M
Mean	3.69		4.19		5.00		4.57		5.36		5.37		3.98		4.49		3.99		5.66		3.74		5.36		55.60
Max	4.76 2015		9.04 2008		17.56 2010		9.27 2007		20.77 2006		11.04 2006		7.55 2009		8.22 2011		10.15 2008		13.87 2005		7.19 2006		9.79 2014		73.90 2006
Min	1.42 2013		1.18 2012		0.63 2006		2.19 2016		0.62 2015		2.07 2010		1.07 2011		1.04 2007		1.62 2016		0.65 2013		0.77 2012		3.23 2010		44.49 2013

From: Northeast Regional Climate Center Monthly Total Precipiation for Station ID 276070 (Coop), North Hampton, NH. www.climod2.nrcc.cornell.edu

Barometric Pressure Data

Date	Measured Atmospheric Pressure (PSI)	Calculated Atmospheric Pressure (in. Hg) (PSI *2.03602)
June 10, 2018	14.72	29.98
June 11, 2018	14.73	29.99
June 12, 2018	14.77	30.06
June 13, 2018	14.64	29.81
June 14, 2018	14.50	29.52
June 15, 2018	14.65	29.83
June 16, 2018	14.68	29.88
June 17, 2018	14.73	30.00
June 18, 2018	14.65	29.83
June 19, 2018	14.55	29.62
June 20, 2018	14.65	29.82
June 21, 2018	14.58	29.69
June 22, 2018	14.73	29.98
June 23, 2018	14.72	29.96
June 24, 2018	14.59	29.71
June 25, 2018	14.62	29.76
June 26, 2018	14.81	30.16
June 27, 2018	14.75	30.02
June 28, 2018	14.63	29.78
June 29, 2018	14.63	29.78
June 30, 2018	14.71	29.96
July 1, 2018	14.67	29.87
July 2, 2018	14.74	30.01
July 3, 2018	14.74	30.01
July 4, 2018	14.85	30.23
July 5, 2018	14.82	30.18
July 6, 2018	14.66	29.85
July 7, 2018	14.84	30.21
July 8, 2018	14.87	30.28
July 9, 2018	14.79	30.12
July 10, 2018	14.64	29.80
July 11, 2018	14.69	29.92
July 12, 2018	14.76	30.05
July 13, 2018	14.83	30.20
July 14, 2018	14.80	30.12
July 15, 2018	14.69	29.91
July 16, 2018	14.70	29.93
July 17, 2018	14.62	29.77
July 18, 2018	14.63	29.80
July 19, 2018	14.73	29.98

Notes:
-Pressure data collected via barometric pressure transducer, at 1-minute intervals, located 485 feet NNE of Well 22
-Record shown in table represents the 8:00 am reading for each day, corresponding to precipitation and temperature collection time at NORTH HAMPTON, NH US USC00276070

Appendix B

WELL LOGS

Monitoring Points

Well 22

RW-4 (Ambient)

Well 7

OBS-1

GEOSPHERE
ENVIRONMENTAL MANAGEMENT INC.
51 Portsmouth Avenue, Exeter, NH 03833
Phone: 603-773-0075 www.geospherenh.com

Boring Log : BEDROCK TEST WELL - BTW-7A

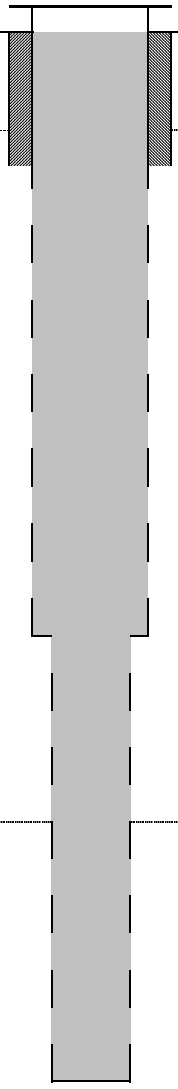
Potential Production Well 22

Little River Road, Hampton, NH
Project Number: 12217
SHEET 1 of 1

Well Owner:	Aquarion Water Co. of NH	*Well Location:*	120 Feet NW of Well 7
Date of Completion:	10/9/2012	*Well Depth:*	560 Feet BGS
Drilling Contractor:	Viera Artesian Well Co.	*Water Depth:*	9 Feet BGS (10/10/2012)
On -Site Driller:	Jim Viera	*Casing Depth:*	67 Feet BGS
Field Technician:	C. Hanson / A. Fopiano	*Casing Stick-up:*	2 Feet AGS
Project Manager:	A. Fopiano	*Drill Method:*	Air Rotary

Notes:
Drilling Dates 10/1/2012 - 10/9/2012
10/3-10/5: Initially advanced 6.6-inch borehole from 67-340 feet bgs. 10/8: Due to high amounts of water reamed 10-inch borehole from 67-320 feet bgs. 10/9: 8-inch borehole advanced from 320-560 feet bgs. Excavated 150-foot long, 4-foot wide trench for discharge water.

DEPTH	Soil and Rock Description	Fracture	Depth	Well Yield
0.0				
20.0	(0'-50') Coarse Sand and Gravel, with Cobbles, trace Clays present from 48'-50'.			
40.0				
60.0				
80.0		Fn	90'	
100.0				
120.0				
140.0		Fn	135'	
160.0		Fn	150'	
180.0		Fn	175'	
200.0	(50' - 420') Dark Grey/Green foliated schist. (Rye Formation)			
220.0		Fp	219'	30-40 GPM
		Fp	230'	80 GPM
240.0		Fp	245'	100 GPM
		Fp	256'	
260.0				>200 GPM
280.0		Fp	285' - 295'	>300 GPM
300.0		Fp	310'	
320.0		Fp	316'	
340.0		Fp	330'	
360.0				
380.0				
400.0		Fp	390'	
420.0		Fp	420'	
440.0				
460.0	(420'- 560') Light Grey Granite/Quartzite. High quartz and mica content. (Breakfast Hill Granite)			
480.0		Fp	480'	>300 GPM
500.0		Fp	505' - 510'	
520.0				
540.0				
560.0				>300 GPM
580.0				
600.0				
620.0				
640.0				
660.0				
680.0				
700.0				



Well Description	Depth	WELL CONSTRUCTION INFORMATION
	+2'	TOP OF STEEL CASING - 2 FT AGS
	0'	EXISTING GRADE
CONCRETE SANITARY SEAL AROUND CASING 0 - 67 FT BGS		
	50'	BEDROCK INTERFACE
	67'	10-INCH STEEL CASING TO 67 FT BGS
OPEN 10-INCH BORE HOLE 67 - 320 FT BGS		
		Air Lift / Bucket Test
		Air Lift / Bucket Test
	320'	OPEN 8-INCH BORE HOLE 320 - 560 FT BGS
	420'	BEDROCK CONTACT ZONE 420 FT BGS
	560'	BOTTOM OF BOREHOLE

* Geologic descriptions based upon drilling cuttings. Rock Formation identifications based upon descriptions presented by Lyons et al 1997 in the Geologic Map of New Hampshire.

* Could not accurately measure flow rate with air lift test at well completion because of high flow rate and flooding around the drill rig.

Fp: Producing
Fn: Nonproducing

GPM = gallons/minute

BGS = Below Ground Surface
AGS = Above Ground Surface

PAGE 1

Drilling Log

Customer: AQUARION WATER CO. Rt 4 Location: HAMPTON NH Date: 12-7-05

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Med/ Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
18	63	16	1600	500	MED	3	0	Dark Grey	
20	83	13						" "	
	103	8						LT. GRY	Blow Hole
	123	17						DARK Grey	
	143	19							
	163	19							
	183	21					↓		
	203	16					1		Blow Holes 10 min
	223	18							
	243	22½							
	263	21							
	283	23					↓		
	303	25					4		Blow Holes 20 min
	323	25							
	343	22							
	363	24							
	383	22							
	403	27							Blow Holes 30 min
	423	27							
	443	35							
	463	28							
	483	24					↓		
↓	503	23	↓	↓	↓	↓	8	↓	Small Frac @ 460 Blow Holes 30 min

Bit SN: _____ Bit Size: 6

12/22/2005 THU 14:42 FAX 9786643299 DL MAHER

1100 o

Drilling Log

Customer: Aquarion water Co. RW#4 Location: Hampton NH Date: 12-7-05

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Med/ Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
20	583	23	1800	500	HARD	3	8	Dark Grey	
	543	25							
	563	27							
	583	32					↓		
	603	36					8		Blowhole 20min
	623	38							
	643	55							
	663	50							
	683	41					↓		
	703	35					8		Blow Hole 20min
	723	27							
	743	26							
	763	26							
	783	26		↓			↓		
	803	25		250			8		Blowholes 20min)
	823	26					20		Sandrock @ 815'
	843	48							
↓	863	49	↓	↓	↓	↓	↓	↓	

Bit SN:_____ Bit Size:_____

12/22/2005 THU 14:43 FAX 9786643289 DL MAHER

HAMPTON WATER WORKS COMPANY

RYDER WELL NO. 7

Date Drilled: 1950

Depth (ft-pb*): *46*

Diameter (inches): 24

Screen:

Type: Transite and stainless steel

Length (ft): 15

Setting (ft-pb): 31-46

Slot opening (inch):

Pump:

Type: Turbine

Capacity (gpm): 700

Bowls/Intake (ft-pb): --/ 43.8

PUMPING TEST-OPERATIONAL DATA

Date	Pumping rate (gpm)	Water-level (ft-pb)		Specific capacity (gpm/ft/dd)	Duration of pumping (hours)
		Non-pumping	pumping		
5/50	805	2.5	14.7	66.1	48

Remarks: Well produces water of good quality.

NOTE: Italicized figures indicate questionable value.

* feet below pump base

GEOSPHERE
ENVIRONMENTAL MANAGEMENT INC.

51 Portsmouth Ave.
Exeter, NH 03833

Log of Borehole/MW: OBS-1

Project No.: 12217

Site: Well 22 Borehole Location: Hampton, NH

Address: McCarron Drive

Client: Aquarion Water Co of NH Geologist/Engineer: Matt Krapf

SUBSURFACE PROFILE			SAMPLE					
Depth (ft / m)	Symbol	Description	Sample ID / Depth	Pen (in)	Rec (in)	Total VOC's (ppm)	Well Data	Comments
0 / 0		Ground Surface					5-ft., 4-in. dia. standpipe set at 1.69 ft. ags Top of 2-in. PVC well is 1.36 ft. ags	
0 – 2		***Organic Material*** Organic Material (0.0 - 0.5 ft.)						
2 – 8 / 0.5 – 2		***Poorly Graded Sand with Gravel*** Coarse Sand with small Gravel (0.5 - 8.0 ft.)						
8 – 12 / 2 – 4		***Poorly Graded Gravel with Sand*** Medium to large Gravel with fine brown Sand and Silt. Trace Clay (8.0 - 12.0 ft.) Drilled through large boulder (9.0 ft.)						
12 – 20 / 4 – 6		***Poorly Graded Sand with Gravel*** Fine to medium brown Sand with medium to large angular Gravel. Trace Silt and Clay (12.0 - 20.0 ft.)					Static WL 14.36 ft. btpvc on 8/3/16 Native Material (0 - 30 ft.)	
20 – 22 / 6 – 6.5		***Sandy Silt with Gravel*** Gray/green Fines with fine to medium Sand and small to large angular Gravel (20.0-22.0 ft.)						
22 – 30 / 6.5 – 8		***Poorly Graded Gravel with Sand*** Medium to large Gravel with fine brown Sand and Silt. Trace Clay (22.0 - 30.0 ft.) Drilled through large Boulder (27.0 ft.)						
30 – 32 / 8 – 10		***Silt with Sand*** Dense gray/green Fines with tightly packedfine brown Sand. Trace coarse brown Sand (30.0 - 32.0)					Bentonite Seal (30 - 32 ft.)	
32 – 40 / 10 – 12		***Well Graded Sand with Silt and Gravel*** Fine to coarse brown sand with small to large Gravel. Lenses of gray/gren Fines with coarse Sand and small Gravel distributed throughout layer (32.0 - 40.5 ft.)					Filter Pack Sand (32 - 44 ft.) 2-in. dia., 10-slot PVC screen (34 - 44 ft.)	
40 – 44 / 12 – 13		***Weathered Bedrock*** End of Boring = 44.0 ft.						

Drill Date: 7/27/2016
Drill Method: Drive and Wash/Rotary
Driller: Crawford

Borehole Diameter: 3"
Sampler Diameter: 2"
Well Casing Diameter: 4"

PVC Elev.: 44.43 ft. ASL
Depth to GW: 14.36 ft. btpvc
Date of Static GW Level: 8/3/2016

WELL LOGS

Residential Wells – Available Logs

11 Bear Path
31 Windmill Lane
38 Edgewood Drive
53 Winnacunnet Road
59 Edgewood Drive
81 Landing Road
117 Little River Road
195 Woodland Road
206 Woodland Road
321 Winnacunnet Road

1, 1

Well Number 177- 734
(FOR DRILLER'S USE)

This report must be submitted to the N.H. Water Well Board no later than 60 days after the completion of the well.

State of New Hampshire
Water Well Board
PO Box 2008
Concord, NH 03301

Well Completion Report

Special Notes on Back

Staff Use Only
No. 105.0112 Elev. _____
Quad _____
☐ 62,500 ☐ 25,000 ☐ 24,000
Latitude _____ ° _____ ' _____ "
Longitude _____ ° _____ ' _____ "

A LOCATION MAP MUST BE ATTACHED TO THIS FORM

1. **Well Owner/Home Owner** William Freedman (Name) 11 Bear Path Hampton (Permanent Mailing Address)
   and/or Building Contractor _____ (Name) _____ (Permanent Mailing Address)
2. **Location of Well:** Town Hampton Road Bear Path
   Subdivision _____ Lot No. 11
   Tax map number necessary for future well location. Map _____ Parcel No. _____
3. **Date Well was Completed:** 9/11/95
4. **Proposed Use of Well:** |x| Domestic | | Other (Explain) _____
5. **Reason for Constructing Well:** |x| New Supply | | Replace Existing Supply | | Other _____
6. **Type of Well:** |x| Drilled in Bedrock | | Drilled in Gravel | | Dug | | Other _____
7. **Total Depth of Well:** 160 feet below land surface.
8. **Depth to Bedrock:** 8
9. **Casing Details:** Length 17 Ft., Dia. 6 in., Material Steel Wt. 17 lb./ft.
10. **Method of Sealing Casing to Bedrock:** |x| Drive Shoe | | Other _____
11. **Yield Test:** | | Bailed | | Pumped |x| Compressed Air, for 1/2 hrs. at 50+ GPM
12. **Static Water Level:** _____ feet below land surface Date Measured _____
13. **Water Analysis:** Has the water been analyzed? | | Yes | | No If yes, where _____
14. **Screen Details:** See back
15. **Well Log:**

Depth in Feet From	To	Water Bearing	Formation Description	Type
Ground Surface	8		☑ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
8	160		☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☒ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	

16. **Tested Yield:**
If the yield tested at different depths during drilling, list below

Feet	GPM

Doing Business as L.A. Hanna & Sons, Inc.
Company or Business Name

Report Filed by Jeanne Mueller
Authorized Signature

Date of Report 9/12/95 License No. 177

Well Number _____

(FOR DRILLER'S USE)

This report must be submitted to the N.H. Water Well Board no later than 90 days after the completion of the well.

State of New Hampshire
Water Well Board
PO BOX 95
Concord, NH 03302-0095

Well Completion Report

Special Notes on Back

Staff Use Only
ID# 105.0203 Elev _____
Quad _____
☐25,000 ☐24,000
Latitude ____ ° ____ ' ____ "
Longitude ____ ° ____ ' ____ "
GPS: ☐ Auton ☐ Corr

1. **Well Owner/Home Owner:** John Arakelian 31 Windmill Lane, Hampton NH 03842
and/or Name Permanent Mailing Address

Building Contractor: _____
Name Permanent Mailing Address

2. **Location of Well:** Town Hampton Address 31 Windmill Lane
Street No Road Name
Subdivision Name _____ Subdivision Lot No. _____
Town Tax Map and Lot No: Map No. _____ Lot No. 177-21

3. **Date Well was Completed:** 5-14-03

4. **Proposed Use of Well:** ☐ Domestic ☑ Other (Explain) irrigation

5. **Reason for Constructing Well:** ☑ New Supply ☐ Replace Existing Supply ☐ Other _____

6. **Type of Well:** ☑ Drilled in Bedrock ☐ Drilled in Gravel ☐ Dug ☐ Other _____
(Screen Details on Back)

7. **Total Depth of Well:** 380 feet below land surface.

8. **Depth to Bedrock:** 42 feet below land surface.

9. **Casing Details:** Length 89 ft., Dia. 6 in., Material STEEL Wt. 17 lb./ft.

10. **Method(s) of Sealing Casing to Bedrock:** ☑ Drive Shoe ☐ Drillings ☐ Grout ☐ Other _____

11. **Yield Test:** ☐ Bailed ☐ Pumped ☑ Compressed Air, for 1 hrs. at 20 GPM

12. **Static Water Level:** _____ feet below land surface. Date Measured _____

13. **Water Analysis:** Has the water been analyzed? ☐ Yes ☑ No If yes, where _____

14. **Well Log:**

Depth in Feet From	To	Water Bearing	Formation Description					Type
Ground Surface	42	Y/S	☑ Sand	☑ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
42	380	Y/S	☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	Slate
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	

15. **Tested Yield:**
If the yield was tested at different depths during drilling, list below.

Feet	GPM
360	20

Doing Business as Clear Water Artesian Well Co. Inc.
Company or Business Name

Report Filed by _____
Licensee Signature

Date of Report 5/22/03 License No. 1236

Well Number _____

(FOR DRILLER'S USE)

This report must be submitted to the N.H. Water Well Board no later than 90 days after the completion of the well.

State of New Hampshire
Water Well Board
PO BOX 95
Concord, NH 03302-0095

Well Completion Report

Special Notes on Back

Staff Use Only
ID# 105.0204 Elev _____
Quad _____
☐25,000 ☐24,000
Latitude _____ ° ' "
Longitude _____ ° ' "
GPS: ☐ Auton ☐ Corr

1. **Well Owner/Home Owner:** Nancy Jo + Randy Walter 38 Edgewood Drive Hampton 03842
and/or Name Permanent Mailing Address

Building Contractor: _____
Name Permanent Mailing Address

2. **Location of Well:** Town Hampton Address 38 Edgewood Drive
Street No Road Name
Subdivision Name _____ Subdivision Lot No. _____
Town Tax Map and Lot No: Map No. _____ Lot No. 193-64

3. **Date Well was Completed:** 5-15-03

4. **Proposed Use of Well:** ☐ Domestic ☑ Other (Explain) irrigation

5. **Reason for Constructing Well:** ☑ New Supply ☐ Replace Existing Supply ☐ Other _____

6. **Type of Well:** ☑ Drilled in Bedrock ☐ Drilled in Gravel ☐ Dug ☐ Other _____
(Screen Details on Back)

7. **Total Depth of Well:** 180 feet below land surface.

8. **Depth to Bedrock:** 67 feet below land surface.

9. **Casing Details:** Length 80 ft., Dia. 6 in., Material Steel Wt. 17 lb./ft.

10. **Method(s) of Sealing Casing to Bedrock:** ☑ Drive Shoe ☐ Drillings ☐ Grout ☐ Other _____

11. **Yield Test:** ☐ Bailed ☐ Pumped ☑ Compressed Air, for 1 hrs. at 30 GPM

12. **Static Water Level:** _____ feet below land surface. Date Measured _____

13. **Water Analysis:** Has the water been analyzed? ☐ Yes ☑ No If yes, where _____

14. **Well Log:**

Depth in Feet From	To	Water Bearing	Formation Description					Type
Ground Surface	67	yes	☑ Sand	☑ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
67	180	yes	☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☑ Bedrock	Slate
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	

15. **Tested Yield:**
If the yield was tested at different depths during drilling, list below.

Feet	GPM
158	30

Doing Business as Clear Water Artesian Well Co. Inc.
Company or Business Name

Report Filed by _____
Licensee Signature

Date of Report 5/22/03 License No. 1236

406
(OR DRILLER'S USE)

This report must be submitted to the N.H. Water Well Board no later than 60 days after the completion of the well.

State of New Hampshire
Water Well Board
PO BOX 2008
Concord. NH 03301

Well Completion Report

Special Notes on Back

Staff Use Only
ID# 105.0171 Elev
Quad
☐25,000 ☐24,000
Latitude ° ' "
Longitude ° ' "
GPS: ☐ Auton ☐ Corr

1. **Well Owner/Home Owner:** Centre School/ Hampton School District Hampton, N. H. 03842
and/or Name Permanent Mailing Address

Building Contractor: Name Permanent Mailing Address

2. **Location of Well:** Town Hampton, N. H. Address Hampton School District, Hampton, N.H. 03842
Street No Road Name
Subdivision Name Subdivision Lot No.
Town Tax Map and Lot No: Map No. Lot No.

3. **Date Well was Completed:** 8/09/99

4. **Proposed Use of Well:** ☑ Domestic ☐ Other (Explain)

5. **Reason for Constructing Well:** ☑ New Supply ☐ Replace Existing Supply ☐ Other

6. **Type of Well:** ☑ Drilled in Bedrock ☐ Drilled in Gravel ☐ Dug ☐ Other
(Screen Details on Back)

7. **Total Depth of Well:** 140' feet below land surface.

8. **Depth to Bedrock:** 61 feet below land surface.

9. **Casing Details:** Length 73' ft., Dia. 6 in., Material 5 Wt. 17 lb./ft.

10. **Method(s) of Sealing Casing to Bedrock:** ☒ Drive Shoe ☐ Drillings ☒ Grout ☐ Other

11. **Yield Test:** ☐ Bailed ☐ Pumped ☒ Compressed Air, for ½ hrs. at 20 GPM

12. **Static Water Level:** 31 feet below land surface. Date Measured 8-9-99

13. **Water Analysis:** Has the water been analyzed? ☐ Yes ☒ No If yes, where

14. **Well Log:**

Depth in Feet From	To	Water Bearing	Formation Description					Type
Ground Surface	61	yes	☒ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
61	140	yes	☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☒ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	
			☐ Sand	☐ Gravel	☐ Till	☐ Clay/Silt	☐ Bedrock	

15. **Tested Yield:**
If the yield was tested at different depths during drilling, list below.

Feet	GPM
123	20

Doing Business as DOWNEAST DRILLING CO., INC.
23 Pierce Road
Barrington, NH 03825-3615
Company or Business Name

Report Filed by
Licensee Signature

Date of Report 8-9-99 License No. 406

Tuesday, Nov. 13, 2018

OneStop - Water Well

Document Retrieval Problems? Learn More

Save Results | Well Completion Report | Well Driller | Request Sample Containers | Program Info | Program Contact | Water Well Board | Water Well Contractors Search

If you have any questions about or corrections to the information below, please contact us. Click the Program Contact button above for contact information.

Well Id (WRB#):	105.0171	Date Completed:	08/09/1999
Name and Location:	CENTRE SCHOOL HAMPTON SCHOOL DISTRICT HAMPTON	Total Depth:	140 FT
		Depth to Bedrock:	61 FT
Tax Map No:		Casing:	73 FT
Lot No:		Tested Yield:	20 GAL/MIN
Type:	DRILLED IN BEDROCK	Static Water Level:	31 FT
Use:	AGRICULTURAL	Measured Yield After Development:	

Well Driller

Document Retrieval Problems? Learn More

Driller License No:	406	Driller Well Id:	
Name and Address:	DOWNEAST DRILLING COMPANY INC 23 PIERCE RD BARRINGTON NH 03825-3615	Current License Status:	INACTIVE
Email:		Phone Number:	603-664-2111

Well Number
177-824
(FOR DRILLER'S USE)

This report must be submitted to the N.H. Water Well Board no later than 60 days after the completion of the well.

State of New Hampshire
Water Well Board
PO Box 2008
Concord, NH 03301

Well Completion Report

Special Notes on Back

Staff Use Only
No. 105.037 Elev. _____
Quad _____
☐ 62,500 ☐ 25,000 ☐ 24,000
Latitude _____ ° _____ ' _____ "
Longitude _____ ° _____ ' _____ "

A LOCATION MAP MUST BE ATTACHED TO THIS FORM

1. **Well Owner/Home Owner** Eric Fachon (Name) 59 Edgewood Drive (Permanent Mailing Address) Hampton
   and/or
   Building Contractor _____ (Name) _____ (Permanent Mailing Address)
2. **Location of Well:** Town Hampton Road Edgewood Drive
   Subdivision _____ Lot No. 59
   Tax map number necessary for future well location. Map _____ Parcel No. _____
3. **Date Well was Completed:** 6/11/96
4. **Proposed Use of Well:** ☑ Domestic ☐ Other (Explain) _____
5. **Reason for Constructing Well:** ☑ New Supply ☐ Replace Existing Supply ☐ Other _____
6. **Type of Well:** ☑ Drilled in Bedrock ☐ Drilled in Gravel ☐ Dug ☐ Other _____
7. **Total Depth of Well:** 120' feet below land surface.
8. **Depth to Bedrock:** 65'
9. **Casing Details:** Length 81 Ft., Dia. 6 in., Material Steel Wt. 17 lb./ft.
10. **Method of Sealing Casing to Bedrock:** ☑ Drive Shoe ☐ Other _____
11. **Yield Test:** ☐ Bailed ☐ Pumped ☑ Compressed Air, for 1/2 hrs. at 30 GPM
12. **Static Water Level:** _____ feet below land surface Date Measured _____
13. **Water Analysis:** Has the water been analyzed? ☐ Yes ☐ No If yes, where _____
14. **Screen Details:** See back
15. **Well Log:**

Depth in Feet From	To	Water Bearing	Formation Description	Type
Ground Surface	65'		☑ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
65	120		☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☑ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	

16. **Tested Yield:**
    If the yield tested at different depths during drilling, list below

Feet	GPM

Doing Business as L.A. Hanna & Sons
Company or Business Name

Report Filed by Jeanne Mueller
Authorized Signature

Date of Report 6/14/96 License No. 177

Please fill in items 1 & 2 only and return to us. Thank you

Well Number 457/87/98
(for Driller's Use)

This report must be submitted to the N.H. Water Well Board no later than 60 days after the completion of the well.

State of New Hampshire
Water Well Board
PO Box 2008
Concord, NH 03301

Well Completion Report

Special Notes on Back

Staff Use Only
No. 105.0023 Elev. ____
Quad ____
☐ 62,500 ☐ 25,000 ☐ 24,000
Latitude ____ ° ____ ' ____ "
Longitude ____ ° ____ ' ____ "
Field Location ☐

A LOCATION MAP MUST BE ATTACHED TO THIS FORM

1. **Well Owner/Home Owner** DANIEL LYLIS 81 LANDING RD, HAMPTON, N.H.
Name Permanent Mailing Address
and/or
Building Contractor ____
Name Permanent Mailing Address

2. **Location of Well:** Town HAMPTON, N.H. Road 81 LANDING RD.
Subdivision ____ Lot No. 229-1
Tax map number necessary for future well location. Map ____ Parcel No. ____

3. **Date Well was Completed:** July 14, 1987

4. **Proposed Use of Well:** ☒ Domestic ☐ Other (Explain) ____

5. **Reason for Constructing Well:** ☒ New Supply ☐ Replace Existing Supply ☐ Other ____

6. **Type of Well:** ☒ Drilled in Bedrock ☐ Drilled in Gravel ☐ Dug ☐ Other ____

7. **Total Depth of Well:** 250' feet below land surface.

8. **Depth to Bedrock:** 65'

9. **Casing Details:** Length 87 Ft., Dia. 6 5/8 in., Material STEEL Wt 17 lb./ft.

10. **Method of Sealing Casing to Bedrock:** ☒ Drive Shoe ☐ Other ____

11. **Yield Test:** ☐ Bailed ☐ Pumped ☒ Compressed Air, for 1 hrs. at 15 GPM

12. **Static Water Level:** 5' feet below land surface Date Measured 7/14/87

13. **Water Analysis:** Has the water been analyzed? ☐ Yes ☒ No If yes, where ____

14. **Screen Details:** See back

15. **Well Log:**

Depth in Feet From	To	Water Bearing	Formation Description					Type
Ground Surface	5		☒ Sand	☐ Gravel	☐ Hardpan	☐ Clay	☐ Bedrock	
5	65		☐ Sand	☐ Gravel	☐ Hardpan	☒ Clay	☐ Bedrock	
65	86		☐ Sand	☐ Gravel	☐ Hardpan	☐ Clay	☒ Bedrock	BROKEN UP 1ST 10'
86	240		☐ Sand	☐ Gravel	☐ Hardpan	☐ Clay	☒ Bedrock	HARD
240	241	X	☐ Sand	☐ Gravel	☐ Hardpan	☐ Clay	☒ Bedrock	BROKEN
241	250		☐ Sand	☐ Gravel	☐ Hardpan	☐ Clay	☒ Bedrock	HARD

16. **Tested Yield:**
If the yield tested at different depths during drilling, list below

Feet	GPM

Doing Business as Buxton Well Co.
Company or Business Name

Report Filed by Jacqueline Murphy
Authorized Signature

Date of Report 7/28/87 License No. 457

Well Id (WRB#): **105.0003** Well Completion Report

Name and Location: **K ROBSON**
117 LITTLE RIVER RD
HAMPTON

Mapit

Tax Map No:

Lot No:

Type: **DRILLED IN BEDROCK**

Use: **DOMESTIC;**

Date Completed: **07/30/1987**

Total Depth: **160 ft**

Depth to Bedrock: **19 ft**

Casing: **31 ft**

Tested Yield: **10 gal/min**

Static Water Level:

Measured Yield After Development:

Well Driller

Driller License No: **177**

Name and Address: **LA HANNA & SONS INC**
313 PORTSMOUTH AVE
STRATHAM NH 03885

Email: **MENTER83@METROCAST.NET**

Driller Well Id: **674**

Current License Status: **Inactive**

Phone Number: **603-436-5776**

1-1

Well Number
177-674
(for Driller's Use)

This report must be submitted to the N.H. Water Well Board no later than 60 days after the completion of the well.

State of New Hampshire
Water Well Board
PO Box 2008
Concord, NH 03301

Well Completion Report

Special Notes on Back

Staff Use Only
No. 105.0003 Elev. ____
Quad ____
☐ 62,500 ☐ 25,000 ☐ 24,000
Latitude ____ ° ____ ' ____ "
Longitude ____ ° ____ ' ____ "
Field Location ☐

A LOCATION MAP MUST BE ATTACHED TO THIS FORM

1. **Well Owner/Home Owner** Ken Robson 119 Little River Rd. Hampton N.H. 03842
   Name Permanent Mailing Address
   and/or
   Building Contractor ____
   Name Permanent Mailing Address
2. **Location of Well:** Town Hampton Road Little River Rd.
   Subdivision ____ Lot No. 117
   Tax map number necessary for future well location. Map ____ Parcel No. ____
3. **Date Well was Completed:** 7/30/87
4. **Proposed Use of Well:** ☒ Domestic ☐ Other (Explain) ____
5. **Reason for Constructing Well:** ☒ New Supply ☐ Replace Existing Supply ☐ Other ____
6. **Type of Well:** ☒ Drilled in Bedrock ☐ Drilled in Gravel ☐ Dug ☐ Other ____
7. **Total Depth of Well:** 160' feet below land surface.
8. **Depth to Bedrock:** 19'
9. **Casing Details:** Length 31 Ft., Dia. 6 in., Material ST Wt 17 lb./ft.
10. **Method of Sealing Casing to Bedrock:** ☒ Drive Shoe ☐ Other ____
11. **Yield Test:** ☐ Bailed ☐ Pumped ☒ Compressed Air, for ____ hrs. at 10 GPM
12. **Static Water Level:** ____ feet below land surface Date Measured ____
13. **Water Analysis:** Has the water been analyzed? ☐ Yes ☒ No If yes, where ____
14. **Screen Details:** See back
15. **Well Log:**

Depth in Feet From	To	Water Bearing	Formation Description	Type
Ground Surface	19'		☐ Sand ☒ Gravel ☐ Hardpan ☐ Clay ☐ Bedrock	
19'	160'		☐ Sand ☐ Gravel ☐ Hardpan ☐ Clay ☒ Bedrock	
			☐ Sand ☐ Gravel ☐ Hardpan ☐ Clay ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Hardpan ☐ Clay ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Hardpan ☐ Clay ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Hardpan ☐ Clay ☐ Bedrock	

16. **Tested Yield:**
If the yield tested at different depths during drilling, list below

Feet	GPM

Doing Business as L. A. Hazen & Son Inc.
Company or Business Name

Report Filed by Linda L. Nee
Authorized Signature

Date of Report 8/7/87 License No. 177

Well Id (WRB#): **105.0264**

Name and Location: **G. ALIE**
195 WOODLAND RD
HAMPTON

Mapit

Tax Map No: **95**

Lot No: **1**

Type: **DRILLED IN BEDROCK**

Use: **OTHER;**

Date Completed: **04/09/2010**

Total Depth: **175 ft**

Depth to Bedrock: **9 ft**

Casing: **40 ft**

Tested Yield: **40 gal/min**

Static Water Level: **10 ft**

Measured Yield After Development:

Well Driller

Driller License No: **1543**

Name and Address: **SKILLINGS & SONS INC**
9 COLUMBIA DR
AMHERST NH 03031

Email: **NSKILLINGS@SKILLINGSANDSONS.COM**

Driller Well Id: **09292**

Current License Status: **Inactive**

Phone Number: **603-889-5009**

Well Number **09292**

(for Driller's Use)

This report must be submitted to the N.H. Water Well board no later than 60 days after the completion of the well.

State of New Hampshire
Water Well Board
PO Box 2008
Concord, NH 03301

W E L L C O M P L E T I O N R E P O R T

Special Notes on Back

Staff Use Only
No. _____ Elev. _____
Quad _____
__ 62,500 __ 25,000 __ 24,000

Latitude 42 o 57 ' 050 "
Longitude 070 o 48 ' 269 "

A LOCATION MAP MUST BE ATTACHED TO THIS FORM

1. Well Owner/Home Owner and/or Building Contractor — Name **GARIE ALIE** — Permanent Mailing Address **P.O. BOX 663 N. HAMPTON, NH 03862**
   Name _____ Permanent Mailing Address _____ , **NH**
2. **Location of Well:** Town **HAMPTON** Road **195 WOODLAND**
   Subdivision _____ Lot Number **1**
   Tax map number necessary for future well location. Map **95** Parcel
3. Date Well was Completed: **04/09/10**
4. Proposed Use of Well: **OTHER WELL USE**
5. Reason for Constructing Well: **OTHER REASON**
6. Type of Well: **DRL IN BEDROCK**
7. Total Depth of Well: **175** feet below land surface.
8. Depth to Bedrock: **9**
9. Casing Details: Length **40** Ft., Dia **6** in., Material **STEEL** Wt **17** lb./ft.
10. Method of Sealing Casing to Bedrock: **DRIVE SHOE**
11. Yield Test: **COMPRESSED AIR**, for **1** hrs. at **40** GPM
12. Static Water Level: **10** feet below land surface Date Measured **04/09/10**
13. Water Analysis: Has the water been analyzed? **NO** If yes, where
14. Screen Details: Make Type Material Length ft.
    Diameter in. Slot Size Depth to top of screen from land surface
    Gravel Pack, if used: Gravel Size or Type
15. Well Log:

Depth in Feet From	To	Water Bearing	Formation Description
0	**9**	**N**	**CLAY**
9	**175**	**Y**	**SHALE**

16. Tested Yield:
    If the yield tested at different depths during drilling, list below

Feet	GPM
175	**40**

17. Additional Information
    WELL DRILLER IS CHRIS BERNIER
    GEOTHERMAL / DOMESTIC STANDING COLUMN WELL SYSTEM

Doing Business as **SKILLINGS & SONS, INC.**

Report Filed by _____
Authorized Signature

Date of Report **05/18/10**

License. No. **1543**

FILE COPY

Well Id (WRB#): **105.0260**

Name and Location: **J. DIENER**
206 WOODLAND RD
HAMPTON

Mapit

Tax Map No: **14**

Lot No: **212**

Type: **DRILLED IN BEDROCK**

Use: **DOMESTIC;**

Date Completed: **10/07/2009**

Total Depth: **400 ft**

Depth to Bedrock:

Casing:

Tested Yield: **20 gal/min**

Static Water Level:

Measured Yield After Development:

Well Driller

Driller License No: **225**

Name and Address: **CAPITAL WELL CO INC**
150 CONCORD STAGE RD
DUNBARTON NH 03046

Email: **JDRAGON@CAPITALWELL.COM**

Driller Well Id: **09144**

Current License Status: **Active**

Phone Number: **603-774-6155**

CC: Watrous

Well Number 243-109
(FOR DRILLER'S USE)

This report must be submitted to the N.H. Water Well Board no later than 60 days after the completion of the well.

State of New Hampshire
Water Well Board
PO Box 2008
Concord, NH 03301

Well Completion Report

Special Notes on Back

Staff Use Only
No. 1055078 Elev. _____
Quad _____
☐ 62,500 ☐ 25,000 ☐ 24,000
Latitude _____ ° _____ ' _____ "
Longitude _____ ° _____ ' _____ "

A LOCATION MAP MUST BE ATTACHED TO THIS FORM

1. **Well Owner/Home Owner** Mr. Jeff Cirus (Name) 37 Winnicunnet Rd (Permanent Mailing Address)
and/or
Building Contractor _____
(Name) (Permanent Mailing Address)

2. **Location of Well:** Town Hampton Road Winnicunnet Rd
Subdivision _____ Lot No. 174-3
Tax map number necessary for future well location. Map _____ Parcel No. 22 1, 1

3. **Date Well was Completed:** 24 May 94

4. **Proposed Use of Well:** | | Domestic | | Other (Explain) Irrigation

5. **Reason for Constructing Well:** | | New Supply | | Replace Existing Supply | | Other _____

6. **Type of Well:** | | Drilled in Bedrock | X | Drilled in Gravel | ☐ Dug | | Other _____

7. **Total Depth of Well:** 75 feet below land surface.

8. **Depth to Bedrock:** _____

9. **Casing Details:** Length 70 Ft., Dia. 4 in., Material PVC Wt. IF 40 lb./ft.

10. **Method of Sealing Casing to Bedrock:** | | Drive Shoe | | Other _____

11. **Yield Test:** X Bailed X Pumped | | Compressed Air, for 24 hrs. at 12 GPM

12. **Static Water Level:** 38 feet below land surface Date Measured 24 May 94

13. **Water Analysis:** Has the water been analyzed? | | Yes X No If yes, where _____

14. **Screen Details:** See back

15. **Well Log:**

Depth in Feet From	To	Water Bearing	Formation Description	Type
Ground Surface	66	no	☐ Sand ☐ Gravel ☐ Till X Clay/Silt ☐ Bedrock	
66	75	YES	X Sand X Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	
			☐ Sand ☐ Gravel ☐ Till ☐ Clay/Silt ☐ Bedrock	

16. **Tested Yield:**
If the yield tested at different depths during drilling, list below

Feet	GPM
75	12

Doing Business as O.E. Dube & Son Inc
(Company or Business Name)

Report Filed by Ronald B. Dube
(Authorized Signature)

Date of Report 27 May 94 License No. 243

SPECIAL NOTES

Screen Details: Make & Type Johnson, Material PVC, Length 5' ft.

Diameter 4 in. Slot Size 30 Depth to top of screen from land surface 20

Gravel Pack, if used: Gravel Size or Type #2 Morie

Include optional information on:

1. Addition or unusual information on the well.
2. A sketch of well location on the lot.
3. Results of drawdown test if performed.
4. Odor, iron, etc.

RECEIVED
NEW HAMPSHIRE
JUN 03 1994
WATER RESOURCES DIVISION

Appendix C

Private Well Documentation

- Outreach Letters – Sample
- Table of Private Wells: Approached and Selected
- Participant Questionnaires

Aquarion Water Company of New Hampshire
7 Scott Road
Hampton, NH 03842
603-926-3319 phone
www.aquarionwater.com

Stewards of the Environment®

January 25, 2018

Dear Well Owner:

Aquarion Water Company of New Hampshire (AQUARION) will be conducting an aquifer pumping test for a new public water supply well in the near future, and is requesting your permission to access your private well to monitor groundwater levels. AQUARION is seeking to obtain a new Large Groundwater Withdrawal Permit from the State of New Hampshire Department of Environmental Services (NHDES) per current regulations under RSA 485:3 and 485-C. This new well is needed to support continued growth in Hampton, North Hampton and Rye, and to continue to meet existing customer water service demands and expectations.

You are not required by NHDES to provide AQUARION information about your well, or to grant us permission to access your well to collect groundwater level measurements. However, our ability to monitor your well during this pumping test will provide important information to NHDES to determine a sustainable pumping rate for the new well that does not adversely impact your groundwater supply.

If you choose to participate, data collection will be performed by our consultant Geosphere Environmental Management, Inc. (GEOSPHERE). Groundwater level measurements in your well will be collected by temporarily installing a small, automated groundwater level recording device in your well. The recording device will be left in the well for four to six weeks, to measure groundwater levels before, during, and after the pumping test. Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing of your well, and we will provide you with the results if you are interested.

We have included with this letter a Water Well Questionnaire that will provide information on your well to help assess any potential impacts on your well from the pumping test. Please complete it and return it to GEOSPHERE in the enclosed self-addressed stamped envelope. If you are "Not Interested" or have "No Well", please annotate the questionnaire as such, and return it so that we can accurately document your response.

Should you like more information regarding the State's Large Groundwater Withdrawal regulations, or information pertaining directly to AQUARION's proposed Large Groundwater Withdrawal, please contact Stephen Roy at NHDES, (603) 271-3918 or stephen.roy@des.nh.gov or Lisa Coté at GEOSPHERE, (603) 773-0075 ext. 19 or lcote@geospherenh.com.

Please give strong consideration to participating in this request. The best way for us to ensure that there will be no long term adverse impacts on your well is to get this monitoring data during the pumping test. If you have any questions or comments, please contact me at (603) 926-3319 extension 116 or cmcmorran@aquarionwater.com.

Sincerely,
AQUARION WATER COMPANY OF NEW HAMPSHIRE

Carl McMorran

Carl McMorran, Operations Manager

Attachments: Well Questionnaire Form

GEOSPHERE
ENVIRONMENTAL MANAGEMENT INC.

January 25, 2018
Project # 12217

11A Homestead Circle
Hampton, NH 03842

Re: Request to monitor private well at 11A Homestead Circle, Hampton, NH

Dear _____:

I am reaching out to you to provide information about a groundwater monitoring project we are about to embark upon in your neighborhood on behalf of our client, Aquarion Water Company of NH, and to request information about any water wells that may exist on your property.

Aquarion Water Company is in the process of developing a new water supply well in Hampton to serve the needs of its customers in Hampton, North Hampton and Rye. Geosphere Environmental Management is working with Aquarion to plan the groundwater monitoring program in compliance with NH Department of Environmental Services' permitting requirements for the new production well.

NH DES records indicate that you may have (or had) a water supply well on your property. If so, it may currently be used for lawn irrigation, may have been sealed after connection to the water main, or may be unused. We are surveying your neighborhood to identify the location and condition of any such wells to consider their inclusion in the upcoming groundwater monitoring program planned for early 2018.

I've included a cover letter providing more information about the project, and a well questionnaire. It would be of great help if you will review the questionnaire and complete it with any information you may have pertaining to the well's age, use, condition, depth, etc., your signature allowing us to monitor and sample the well as part of this study would be greatly appreciated.

Should you have questions, please feel free to contact me in the office during regular business hours at (603) 773-0075 x 19, or on my personal mobile phone (evenings and weekends) if that's more convenient: (207) 649-4715. Emailing me at lcote@geospherenh.com is also an option. I look forward to hearing from you.

Sincerely,
GEOSPHERE ENVIRONMENTAL MANAGEMENT, INC

Lisa P. Coté, M.A.
Senior Hydrogeologist

51 PORTSMOUTH AVENUE, EXETER, NEW HAMPSHIRE 03833
Telephone: 603-773-0075 Fax: 603-773-0077
www.geospherenh.com

WATER WELL QUESTIONNAIRE

Aquarion Water Company of New Hampshire (AQUARION) has filed an application for a Large Groundwater Withdrawal Permit with the New Hampshire Department of Environmental Services for a proposed new water supply well located off Little River Road. AQUARION and its consultant, Geosphere Environmental Management, Inc. (GEOSPHERE), are gathering information about private wells in the vicinity of the new well which will be helpful in determining an appropriate pumping rate for the new well. Therefore, we are requesting that private well owners complete the following questionnaire (Your well installer or pump repair company may be able to assist you in providing the information on this questionnaire). If available to you, please provide a copy of the well driller's log. ***Even if much of the information is not known, please fill this out to the best of your ability and return it in the self-addressed, stamped envelope provided.*** **If you have NO WELL, or your well has been decommissioned, that information would be very helpful to know, please note the questionnaire and return to us.** *Thank you for your help!*

Owner's Name: Telephone:
Cell #:

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: _____

Property Address: _____ Town Assessor's Map No.: Lot No.:

Mailing Address:_____

Is your well for domestic use only? Yes____ No___ If no, what are the other uses (irrigation?) and what (estimated) quantity of water is used?

_____

Well Type (bedrock, dug, driven point): _____ Well Driller: _____

Date Installed: _____ Well Depth: _____ ft Well Diameter: _____ inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age _____ yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes ____ No____

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:

Describe any water shortage problems with the well; when and why:

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels and sample for chemical properties during the pumping test to be performed by Aquarion.

YES____ NO____

Signature: _____ Date: _____

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form using the envelope included with our original letter, via FAX to (603) 773-0077, or email lcote@geospherenh.com ***at your earliest possible convenience***. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 lcote@geospherenh.com or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

Private Wells Selected and Approved for Monitoring

Aquarion Well 22 Long Term Pumping Test

Aquarion Water Company of New Hampshire - Hampton, NH

ID#	Address	Town	Map	Parcel / Lot	Distance/Dir from Well 22 (feet)	Chemical Monitoring S / V	Monitoring Program Participation/Certified Letter Responses	Mailings & Calls Summary	Type of Well/ Comment
56858	195 Woodland Road	Hampton	95	1	4159/NE		Ltr Response: Yes	1 mailing; 1 call	Geothermal
AMBIENT	Exeter Road	Hampton	40	A	11809/NW		APPLICANT: Yes	AMBIENT	AMBIENT
41212 **	31 Windmill Lane	Hampton	177	21	3940/WSW	V	Ltr Response: Yes	1 mailing; 1 home visit	Irrigation
GEM-2 **	3 McCarron (formerly 86 Woodland)	Hampton	148	4	700/N *		Ltr Response: Yes	1 mailing; 4 calls; e-mail exchange	Irrigation
A-71	82 Woodland Road	Hampton	148	3	600/N *		Ltr Response: Yes	2 mailings; 1 hand delivered; 1 call	Irrigation Well well buried, not found or monitored
12524	117 Little River Road	Hampton	147	3	971/NW *		Ltr Response: Yes	1 mailing; 2 calls	former drinking water well; no pump installed
56222	206 Woodland Road	Hampton	14	212	4597/NE		Ltr Response: Yes	1 mailing	Unknown
12749	3 Hilda Drive	Hampton	218	2	5632/SW	S	Ltr Response: Yes	1 mailing; 1 call	Irrigation
A-42	321 Winnacunnet	Hampton	206	36	4369	WSW	Ltr Response: Yes	1 mailing; 2 calls	Irrigation (Included at the request of NHDES)
12755 **	59 Edgewood Dr	Hampton	206	13	4450/SW		Ltr Response: Yes	1 mailing	Irrigation
A-41	81/53 Winnacunnet Road	Hampton	176	18	5975/WSW		Ltr Response: Yes	1 mailing; 1 call	Irrigation
A-4	23 Esker Drive	Hampton	208	22	3782/SSE	S	Ltr Response: Yes	1 mailing; 1 call	Irrigation
A-76	12 Springhead Lane	Hampton	165	3-3	790/SSE *		Ltr Response: Yes	1 mailing; 1 hand delivered letter	Drinking water
A-77	110 Mill Road	N. Hampton	6	147-4	10158/NNE		Ltr Response: Yes	1 mailing; 3 calls	Unknown
52755	81 Landing Road	Hampton	229	1	8135/SW	S	Ltr Response: Yes	2 mailings	DW, house unoccupied
A-22 **	78 Little River Road	Hampton	129	5	2600/NW		Ltr Response: Yes	2 mailings; 2 calls; e-mail exchange	Shallow dug well, unused
GEM-1 **	47 Little River Rd	Hampton	128	29	2300/NW		Verbal: Yes	1 mailing; 1 call	Irrigation; Well buried on adjacent lot, not found or monitored
A-74	8 Springhead Lane	Hampton	165	3-1	695/SSE *		Ltr Response: Yes	1 mailing	Drinking water
A-75	10 Springhead Lane	Hampton	165	3-2	676/S *		Ltr Response: Yes	1 mailing	Drinking water
12685	11 Bear Path	Hampton	130	4-13	1516/N		Ltr Response: Yes	1 mailing; 1 call	Drinking water
GEM-6 **	83 Little River Rd	Hampton	129	11	1700/NW	V	Ltr Response: Yes	1 mailing	Unknown
41213 +	38 Edgewood Drive	Hampton	192	68	3773/SW	S / V	Ltr Response: Yes	2 mailings	Irrigation
A-73	7 Springhead Lane	Hampton	165	3-5	844/S *	S	Ltr Response: Yes	1 mailing; 2 calls	Drinking water

Notes:

All mailings (except indicated as hand-delivered) were certified mail/return reciept

All wells on table are mapped with the exception of 105.0040 and 12605 due to lack of physical address

* = Within 1,000 feet of Well 22

** = Additional private wells selected since original submittal

+ = NHDES requested well for monitoring

No response, delivered = No letter response received, but signed return reciept received.

No response, not delivered = certified reciept returned after 3 delivery attempts by USPS over 30 days.

DW = Drinking Water

S = Baseline and daily monitoring for salt water impacts proposed.

V = Monitoring for volatile organic compounds (VOCs) required once during pumping test if water levels are affected, per NH DES.

Private Well Owners Approached and Removed from Consideration for Monitoring

Aquarion Well 22 Long Term Pumping Test

Aquarion Water Company of New Hampshire - Hampton, NH

ID#	Address	Town	Map	Parcel / Lot	Distance/Dir from Well 22 (feet)	Chemical Monitoring S / V	Monitoring Program Participation/Certified Letter Responses	Mailings & Calls Summary	Type of Well/ Comment
A-2 **	55 Edgewood Dr	Hampton	206	9			No response, delivered	1 mailing	Irrigation
GEM-9 **	29 Hobbs Road	Hampton	127	88			Verbal resp: No known well	1 mailing; (alternate to A-10)	no well
42765	14 Penniman Lane	Hampton	220	16			No response, delivered	2 mailings; 2 calls (phone # out of service)	no reply, unknown
GEM-10 **	30 Hobbs Road	Hampton	127	88			Ltr Response: No well	1 mailing; (alternate to A-10)	no well
A-25 +	166 Mill Road	Hampton	127	10		V	No response, 2nd not delivered	2 mailings; 4 calls replaced with GEM-6	no reply, unknown
40536	16 Rockrimmon Road	N. Hampton	2	57-19			No response, not delivered	2 mailings (undeliverable); no phone #	Unknown
40965	11 Hunter Drive	Hampton	149	3			No response; delivered	1 mailing; 2 calls	no reply, unknown
52762	134 Woodland Rd	Hampton	131	18			No response, delivered	1 mailing; 2 calls	no reply, unknown
GEM-7 **	27 Little River Rd	Hampton	128	42			Ltr Response: No well	1 mailing	fmr DW, decommissioned
GEM-5 **	11A Homestead Cir	Hampton	127	88			No response, delivered	1 mailing; no phone #	no reply, unknown
GEM-8 **	71 Little River Road	Hampton	129	9			Verbal resp: No well	1 mailing; 1 call	no well
A-35	3 Seventeenth Street	Hampton	168	72-1			No response, delivered	1 mailing; 2 calls	no reply, unknown
105.0040 +	Lot 47 on Little River Rd	Hampton	?	47			Not located	Address not found; replaced with GEM-1	replaced with GEM 1, GEM 6
A-1	2 Elm Drive	Hampton	107	7-1			Verbal resp: No well	1 mailing; 2 calls	no well
A-10 +	28 Hobbs Road	Hampton	-	-		V	Address does not exist	Alternate to A-11; attempted GEM-9 & -10 as replacements; replaced with 41212	--
A-28	505 Ocean Boulevard #1	Hampton	266	18-2			Verbal resp: No well	1 mailing; fax/e-mail exchange	no well
41505	157 Little River Road	Hampton	164	1A			No response, delivered	1 mailing; 3 calls	no reply, unknown
52757 +	39 Norton Road	Hampton	128	44			Ltr Response: No well	1 mailing; no phone #; replaced with GEM-6	no well
A-21 **	91 Leavitt Rd	Hampton	205	11A			No response, delivered	1 mailing	no reply, unknown
A-13	3 Janvrin Road	Hampton	179	54			No response, delivered	1 mailing; 2 calls	no reply, unknown
12605 +	Lot 80 on Little River Rd	Hampton	?	80			Not located	Address not found; replaced with A-22	replaced with A-22
A-11 +	24 Hobbs Rd	Hampton	163	53		V	No response, not delivered	2 mailings; 3 calls replaced with 41212	Unknown
A-8	430 HIGH ST	Hampton	166	7			Verbal resp: No well	1 mailing; 2 calls; e-mail exchange w facilities mgr	no well
A-45	117 Woodland Road	Hampton	130	2			No	1 mailing; 2 calls; did not want to participate due to concerns about WQ	Drinking water
12678	496-502 High St	Hampton	150	53			Verbal resp: No well	2 mailings; 1 call	no well

Notes:

All mailings (except indicated as hand-delivered) were certified mail/return reciept

All wells on table are mapped with the exception of 105.0040 and 12605 due to lack of physical address

* = Within 1,000 feet of Well 22

** = Additional private wells selected since original submittal

+ = NHDES requested well for monitoring

No response, delivered = No letter response received, but signed return reciept received.

No response, not delivered = certified reciept returned after 3 delivery attempts by USPS over 30 days.

DW = Drinking Water

S = Baseline and daily monitoring for salt water impacts proposed.

V = Monitoring for volatile organic compounds (VOCs) required once during pumping test if water levels are affected, per NH DES.

WATER WELL QUESTIONNAIRE

Aquarion Water Company of New Hampshire (AQUARION) has filed an application for a Large Groundwater Withdrawal Permit with the New Hampshire Department of Environmental Services for a proposed new water supply well located off Little River Road. AQUARION and its consultant, Geosphere Environmental Management, Inc. (GEOSPHERE), are gathering information about private wells in the vicinity of the new well which will be helpful in determining an appropriate pumping rate for the new well. Therefore, we are requesting that private well owners complete the following questionnaire (Your well installer or pump repair company may be able to assist you in providing the information on this questionnaire). If available to you, please provide a copy of the well driller's log. Even if much of the information is not known, please fill this out to the best of your ability and return it in the self-addressed, stamped envelope provided, by November 25, 2017. ***Thank you for your help!***

Owner's Name: James B. Donahoe Home Telephone: 603 926 6797
Cell #: 401 6035

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: _____

Property Address: 3 Hilda Drive Hampton Town Assessor's Map No.: _____ Lot No.: _____

Mailing Address: Same as above

Is your well for domestic use only? Yes A No ____ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

outside use only

Well Type (bedrock, dug, driven point): _____ Well Driller: Tasker

Date Installed: mid 90's Well Depth: 328 ft Well Diameter: 4 inches

Casing Depth: ~100 FT ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: 290 ft Pump Age ~ 22 yrs Estimated Depth to Bedrock 90 ft

Do you have more than one (1) well on the property? Yes ____ No X

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:

None

Describe any water shortage problems with the well; when and why:

None

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

None

Additional comments or known problems with your well:

Out side use only

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES X NO ____

Signature: Jon B. Dowd Date: 11/22/17

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773-0077, ***by 11/25/2017***. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

Well has never Run dry

WATER WELL QUESTIONNAIRE

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Owner's
Name: MARK + ELIZABETH ZELEPSKY Home Telephone: 603-929-0036
Cell #: 617-694-3845

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: _____

Property Address: 7 SPRINGHEAD LANE Town Assessor's Map No.: _____ Lot No.: _____

Mailing Address: 7 SPRINGHEAD LANE HAMPTON, NH 03842

Is your well for domestic use only? Yes ✓ No ___ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

_____

Well Type (bedrock, dug, driven point): BEDROCK Well Driller: SOUTHERN MAINE PUMP SUPPLY SANFORD, ME

Date Installed: 1998 Well Depth: 180 ft Well Diameter: _____ inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age 19 yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes ___ No ✓
If so, what type of well? (use back of page if necessary):

List any water treatment equipment: WATER SOFTENER

Describe any water shortage problems with the well; when and why:

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion. $ Period not

YES ✓ NO ___

Signature: Mark Zlogar Date: DEC 13, 2017

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773-0077, ***by 11/25/2017***. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

rcd 12/4 LPC

WATER WELL QUESTIONNAIRE

Aquarion Water Company of New Hampshire (AQUARION) has filed an application for a Large Groundwater Withdrawal Permit with the New Hampshire Department of Environmental Services for a proposed new water supply well located off Little River Road. AQUARION and its consultant, Geosphere Environmental Management, Inc. (GEOSPHERE), are gathering information about private wells in the vicinity of the new well which will be helpful in determining an appropriate pumping rate for the new well. Therefore, we are requesting that private well owners complete the following questionnaire (Your well installer or pump repair company may be able to assist you in providing the information on this questionnaire). If available to you, please provide a copy of the well driller's log. Even if much of the information is not known, please fill this out to the best of your ability and return it in the self-addressed, stamped envelope provided, by November 25, 2017. ***Thank you for your help!***

Owner's Name: David Norton Home Telephone: None

Cell #: 603-502-1817

In the event we need to contact you for follow up:

Preferred days or times to contact me via phone are: ANY TIME

Property Address: 8 Springhead Lane Town Assessor's Map No.: _____ Lot No.: _____

Mailing Address: Same

Is your well for domestic use only? Yes 1 No____ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

_____

Well Type (bedrock, dug, driven point): _____ Well Driller: Judd Goodwin

Date Installed: Aug 1998 Well Depth: 220 ft Well Diameter: _____ inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age _____ yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes____ No X

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:

Culligan Water Softner

Describe any water shortage problems with the well; when and why:

Years ago during drought conditions when watering the lawn it couldn't keep up. No longer water the lawn

Describe any changes in water quality; when and why:

High Iron & Manganese Rotten egg smell

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

None

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES X NO___

Signature: [signature] Date: 11/29/2017

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773-0077, ***by 11/25/2017***. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

redd rdl 1/17
UR

WATER WELL QUESTIONNAIRE

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Owner's Name: Patricia D. Parent Home Telephone: —

Cell #: 603 244 9230

In the event we need to contact you for follow up:

Preferred days or times to contact me via phone are: anytime

Property Address: 10 Springhead Lane Town Assessor's Map No.: _____ Lot No.: _____

Mailing Address: 10 Springhead Lane Hampton
Hampton

Is your well for domestic use only? Yes ✓ No ____ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

one person living at address

Well Type (bedrock, dug, driven point): _____ Well Driller: _____

Date Installed: _____ Well Depth: _____ ft Well Diameter: _____ inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age _____ yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes ____ No ✓

If so, what type of well? (use back of page if necessary):

List any water treatment equipment: none

Describe any water shortage problems with the well; when and why:

none

Describe any changes in water quality; when and why: never

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump: never

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES ✓ NO ___

Signature: Rebecca D Parent Date: 11/28/17

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773-0077, ***by 11/25/2017***. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

WATER WELL QUESTIONNAIRE

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Owner's Name: MARK ROBERTSON Home Telephone: 603-601-2618
Cell #: 734-718-5931

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: ANY TIME DURING THE DAY

Property Address: 11 BEAR PATH, HAMPTON, NH Town Assessor's Map No.: _____ Lot No.: _____

Mailing Address: 11 BEAR PATH, HAMPTON, NH 03842

Is your well for domestic use only? Yes ✓ No ____ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

irrigation

Well Type (bedrock, dug, driven point): BEDROCK Well Driller: ?

Date Installed: ? ~ 1996 Well Depth: ? 450-600 160 ft Well Diameter: _____ inches

Casing Depth: ? ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: 1 horsepower

Pump Depth: ? 150 ft Pump Age ~20 yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes ____ No ✓

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:

FILTER

Describe any water shortage problems with the well; when and why:

NONE

Describe any changes in water quality; when and why:

NONE NOTED

rec'd 12/4/17 CPC

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

WIRE REPAIR ~ 2009

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES✓ NO___

Signature: _____ Date: 12/2/17

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773-0077, **by 11/25/2017**. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

I WOULD LIKE THE TESTING RESULTS - ANY AND ALL WATER QUALITY INFO IS OF INTEREST.

rec'd JC 1/11/18

WATER WELL QUESTIONNAIRE

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Owner's Name: **Gregory & Bonnie Heath** Home Telephone: 781-922-0836
Cell #: 781 922-0836

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: Anytime

Property Address: **12 Springhead Lane, Hampton, NH 03842** Town Assessor's Map No.: **165** Lot No.: **3-3**

Mailing Address: SAME

Is your well for domestic use only? Yes X No___ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

Well Type (bedrock, dug, ~~driven point~~): _____ Well Driller: Unknown drilled 1998

Date Installed: 1998 Well Depth: 200+ ft Well Diameter: ? 6" or 8" inches

Casing Depth: unknown ft (estimated)

Yield (gallons per minute): ? Estimated Water Depth: ? ft Pump Size: ? horsepower

Pump Depth: 150 ft Pump Age 20 yrs Estimated Depth to Bedrock 200+/- ft

Do you have more than one (1) well on the property? Yes___ No X

If so, what type of well? (use back of page if necessary):

List any water treatment equipment: water softner

Describe any water shortage problems with the well; when and why:

never

Describe any changes in water quality; when and why:

High iron after it rains

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump: none in 20yrs

Additional comments or known problems with your well:
High in iron.

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES X NO ___

Signature: _____ Date: 1/2/18

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773/0077, **by 11/25/2017**. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 lcote@geospherenh.com or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

We just received your letter on 29 NOV, it was forwarded to our Snowbird Address in Florida.

WATER WELL QUESTIONNAIRE

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Owner's Name: William J. Hanig Home Telephone: _____

Cell #: 603 396-8147

In the event we need to contact you for follow up:

Preferred days or times to contact me via phone are: Anytime

Property Address: 23 ESKER RD, Hampton Town Assessor's Map No.: _____ Lot No.: _____

Mailing Address: 1100 Curlew Rd, Lot 211 Dunedin, FL, 34698

Is your well for domestic use only? Yes____ No X If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

shallow well 20' deep for LAWN WATTERING & FOUNTAIN ONLY

Well Type (bedrock, dug, driven point): driven point Well Driller: myself Approx 20 years Ago

Date Installed: _____ Well Depth: 20 (18) ft Well Diameter: 2 or 3" inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: 8 ft Pump Size: 1/4 horsepower

Pump Depth: Ground Level ft Pump Age 15 yrs Estimated Depth to Bedrock ? ft

Do you have more than one (1) well on the property? Yes____ No X

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:

Describe any water shortage problems with the well; when and why:

Pump has not been hooked up Last 4 or 5 years

Describe any changes in water quality; when and why:

rec'd 12/4/17 UR

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES X NO ____

Signature: Walter J Hamm Date: 29 Nov 17

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

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If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

Visited home & received signed questionaire 1/31/18

WATER WELL QUESTIONNAIRE

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Owner's Name: **John & Elizabeth Arakelian** Telephone: 926-5560
Cell #:

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: _____

Property Address: **31 Windmill Lane, Hampton, NH 03842** Town Assessor's Map No.: **177** Lot No.: **21**

Mailing Address: _____

Is your well for irrigation use only? Yes ✓ No ___ If no, what are the other uses and what (estimated) quantity of water is used? _____

Well Type (bedrock, dug, driven point): BR Well Driller: Clear Water

Date Installed: 2003 Well Depth: _____ ft Well Diameter: _____ inches

Casing Depth: 180' ft (estimated) see attached

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age _____ yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes ___ No ✓

If so, what type of well? (use back of page if necessary):
n/a

List any water treatment equipment:

Describe any water shortage problems with the well; when and why:

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

no

Additional comments or known problems with your well:

never ran dry

Authorization:

My private well may be used to monitor water levels and sample for chemical properties during the pumping test to be performed by Aquarion.

YES ✓ NO ___

Signature: Elizabeth Arakelian Date: 1/31/17

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form using the envelope included with our original letter, via FAX to (603) 773-0077, or email lcote@geospherenh.com ***at your earliest possible convenience.*** Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 lcote@geospherenh.com or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

Well will be returned to the condition it was found.

WATER WELL QUESTIONNAIRE

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Hampton Keith Lessard, Facility Mgr, office@hamptonschl: 926-8708x71

Owner's Name: Centre School HSD SAU 90 Home Telephone: 603-926-4520 - schl office

Cell #: _____

In the event we need to contact you for follow up:

Preferred days or times to contact me via phone are: 8-4

Property Address: 53 Winnacunnet Rd Town Assessor's Map No.: _____ Lot No.: _____

Mailing Address: 7 Scott Rd. Hampton NH 03842

Is your well for domestic use only? Yes____ No X If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

irrigating Centre School + Tuck field - grass Areas.

Well Type (bedrock, dug, driven point): Art Well Driller: Epping well?

Date Installed: 1999 Well Depth: ? ft Well Diameter: 6" inches

Casing Depth: ? ft (estimated)

Yield (gallons per minute): ? Estimated Water Depth: ? ft Pump Size: ? horsepower

Pump Depth: ? ft Pump Age 4 yrs Estimated Depth to Bedrock ? ft

Do you have more than one (1) well on the property? Yes____ No X

If so, what type of well? (use back of page if necessary):

Rec EPPING well

10gpm 15hp pump - no notes on depth pump

List any water treatment equipment: none

Describe any water shortage problems with the well;

Never

Describe any changes in water quality; when and w

flowing well

Abby F. @ WWSD no info

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

Annual testing at open of season

Additional comments or known problems with your well:

no problems.

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES X NO ____

Signature: [signature] Date: 11.30.17

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773-0077, ***by 11/25/2017***. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

rcvd GCM 1/31/18 ltr

WATER WELL QUESTIONNAIRE

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Owner's Name: **Eric Fachon**, alicia Telephone: 926-3683 ✓
Cell #:

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: weekdays 601-0144 (work, direct)

Property Address: **59 Edgewood Drive, Hampton, NH 03842** Town Assessor's Map No.: **206** Lot No.: **13**

Mailing Address: same

Is your well for irrigation use only? Yes ✓ No ___ If no, what are the other uses and what (estimated) quantity of water is used? _____

Well Type (bedrock, dug, driven point): Drilled Well Driller: L.A. Hanna & Sons

Date Installed: 6/11/96 Well Depth: 120 ft Well Diameter: 7 inches

Casing Depth: 81 ft (estimated)

Yield (gallons per minute): 30+ Estimated Water Depth*: 20-30 ft Pump Size: 1 horsepower

Pump Depth: 75 ft Pump Age 21.5 yrs Estimated Depth to Bedrock 75 ft see comment

Do you have more than one (1) well on the property? Yes ___ No ✓

If so, what type of well? (use back of page if necessary):

*Depth to water from top of well

List any water treatment equipment:

Pervector iron removal system. -not hooked up-
<Fe + Mn are high>

Describe any water shortage problems with the well; when and why:

Never

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

None

Additional comments or known problems with your well:

Hanna encountered "punky ledge" and wanted to drill deeper to reach "solid ledge". Drilling was stopped due to large amount of water & drilling mud coming up well & flooding the yard.

Authorization:

My private well may be used to monitor water levels and sample for chemical properties during the pumping test to be performed by Aquarion.

YES ✓ NO ___

Signature: Eric S. Faber Date: 1/27/2018

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form using the envelope included with our original letter, via FAX to (603) 773-0077, or email lcote@geospherenh.com ***at your earliest possible convenience.*** Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 lcote@geospherenh.com or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

recd GFM 2/8/18

WATER WELL QUESTIONNAIRE

Aquarion Water Company of New Hampshire (AQUARION) has filed an application for a Large Groundwater Withdrawal Permit with the New Hampshire Department of Environmental Services for a proposed new water supply well located off Little River Road. AQUARION and its consultant, Geosphere Environmental Management, Inc. (GEOSPHERE), are gathering information about private wells in the vicinity of the new well which will be helpful in determining an appropriate pumping rate for the new well. Therefore, we are requesting that private well owners complete the following questionnaire (Your well installer or pump repair company may be able to assist you in providing the information on this questionnaire). If available to you, please provide a copy of the well driller's log. ***Even if much of the information is not known, please fill this out to the best of your ability and return it in the self-addressed, stamped envelope provided.*** **If you have NO WELL, or your well has been decommissioned, that information would be very helpful to know, please note the questionnaire and return to us.** *Thank you for your help!*

Owner's Name: **Daniel & Sharon** MacDonald **Sheedy**

Telephone: 603 926 5519 (h) pref'd
Cell #: 603 918 7894

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: _____

Property Address: **78 Little River Road, Hampton, NH 03842**

Town Assessor's
Map No.: **129** Lot No.: **5**

Mailing Address: SAME

Is your well for irrigation use only? Yes ✓ No___ If no, what are the other uses (domestic?) and what (estimated) quantity of water is used?

_____

Well Type (bedrock, dug, driven point): _____ Well Driller: _____

Date Installed: _____ Well Depth: _____ ft Well Diameter: _____ inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age _____ yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes ____ No____

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:

well rarely used - pump uncertain ✓ ~~less~~ than 20'

Describe any water shortage problems with the well; when and why:

Describe any changes in water quality; when and why:

Bit 1860 no WWB log

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels and sample for chemical properties during the pumping test to be performed by Aquarion.

YES ✓ NO ___

Signature: David J Steedy Date: 1-23-18

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

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If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 lcote@geospherenh.com or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

rec'd 11/5/18

WATER WELL QUESTIONNAIRE

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Owner's Name: Charles Lylis Home Telephone: _____

Cell #: 603 218-9975

In the event we need to contact you for follow up:

Preferred days or times to contact me via phone are: _____

Property Address: 81 Landing Road Hampton NH 03842 Town Assessor's Map No.: 229 Lot No.: 1

Mailing Address: 147 Cottage Rd. Manchester, NH 03103

Is your well for domestic use only? Yes ✓ No ____ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

_____

Well Type (bedrock, dug, driven point): Bedrock Well Driller: Burton / Buxton

Date Installed: _____ Well Depth: 275"? ft Well Diameter: _____ inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age _____ yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes ____ No ✓

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:

Describe any water shortage problems with the well; when and why:

well hasn't worked for more than 5 years (house not lived in)

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES ✓ NO ____

Signature: Chr Pyle Date: 12/20/17

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773-0077, ***by 11/25/2017***. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

(2d 12/2/18

WATER WELL QUESTIONNAIRE

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Owner's Name: **David Boles** Home Telephone: _____

Haley Boles Cell #: 1003-244-9720 (Haley Boles)

In the event we need to contact you for follow up: 978-914-5880 (David Boles)

Preferred days or times to contact me via phone are: evenings

Town Assessor's

Property Address: **82 Woodland Road Hampton, NH 03842** Map No.: **148** Lot No.: **3**

Mailing Address: _____

Is your well for irrigation use only? Yes____ No___ What are the uses and what (estimated) quantity of water is used each day?

We are on city water now - just moved in

Well Type (bedrock, dug, driven point): _____ Well Driller: _____

Date Installed: _____ Well Depth: _____ ft Well Diameter: _____ inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age _____ yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes____ No____

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:

Describe any water shortage problems with the well; when and why:

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES X NO___

Signature: Holly Boccesi Date: 1/17/18

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

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If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 lcote@geospherenh.com or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

rec'd 1/31/19 MC

WATER WELL QUESTIONNAIRE

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Owner's Name: **David Wilbur** Telephone: **(603) 926-9075**
Cell #:

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: Any time

Town Assessor's
Property Address: **83 Little River Road, Hampton, NH 03842** Map No.: **129** Lot No.: **11**

Mailing Address: same

Is your well for domestic use only? Yes ✓ No ___ If no, what are the other uses (irrigation?) and what (estimated) quantity of water is used?

_____

Well Type (bedrock, dug, driven point): _____ Well Driller: _____

Date Installed: 1967 Well Depth: _____ ft Well Diameter: _____ inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): _____ Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age _____ yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes ___ No ✓

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:
Kinetico water system installed by Second Wind Water

Describe any water shortage problems with the well; when and why:
recently did maintenance

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels and sample for chemical properties during the pumping test to be performed by Aquarion.

YES ✓ NO ___

Signature: Dawn Wilk Date: 1/27/18

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

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If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 lcote@geospherenh.com or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

WATER WELL QUESTIONNAIRE

rec'd 12/11/17

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Owner's Name: PETER HORNE MGR/TRUSTEE HTLAEH NOMINEE TRUST Home Telephone: _____

Cell #: 603-289-1878

In the event we need to contact you for follow up:

Preferred days or times to contact me via phone are: "

Property Address: 110 MILL RD Town Assessor's Map No.: 6 Lot No.: 147-3

Mailing Address: P.O. BOX 1435 NORTH HAMPTON N.H. 03862

Is your well for domestic use only? Yes ✓ No ____ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

_____

Well Type (bedrock, dug, driven point): UNKNOWN Well Driller: UNKNOWN

Date Installed: < 1994 Well Depth: 97 ft Well Diameter: _____ inches

Casing Depth: UNKNOWN ft (estimated)

Yield (gallons per minute): RETURN 9.8 Estimated Water Depth: STATIC LEVEL 19.8 ft Pump Size: 1/2 horsepower FRANKLIN 10 G.P.M.

Pump Depth: 50 ft Pump Age UNKNOWN yrs Estimated Depth to Bedrock UNKNOWN ft

Do you have more than one (1) well on the property? Yes ____ No ✓

If so, what type of well? (use back of page if necessary):

List any water treatment equipment: WATER SOFTENER

Describe any water shortage problems with the well; when and why:

no WWB log found

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES ✓ NO ___

Signature: Peter Horne Date: 12/8/17

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

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If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

rec'd WFC 12/11/17 192

WATER WELL QUESTIONNAIRE

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Owner's
Name: Louis Bruno Home Telephone: 603 926 7768
Cell #: _____

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: _____

Property Address: 117 Little River Road, Hampton, NH 03842 Town Assessor's Map No.: 147 Lot No.: 3

Mailing Address: SAME

Is your well for domestic use only? Yes X No___ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

Former owner converted to city in 1997, thus well has not been in use since then.

Well Type (bedrock, dug, driven point): _____ Well Driller: _____

Date Installed: 7/87 Well Depth: 160 ft Well Diameter: _____ inches

Casing Depth: 31 ft (estimated)

Yield (gallons per minute): 10 gpm Estimated Water Depth: _____ ft Pump Size: _____ horsepower

Pump Depth: _____ ft Pump Age _____ yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes ___ No X

If so, what type of well? (use back of page if necessary):

List any water treatment equipment:

Describe any water shortage problems with the well; when and why:

Describe any changes in water quality; when and why:

(Questionnaire continues on back of page)

rec'd 12/11/17

Describe any maintenance performed on your well or pump:

Additional comments or known problems with your well: As stated, well has not been in use since 1997. I have no specific knowledge of the wells depth, type, etc.

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES X NO ___

Signature: Lou Bruno Date: 12/6/17

Care will be taken to prevent any contamination of your well, ar ill be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will b o cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773-0077. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

WATER WELL QUESTIONNAIRE

Aquarion Water Company of New Hampshire (AQUARION) has filed an application for a Large Groundwater Withdrawal Permit with the New Hampshire Department of Environmental Services for a proposed new water supply well located off Little River Road. AQUARION and its consultant, Geosphere Environmental Management, Inc. (GEOSPHERE), are gathering information about private wells in the vicinity of the new well which will be helpful in determining an appropriate pumping rate for the new well. Therefore, we are requesting that private well owners complete the following questionnaire (Your well installer or pump repair company may be able to assist you in providing the information on this questionnaire). If available to you, please provide a copy of the well driller's log. Even if much of the information is not known, please fill this out to the best of your ability and return it in the self-addressed, stamped envelope provided, by November 25, 2017. ***Thank you for your help!***

Owner's Name: GARY J. ALIE Home Telephone: 603-601-6625

Cell #: 630-803-5906

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: ANYTIME

Property Address: 195 WOODLAND RD. Town Assessor's Map No.: 95 Lot No.: 2-1

Mailing Address: SAME AS ABOVE

Is your well for domestic use only? Yes X No____ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?

Well Type (bedrock, dug, driven point): DRILLED Well Driller: SKILLINGS

Date Installed: 4-2010 Well Depth: No. 1 175 ft No. 2 180 Well Diameter: 6 inches

Casing Depth: 40 ft (estimated)

Yield (gallons per minute): 40 Estimated Water Depth: 10 ft Pump Size: 1/2 horsepower

Pump Depth: 160 ft Pump Age 7 yrs Estimated Depth to Bedrock No. 1 - 9 ft No. 2 - 11 ft.

Do you have more than one (1) well on the property? Yes X No____

If so, what type of well? (use back of page if necessary):

SEE BACK

List any water treatment equipment:

NONE

Describe any water shortage problems with the well; when and why:

NONE

Geothermal
Sean @ Skillings / Chris geothermal man X34
installed 2010
Supply / Return well "Pump & Dump"
use return well →??

Describe any changes in water quality; when and why:

N/A

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump:

NONE

Additional comments or known problems with your well:

MY TWO WELLS ARE USED FOR GEOTHERMAL HEATING AND COOLING, NO. 1 WELL IS THE SUPPLY WELL AND HAS THE PUMP. NO. 2 WELL IS FOR DISCHARGE. AQUARION SUPPLIES MY DOMESTIC WATER.

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES ✓ NO ___

Signature: [signature] Date: DEC. 5, 2017

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

Please return the completed form in the enclosed, self-addressed stamped envelope or FAX the form to (603) 773-0077, **by 11/25/2017**. Copies of this completed questionnaire will also be shared with Stephen Roy of NHDES.

If you have questions, please contact Lisa Coté, Senior Hydrogeologist, Geosphere Environmental Management, Inc. at (603) 773-0075 ex. 19 or Stephen Roy of NHDES at (603) 271-3918.

Space for additional comments:

rec'd 12/1/17 MK

WATER WELL QUESTIONNAIRE

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Owner's Name: Jay D'Ence Home Telephone: 603-929-6325
Cell #: 603-997-6233

In the event we need to contact you for follow up:
Preferred days or times to contact me via phone are: 8AM - 6PM

Property Address: 206 Woodland Rd, Hampton, NH Town Assessor's Map No.: 96 Lot No.:

Mailing Address: (same)

Is your well for domestic use only? Yes____ No____ If no, what are the non-domestic uses and what (estimated) quantity of water is used each day?
+ geothermal heating & cooling

Well Type (bedrock, dug, driven point): bedrock Well Driller: Capital Well Co.

Date Installed: Oct, 2009 Well Depth: 460 ft Well Diameter: 6" inches

Casing Depth: _____ ft (estimated)

Yield (gallons per minute): 20 gal. Estimated Water Depth: _____ ft Pump Size: 1 horsepower

Pump Depth: 460 ft Pump Age 8 yrs Estimated Depth to Bedrock _____ ft

Do you have more than one (1) well on the property? Yes____ No✓

If so, what type of well? (use back of page if necessary):

List any water treatment equipment: filter - minerals, etc.

Describe any water shortage problems with the well; when and why: none

Describe any changes in water quality; when and why: none

geothermal
open-loop
standing column
in basement well
manifold in the basement
- stainless steel
w/ sampling valve
1" supply line, 1" return
cable guard electrical → pump
taped + secure
@ 480'
Static @ 58'

(Questionnaire continues on back of page)

Describe any maintenance performed on your well or pump: none

Additional comments or known problems with your well:

Authorization:

My private well may be used to monitor water levels during the pumping test to be performed by Aquarion.

YES ✓ NO ____

Signature: Jay Dieuer Date: 11·25·17

Care will be taken to prevent any contamination of your well, and will be confirmed by testing for bacteria before the water level recording device is installed and after it is removed. There will be no cost to you for any monitoring or testing your well, and we will provide you with the results if you are interested.

Your participation in the questionnaire is not mandatory. The information generated will become part of a significant dataset used by Aquarion and the NH DES to determine a sustainable, long-term pumping rate for the new Aquarion water supply well that: a) will not adversely impact your own well, and b) will ensure the long-term viability of the aquifer system used by the community.

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Space for additional comments:

Appendix D

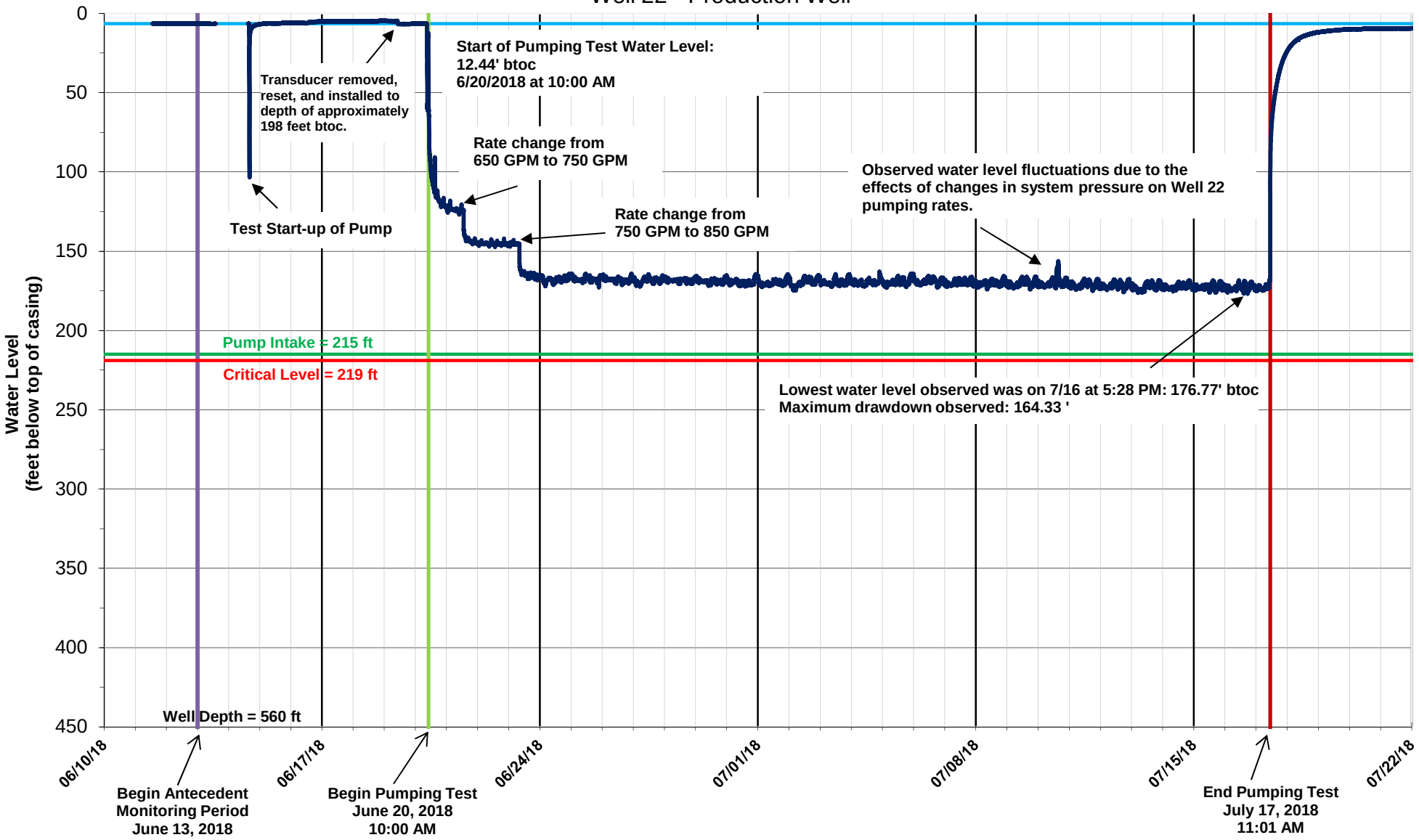
TIME vs. DRAWDOWN GRAPHS

Well 22

Aquarion Water Company of New Hampshire

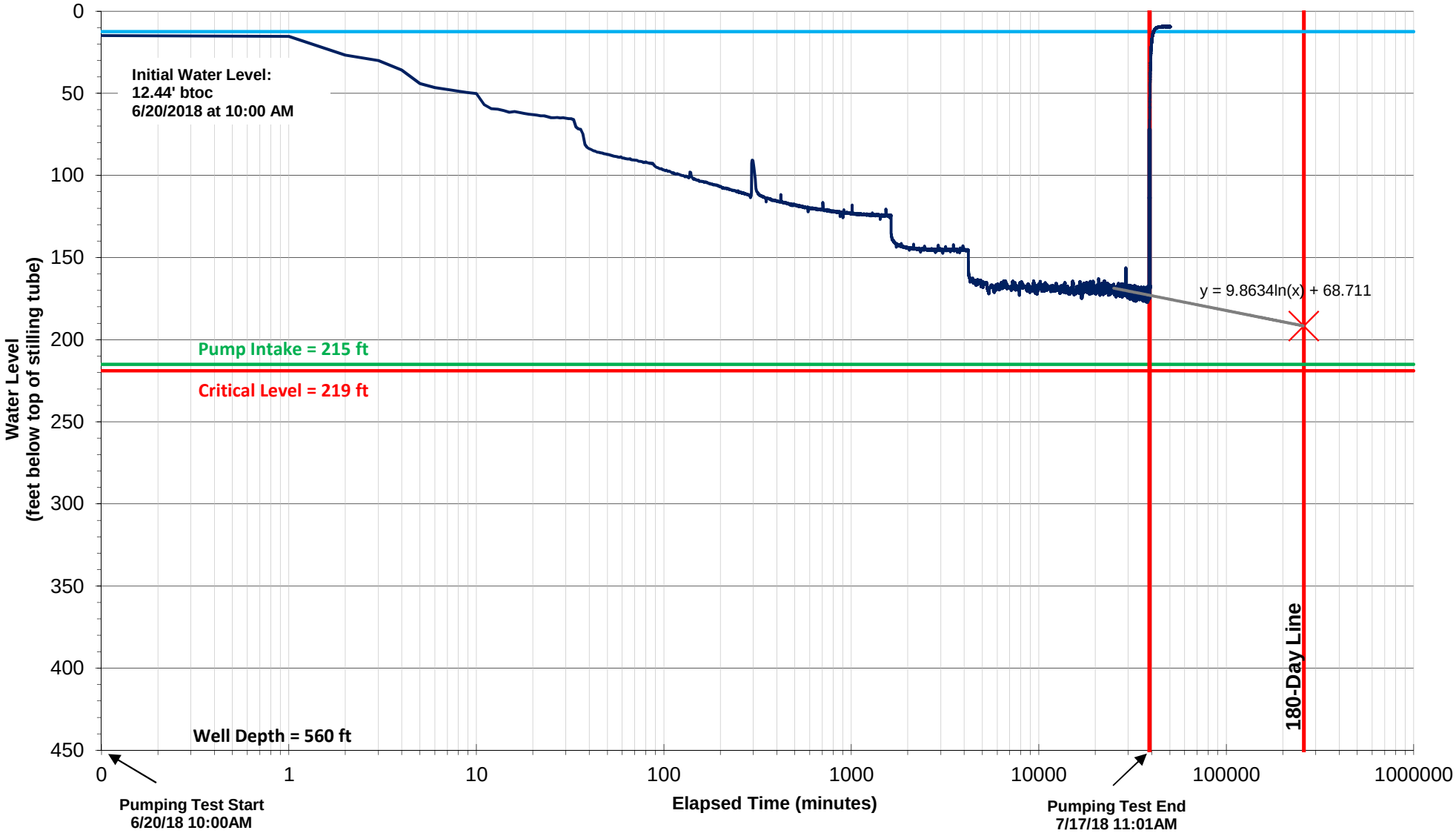
Well 22 Long-term Pumping Test

Well 22 - Production Well



Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Well 22 - Production Well

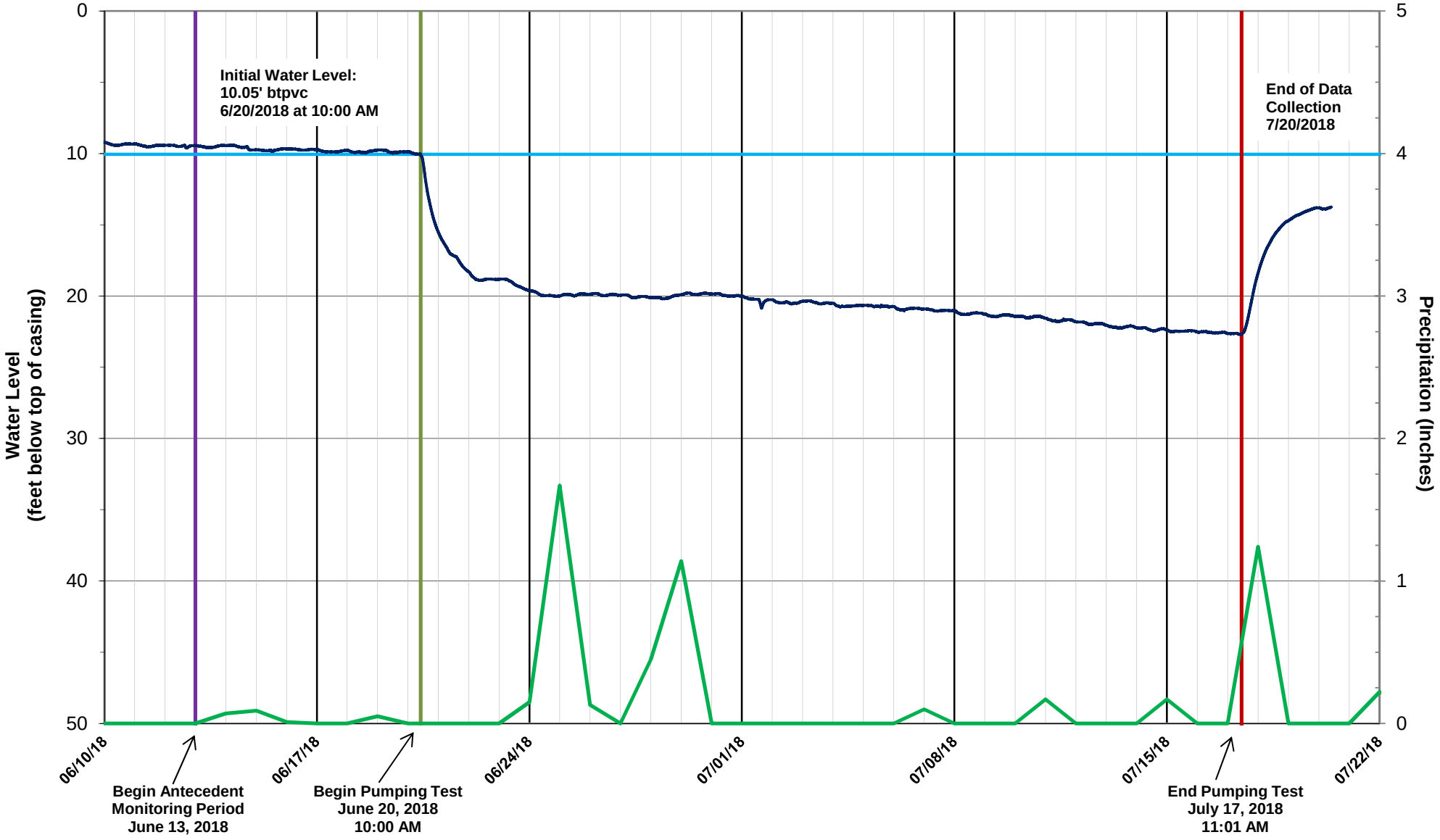


Geosphere Environmental Management, Inc.

TIME vs. DRAWDOWN GRAPHS

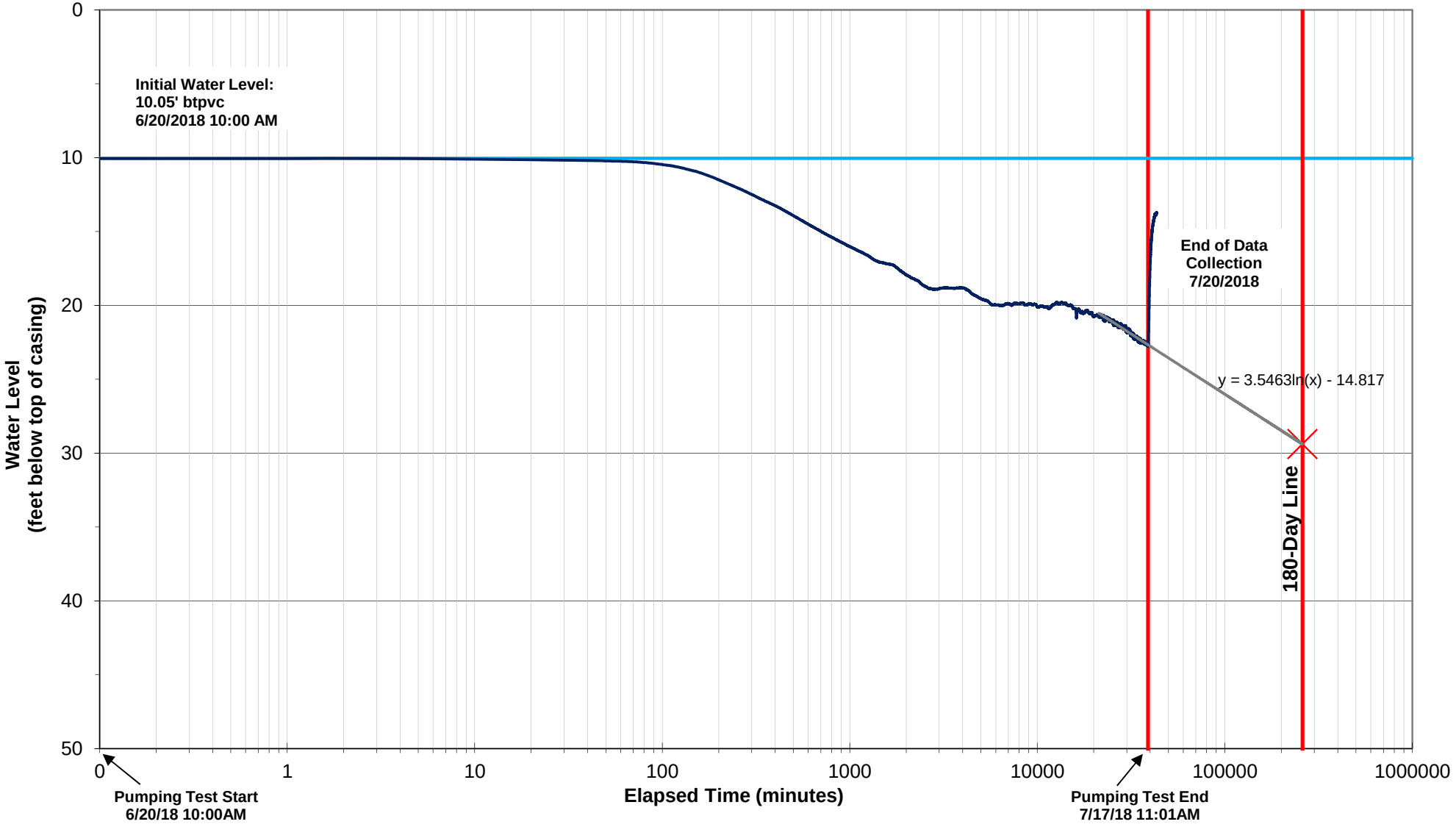
Obs-1
7-Obs
PZ-1
PZ-2
PZ-3
PZ-4
SG-1
SG-2

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Observation Well - OBS-1



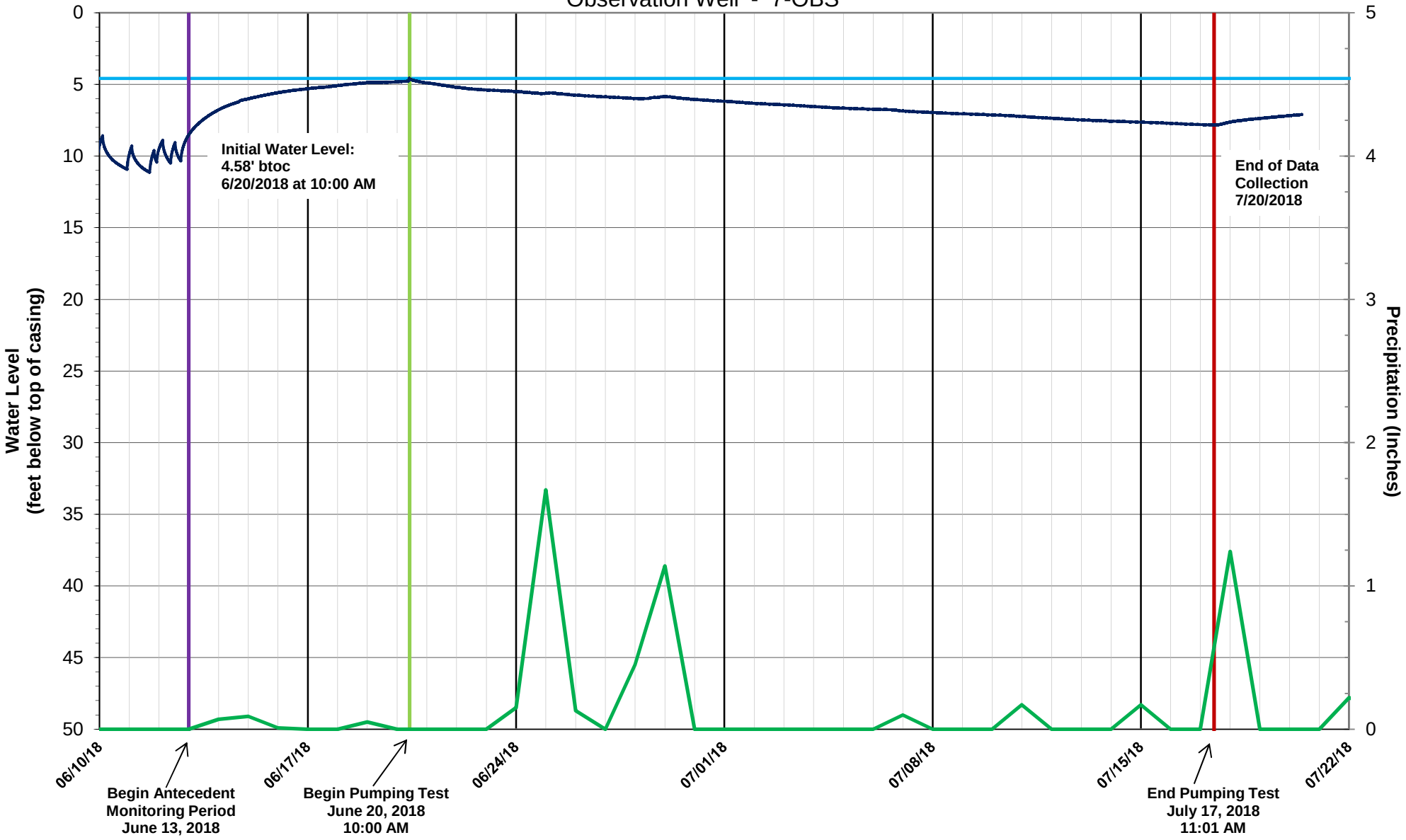
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Observation Well - OBS-1



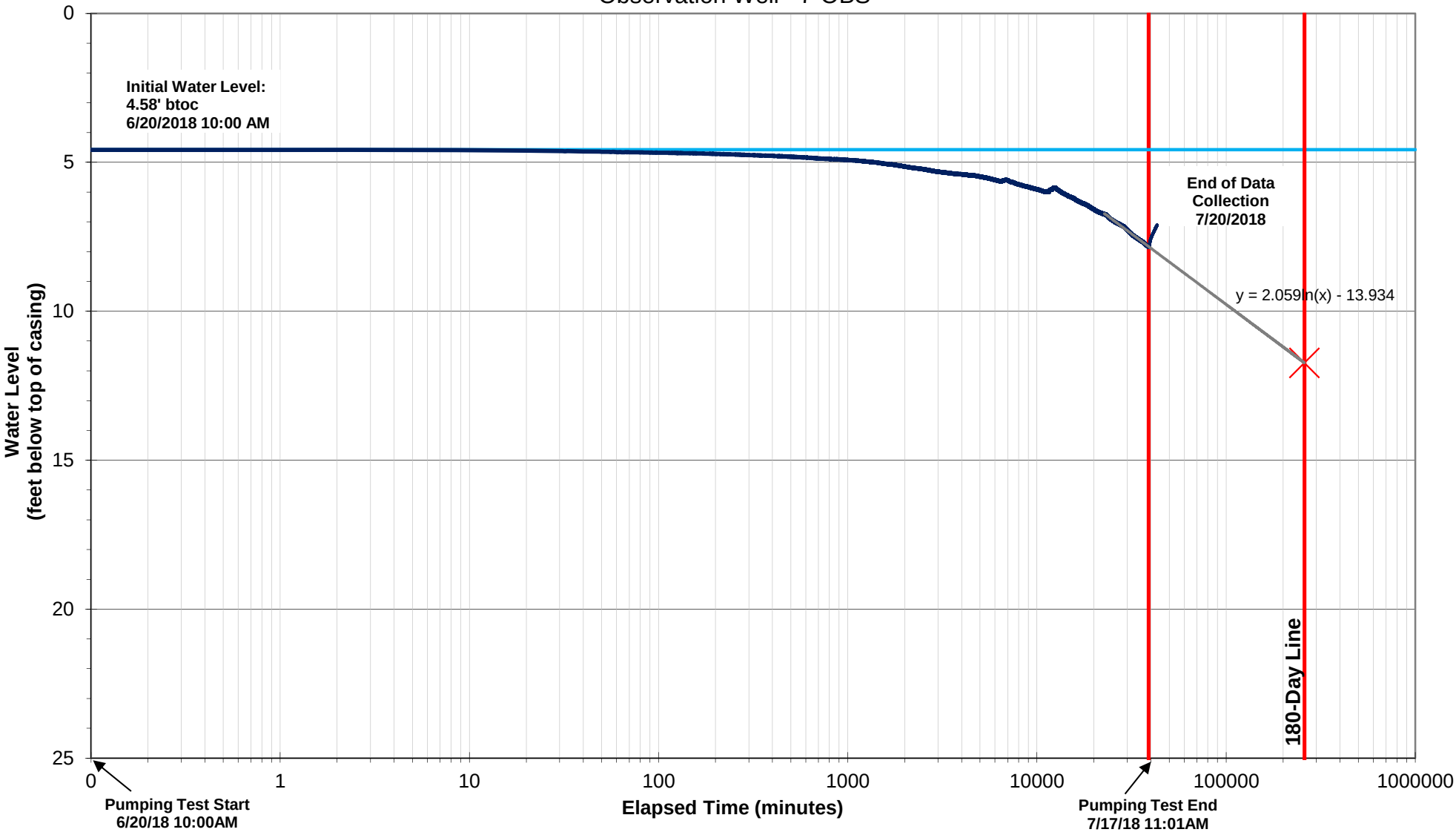
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Observation Well - 7-OBS

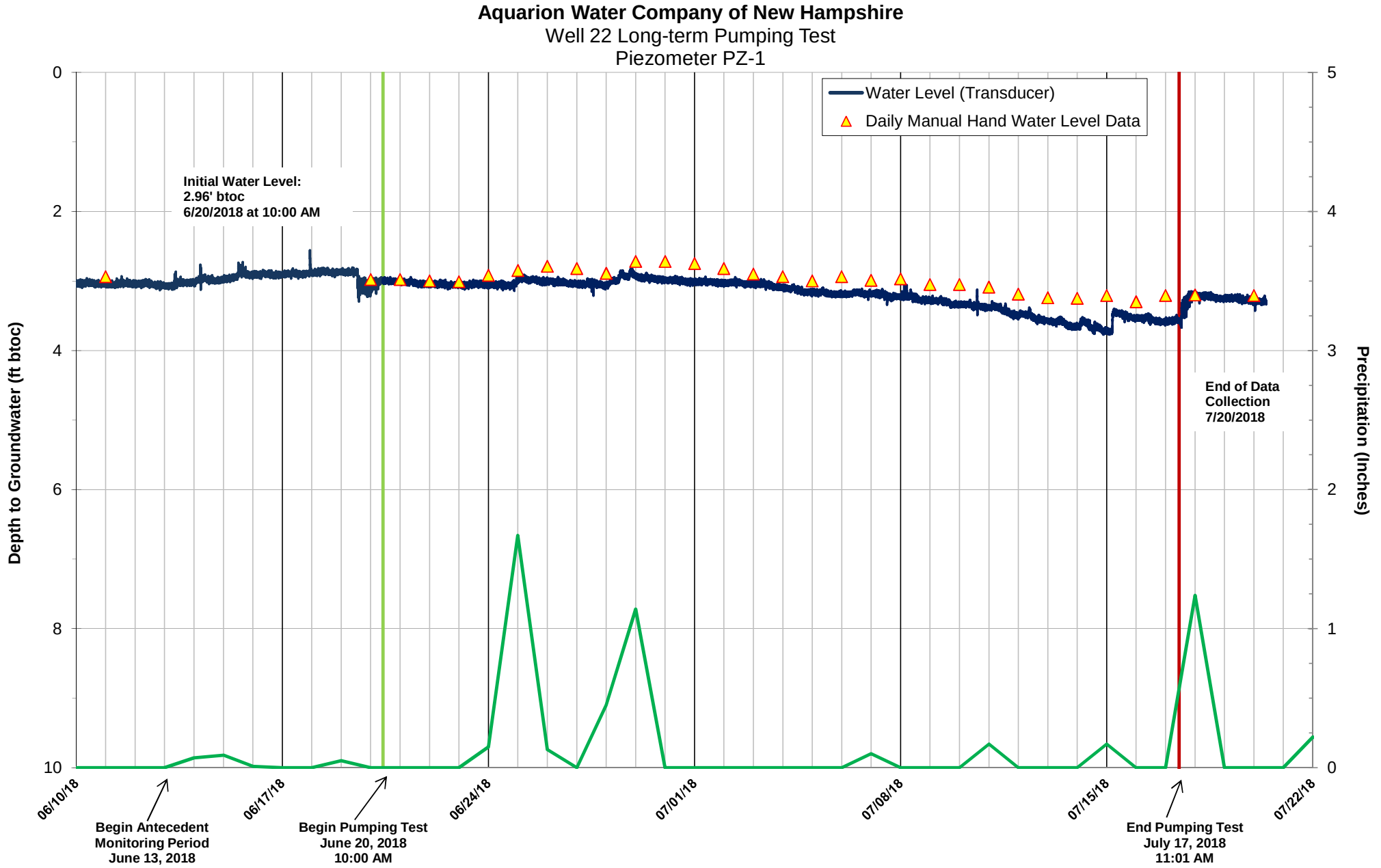


Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Observation Well - 7-OBS

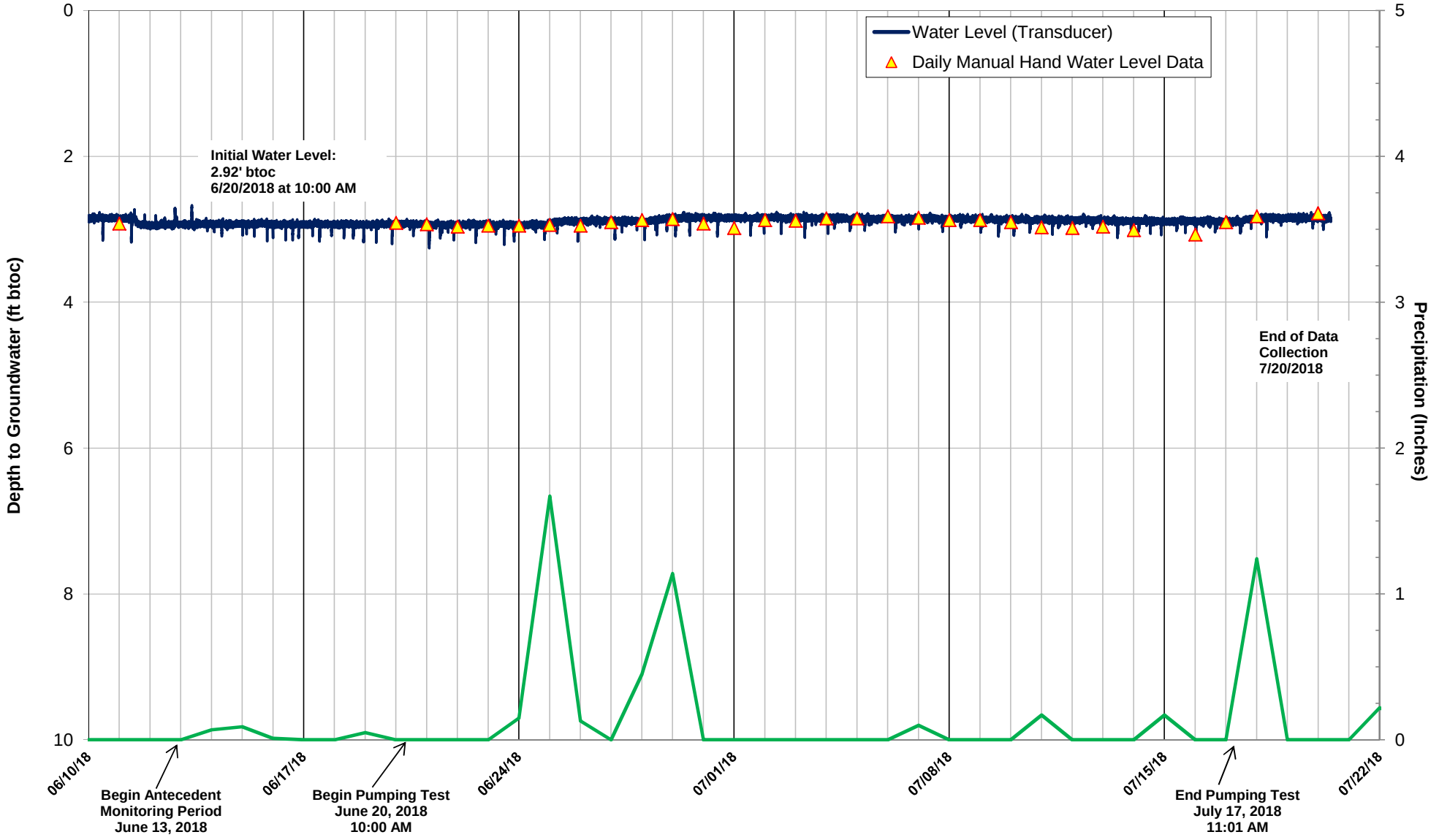


Geosphere Environmental Management, Inc.



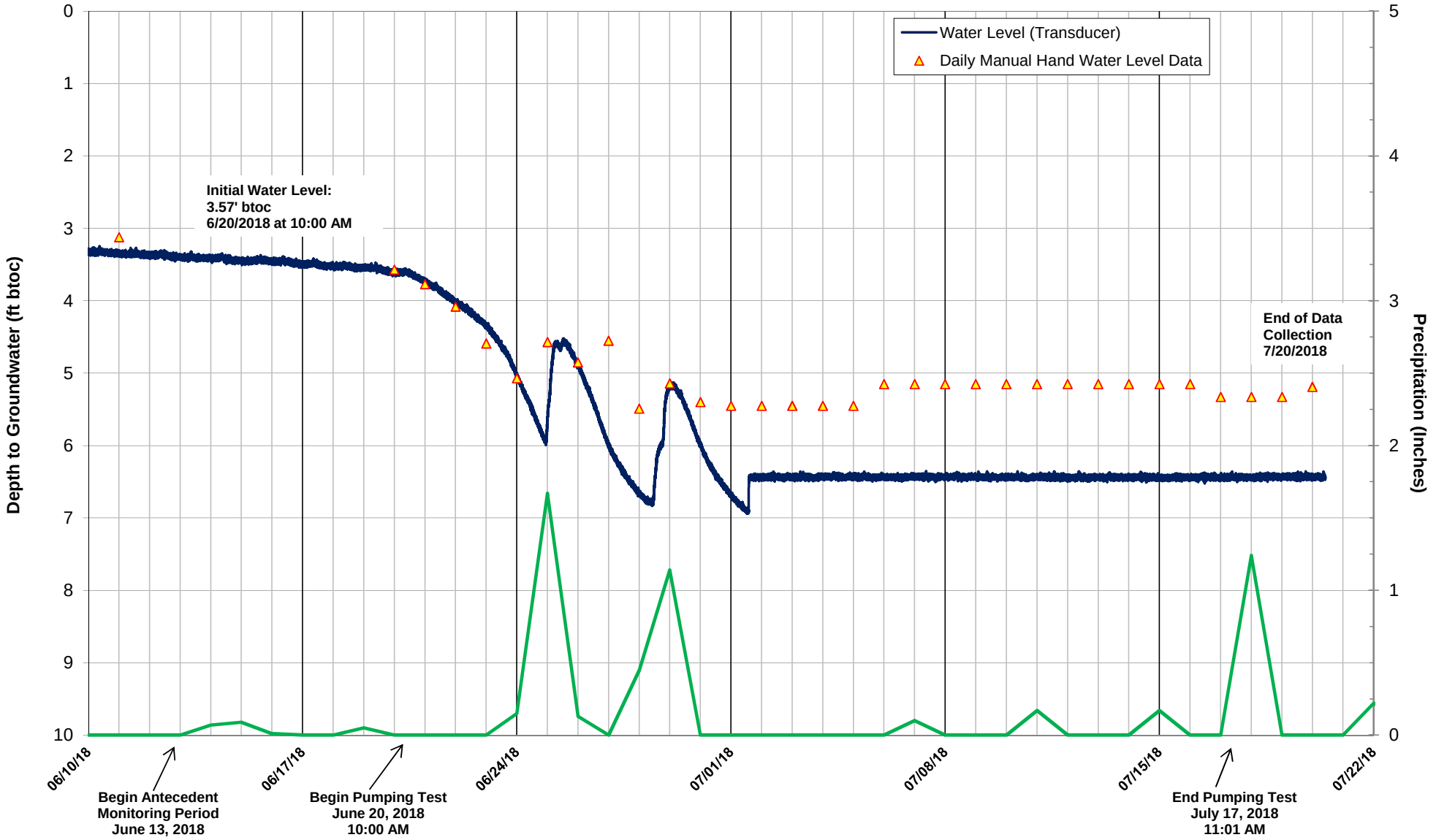
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Piezometer PZ-2



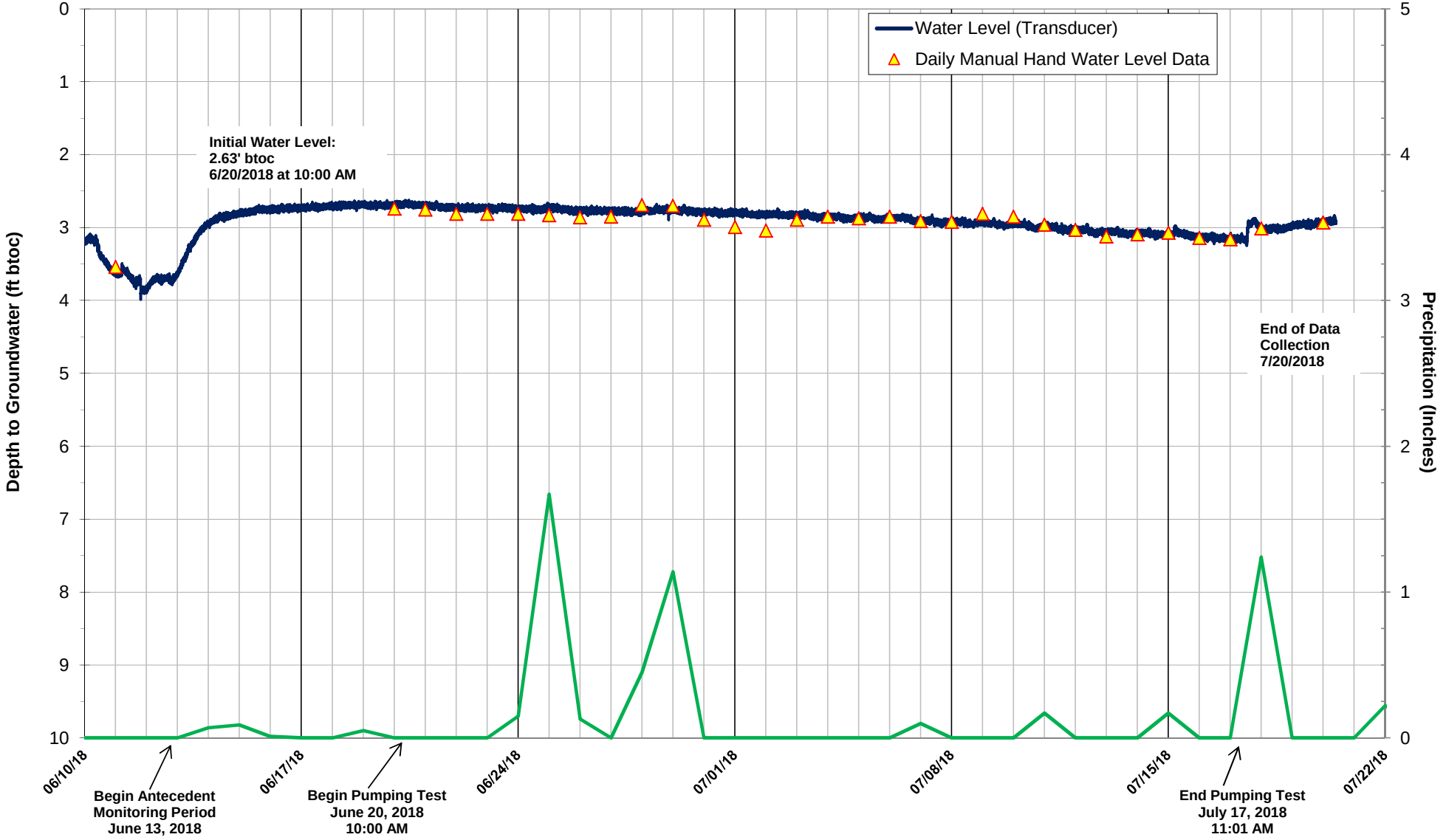
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Piezometer PZ-3

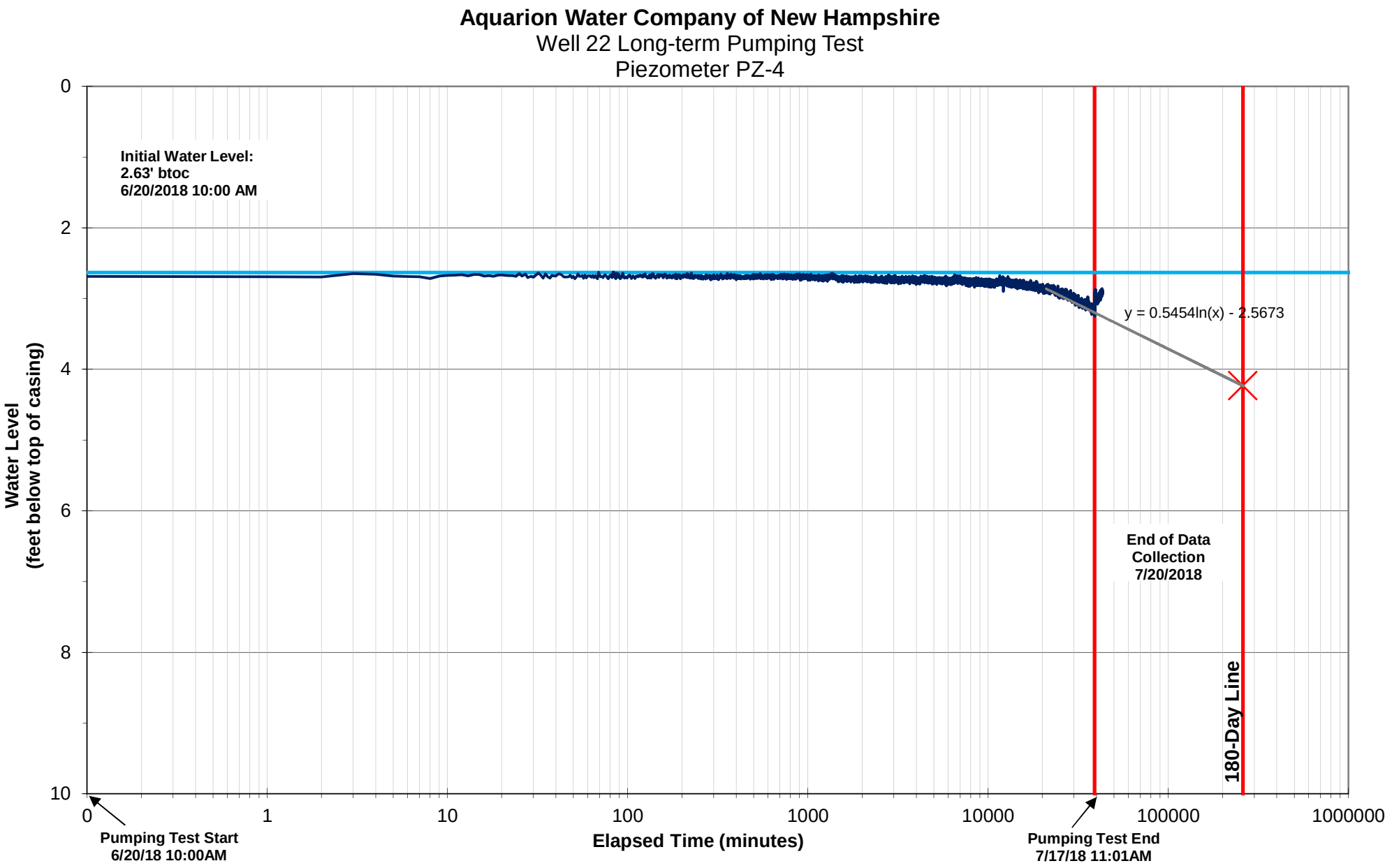


Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well Long-term Pumping Test
Piezometer PZ-4

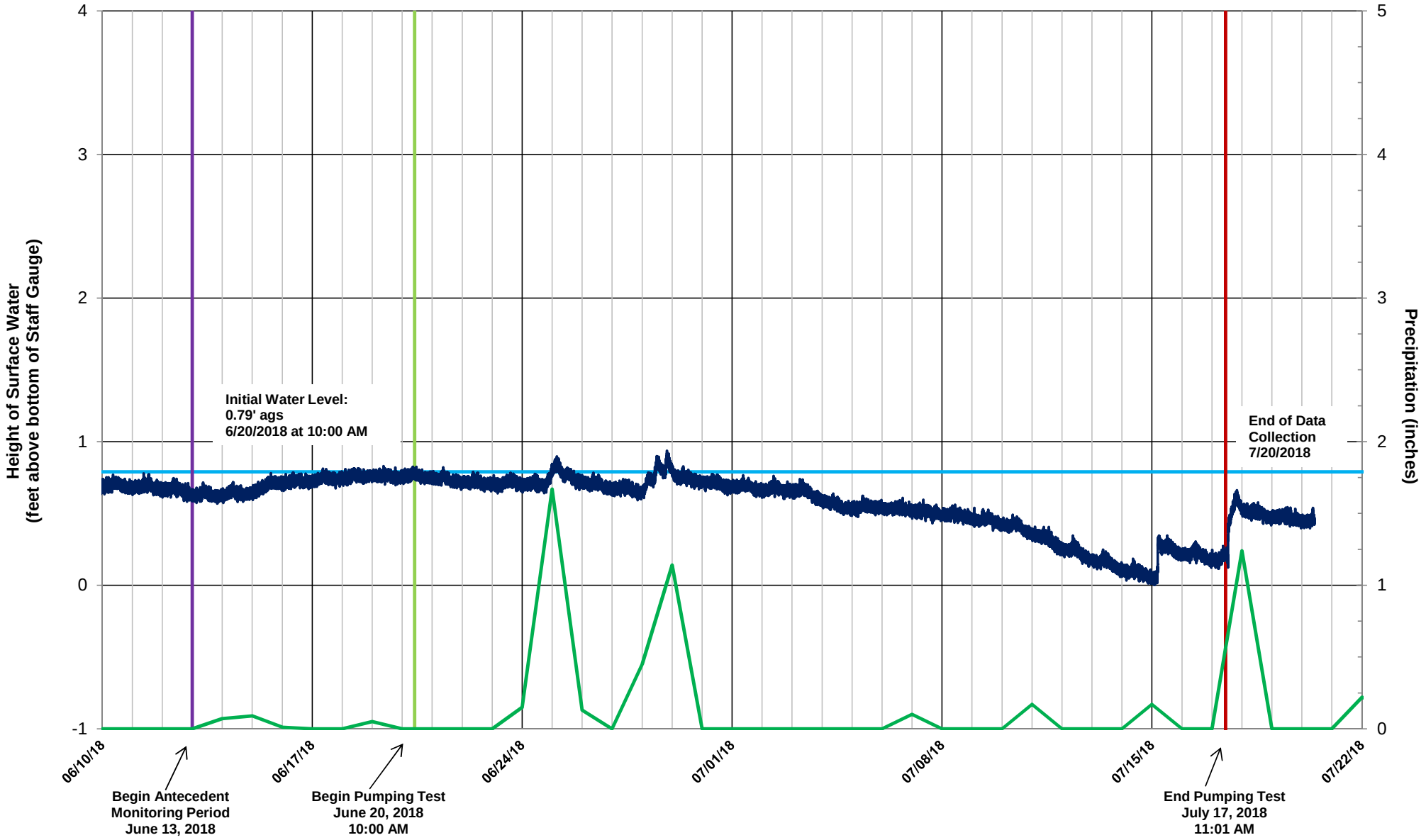


Geosphere Environmental Management, Inc.



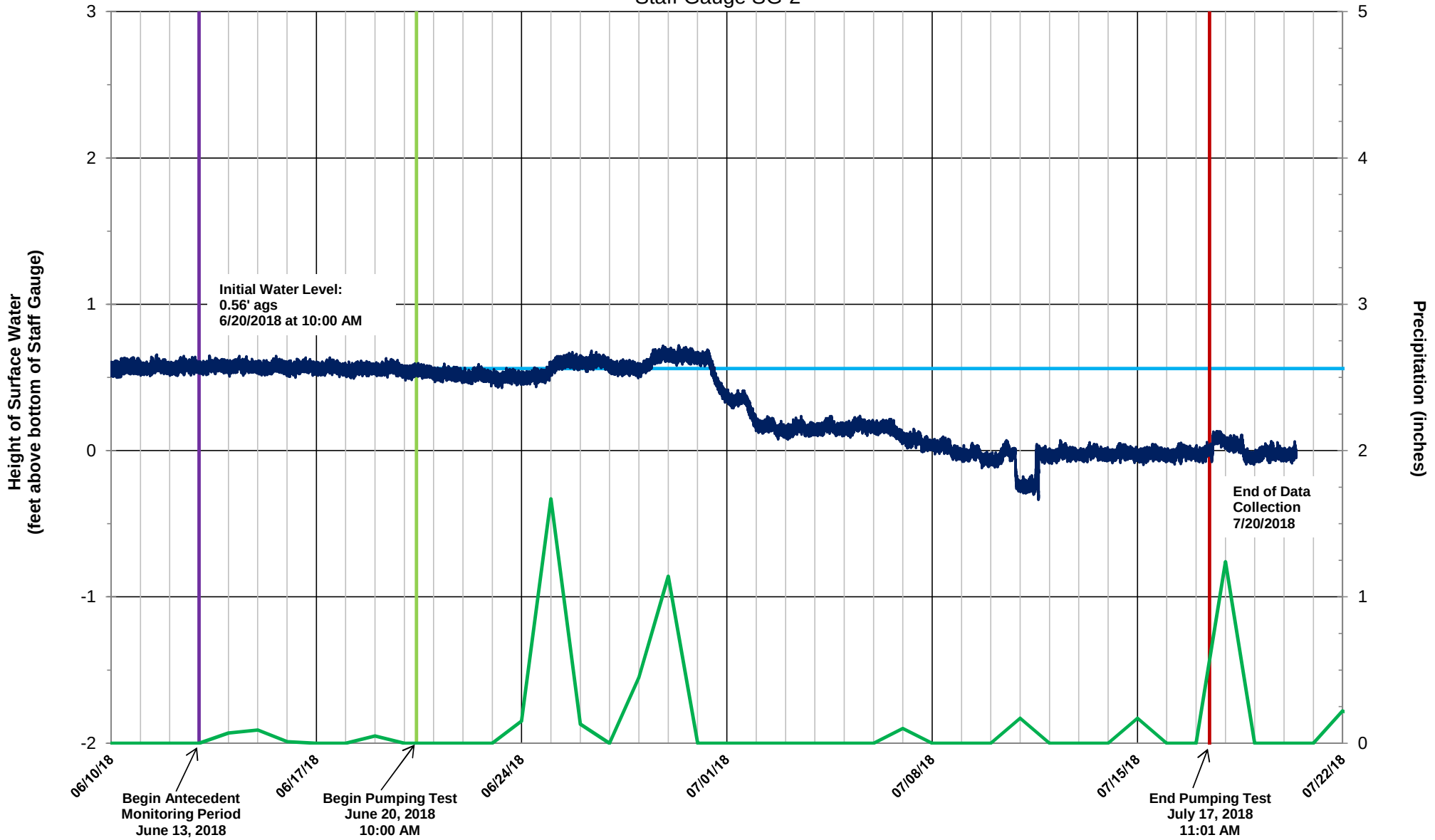
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Staff Gauge SG-1



Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Staff Gauge SG-2

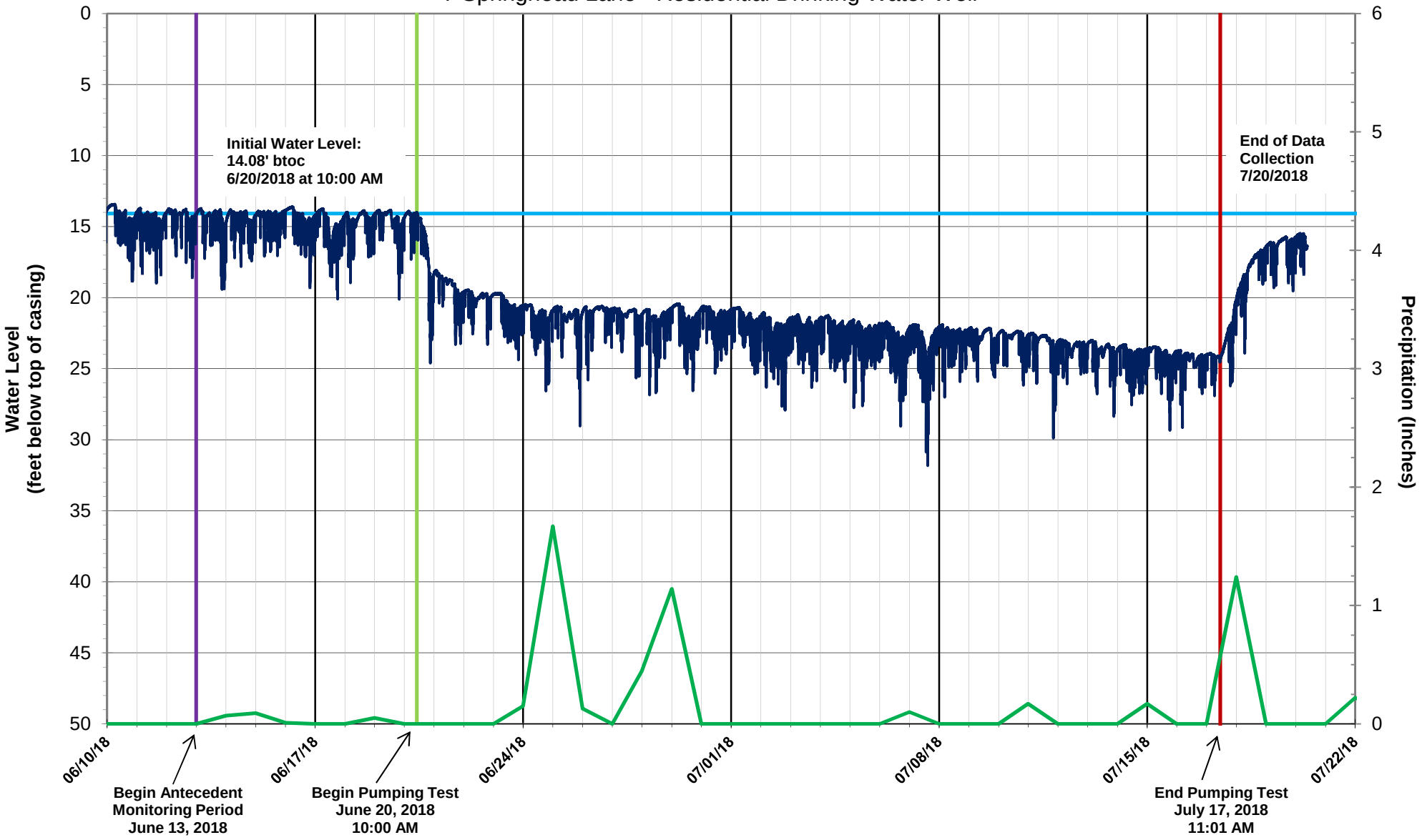


Geosphere Environmental Management, Inc.

TIME vs. DRAWDOWN GRAPHS

7 Springhead
8 Springhead
10 Springhead
11 Bear Path
12 Springhead
23 Esker
31 Windmill
38 Edgewood
53 Winnacunnet
59 Edgewood
78 Little River
81 Landing
82 Woodland
83 Little River
110 Mill Road
117 Little River
195 Woodland
206 Woodland
321 Winnacunnet
Ambient Well

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
7 Springhead Lane - Residential Drinking Water Well

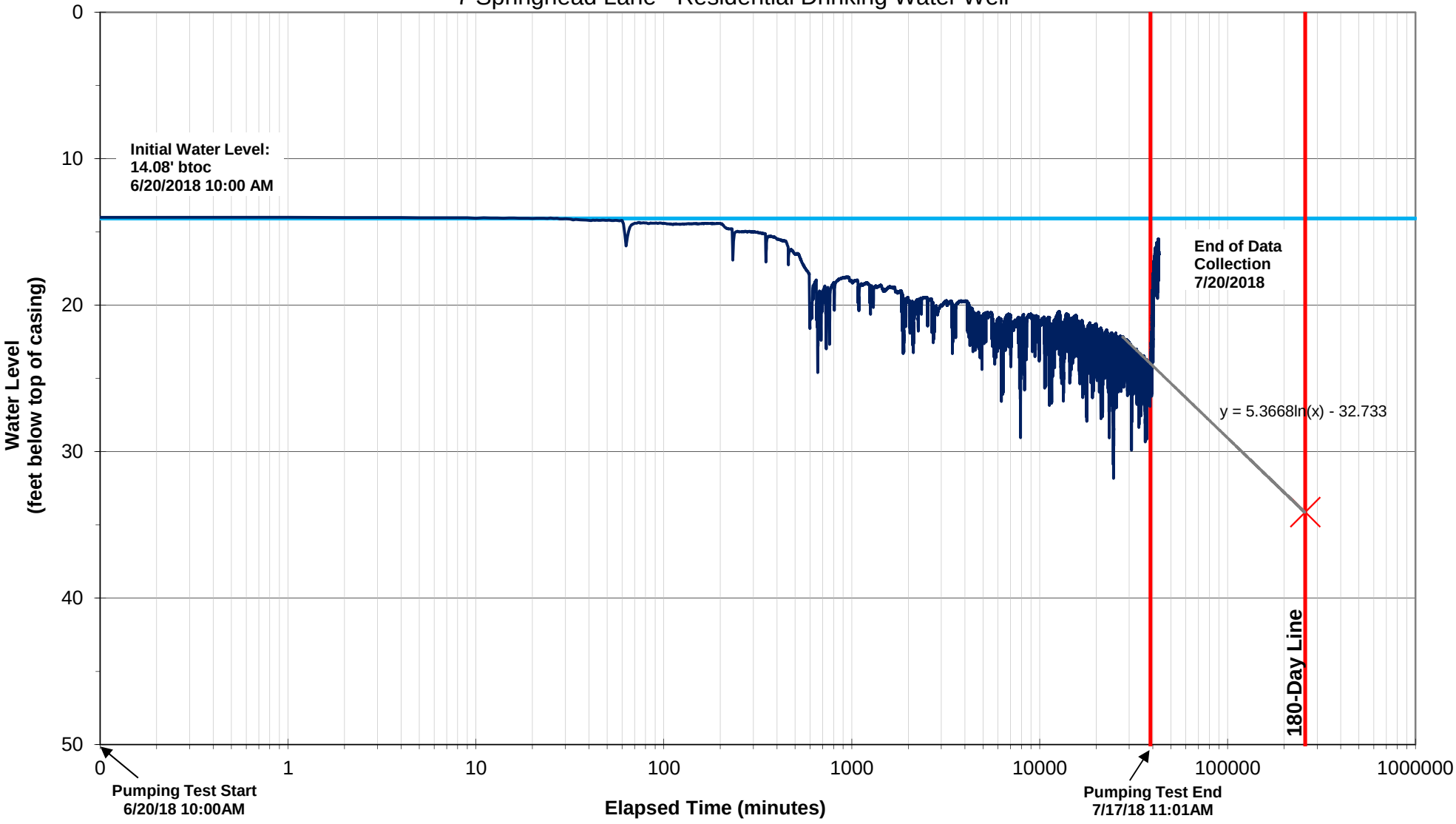


Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire

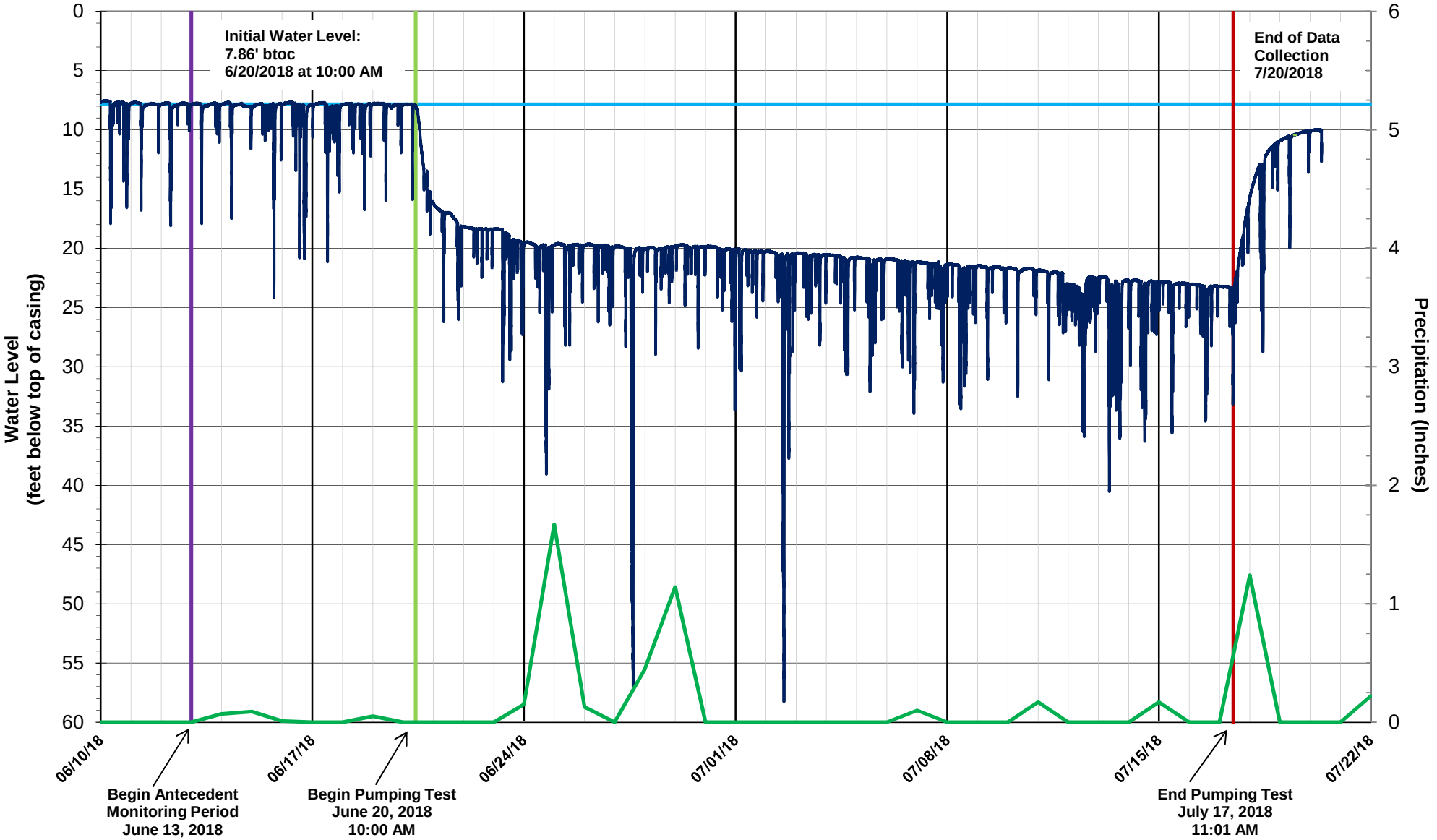
Well 22 Long-term Pumping Test

7 Springhead Lane - Residential Drinking Water Well



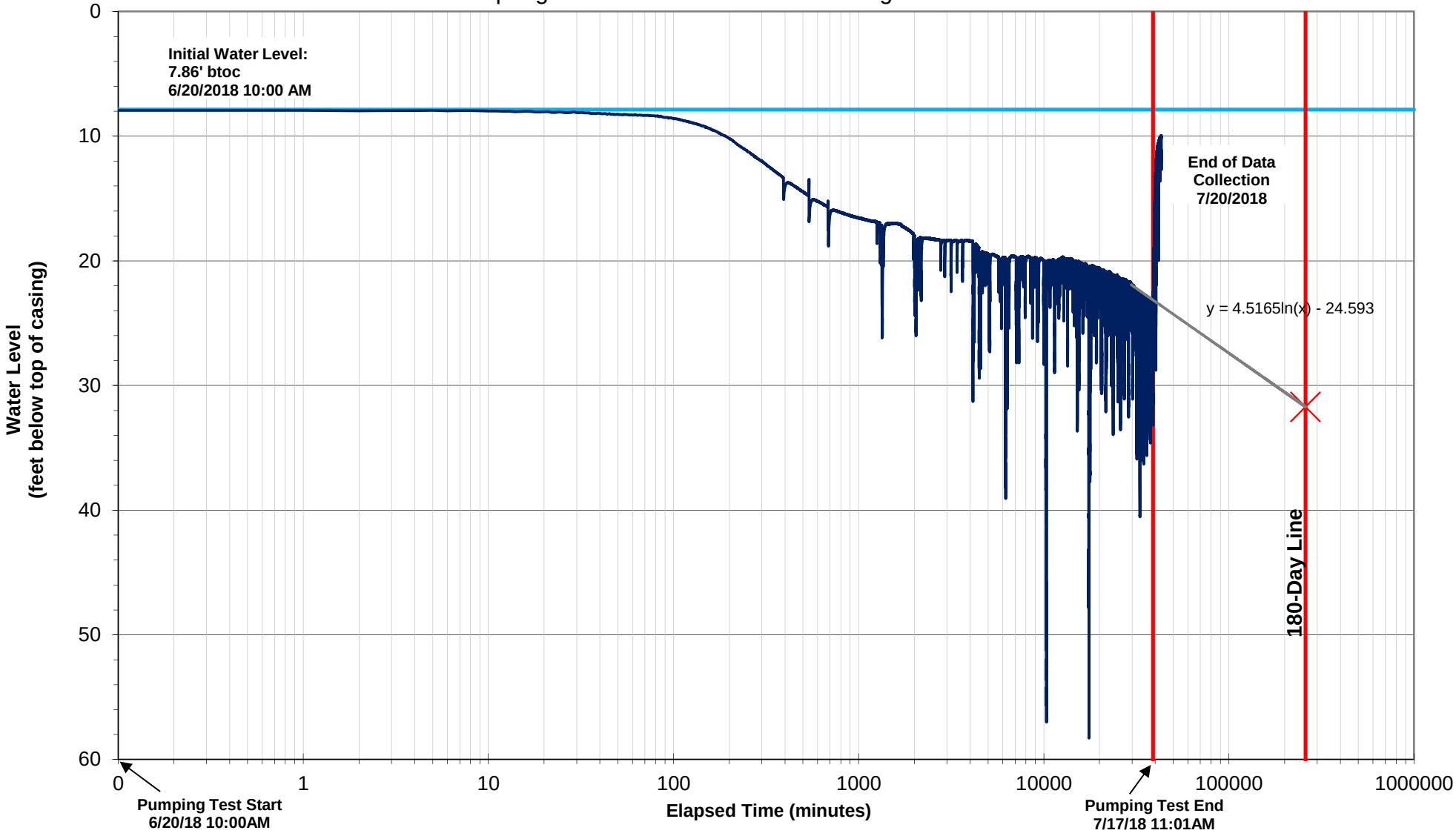
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
8 Springhead Lane - Residential Drinking Water Well



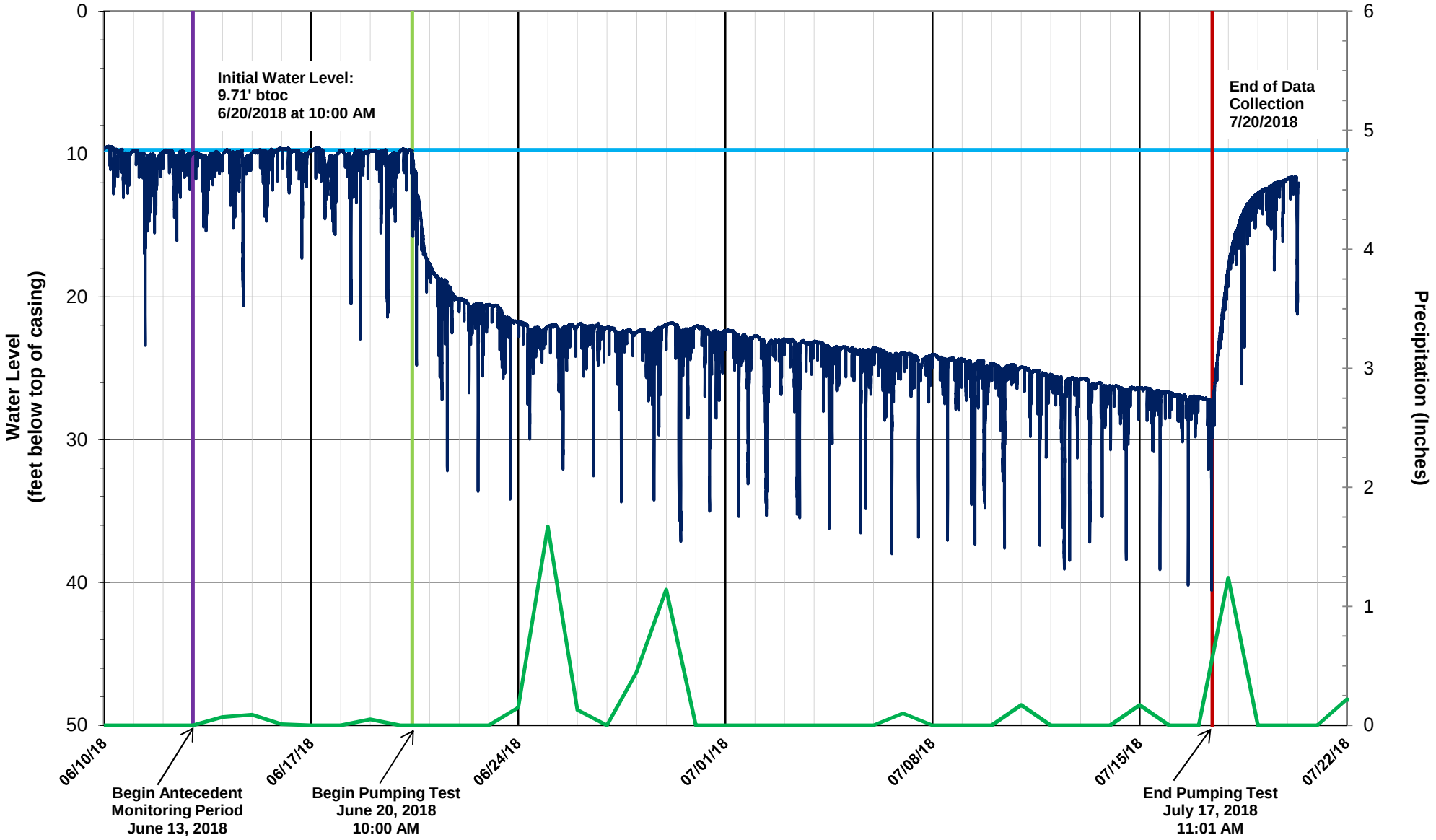
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
8 Springhead Lane - Residential Drinking Water Well



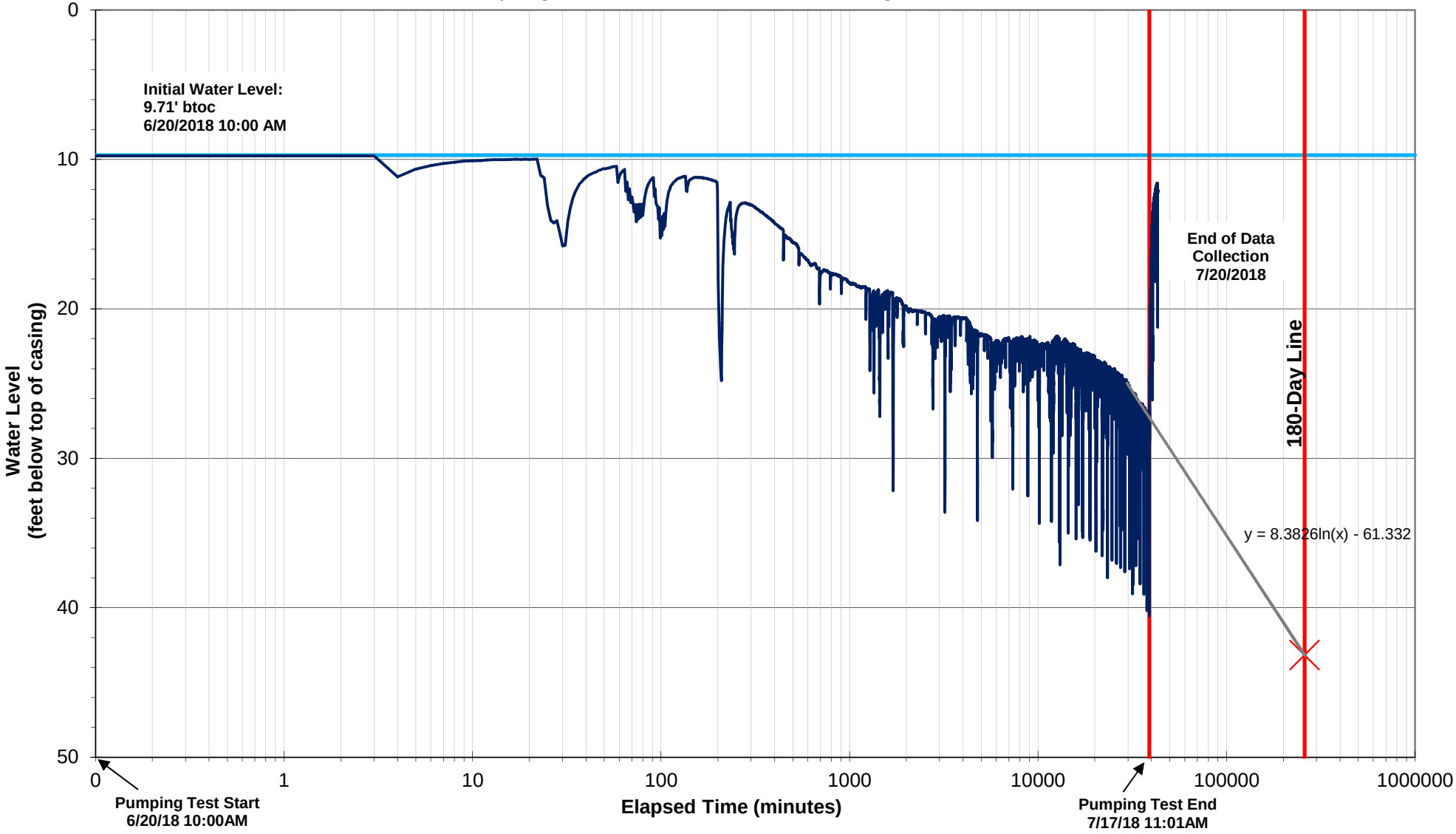
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
10 Springhead Lane - Residential Drinking Water Well



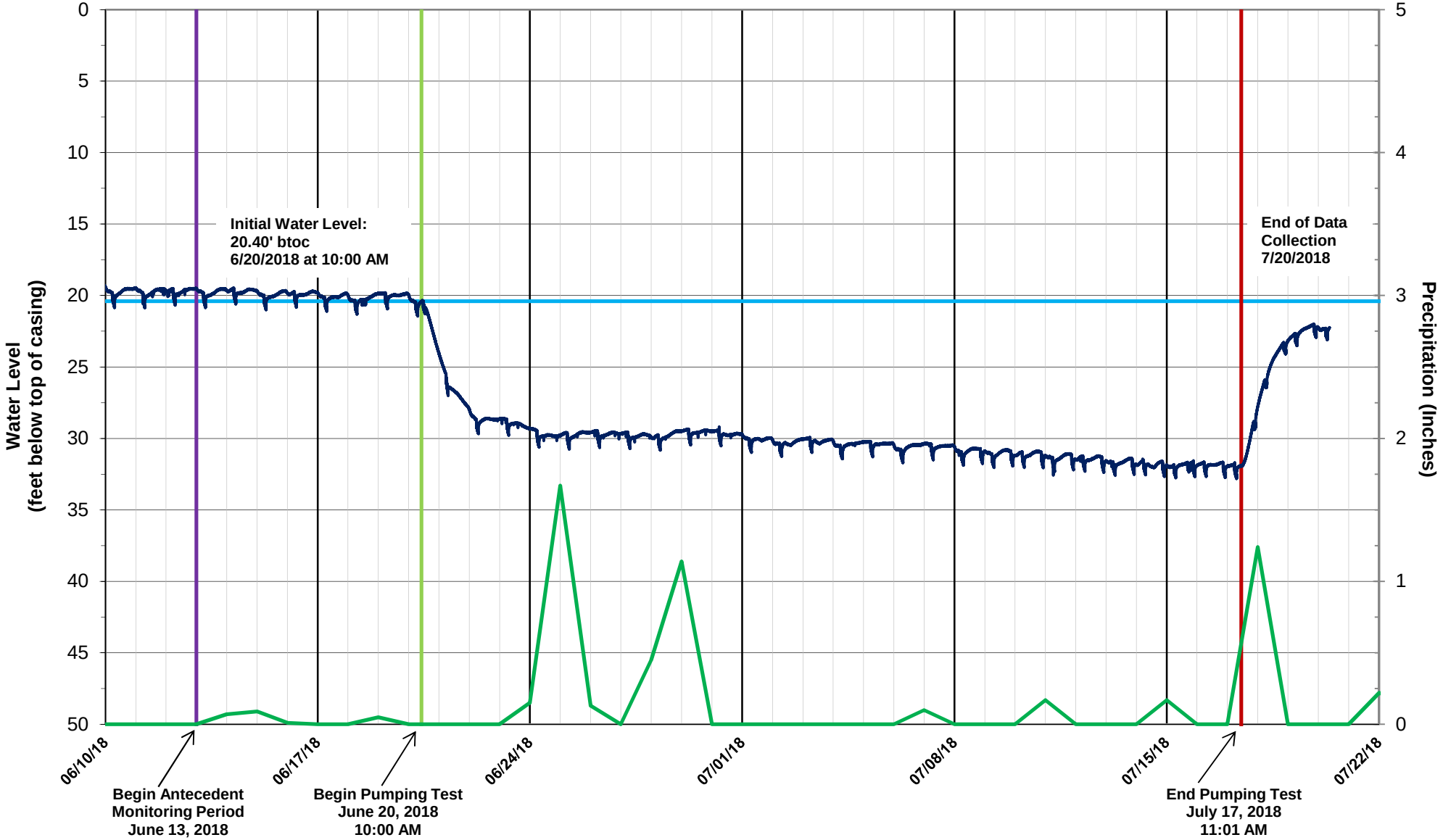
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
10 Springhead Lane - Residential Drinking Water Well



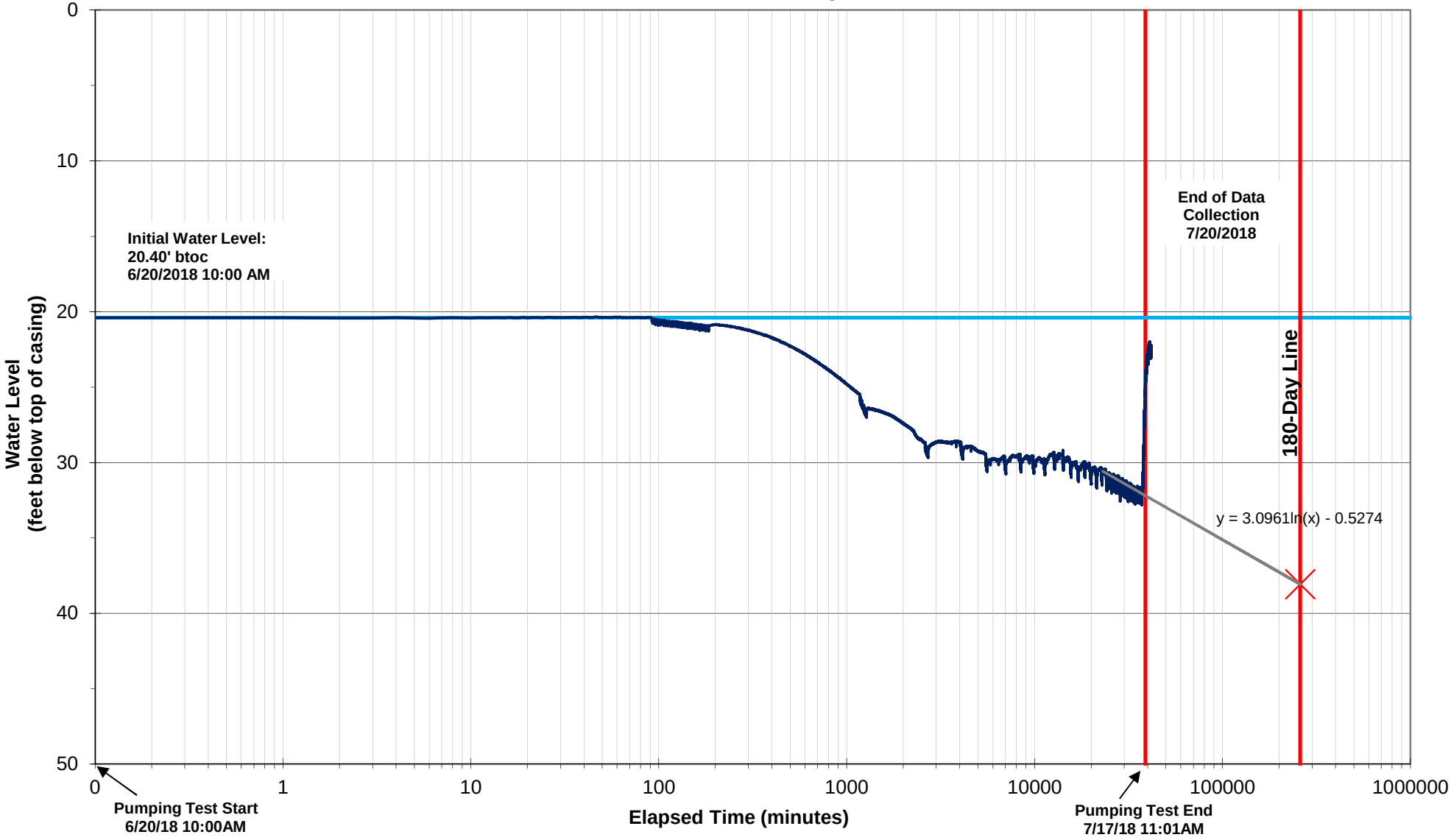
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
11 Bear Path - Residential Irrigation Well

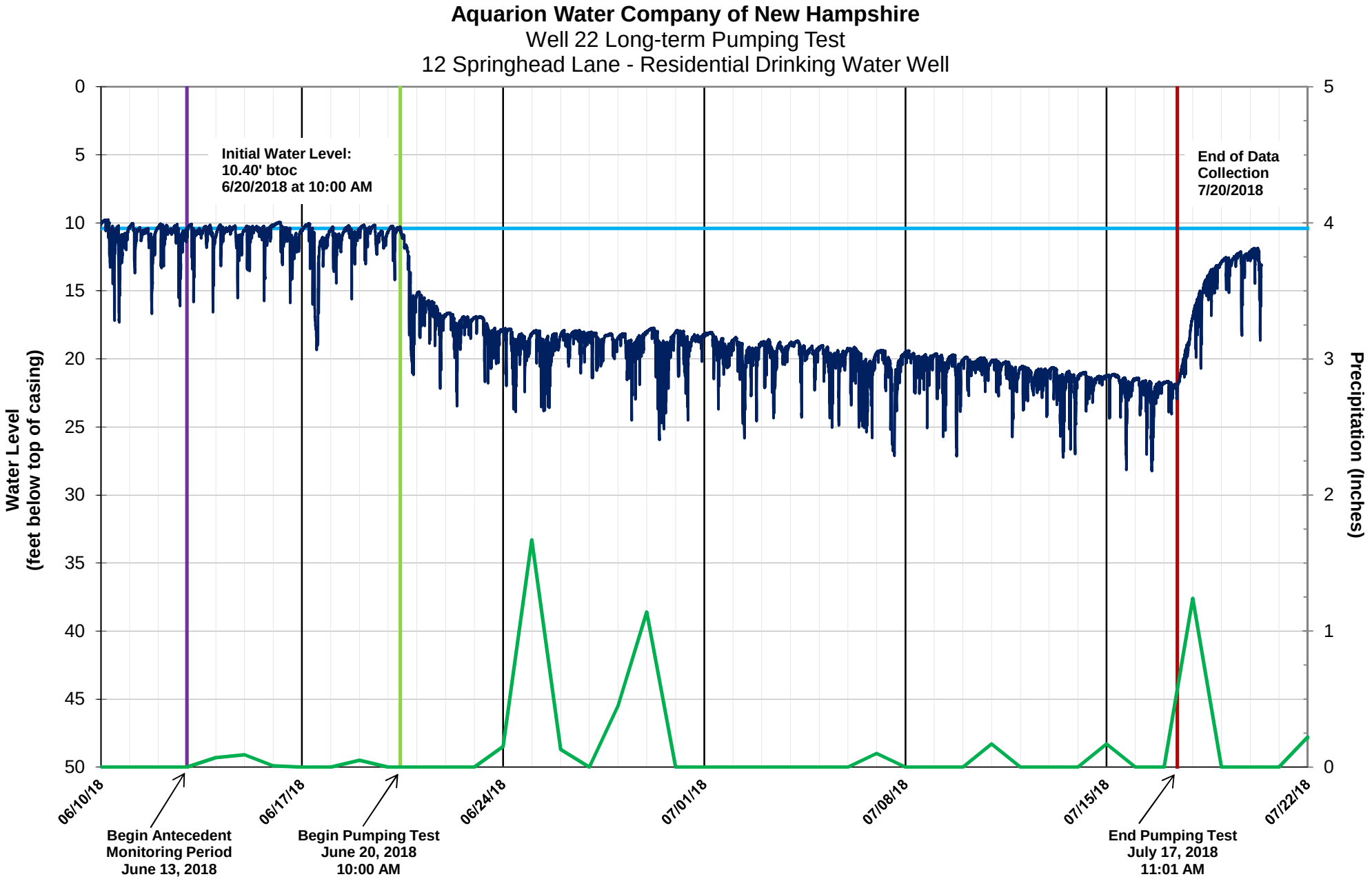


Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
11 Bear Path - Residential Irrigation Well

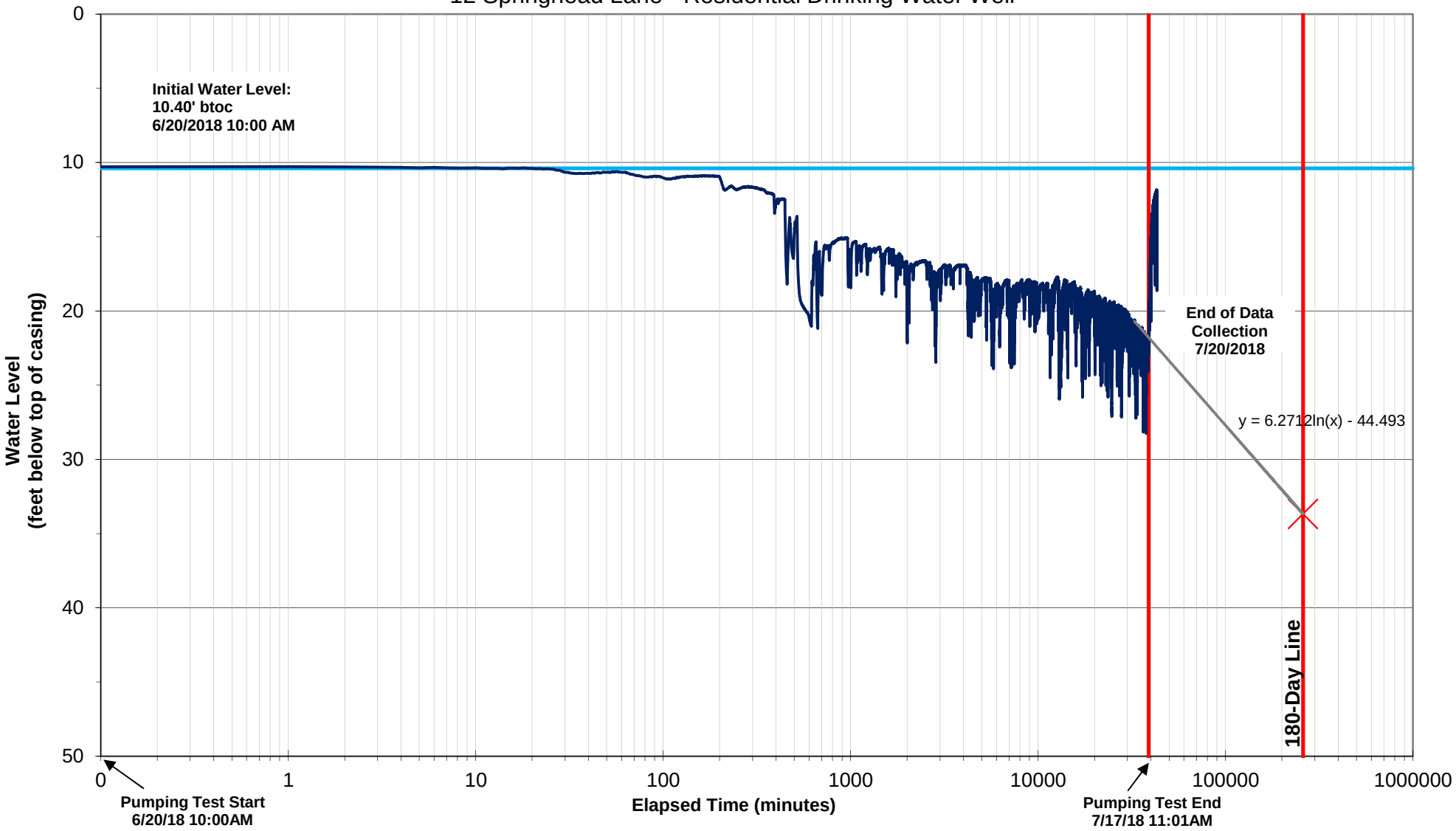


Geosphere Environmental Management, Inc.



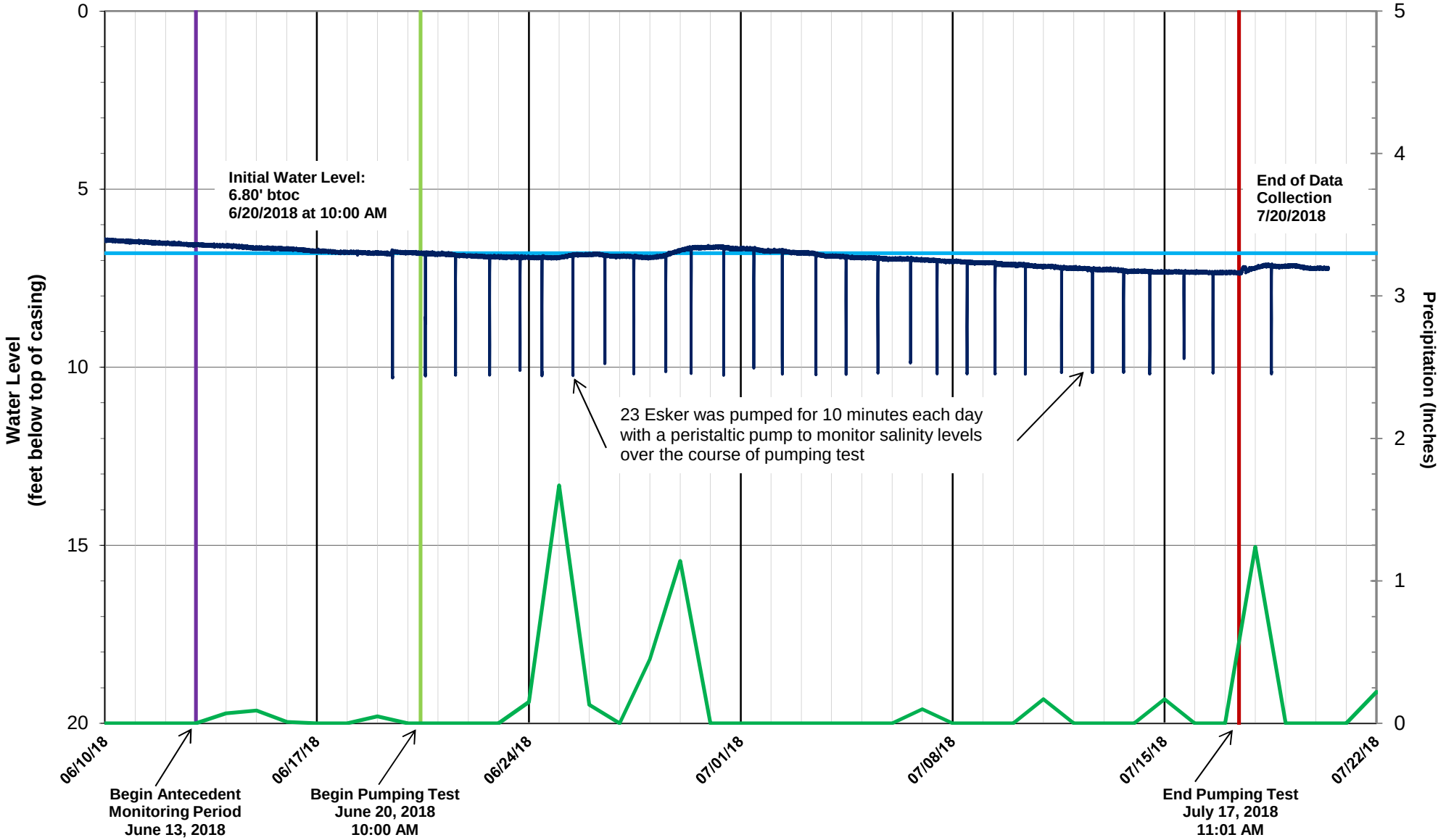
Geosphere Environmental Management, In

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
12 Springhead Lane - Residential Drinking Water Well



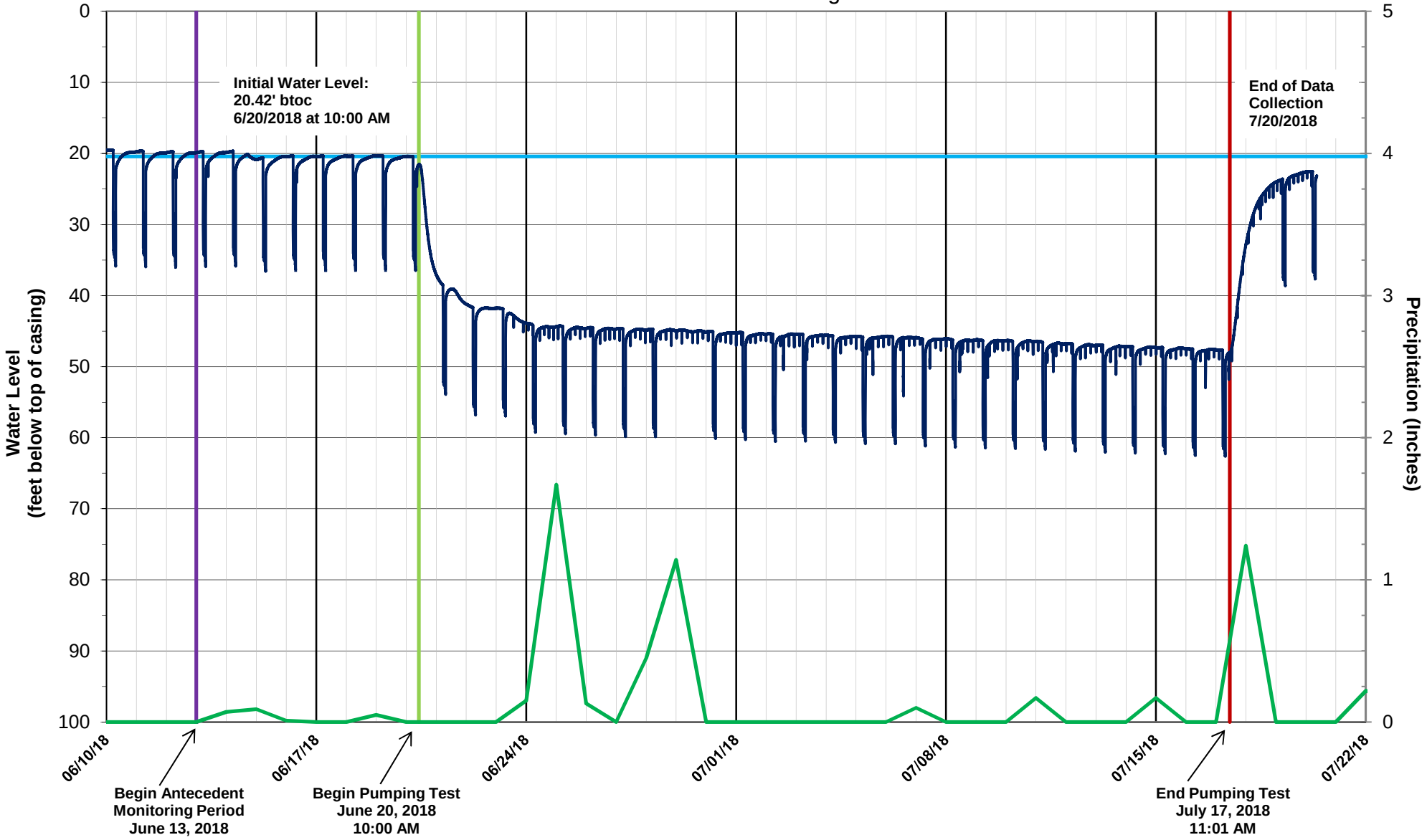
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
23 Esker Drive - Residential Irrigation Well (Unused)



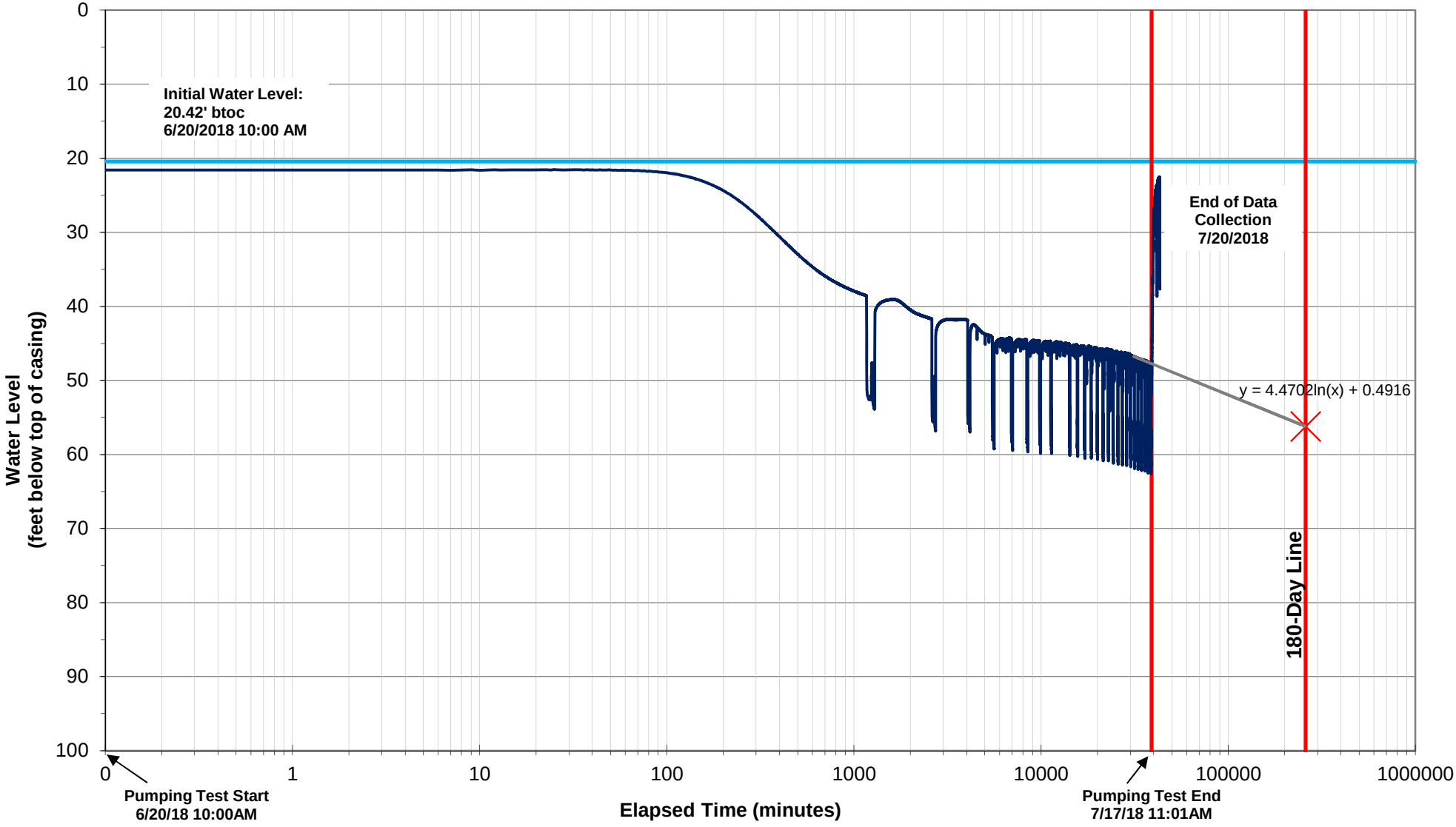
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
31 Windmill Lane - Residential Irrigation Well



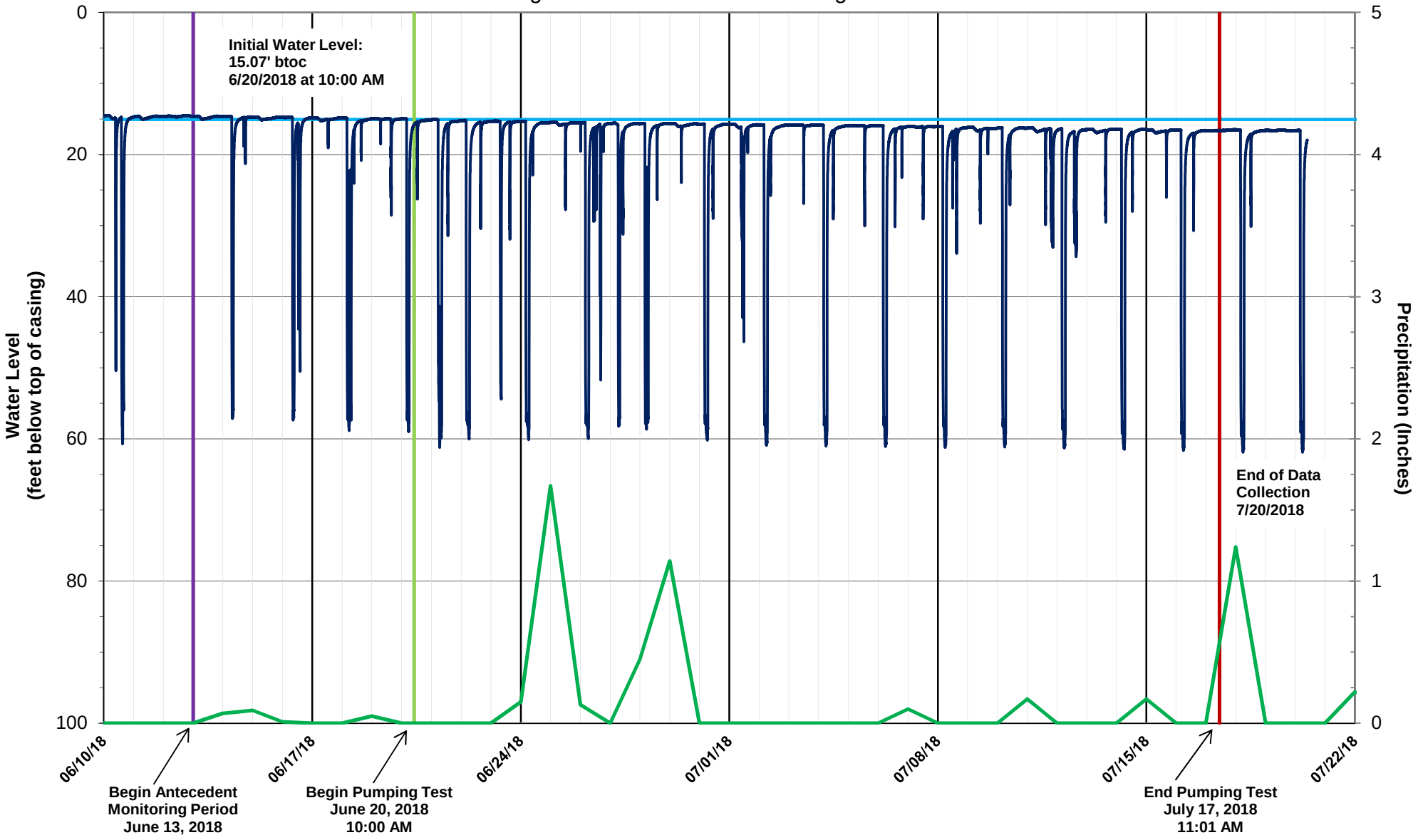
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
31 Windmill Lane - Residential Irrigation Well

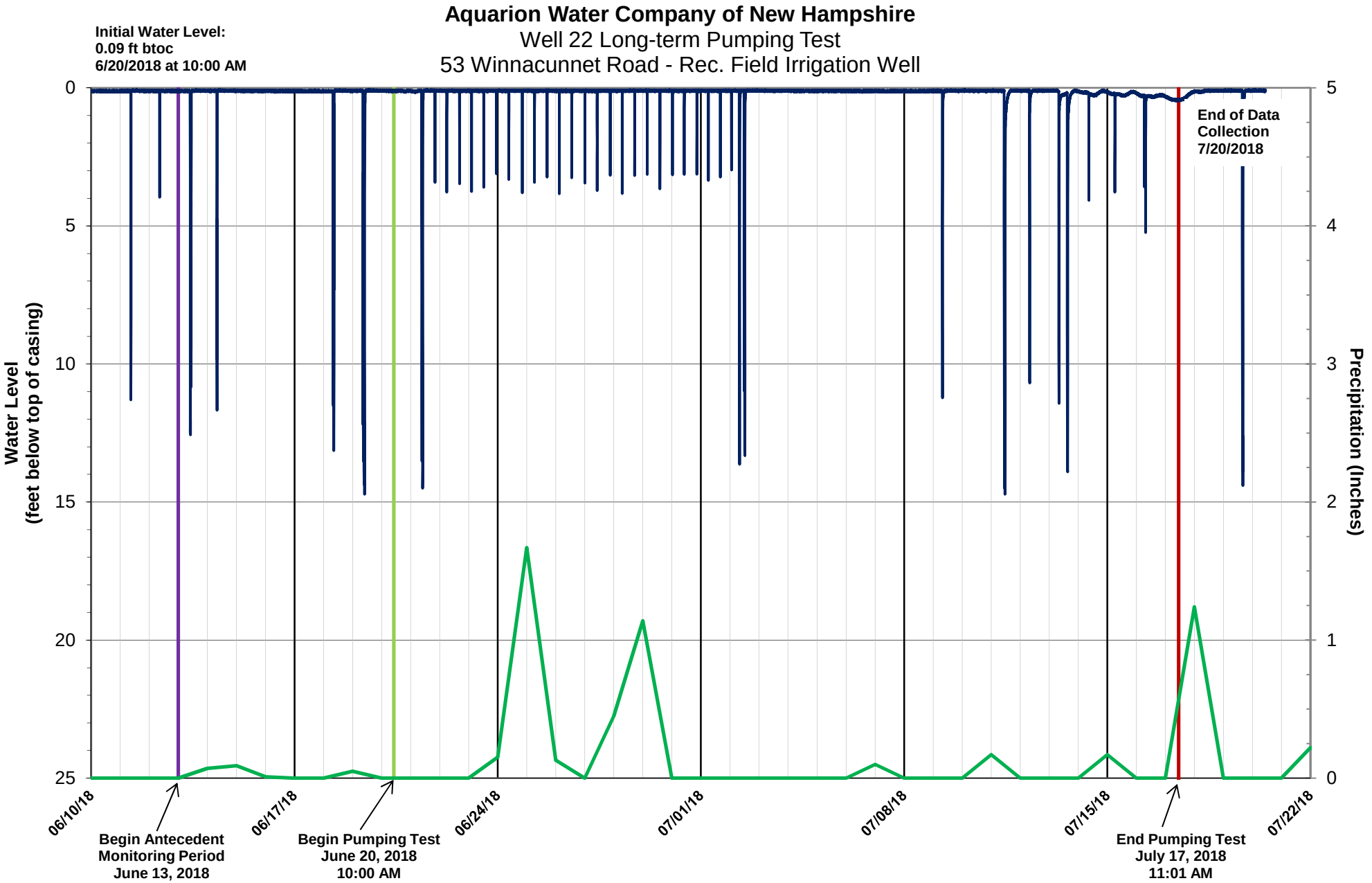


Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
38 Edgewood Drive - Residential Irrigation Well

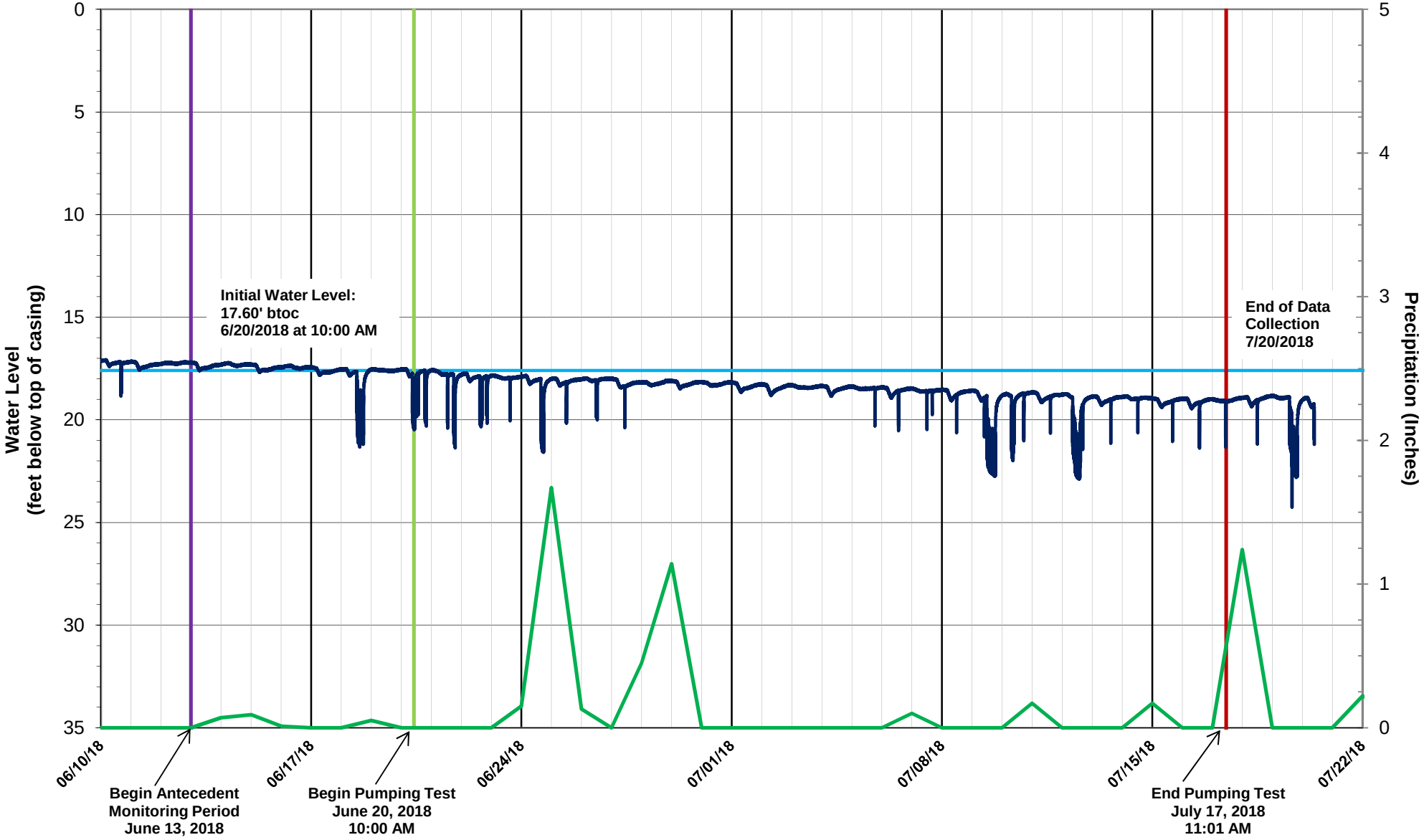


Geosphere Environmental Management, Inc.



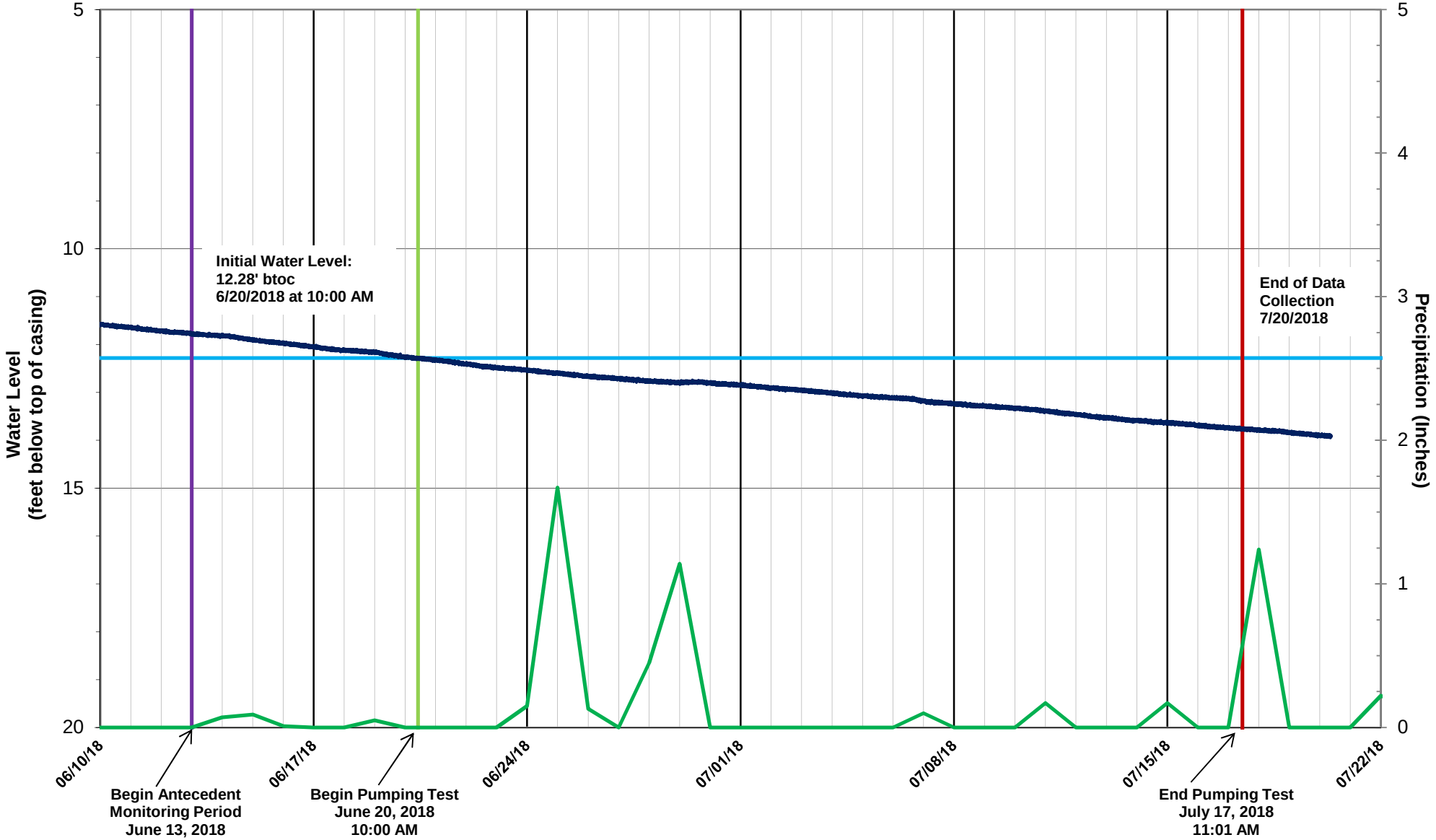
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
59 Edgewood Drive - Residential Irrigation Well



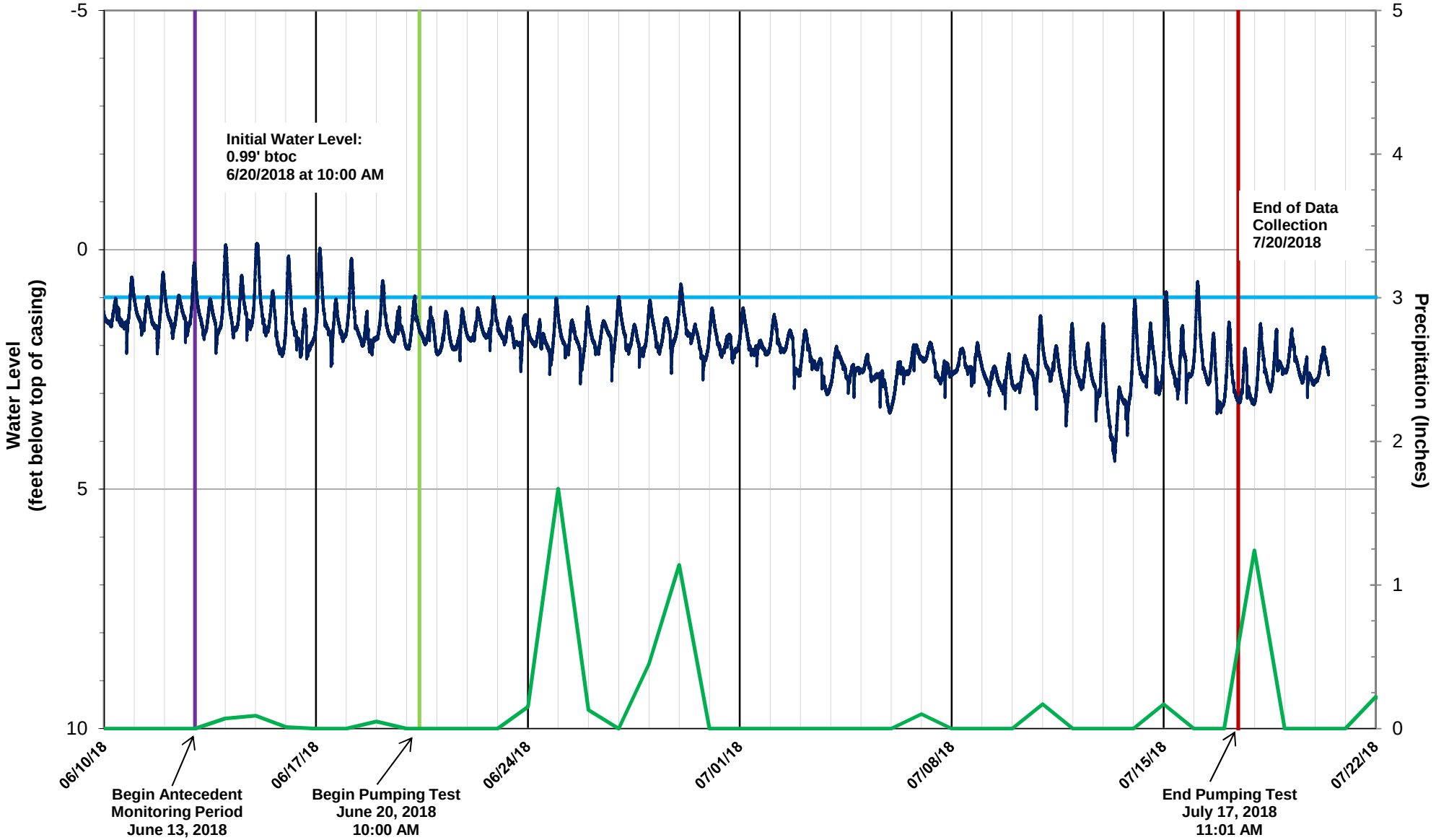
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
78 Little River Road - Dug Well (Unused)



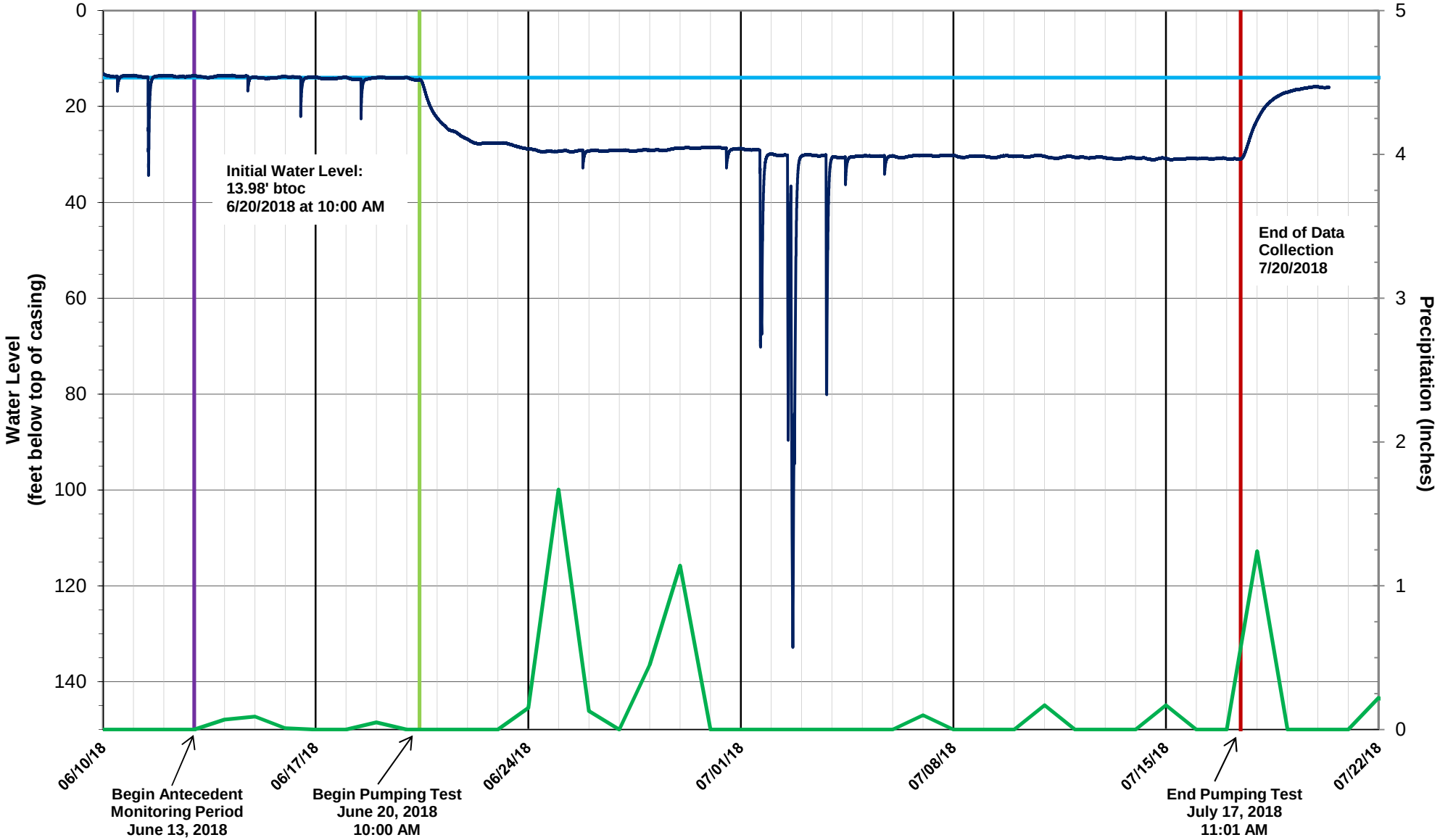
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
81 Landing Road - Residential Well (Unused)



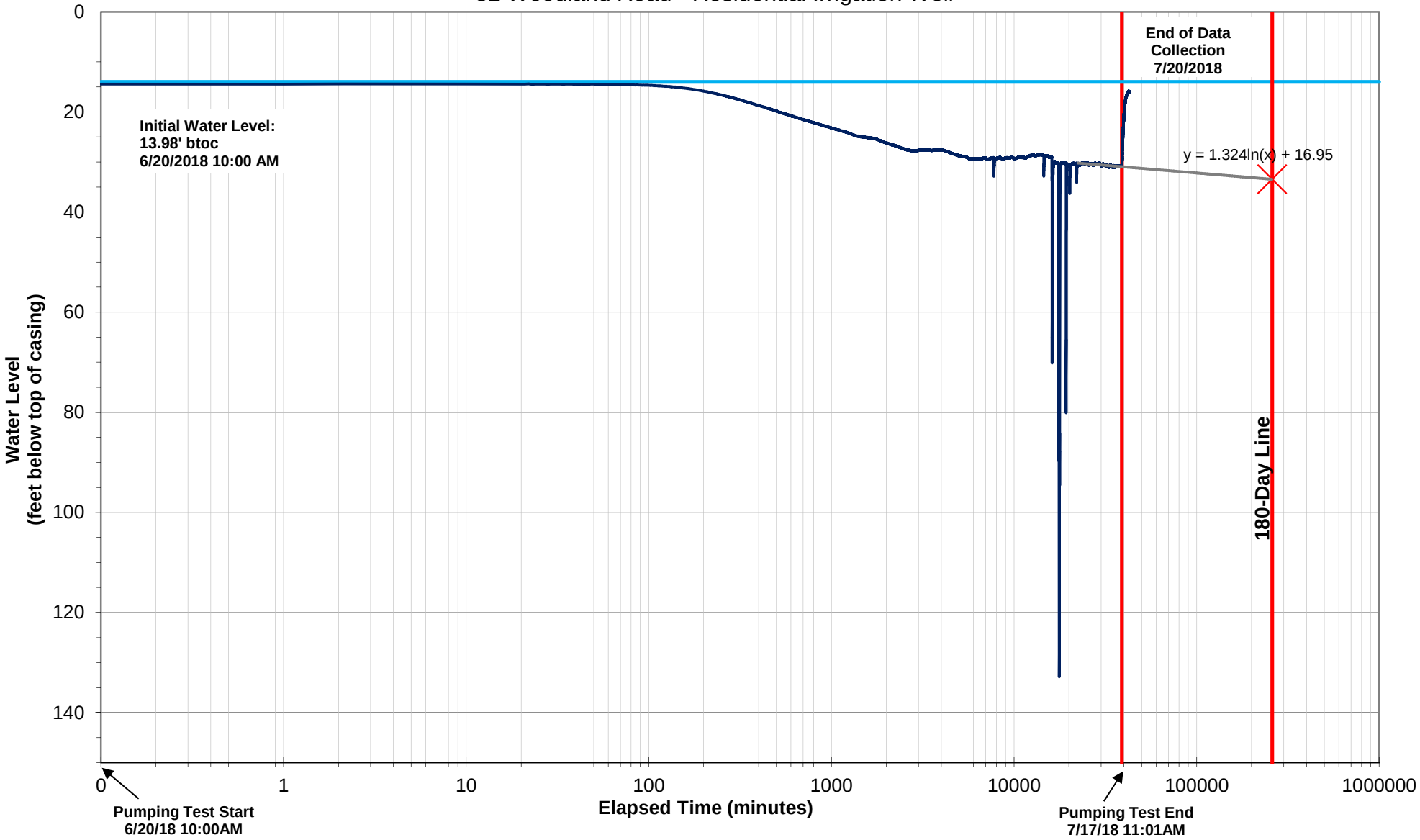
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
82 Woodland Road - Residential Irrigation Well

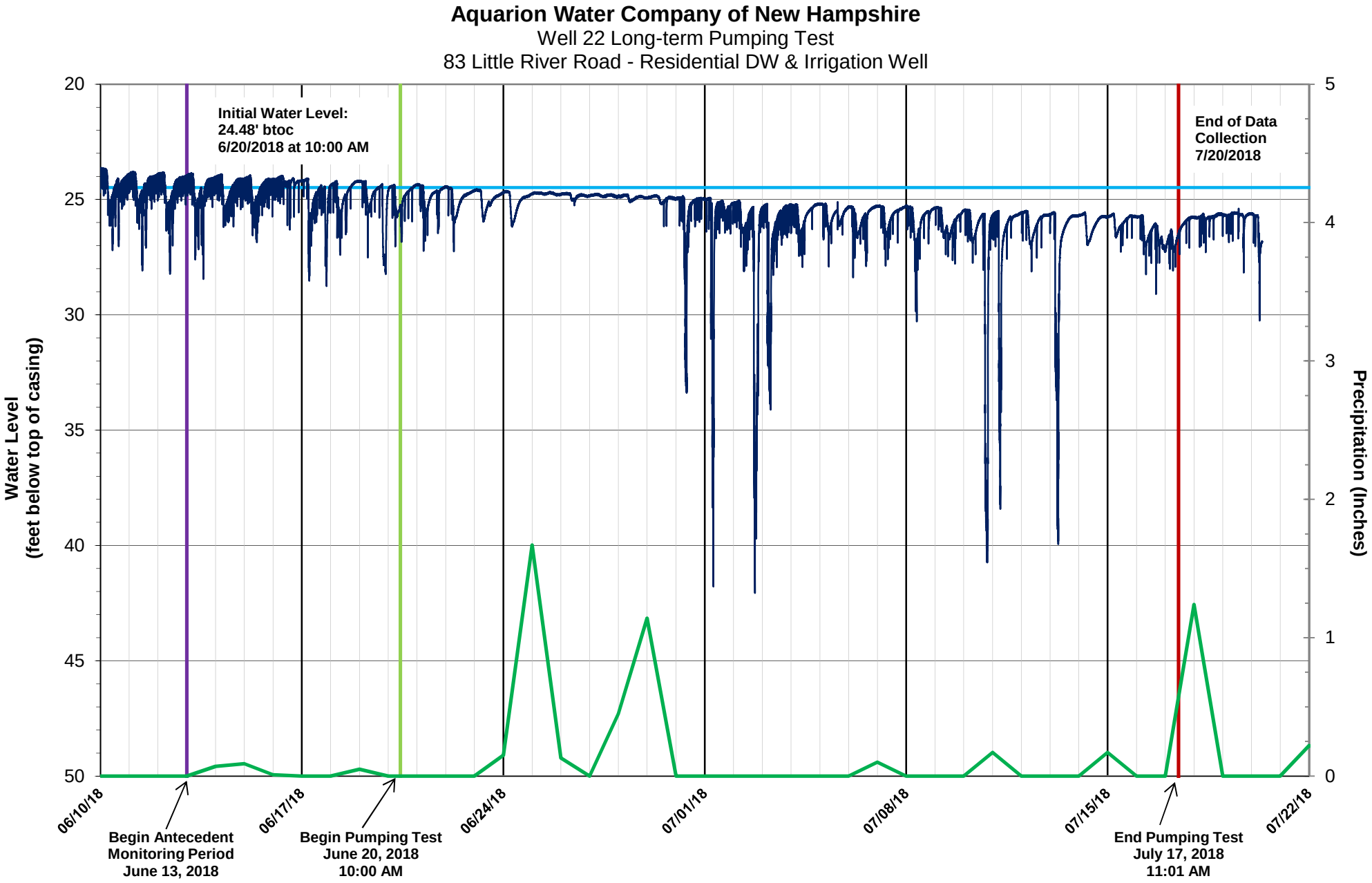


Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
82 Woodland Road - Residential Irrigation Well



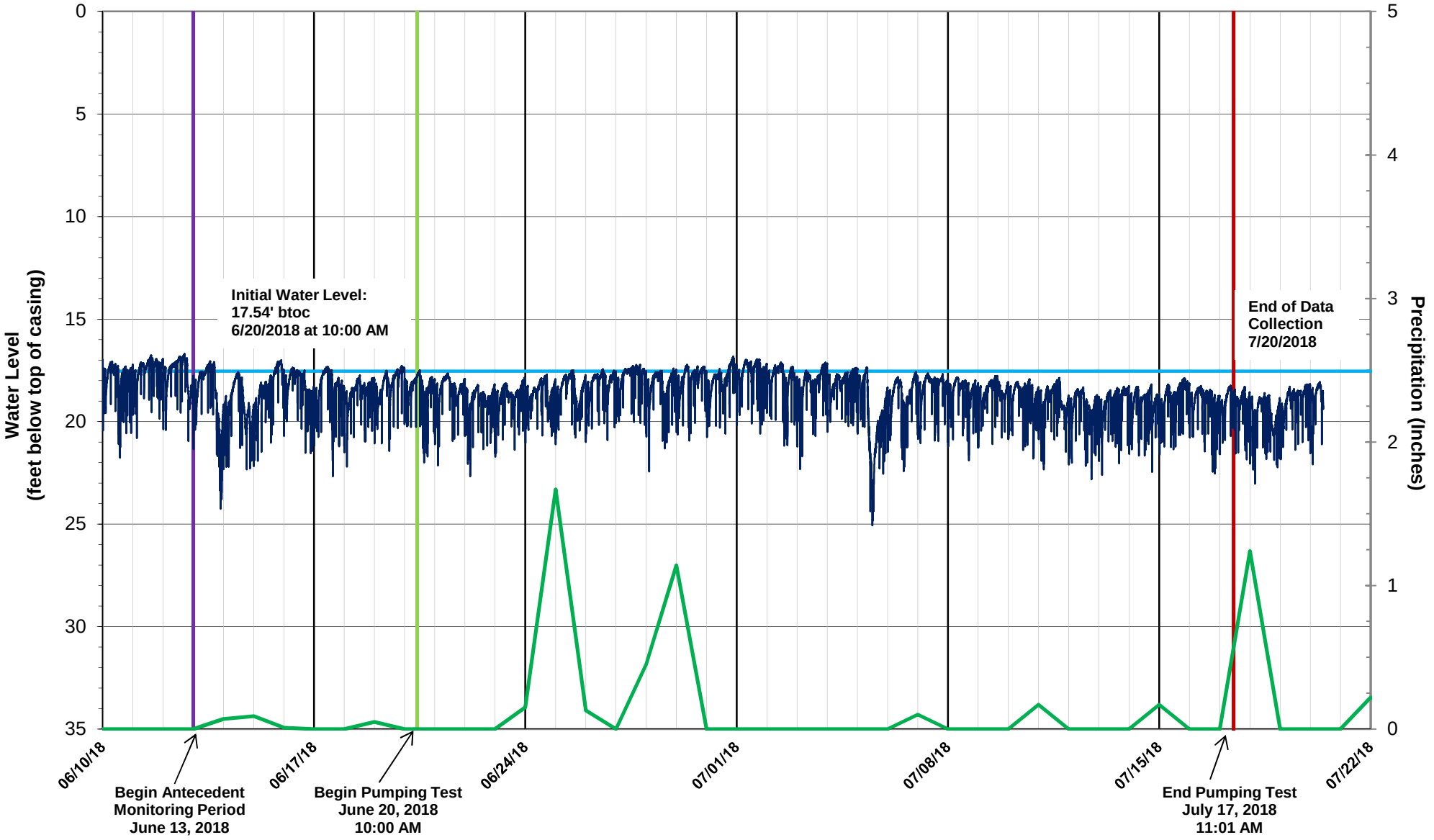
Geosphere Environmental Management, Inc.


Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
83 Little River Road - Residential DW & Irrigation Well
Water Level
(feet below top of casing)
Precipitation (Inches)
20
25
30
35
40
45
50
5
4
3
2
1
0
Initial Water Level:
24.48' btoc
6/20/2018 at 10:00 AM
End of Data
Collection
7/20/2018
06/10/18
06/17/18
06/24/18
07/01/18
07/08/18
07/15/18
07/22/18
Begin Antecedent
Monitoring Period
June 13, 2018
Begin Pumping Test
June 20, 2018
10:00 AM
End Pumping Test
July 17, 2018
11:01 AM
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire

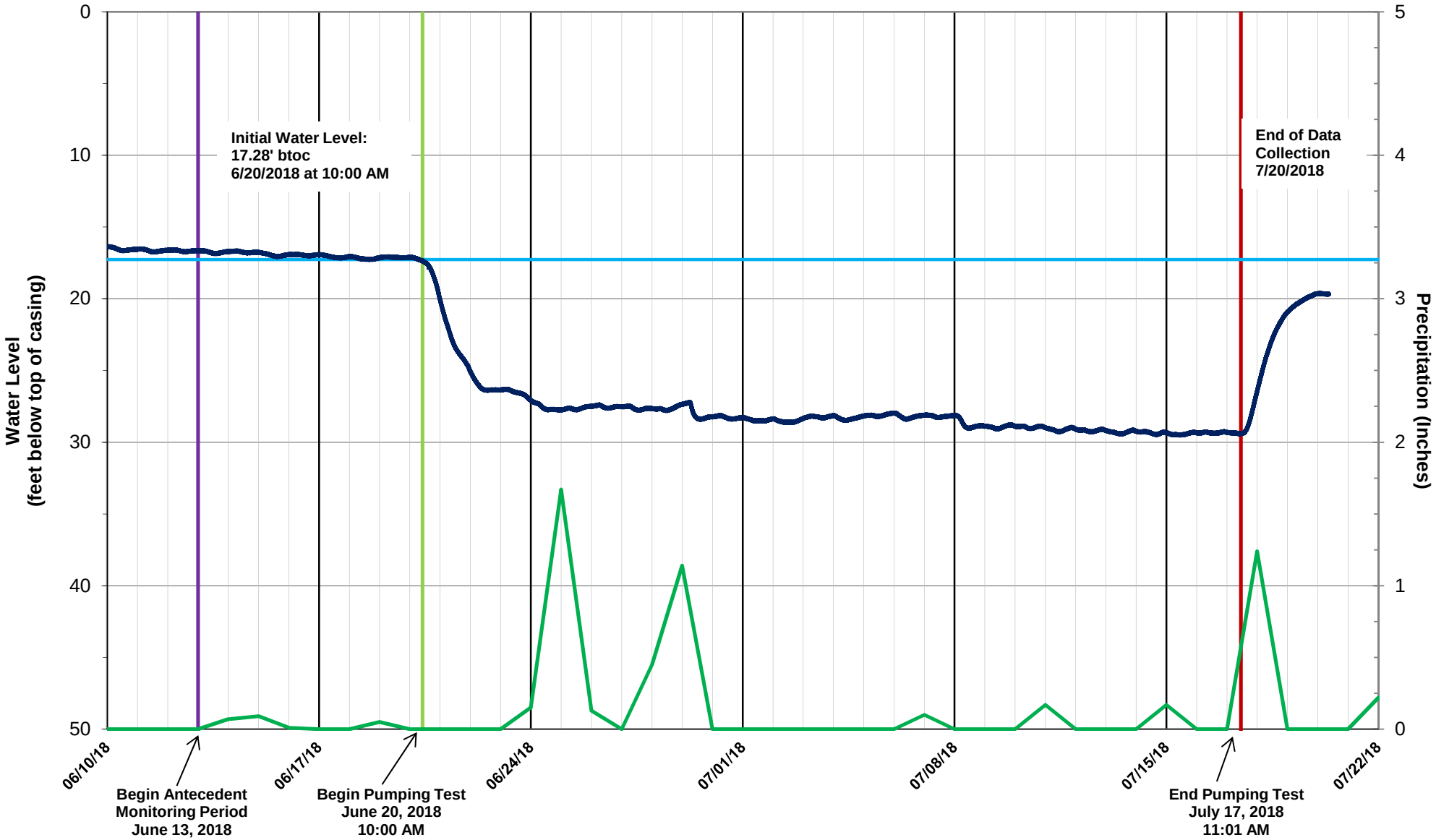
Well 22 Long-term Pumping Test

110 Mill Road No. Hampton - Residential Drinking Water Well



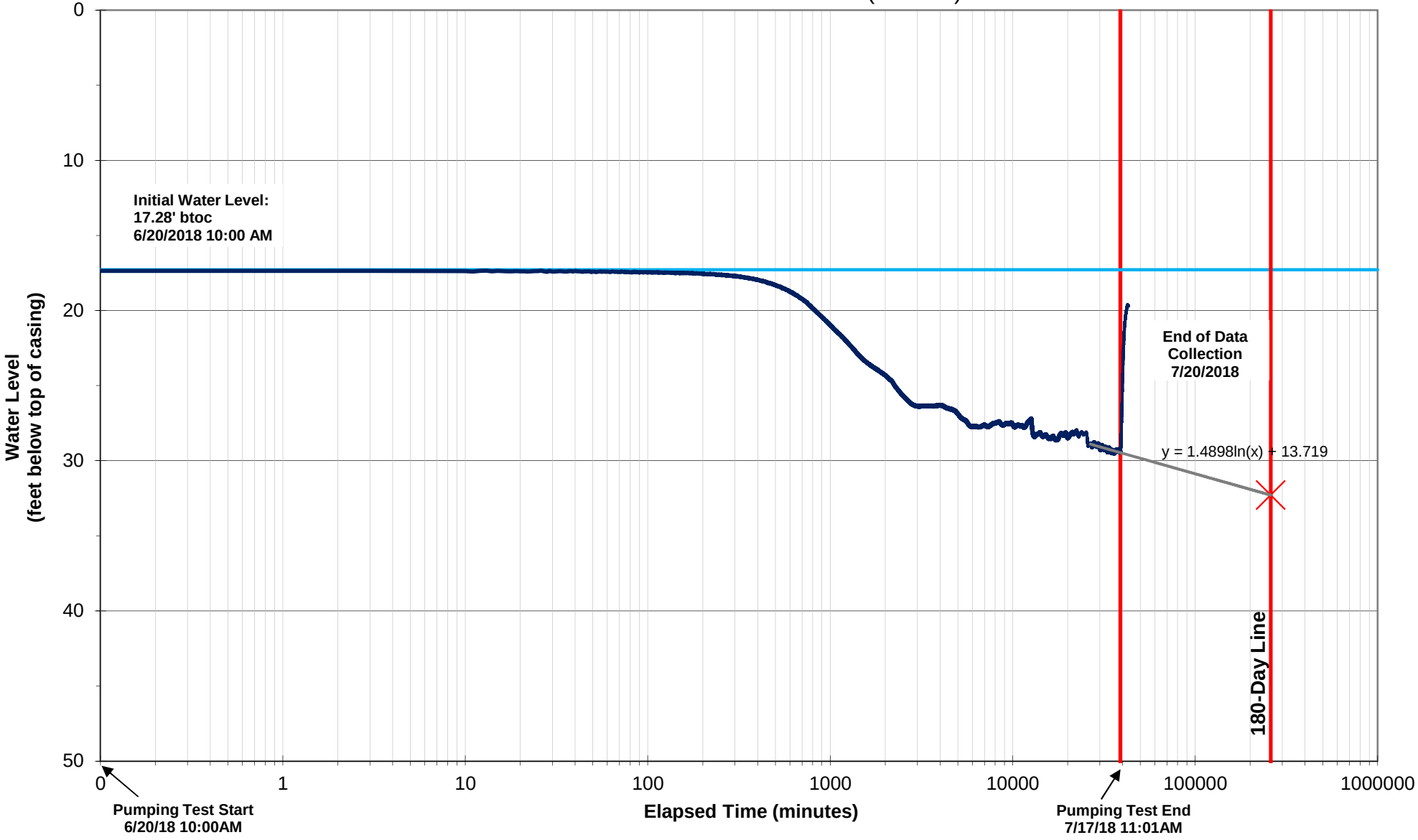
Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
117 Little River Road - Residential Well (Unused)

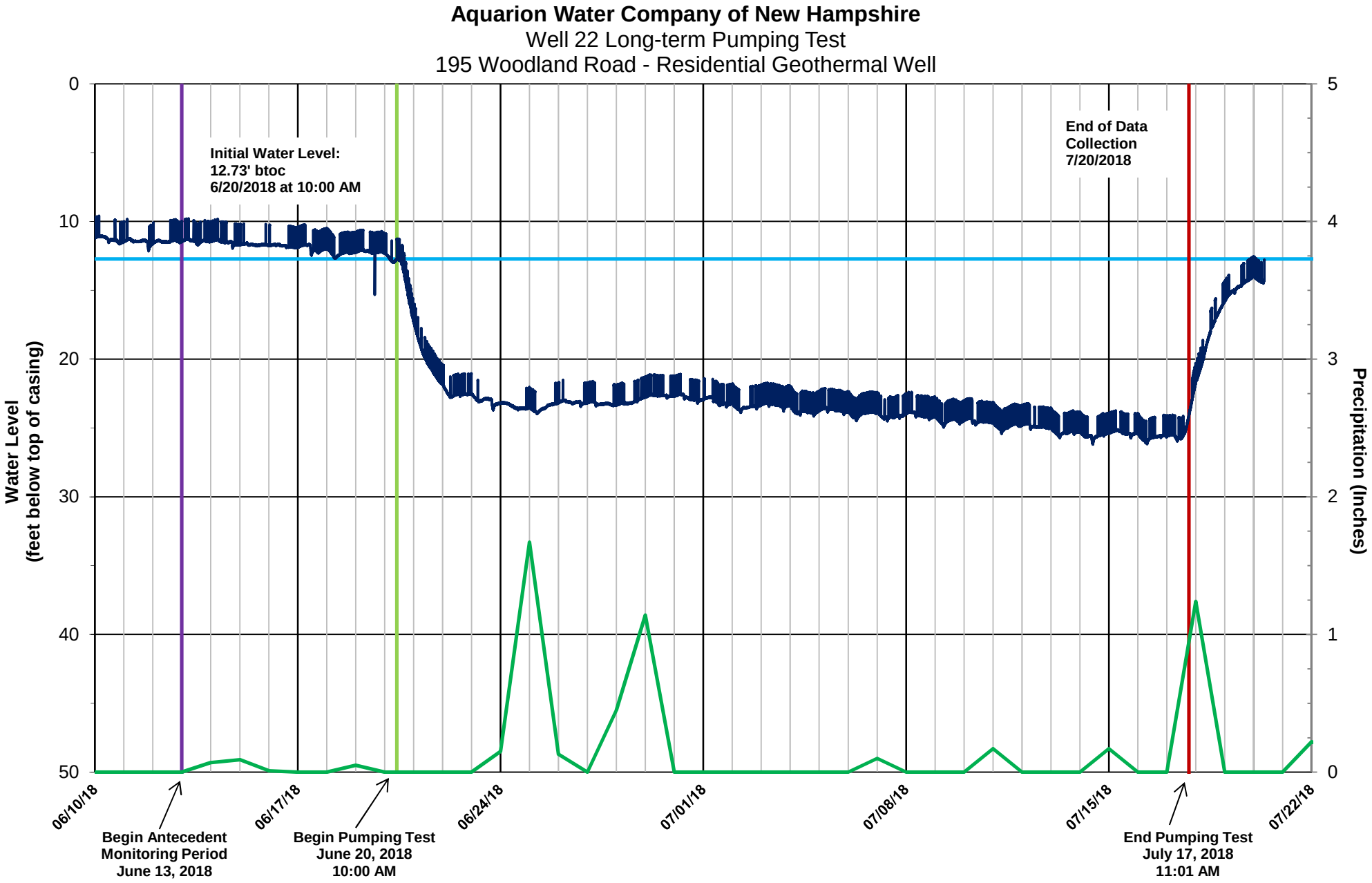


Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
117 Little River Road - Residential Well (Unused)

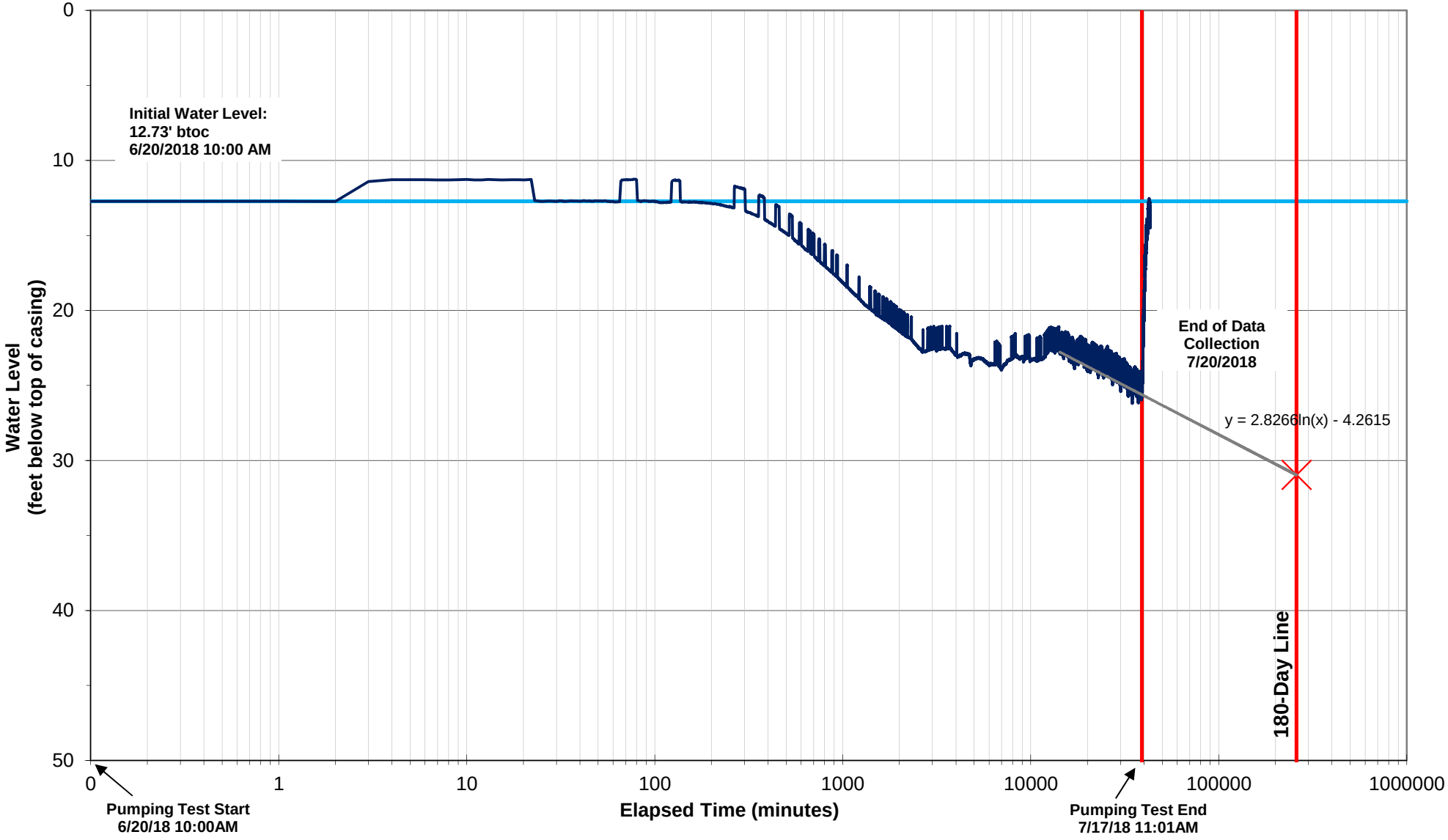


Geosphere Environmental Management, Inc.

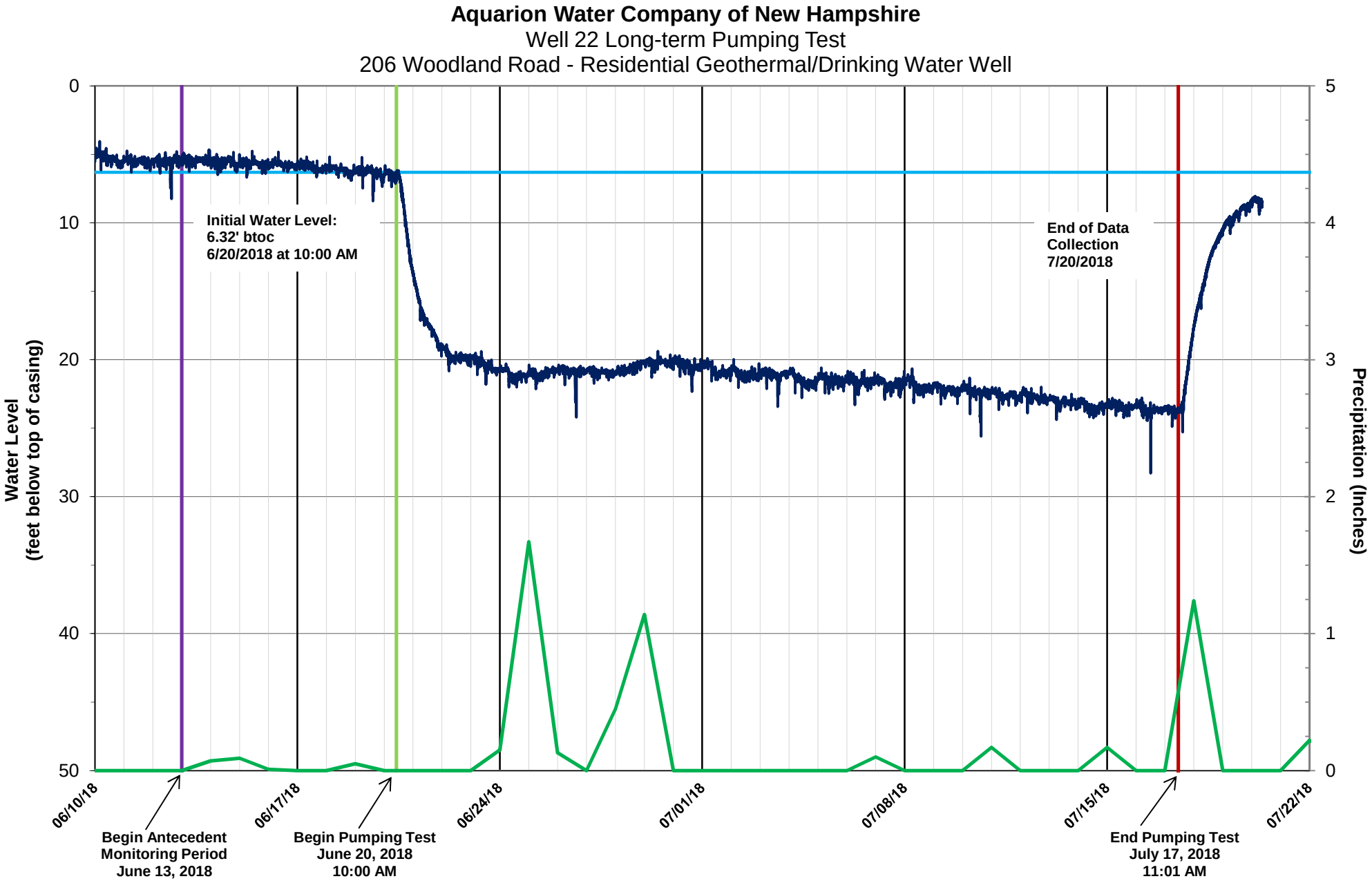


Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
195 Woodland Road - Residential Geothermal Well



Geosphere Environmental Management, Inc.

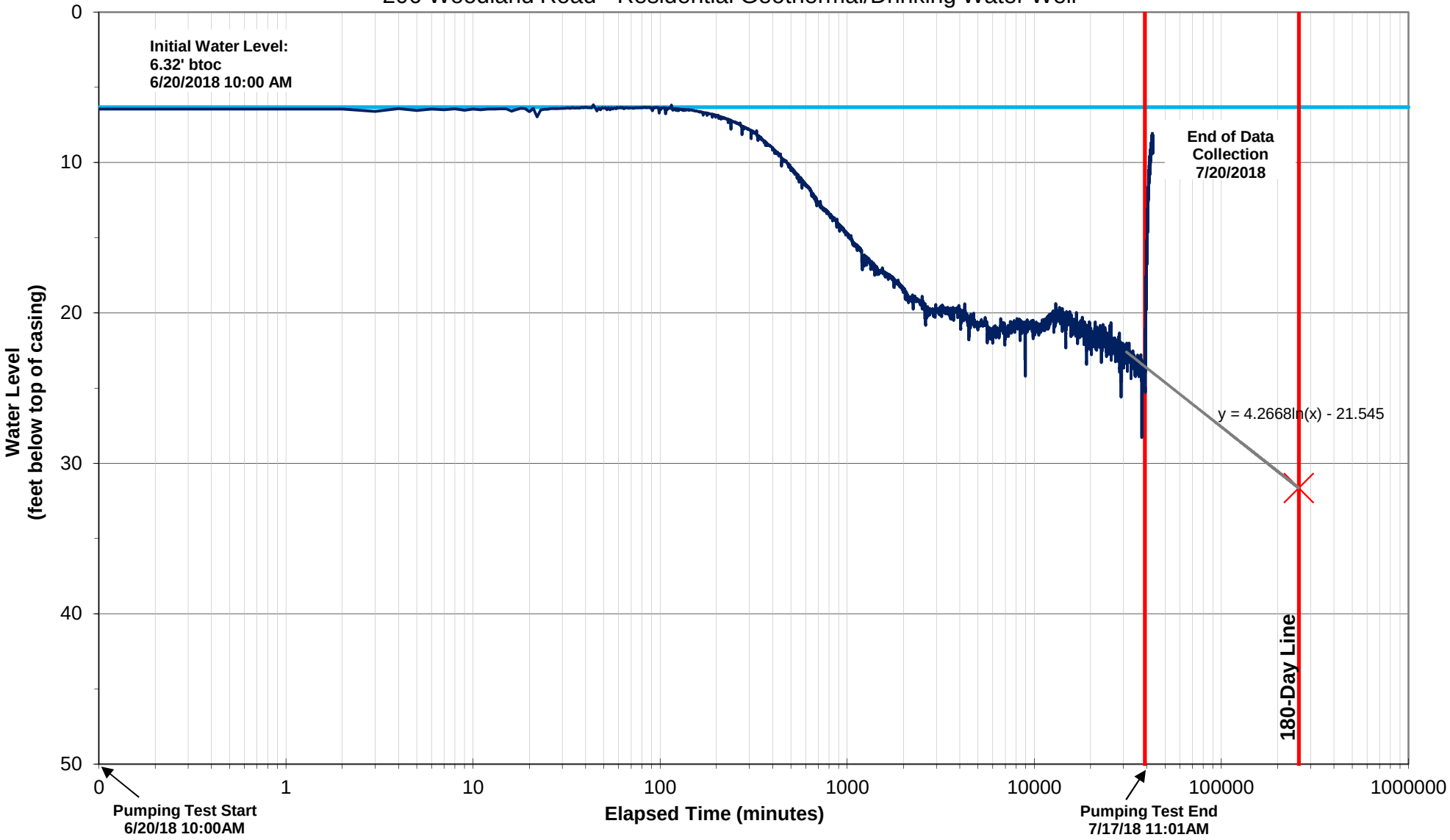


Geosphere Environmental Management, In

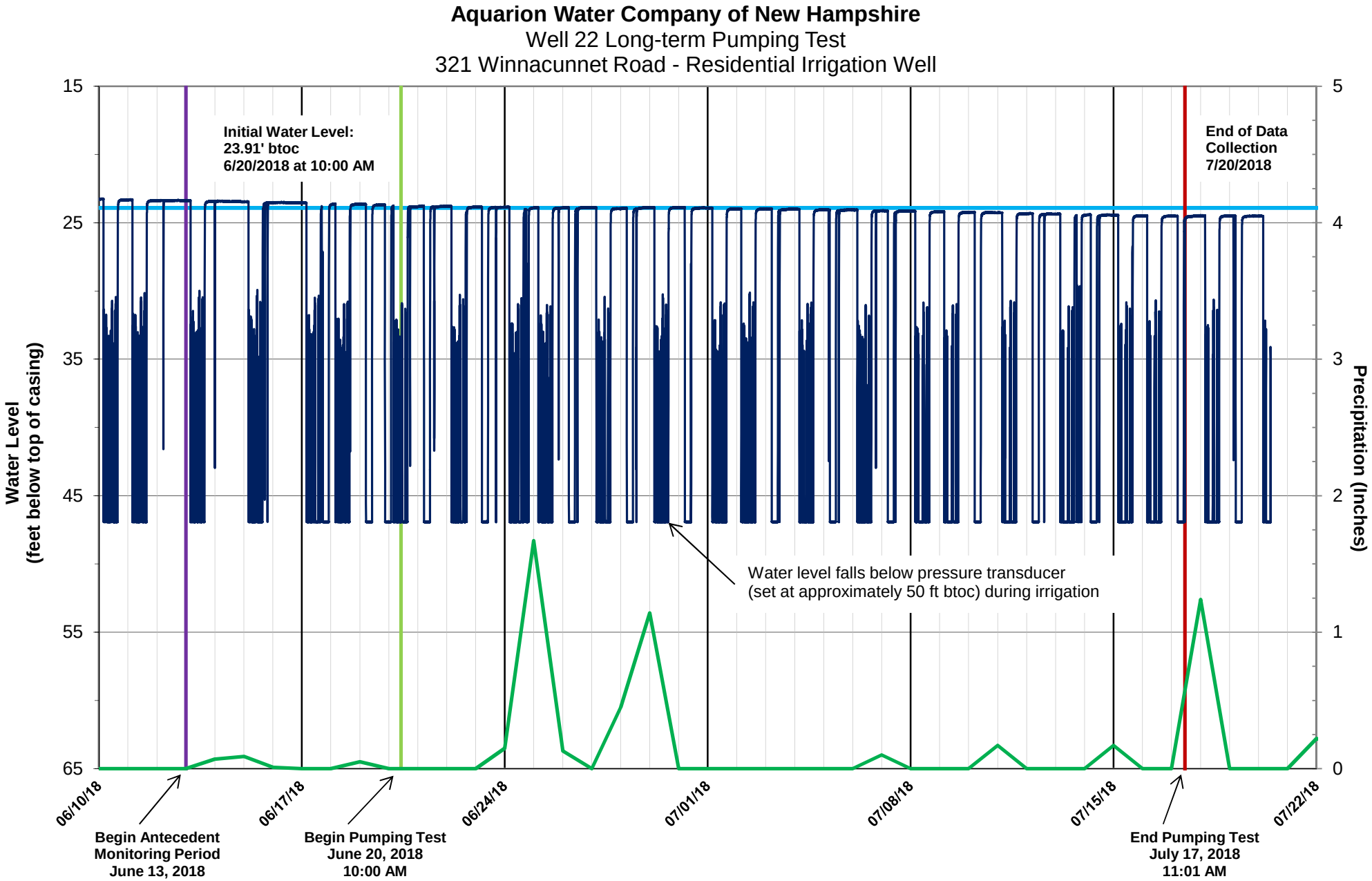
Aquarion Water Company of New Hampshire

Well 22 Long-term Pumping Test

206 Woodland Road - Residential Geothermal/Drinking Water Well

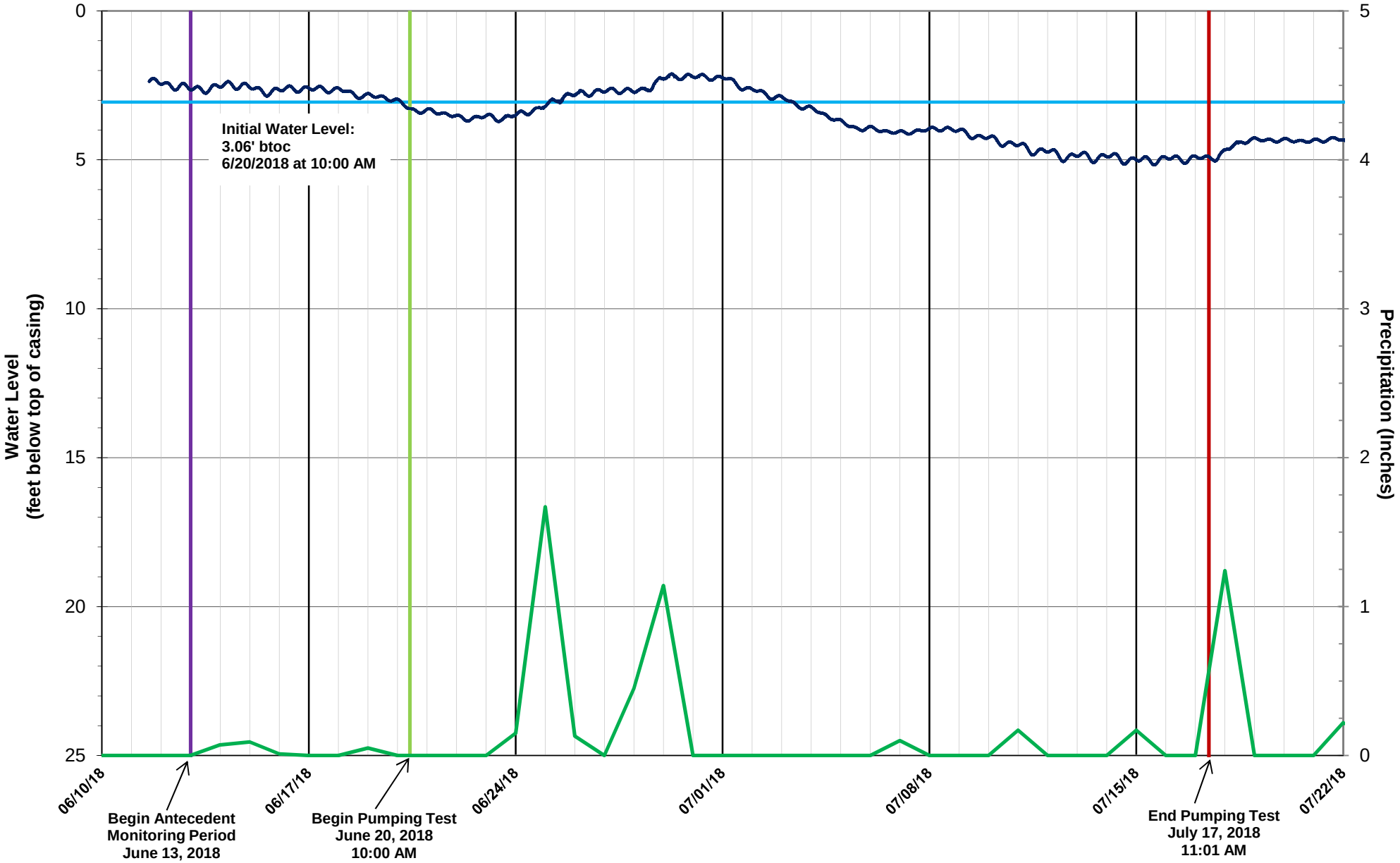


Geosphere Environmental Management, Inc.



Geosphere Environmental Management, Inc.

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Ambient Well - Exeter Road Tank Wellfield



Geosphere Environmental Management, Inc.

Appendix E

BADGER METER

PWS SCADA Equipment Summary

Badger Meter

Order #358671-2

BMI Serial #:	49980064	BME Serial #:	1801-587
BMI Item #:	100-0543	BME Part #:	9011368
BMI Catalog String:	M2-040-R1-A-RBK-S-XXGF-STD	Ship Date:	04/23/18

Detector Type 2

Nominal Size:	4 Inches or 100 DN	Pressure Rating:	150 ASA
Connection:	Type 2	Material:	C-Steel
Liner:	Hard Rubber DW	Max Temperature:	176 °F or 80 °C
Electrode:	Hastelloy C22	Protection Class:	IP 67
Detector Housing:	C-Steel painted	Detector Offset:	-0.0036 m/s
Detector Constant:	2022.2		

Amplifier: M2000

Mounting:	Remote mounted	Protection Class:	IP 67
Amplifier Housing:	Cast aluminium	Cable Length (Feet):	150
Flow Range:	3.7 to 1494 GPM	Cable Type:	
Full Scale Flow	300 GPM	Flow Direction:	Bi-directional
Min/Max Alarm:	Min = 0% Max = 100%	Power Supply:	85-265 VAC
Empty Pipe Detection Active:	Yes	Low Flow Cut Off:	0.2%
Analog Output:	4...20 mA	Pulse Rate:	1 pulse / Gallon
Pulse Output:	Active (Open Collector)	Pulse Width:	1:1
Software	1.18 ES	Full Scale Flow:	300 GPM

	Flow Rate (% of Qn)	% Deviation	
Measure Point 1:	25	0.01	Date of calibration: 02/27/18
Measure Point 2:	50	-0.17	
Measure Point 3:	75	-0.22	

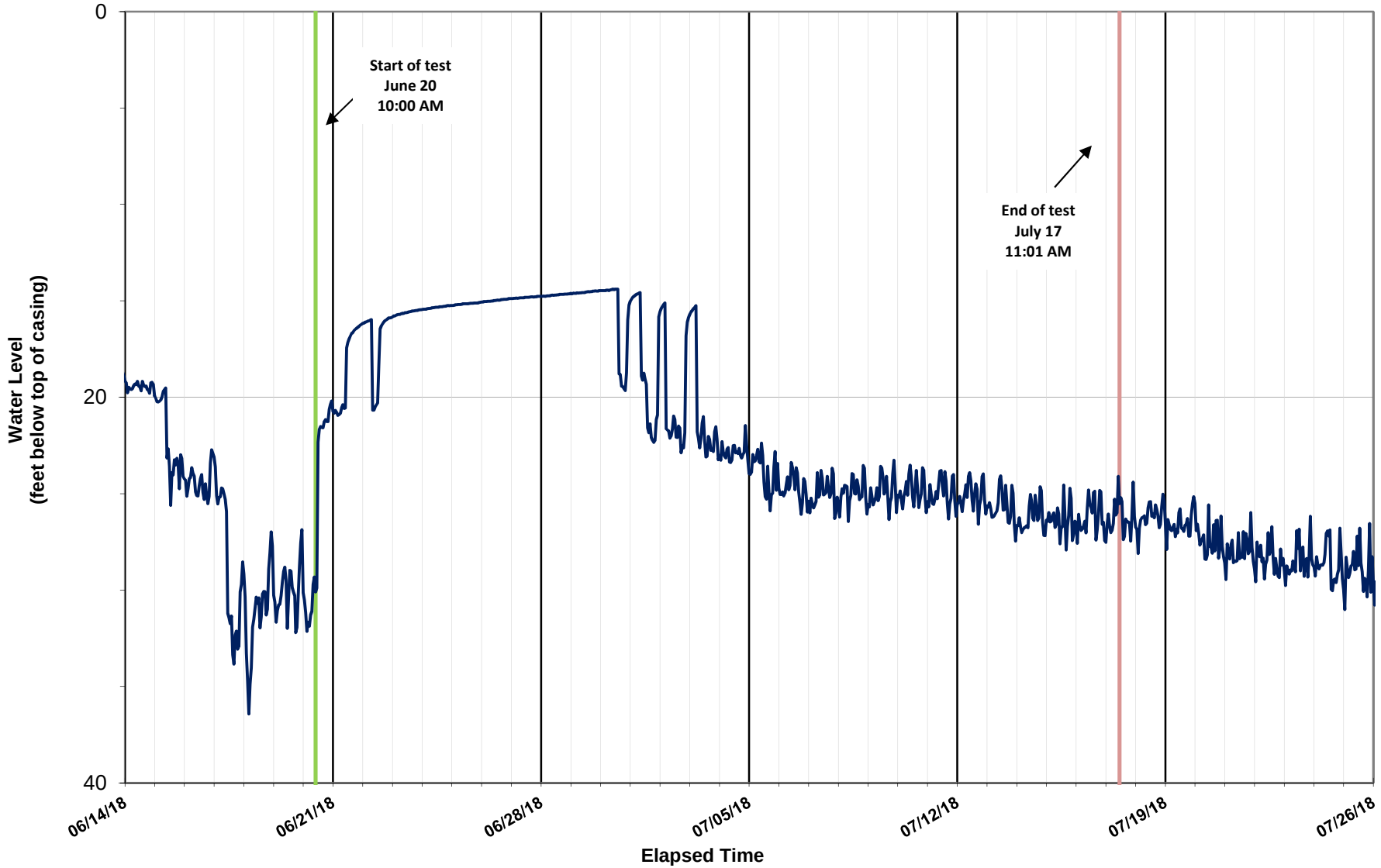
The calibration of the Badger Meter ModMag M1000, M2000, M3000, M4000, M5000 and 7600P meters, sizes ¼ inch through 20 inches, are traceable to the International Systems of units using the services of the Czech Metrology Institute (CMI). The National Institute of Standards and Technology (NIST) recognizes the validity of CMI's calibration and measurement certificates.

PWS SCADA WATER LEVEL GRAPHS

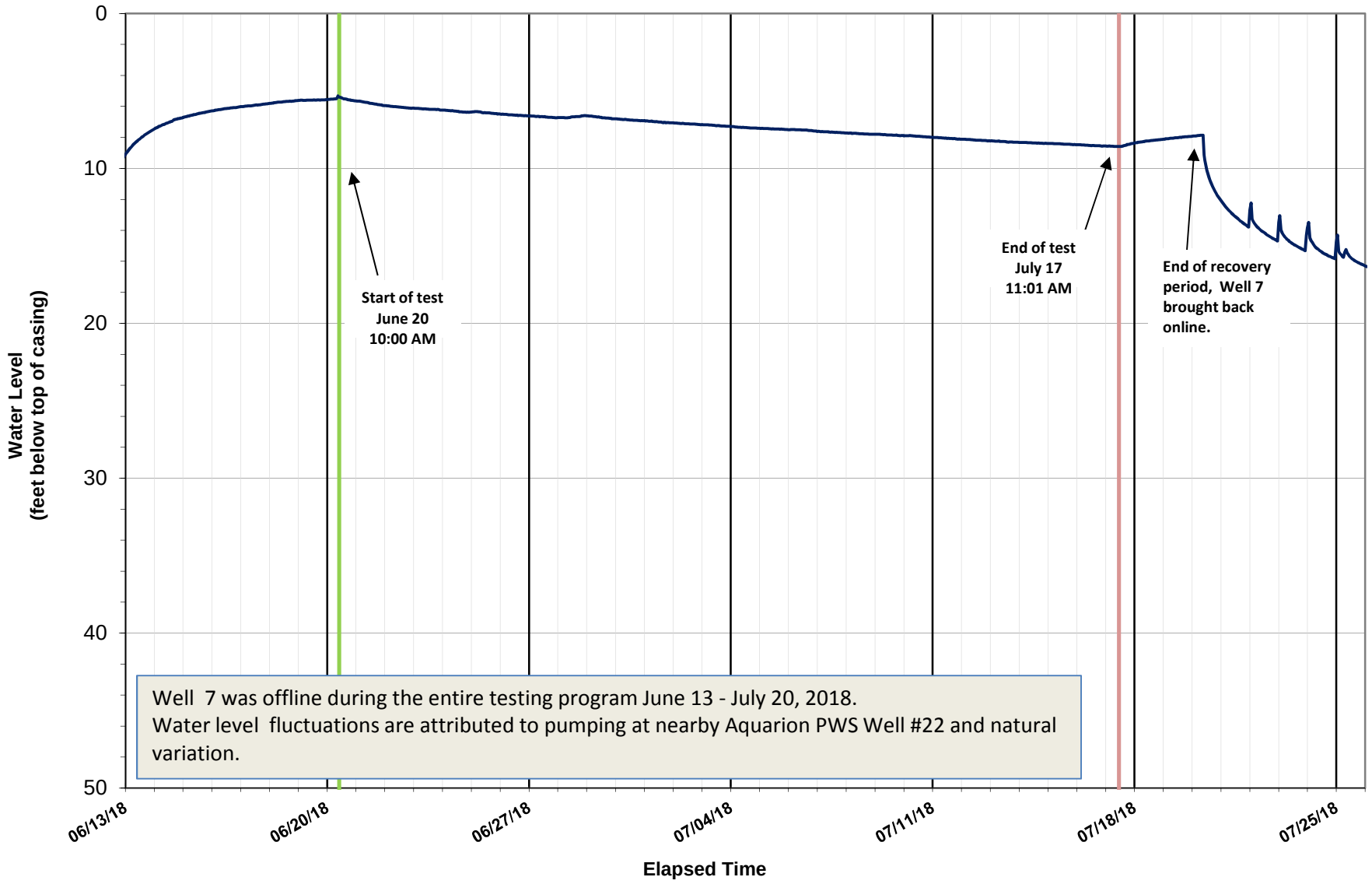
for

PWS Wells within PIA
(Wells 6, 7, 8A, 9, 11, and 20)

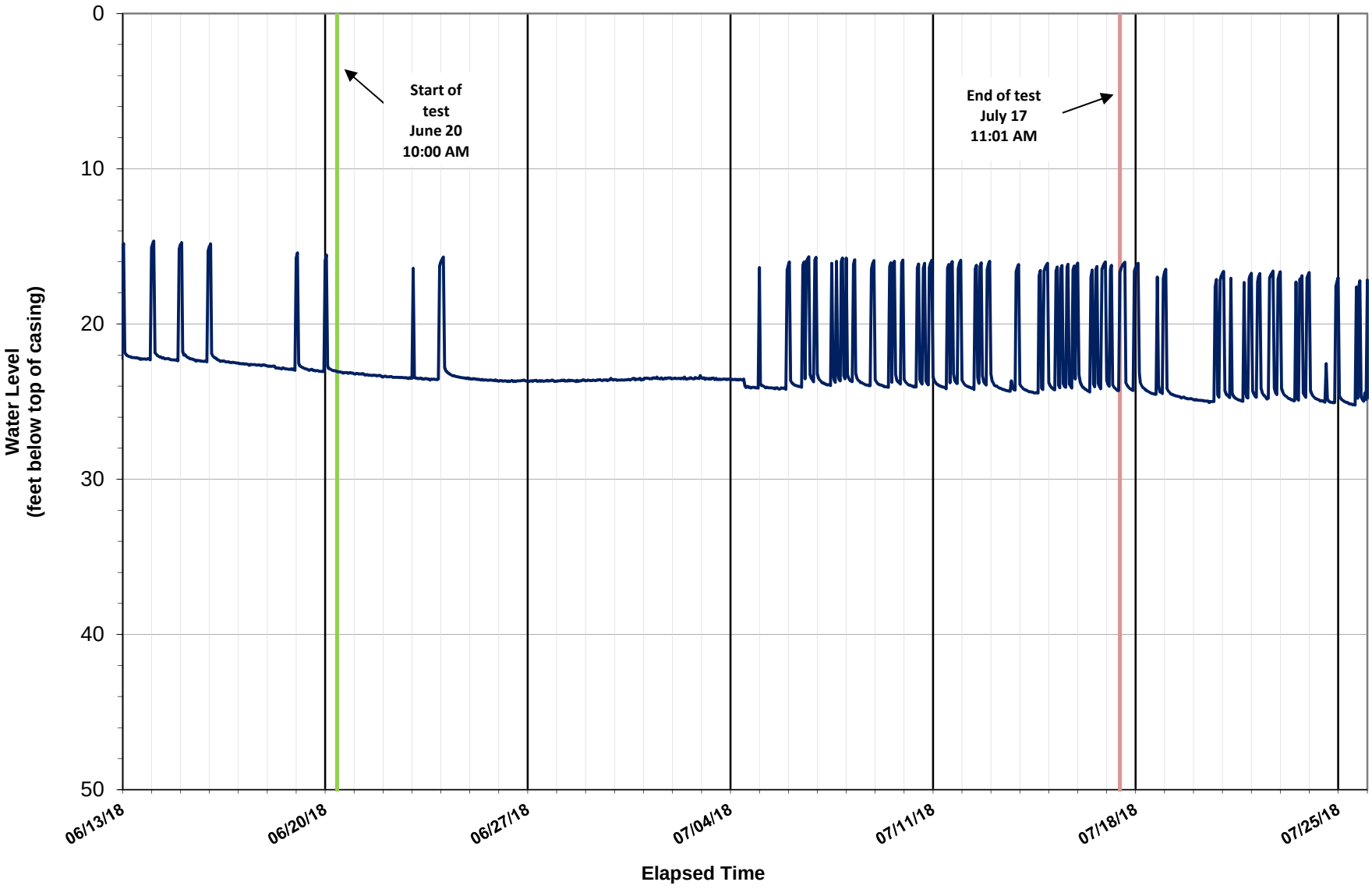
Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Well 6 Linear Graph



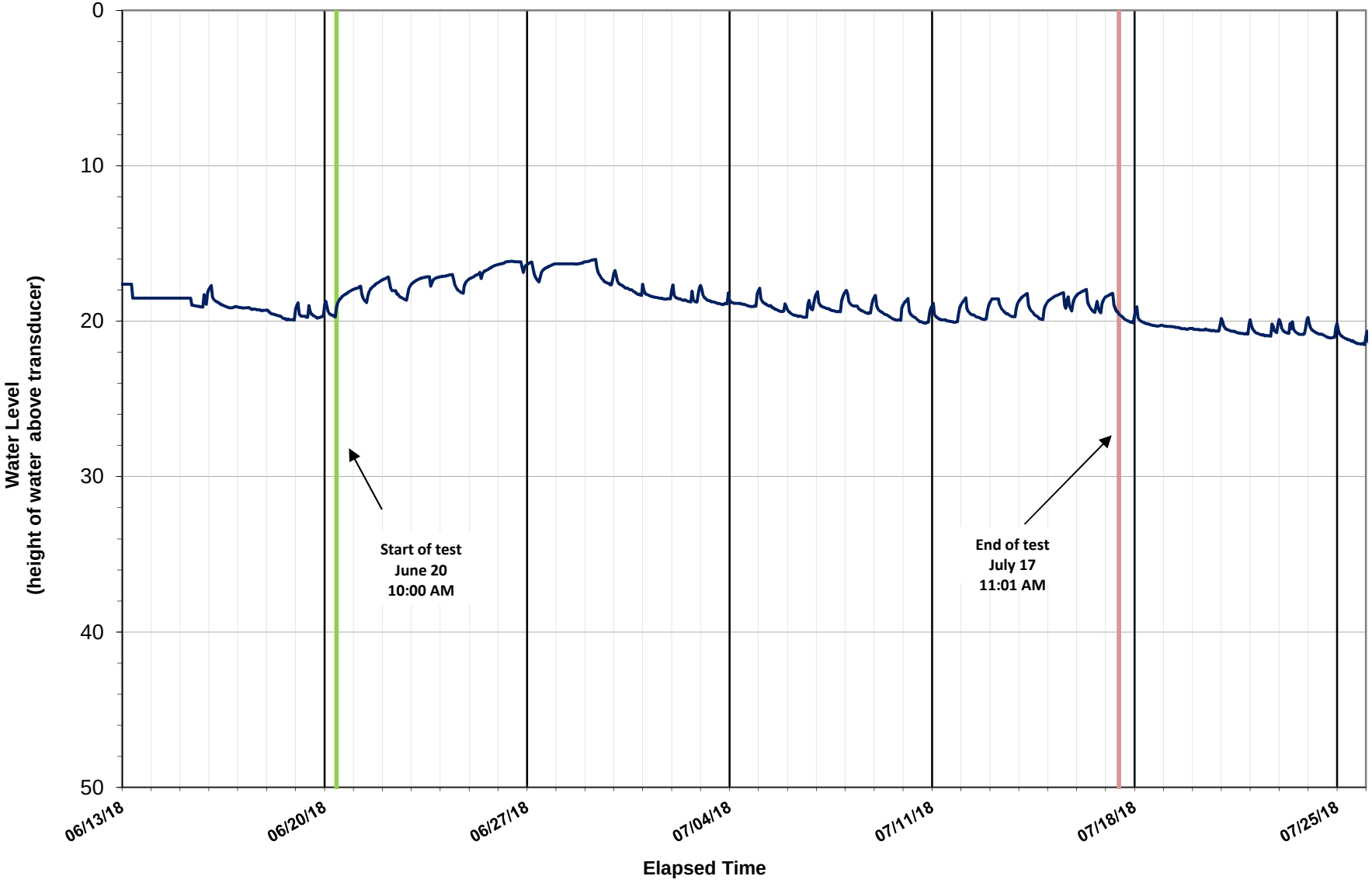
Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Well 7 Linear Graph



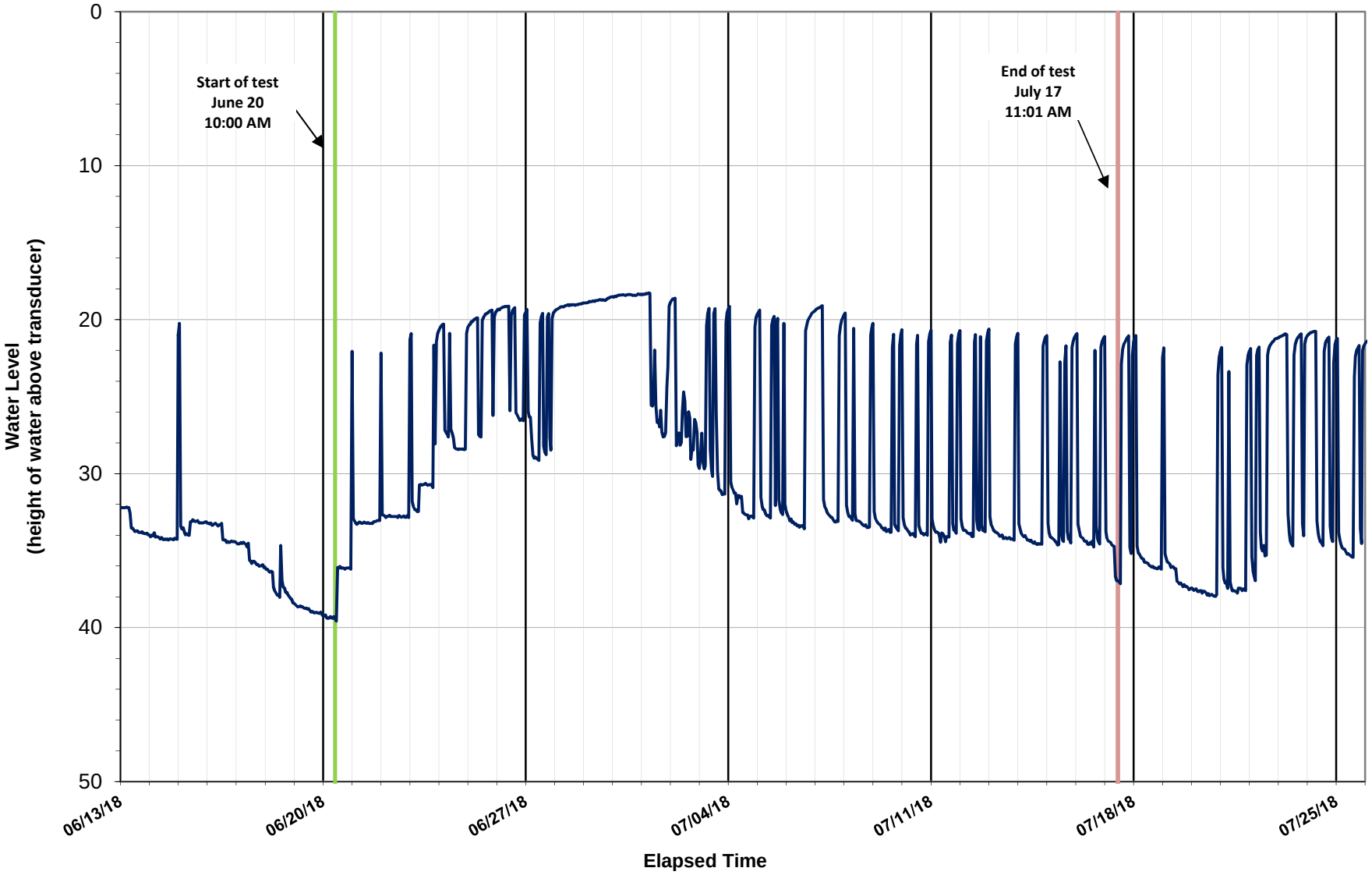
Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Well 8A Linear Graph



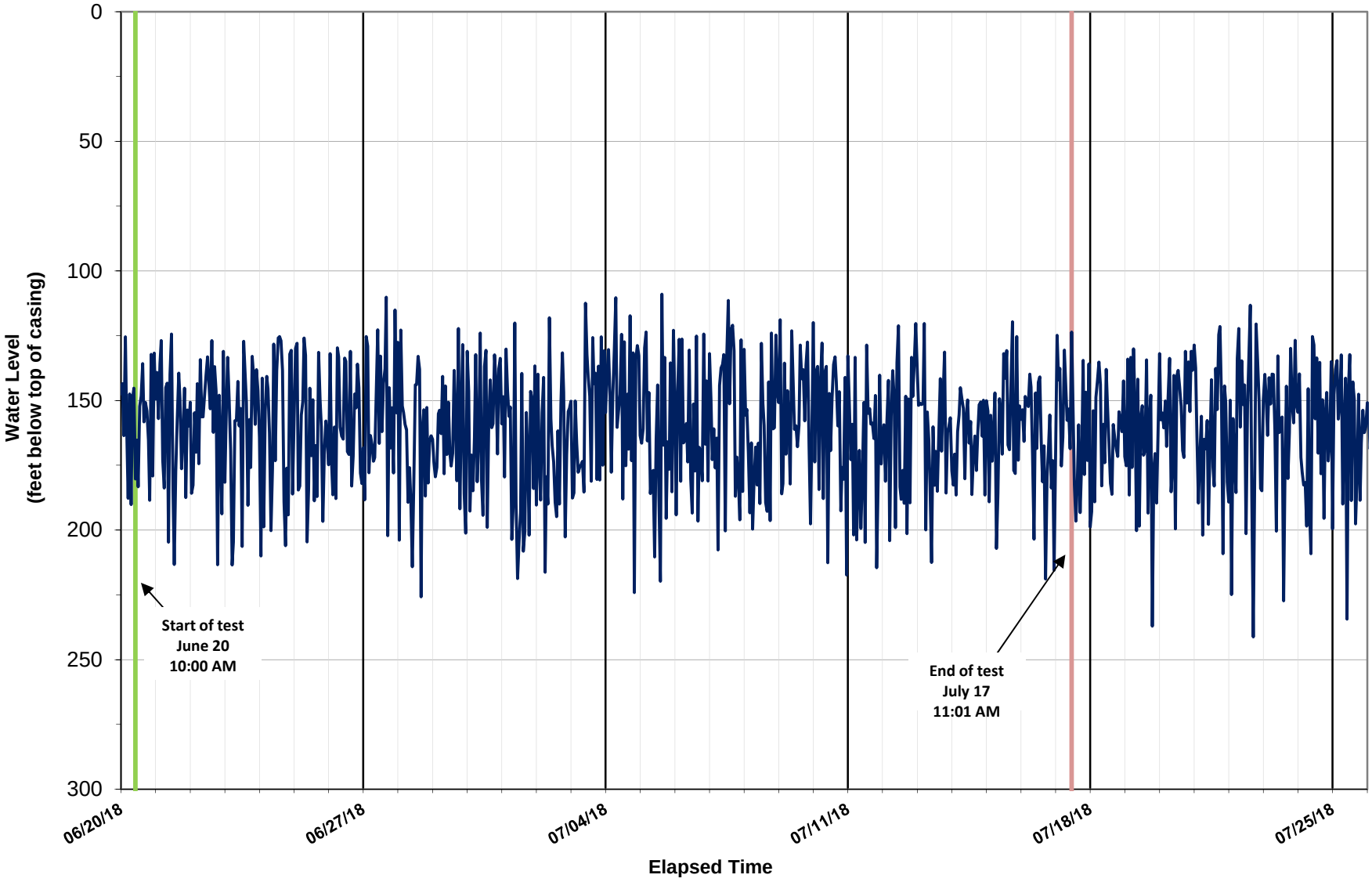
Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Well 9 Linear Graph



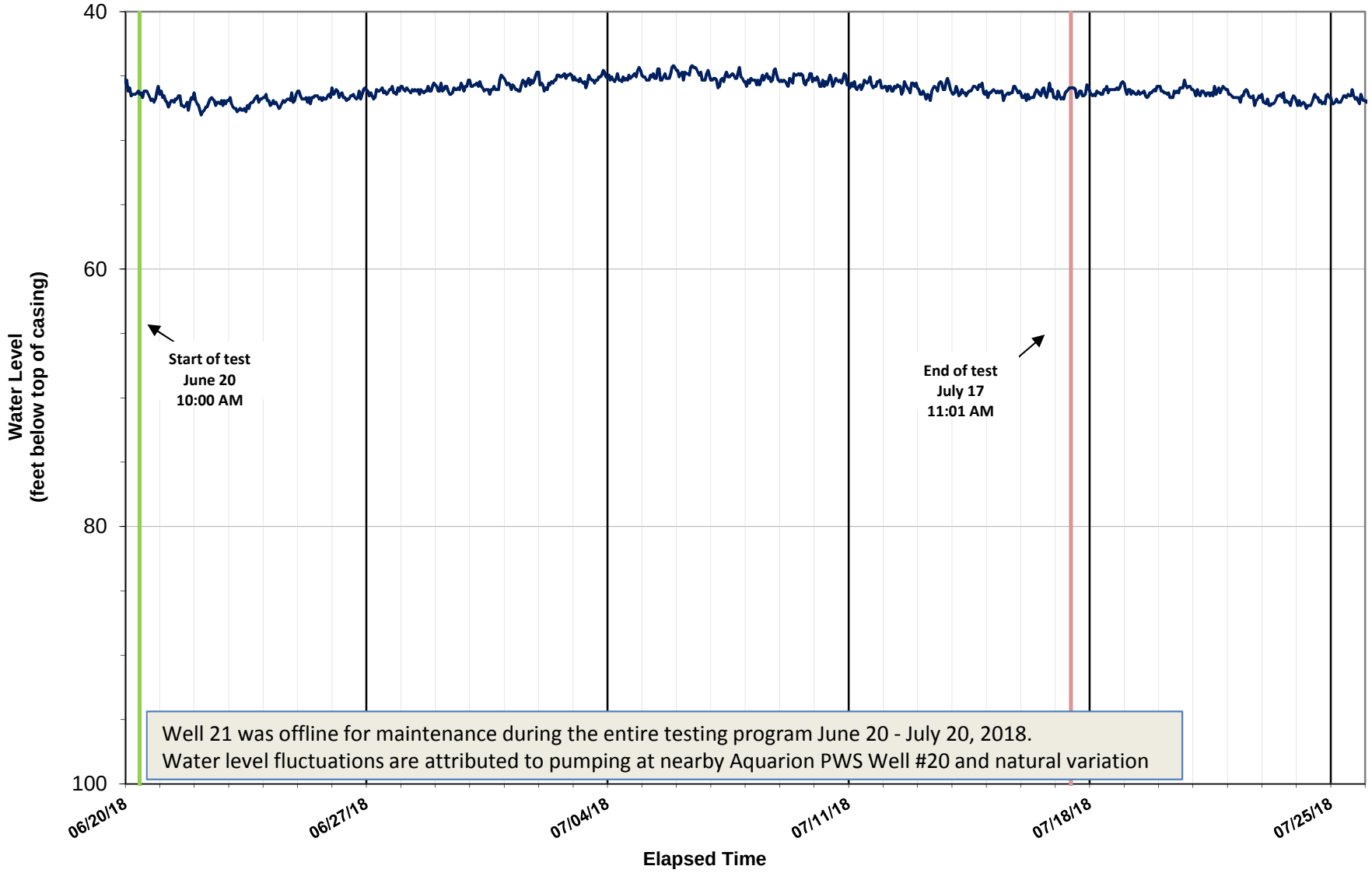
Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Well 11 Linear Graph



Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Well 20 Linear Graph



Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Well 21 Linear Graph



Pumping Test Discharge and Water Level Data (SCADA Tables)

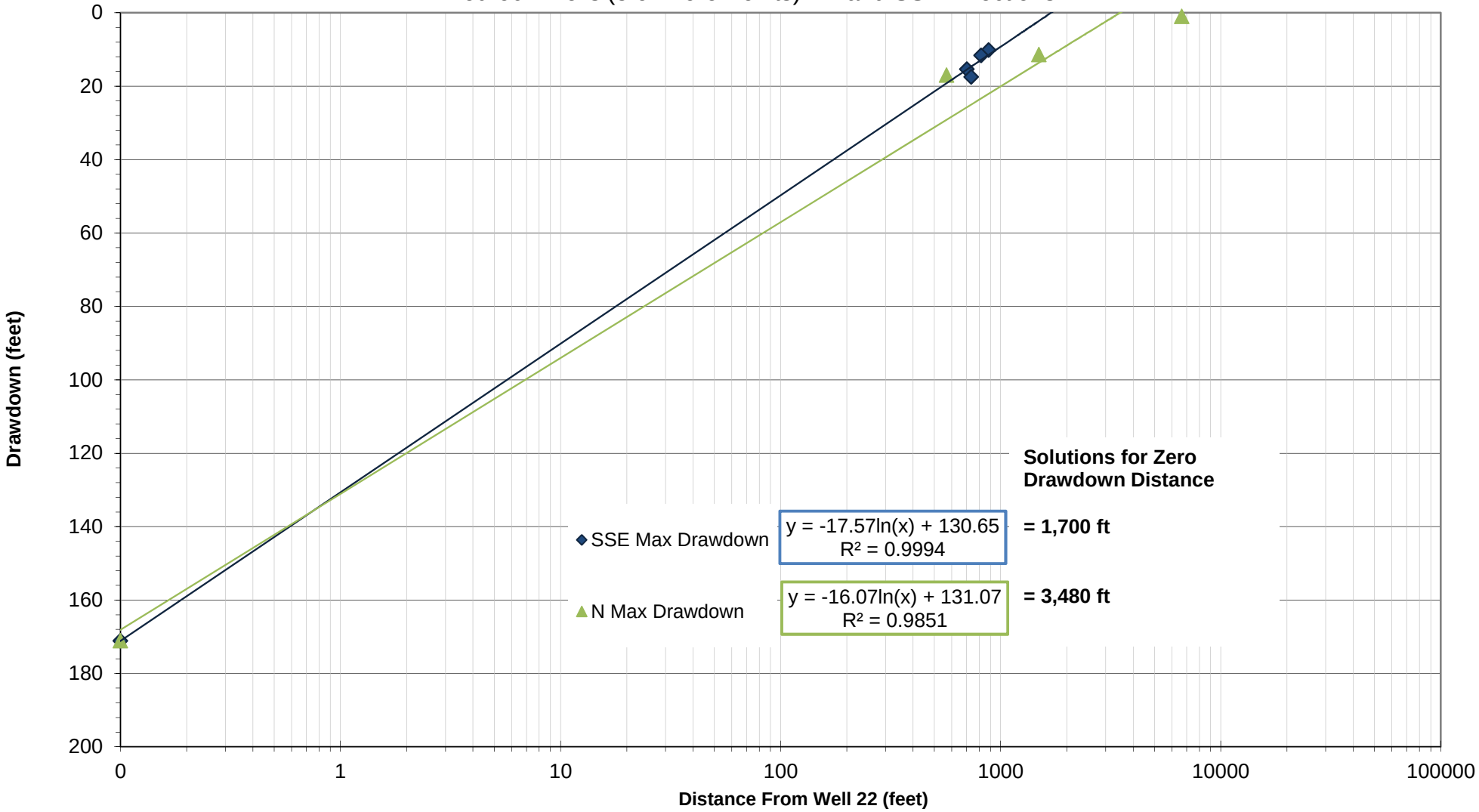
See CD included with Report

Appendix F

DISTANCE vs. DRAWDOWN GRAPHS

Maximum Observed Drawdowns

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Distance vs. Maximum Drawdowns
Bedrock Wells (3 or More Points) - N and SSE Directions

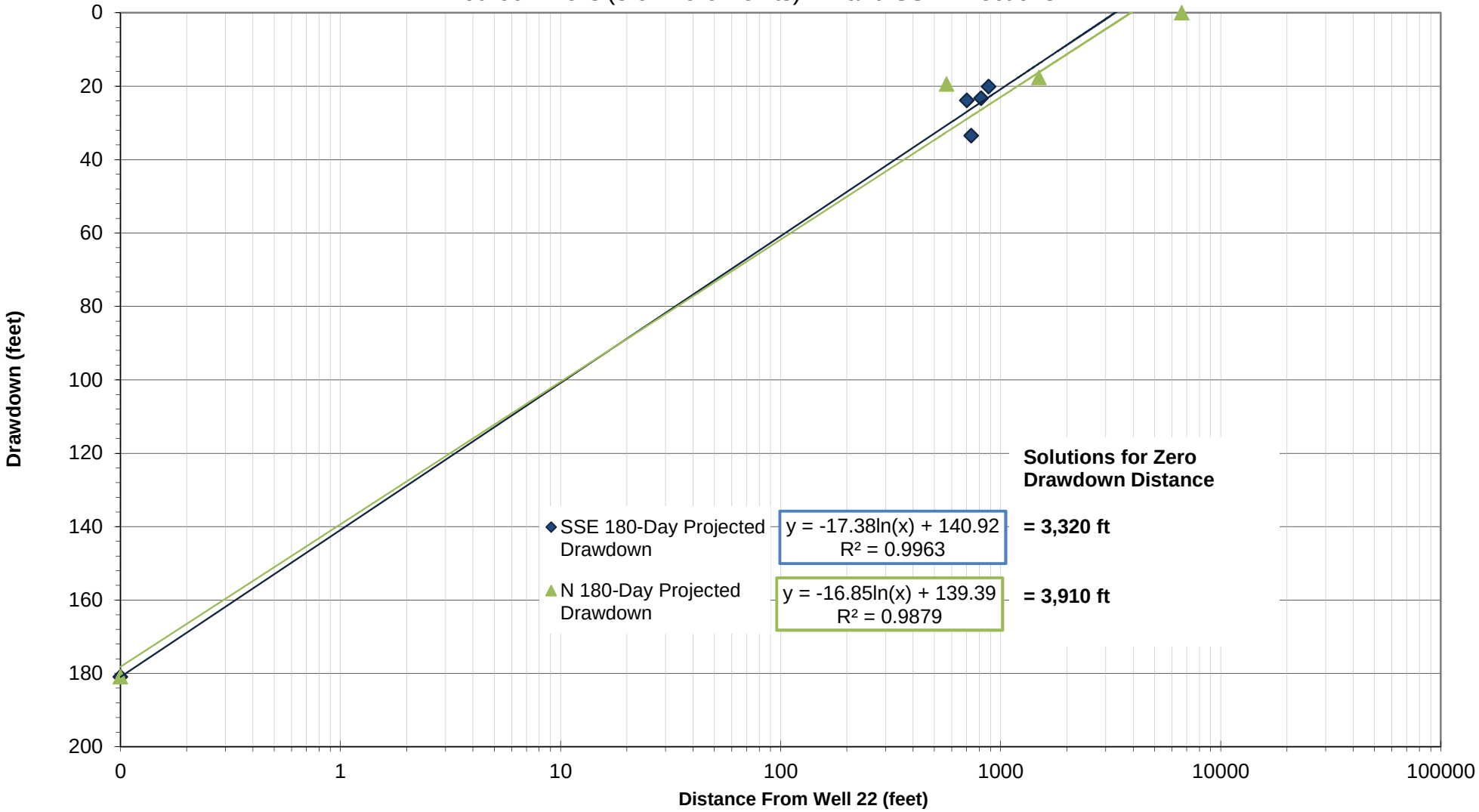


Geosphere Environmental Management, Inc.

DISTANCE vs. DRAWDOWN GRAPHS

180-Day Projected Drawdowns

Aquarion Water Company of New Hampshire
Well 22 Long-term Pumping Test
Distance vs. 180-Day Projected Drawdowns
Bedrock Wells (3 or More Points) - N and SSE Directions



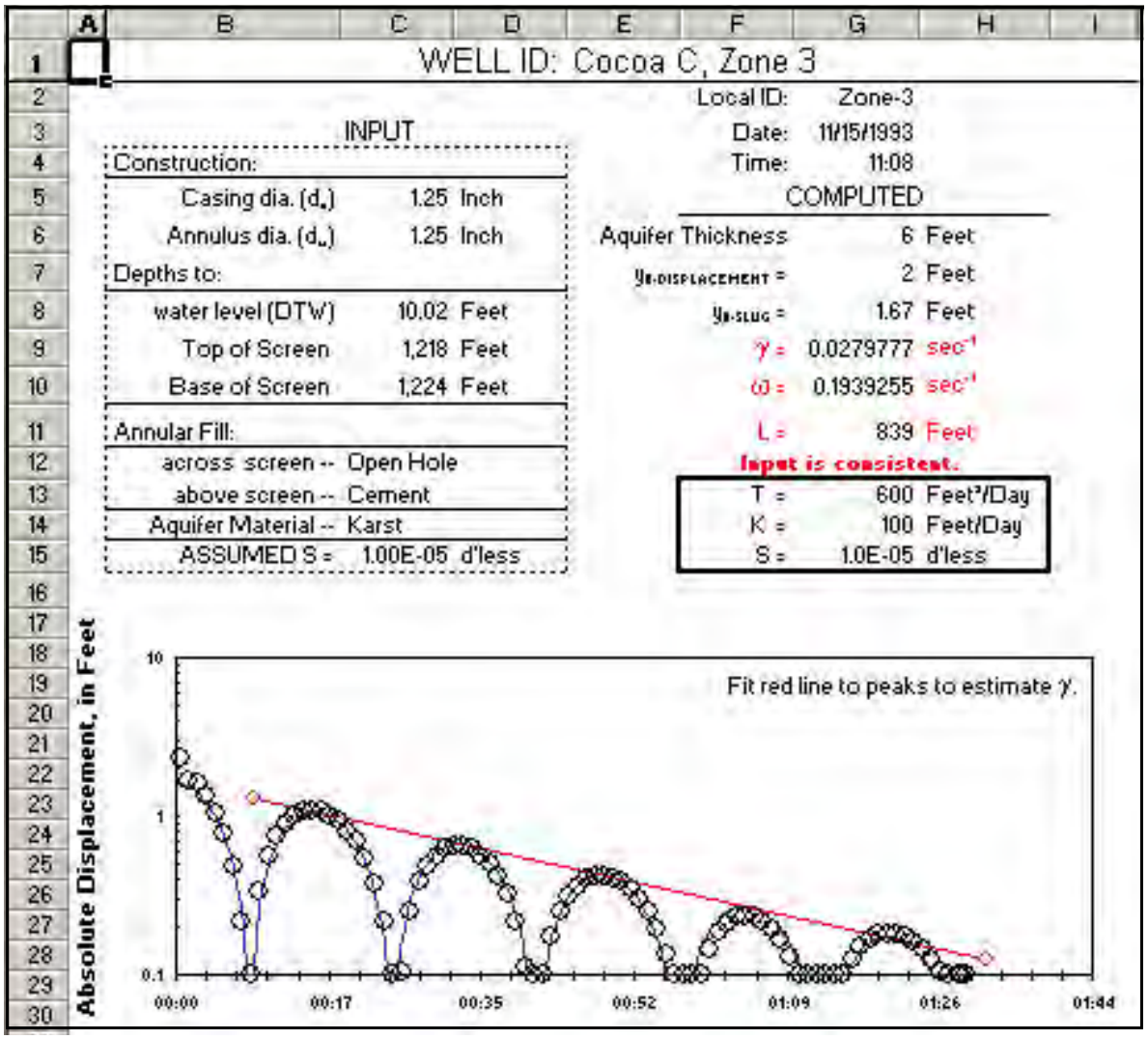
Geosphere Environmental Management, Inc.

USGS Cooper-Jacob Recovery Analytical Solution for Well 22 Transmissivity

U.S. Department of the Interior
U.S. Geological Survey

Documentation of Spreadsheets for the Analysis of Aquifer-Test and Slug-Test Data

Open-File Report 02–197



USGS
science for a changing world

Cooper-Jacob Straight-Line Method

The Cooper-Jacob method (Cooper and Jacob, 1946), commonly referred to as the straight-line method, is a simplification of the Theis (1935) solution for flow to a fully penetrating well in a confined aquifer. The method may be used to analyze data from a single pumping well. The Jacob (1947) equation for predicting drawdown at the well is:

$$s = \frac{Q}{4\pi T} \ln \frac{2.25\,T\,t}{r_w^2\,S}$$

where,

T is aquifer transmissivity (L^2/T),

Q is the constant discharge rate (L^3/T),

S is the storage coefficient (L/L),

s is drawdown (L),

t is time (T), and

r_w is the well radius (L).

The same assumptions apply to the Cooper-Jacob analytical solution as the Theis solution, but the well function ***W(u)*** is calculated for $u < 0.01$ in order to neglect all but the first two terms of the infinite series of the well function in the Theis equation. A straight-line approximation of ***W(u)*** is adequate for most applications even where u is as great as 0.1.

For the Cooper-Jacob straight-line method, drawdown is plotted with an arithmetic scale on the y-axis versus time plotted with a logarithmic scale on the x-axis. Transmissivity (T) is estimated from the pumping rate (Q) and the change in drawdown per log-cycle (Δs) from the following equation:

$$T = \frac{2.3Q}{4\pi} \frac{1}{\Delta s}$$

where,

Δs is change in drawdown per log-cycle (L).

Well losses and partial-penetration have a minimal effect on transmissivity values that are estimated using the Cooper-Jacob method. Well losses and partial penetration affect drawdowns by a fixed amount that changes very little after a well has been discharging for a while (minutes to hours after production begins). Additional drawdown at later times is due to declining heads in the aquifer and the rate of decline is controlled mostly by the transmissivity of the aquifer. Analyzing the change in drawdown at later times negates the effect of a fixed offset due to well losses and partial-penetration on the determination of transmissivity.

WELL ID: AQUARION WELL 22 - RECOVERY

Local ID: Hypo-1
Date: 4/4/2001
Time: 10:00

INPUT

Construction:		
Casing dia. (d_c)	10	Inch
Annulus dia. (d_w)	10	Inch
Screen Length (L)	493	Feet
Depths to:		
water level (DTW)	12.44	Feet
Top of Aquifer	67	Feet
Base of Aquifer	560	Feet
Annular Fill:		
across screen --	Open Hole	
above screen --	Cement	
Aquifer Material --	Fractured Igneous and	
FLOW RATE	850	GPM

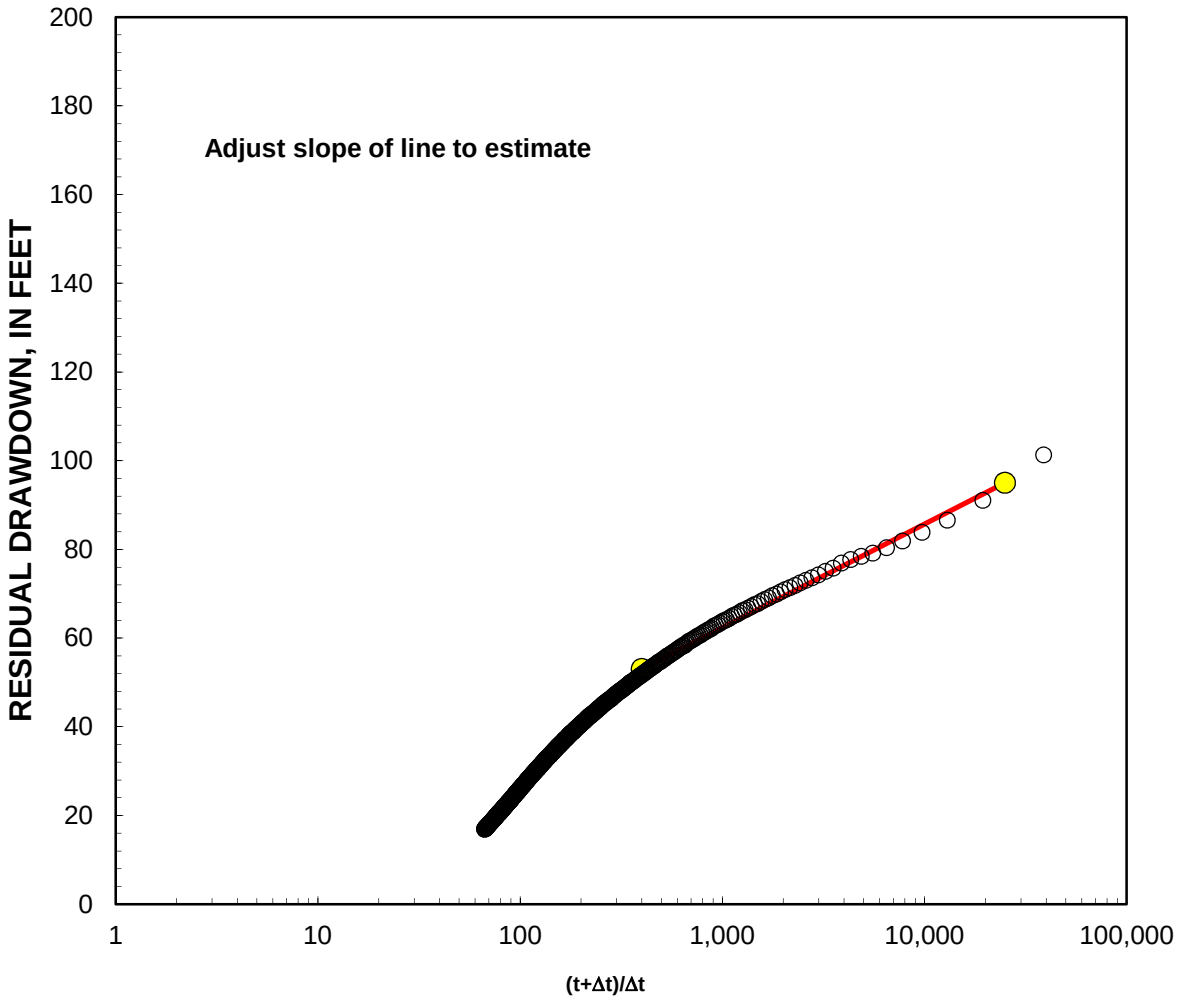
COMPUTED

Aquifer thickness = 500 Feet

Slope = 23.38686 Feet/log10

Input is consistent.

K = 3 Feet/Day
T = 1,000 Feet2/Day



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

Raw Recovery Data for Aquarion Well 22

Inch	0.083333	Second	1.15741E-05		GPM	192.51337
Feet	1	Minute	0.000694444		ft3/d	1
Meter	3.283333	Hour	0.041666667		ft3/s	86400
cm	0.032833	Day	1		m3/d	35.395245
mm	0.003283				m3/s	3058149.2
PSI	2.31				liters/s	3058.1492
					liters/min	50.969153
Out Units =					cc/s	3.0581492
Convert =	1	Feet2/Day				
Convert =	1	Feet/Day				

Casing dia. (dc)	9	Inch	
Annulus dia. (dw)	9	Inch	
Screen Length (L)	493	Feet	
Depths to:			
water level (DTW)	12.44	Feet	
Top of Aquifer	67	Feet	
Base of Aquifer	560	Feet	
Annular Fill:			
across screen --	Open Hole		
above screen --	Cement		
Aquifer Material --	Fractured Igneous and Metamorphic Rock		
wetted hole	493	Feet	
Aquifer thickness =	493	Feet	
Aquifer thickness =	493	feet	
Aquifer thickness =	493	Feet	**100**
Aquifer thickness =	500	Feet	**5**
Fraction penetrated =	1		
slope points	400	53	
	25000	95	
FLOW RATE	845.00	GPM	
FLOW RATE	162673.8	ft^3/d	
Rc =	0.375	ft	
Rw =	0.375	ft	
Slope =	23.38686	feet/log_{10}	
		feet/log_{10}	
T =	1,273	ft2/d	
	1273.103	Feet2/Day	**1000**
	1000	Feet2/Day	**1**
K =	2.582359	ft/d	
	2.582359	Feet/Day	**1**
K =	3	Feet/Day	**3**

Significant Digits = 1

Output Length = Feet
Output Time = Day

Number of points in list = 100

Annular Fill	GROUTS	Aquifer Material	Common Rock Properties Extreme Kmin, ft/d	Likely Kmin, ft/d	Likely Kmax, ft/d	Extreme Kmax, ft/d	Rock Type	References
Gravel	Bentonite	Gravel	90	300	3000	3000	Unconsolidated Sedimentary Rock	1,5
Coarse Sand	Cement	Sand and Gravel Mixes	1	30	300	300	Unconsolidated Sedimentary Rock	1
Medium Sand	Backfill	Coarse Sand	50	70	300	300	Unconsolidated Sedimentary Rock	1
Fine Sand	Open Hole	Medium Sand	1	20	70	200	Unconsolidated Sedimentary Rock	1,5
Open Hole		Fine Sand	0.05	3	20	20	Unconsolidated Sedimentary Rock	1,5
		Gulf Coast Aquifer Systems (6603 values)	2	30	200	800	Unconsolidated Sedimentary Rock	2
		Stream Terrace Deposit, Fort Worth, Texas (59	0.01	1	100	300	Unconsolidated Sedimentary Rock	3
		Surficial Aquifer, central Florida (fine sand and	0.01	0.1	30	50	Unconsolidated Sedimentary Rock	4
		Silt, Loess	0.0003	0.001	0.1	6	Unconsolidated Sedimentary Rock	5
		Till	0.0000003	0.003	0.3	0.6	Unconsolidated Sedimentary Rock	1,5
		Clay soils (surface)	0.01	0.01	1	1	Unconsolidated Sedimentary Rock	1
		Clay	0.000001	0.00001	0.0001	0.001	Unconsolidated Sedimentary Rock	5,7
		Unweathered Marine Clay	0.0000002	0.0000002	0.0006	0.0006	Carbonate Rocks	5
		Karst	0.3	10	1000	10000	Carbonate Rocks	4,5,8
		Reef Limestone	0.3	10	1000	6000	Carbonate Rocks	5
		Limestone, Dolomite	0.0003	0.004	0.1	2	Carbonate Rocks	5
		Fine-Grained Sandstone	0.0001	0.001	1	6	Indurated Sedimentary Rock	1,6
		Medium-Grained Sandstone	0.001	1	10	80	Indurated Sedimentary Rock	6,9
		Siltstone	0.000001	0.00001	0.005	0.04	Indurated Sedimentary Rock	6
		Claystone	0.000000003	0.000001	0.00001	0.00003	Indurated Sedimentary Rock	6,7
		Anhydrite	0.0000001	0.0000001	0.006	0.006	Indurated Sedimentary Rock	5
		Shale	0.00000001	0.0000001	0.0001	1	Metamorphic or Volcanic Rock	7
		Permeable Basalt	0.1	1	100	6000	Metamorphic or Volcanic Rock	5
		Fractured Igneous and Metamorphic Rock	0.001	0.05	10	100	Metamorphic or Volcanic Rock	1
		Weathered Granite	0.1	1	10	20	Metamorphic or Volcanic Rock	6
		Weathered Gabbro	0.1	0.1	1	1	Metamorphic or Volcanic Rock	6
		Basalt	0	0.03	0.1	0.1	Metamorphic or Volcanic Rock	5
		Unfractured Igneous and Metamorphic Rock	0	0.000000009	0.00006	0.00006	Metamorphic or Volcanic Rock	1,5
		Unfractured Igneous and Metamorphic Rock	0	0.000000009	0.00006	0.00006		

1 Bouwer, 1978 (order of magnitude in meter/day)
2 Prudic, 1991
3 Sonia A. Jones, USGS, Written commun., 1998
4 Slug Test Results1998-2001, Orlando Subdistrict, USGS
5 Domenico and Schwartz, 1990
6 Morris and Johnson, 1967
7 Wolff, 1982
8 Reese and Cunningham, 2000
9 Kuniansky and Hamrick, 1998

Appendix G

TABULATED WATER LEVEL DATA

Well 22 and Monitoring Points

See CD included with Report

Well 22
Ambient Well
OBS-1
7-OBS
BARO (psi)
PZ-1
PZ-2
PZ-3
PZ-4
SG-1
SG-2

TABULATED WATER LEVEL DATA

Residential Wells

See CD included with Report

7 Springhead
8 Springhead
10 Springhead
12 Springhead
38 Edgewood
59 Edgewood
81 Landing
11 Bear Path
23 Esker
31 Windmill
78 Little River
83 Little River
117 Little River
53 Winnacunnet
321 Winnacunnet
110 Mill
82 Woodland
195 Woodland
206 Woodland

Appendix H

Laboratory Reports- Eastern Analytical, Inc.

Well 22 – Day 1
June 20, 2018

Analyses:

- Secondary Parameters
- Inorganic Compounds
- Volatile Organic Compounds
- Nitrate

Eastern Analytical, Inc.

professional laboratory and drilling services

Matt Krapf
Geosphere Environmental Management Inc.
51 Portsmouth Avenue
Exeter, NH 03833

Subject: Laboratory Report

Eastern Analytical, Inc. ID: 183339
Client Identification: New Drinking Water Source, Hampton, NH
Date Received: 6/20/2018

Dear Mr. Krapf:

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.easternanalytical.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

Solid samples are reported on a dry weight basis, unless otherwise noted
< : "less than" followed by the reporting limit
> : "greater than" followed by the reporting limit
%R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012) and New York (12072).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample (s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw, Lab Director

6.27.18
Date

10
# of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **183339**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Temperature upon receipt (°C): 4.6 **Received on ice or cold packs (Yes/No): Y**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
183339.01	Well 22	6/20/18	6/20/18	aqueous		Adheres to Sample Acceptance Policy
183339.02	Trip Blank	6/20/18	4/6/18	aqueous		Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.
Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.
All results contained in this report relate only to the above listed samples.
References include:
1) EPA 600/4-79-020, 1983
2) Standard Methods for Examination of Water and Wastewater,20th Edition, 1998 and 22nd Edition, 2012
3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
4) Hach Water Analysis Handbook, 2nd edition, 1992

LABORATORY REPORT

EAI ID#: **183339**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Sample ID:	Well 22	Trip Blank
Lab Sample ID:	183339.01	183339.02
Matrix:	aqueous	aqueous
Date Sampled:	6/20/18	4/6/18
Date Received:	6/20/18	6/20/18
Units:	ug/L	ug/L
Date of Analysis:	6/22/18	6/22/18
Analyst:	BAM	BAM
Method:	524.2	524.2
Dilution Factor:	1	1
Dichlorodifluoromethane	< 0.5	< 0.5
Chloromethane	< 0.5	< 0.5
Vinyl chloride	< 0.5	< 0.5
Bromomethane	< 0.5	< 0.5
Chloroethane	< 0.5	< 0.5
Trichlorofluoromethane	< 0.5	< 0.5
Diethyl Ether	< 5	< 5
Acetone	< 10	< 10
1,1-Dichloroethene	< 0.5	< 0.5
tert-Butyl Alcohol (TBA)	< 30	< 30
Methylene chloride	< 0.5	< 0.5
Carbon disulfide	< 2	< 2
Methyl-t-butyl ether(MTBE)	< 0.5	< 0.5
Ethyl-t-butyl ether(ETBE)	< 0.5	< 0.5
Isopropyl ether(DIPE)	< 0.5	< 0.5
tert-amyl methyl ether(TAME)	< 0.5	< 0.5
trans-1,2-Dichloroethene	< 0.5	< 0.5
Vinyl acetate	< 10	< 10
1,1-Dichloroethane	< 0.5	< 0.5
2,2-Dichloropropane	< 0.5	< 0.5
cis-1,2-Dichloroethene	< 0.5	< 0.5
2-Butanone(MEK)	< 5	< 5
Bromochloromethane	< 0.5	< 0.5
Tetrahydrofuran(THF)	< 5	< 5
Chloroform	< 0.5	< 0.5
1,1,1-Trichloroethane	< 0.5	< 0.5
Carbon tetrachloride	< 0.5	< 0.5
1,1-Dichloropropene	< 0.5	< 0.5
Benzene	< 0.5	< 0.5
1,2-Dichloroethane	< 0.5	< 0.5
Trichloroethene	< 0.5	< 0.5
1,2-Dichloropropane	< 0.5	< 0.5
Dibromomethane	< 0.5	< 0.5
Bromodichloromethane	< 0.5	< 0.5
4-Methyl-2-pentanone(MIBK)	< 5	< 5
cis-1,3-Dichloropropene	< 0.3	< 0.3
Toluene	**1.8**	< 0.5
trans-1,3-Dichloropropene	< 0.3	< 0.3
1,1,2-Trichloroethane	< 0.5	< 0.5
2-Hexanone	< 5	< 5
Tetrachloroethene	< 0.5	< 0.5
1,3-Dichloropropane	< 0.5	< 0.5
Dibromochloromethane	< 0.5	< 0.5
1,2-Dibromoethane(EDB)	< 0.5	< 0.5
Chlorobenzene	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane	< 0.5	< 0.5
Ethylbenzene	< 0.5	< 0.5

LABORATORY REPORT

EAI ID#: **183339**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Sample ID:	Well 22	Trip Blank
Lab Sample ID:	183339.01	183339.02
Matrix:	aqueous	aqueous
Date Sampled:	6/20/18	4/6/18
Date Received:	6/20/18	6/20/18
Units:	ug/L	ug/L
Date of Analysis:	6/22/18	6/22/18
Analyst:	BAM	BAM
Method:	524.2	524.2
Dilution Factor:	1	1
mp-Xylene	< 0.5	< 0.5
o-Xylene	< 0.5	< 0.5
Styrene	< 0.5	< 0.5
Bromoform	< 0.5	< 0.5
IsoPropylbenzene	< 0.5	< 0.5
Bromobenzene	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	< 0.5	< 0.5
1,2,3-Trichloropropane	< 0.5	< 0.5
n-Propylbenzene	< 0.5	< 0.5
2-Chlorotoluene	< 0.5	< 0.5
4-Chlorotoluene	< 0.5	< 0.5
1,3,5-Trimethylbenzene	< 0.5	< 0.5
tert-Butylbenzene	< 0.5	< 0.5
1,2,4-Trimethylbenzene	< 0.5	< 0.5
sec-Butylbenzene	< 0.5	< 0.5
1,3-Dichlorobenzene	< 0.5	< 0.5
p-Isopropyltoluene	< 0.5	< 0.5
1,4-Dichlorobenzene	< 0.5	< 0.5
1,2-Dichlorobenzene	< 0.5	< 0.5
n-Butylbenzene	< 0.5	< 0.5
1,2-Dibromo-3-chloropropane	< 0.5	< 0.5
1,3,5-Trichlorobenzene	< 0.5	< 0.5
1,2,4-Trichlorobenzene	< 0.5	< 0.5
Hexachlorobutadiene	< 0.5	< 0.5
Naphthalene	< 0.5	< 0.5
1,2,3-Trichlorobenzene	< 0.5	< 0.5
4-Bromofluorobenzene (surr)	**96 %R**	**96 %R**
1,2-Dichlorobenzene-d4 (surr)	**95 %R**	**98 %R**

QC REPORT

EAI ID#: **183339**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Dichlorodifluoromethane	< 0.5	8.5 (85 %R)	9.0 (90 %R) (6 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Chloromethane	< 0.5	8.2 (82 %R)	8.2 (82 %R) (0 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Vinyl chloride	< 0.5	8.3 (83 %R)	7.8 (78 %R) (6 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Bromomethane	< 0.5	8.6 (86 %R)	9.1 (91 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Chloroethane	< 0.5	10 (103 %R)	9.6 (96 %R) (7 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Trichlorofluoromethane	< 0.5	9.9 (99 %R)	9.7 (97 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Diethyl Ether	< 5	11 (110 %R)	10 (105 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Acetone	< 10	< 10 (84 %R)	< 10 (82 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,1-Dichloroethene	< 0.5	8.8 (88 %R)	8.7 (87 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
tert-Butyl Alcohol (TBA)	< 30	46 (93 %R)	43 (87 %R) (7 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Methylene chloride	< 0.5	10 (100 %R)	10 (101 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Carbon disulfide	< 2	10 (104 %R)	10 (103 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Methyl-t-butyl ether(MTBE)	< 0.5	10 (102 %R)	9.7 (97 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Ethyl-t-butyl ether(ETBE)	< 0.5	9.9 (99 %R)	9.5 (95 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Isopropyl ether(DIPE)	< 0.5	9.8 (98 %R)	9.4 (94 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
tert-amyl methyl ether(TAME)	< 0.5	10 (101 %R)	9.7 (97 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
trans-1,2-Dichloroethene	< 0.5	9.1 (91 %R)	9.1 (91 %R) (0 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Vinyl acetate	< 10	< 10 (98 %R)	< 10 (93 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,1-Dichloroethane	< 0.5	9.5 (95 %R)	9.3 (93 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
2,2-Dichloropropane	< 0.5	10 (102 %R)	10 (100 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
cis-1,2-Dichloroethene	< 0.5	11 (105 %R)	10 (100 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
2-Butanone(MEK)	< 5	8.1 (81 %R)	7.7 (77 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Bromochloromethane	< 0.5	9.7 (97 %R)	9.3 (93 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Tetrahydrofuran(THF)	< 5	10 (103 %R)	9.5 (95 %R) (9 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Chloroform	< 0.5	9.8 (98 %R)	9.5 (95 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,1,1-Trichloroethane	< 0.5	10 (100 %R)	9.9 (99 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Carbon tetrachloride	< 0.5	11 (107 %R)	11 (106 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,1-Dichloropropene	< 0.5	9.5 (95 %R)	9.5 (95 %R) (0 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Benzene	< 0.5	9.7 (97 %R)	9.5 (95 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,2-Dichloroethane	< 0.5	9.9 (99 %R)	9.5 (95 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Trichloroethene	< 0.5	9.7 (97 %R)	9.4 (94 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,2-Dichloropropane	< 0.5	9.9 (99 %R)	9.8 (98 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Dibromomethane	< 0.5	10 (101 %R)	9.6 (96 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Bromodichloromethane	< 0.5	12 (115 %R)	11 (112 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
4-Methyl-2-pentanone(MIBK)	< 5	8.7 (87 %R)	8.5 (85 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
cis-1,3-Dichloropropene	< 0.3	10 (103 %R)	10 (100 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Toluene	< 0.5	10 (100 %R)	9.7 (97 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
trans-1,3-Dichloropropene	< 0.3	10 (103 %R)	9.9 (99 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,1,2-Trichloroethane	< 0.5	9.7 (97 %R)	9.2 (92 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
2-Hexanone	< 5	8.1 (81 %R)	8 (80 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Tetrachloroethene	< 0.5	9.7 (97 %R)	9.6 (96 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,3-Dichloropropane	< 0.5	9.7 (97 %R)	9.5 (95 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Dibromochloromethane	< 0.5	11 (114 %R)	11 (113 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,2-Dibromoethane(EDB)	< 0.5	10 (100 %R)	9.5 (95 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Chlorobenzene	< 0.5	9.6 (96 %R)	9.4 (94 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,1,1,2-Tetrachloroethane	< 0.5	10 (102 %R)	10 (102 %R) (0 RPD)	6/22/2018	ug/L	70 - 130	30	524.2

QC REPORT

EAI ID#: **183339**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Ethylbenzene	< 0.5	9.7 (97 %R)	9.5 (95 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
mp-Xylene	< 0.5	19 (96 %R)	19 (95 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
o-Xylene	< 0.5	9.6 (96 %R)	9.5 (95 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Styrene	< 0.5	9.5 (95 %R)	9.3 (93 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Bromoform	< 0.5	11 (109 %R)	11 (106 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
IsoPropylbenzene	< 0.5	9.7 (97 %R)	9.5 (95 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Bromobenzene	< 0.5	9.6 (96 %R)	9.2 (92 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,1,2,2-Tetrachloroethane	< 0.5	9.4 (94 %R)	9.0 (90 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,2,3-Trichloropropane	< 0.5	9.2 (92 %R)	9.0 (90 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
n-Propylbenzene	< 0.5	9.8 (98 %R)	9.6 (96 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
2-Chlorotoluene	< 0.5	9.5 (95 %R)	9.2 (92 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
4-Chlorotoluene	< 0.5	9.1 (91 %R)	9.1 (91 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,3,5-Trimethylbenzene	< 0.5	9.6 (96 %R)	9.5 (95 %R) (1 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
tert-Butylbenzene	< 0.5	9.7 (97 %R)	9.4 (94 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,2,4-Trimethylbenzene	< 0.5	9.8 (98 %R)	9.6 (96 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
sec-Butylbenzene	< 0.5	9.8 (98 %R)	9.6 (96 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,3-Dichlorobenzene	< 0.5	9.4 (94 %R)	9.1 (91 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
p-Isopropyltoluene	< 0.5	9.7 (97 %R)	9.5 (95 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,4-Dichlorobenzene	< 0.5	9.4 (94 %R)	9.2 (92 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,2-Dichlorobenzene	< 0.5	9.3 (93 %R)	9.0 (90 %R) (3 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
n-Butylbenzene	< 0.5	9.9 (99 %R)	9.5 (95 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,2-Dibromo-3-chloropropane	< 0.5	10 (103 %R)	9.7 (97 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,3,5-Trichlorobenzene	< 0.5	9.3 (93 %R)	9.1 (91 %R) (2 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,2,4-Trichlorobenzene	< 0.5	9.4 (94 %R)	9.0 (90 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Hexachlorobutadiene	< 0.5	9.1 (91 %R)	8.6 (86 %R) (6 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
Naphthalene	< 0.5	9.3 (93 %R)	8.9 (89 %R) (4 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
1,2,3-Trichlorobenzene	< 0.5	9.3 (93 %R)	8.8 (88 %R) (5 RPD)	6/22/2018	ug/L	70 - 130	30	524.2
4-Bromofluorobenzene (surr)	98 %R	100 %R	99 %R	6/22/2018	% Rec	70 - 130		524.2
1,2-Dichlorobenzene-d4 (surr)	96 %R	98 %R	98 %R	6/22/2018	% Rec	70 - 130		524.2

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.
Analytes that exceed limits high but are not detected in the field samples do not impact the data. For analytes that show low recovery and are not detected in the field samples, a low point calibration standard has been analyzed to support the reporting limit.

LABORATORY REPORT

EAI ID#: **183339**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Sample ID: Well 22

Lab Sample ID: 183339.01

Matrix: aqueous

Date Sampled: 6/20/18

Date Received: 6/20/18

		Analysis			
	Units	**Date**	**Time**	**Method**	**Analyst**
Chloride	**35**	mg/L	6/21/18	15:04	4500ClE-97	KD
Nitrate-N	< 0.5	mg/L	6/21/18	15:04	353.2	KD
Specific Conductance	**350**	uS/cm	6/21/18	10:45	120.1	KL

QC REPORT

EAI ID#: **183339**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Parameter Name	Blank	LCS	LCSD	Units	Date of Analysis	Limits	RPD	Method
Chloride	< 1	24 (98 %R)	25 (99 %R) (1 RPD)	mg/L	6/21/18	90 - 110	20	4500CIE-97
Nitrate-N	< 0.05	5.3 (106 %R)	5.3 (106 %R) (0 RPD)	mg/L	6/21/18	90 - 110	20	353.2
Specific Conductance	< 1	1400 (98 %R)	1400 (98 %R) (0 RPD)	uS/cm	6/21/18	90 - 110	20	120.1

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.

LABORATORY REPORT

EAI ID#: **183339**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Sample ID: Well 22

Lab Sample ID: 183339.01
Matrix: aqueous
Date Sampled: 6/20/18
Date Received: 6/20/18

		Analytical Matrix	Units	Date of Analysis	Method	Analyst
Iron	**0.27**	AqTot	mg/L	6/21/18	200.8	DS
Manganese	**0.016**	AqTot	mg/L	6/21/18	200.8	DS
Sodium	**71**	AqTot	mg/L	6/21/18	200.8	DS
Total Hardness (as CaCO3)	**2**	AqTot	mg/L	6/21/18	200.8	DS

QC REPORT

EAI ID#: **183339**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Parameter Name	Blank	LCS	LCSD		Units	Date of Analysis	Limits	RPD	Method
Iron	< 0.05	11 (102 %R)		NA	mg/L	6/21/18	85 - 115	20	200.8
Manganese	< 0.005	1.0 (102 %R)		NA	mg/L	6/21/18	85 - 115	20	200.8
Sodium	< 5	11 (102 %R)		NA	mg/L	6/21/18	85 - 115	20	200.8

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.

Eastern Analytical, Inc. CHAIN-OF-CUSTODY RECORD

183539

GEMInh

Sample IDs	Date/Time Composites need start and stop dates/times	Matrix	Parameters and Sample Notes	# of containers
Well 22	6/20/18 1020 am	aqueous Grab or Comp	AqTot/VNH524FullList/NO3/Cl/SpecCon/ICPMets.Fe.Mn.Na.HardTot	4
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐
Trip Blank	4/6/18 1130 am	aqueous Grab or Comp	AqTot/VNH524FullList	2
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐

Please ensure this auto COC is accurate, adheres to permit or sampling requirements for this sampling event, and modify as necessary.

EAI Project ID

Project Name: New Drinking Water Source, Hampton, NH

State: NH

Client (Pro Mgr): Matt Krapf

Customer: Geosphere Environmental

Address: 51 Portsmouth Avenue

City: Exeter NH 03833

Phone: 773-0075 Fax: 773-0077(14)

Email: mkrapf@geospherenh.com

Direct

Results Needed by: Preferred date _____

Notes:

Round 1

QC deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ PC

ReportingOptions

☒ HC ☐ NO FAX

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☐ e-mail Login Confirmation

PO# Verbal

Quote#:

Temp 4.6°C

Ice Y ☒ N ☐

Samples Collected by: Matt Krapf

Matthew W. Krapf 6/20/18 1028

Relinquished by Date/Time

Received by

1202

Relinquished by Date/Time

Received by

Laboratory Report
Lancaster Laboratories Environmental (Eurofins)

Well 22 – Day 1
June 20, 2018

Analysis:

- Perfluorinated Compounds

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Geosphere Environmental Mgmt
51 Portsmouth Avenue
Exeter NH 03833

Report Date: June 22, 2018 11:39

Project: 17214 - Aquarion WHPA Sampling

Account #: 42988
Group Number: 1957825
PO Number: 17214
State of Sample Origin: NH

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our current scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . To request copies of prior scopes of accreditation, contact your project manager.

Electronic Copy To	NH Dept of Environmental Svcs	Attn: Derek Bennett
Electronic Copy To	NH Dept of Environmental Svcs	Attn: LeaAnne Atwell
Electronic Copy To	NH Dept of Environmental Svcs	Attn: Brandon Kernen
Electronic Copy To	NH Dept of Environmental Svcs	Attn: Carina Pearson
Electronic Copy To	NH Dept of Environmental Svcs	Attn: Kala Day

Respectfully Submitted,

Lyssa M. Longenecker

Lyssa M. Longenecker
Specialist

(717) 556-7321

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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
Well 22 Grab Groundwater	06/20/2018 16:00	9671430

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Sample Description: **Well 22 Grab Groundwater**
Well 22 Pumping Test

Project Name: **17214 - Aquarion WHPA Sampling**

Submittal Date/Time: 06/21/2018 10:00
Collection Date/Time: 06/20/2018 16:00

Geosphere Environmental Mgmt
ELLE Sample #: GW 9671430
ELLE Group #: 1957825
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	**ng/l**	
14473	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.89	1.8	1
14473	8:2 fluorotelomersulfonate	39108-34-4	N.D.	1.8	5.4	1
14473	NEtFOSAA	2991-50-6	N.D.	0.89	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.					
14473	NEtPFOSA	4151-50-2	N.D.	2.7	8.0	1
	NEtPFOSA is the acronym for N-ethylperfluoro-1-octanesulfonamide					
14473	NEtPFOSAE	1691-99-2	N.D.	0.89	2.7	1
	NEtPFOSAE is the acronym for 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol					
14473	NMeFOSAA	2355-31-9	N.D.	0.89	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.					
14473	NMePFOSA	31506-32-8	N.D.	2.7	8.0	1
	NMePFOSA is the acronym for N-methylperfluoro-1-octanesulfonamide					
14473	NMePFOSAE	24448-09-7	N.D.	0.89	2.7	1
	NMePFOSAE is the acronym for 2-(N-methylperfluoro-1-octanesulfonamido)-ethanol					
14473	Perfluorobutanesulfonate	375-73-5	N.D.	0.27	0.89	1
14473	Perfluorobutanoic acid	375-22-4	N.D.	1.8	5.4	1
14473	Perfluorodecanesulfonate	335-77-3	N.D.	0.54	1.8	1
14473	Perfluorodecanoic acid	335-76-2	N.D.	0.89	1.8	1
14473	Perfluorododecanoic acid	307-55-1	N.D.	0.27	0.89	1
14473	Perfluoroheptanesulfonate	375-92-8	N.D.	0.36	1.8	1
14473	Perfluoroheptanoic acid	375-85-9	N.D.	0.27	0.89	1
14473	Perfluorohexadecanoic acid	67905-19-5	N.D.	0.27	0.89	1
14473	Perfluorohexanesulfonate	355-46-4	0.41 J	0.36	1.8	1
14473	Perfluorohexanoic acid	307-24-4	N.D.	0.36	1.8	1
14473	Perfluorononanoic acid	375-95-1	N.D.	0.36	1.8	1
14473	Perfluorooctanesulfonamide	754-91-6	N.D.	0.89	2.7	1
14473	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.36	1.8	1
14473	Perfluorooctanoic acid	335-67-1	0.39 J	0.27	0.89	1
14473	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	5.4	1
14473	Perfluorotetradecanoic acid	376-06-7	N.D.	0.27	0.89	1
14473	Perfluorotridecanoic acid	72629-94-8	N.D.	0.27	0.89	1
14473	Perfluoroundecanoic acid	2058-94-8	N.D.	0.36	1.8	1

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

Sample Description: **Well 22 Grab Groundwater**
Well 22 Pumping Test

Project Name: **17214 - Aquarion WHPA Sampling**

Submittal Date/Time: 06/21/2018 10:00
Collection Date/Time: 06/20/2018 16:00

Geosphere Environmental Mgmt
ELLE Sample #: GW 9671430
ELLE Group #: 1957825
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18172015	06/22/2018 03:52	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	18172015	06/21/2018 15:00	Anthony C Polaski	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Geosphere Environmental Mgmt Group Number: 1957825
Reported: 06/22/2018 11:39

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ng/l	MDL** ng/l	LOQ ng/l
Batch number: 18172015	Sample number(s): 9671430		
6:2 fluorotelomersulfonate	N.D.	1.0	2.0
8:2 fluorotelomersulfonate	N.D.	2.0	6.0
NEtFOSAA	N.D.	1.0	3.0
NEtPFOSA	N.D.	3.0	9.0
NEtPFOSAE	N.D.	1.0	3.0
NMeFOSAA	N.D.	1.0	3.0
NMePFOSA	N.D.	3.0	9.0
NMePFOSAE	N.D.	1.0	3.0
Perfluorobutanesulfonate	N.D.	0.30	1.0
Perfluorobutanoic acid	N.D.	2.0	6.0
Perfluorodecanesulfonate	N.D.	0.60	2.0
Perfluorodecanoic acid	N.D.	1.0	2.0
Perfluorododecanoic acid	N.D.	0.30	1.0
Perfluoroheptanesulfonate	N.D.	0.40	2.0
Perfluoroheptanoic acid	N.D.	0.30	1.0
Perfluorohexadecanoic acid	N.D.	0.30	1.0
Perfluorohexanesulfonate	N.D.	0.40	2.0
Perfluorohexanoic acid	N.D.	0.40	2.0
Perfluorononanoic acid	N.D.	0.40	2.0
Perfluorooctanesulfonamide	N.D.	1.0	3.0
Perfluoro-octanesulfonate	N.D.	0.40	2.0
Perfluorooctanoic acid	N.D.	0.30	1.0
Perfluoropentanoic acid	N.D.	2.0	6.0
Perfluorotetradecanoic acid	N.D.	0.30	1.0
Perfluorotridecanoic acid	N.D.	0.30	1.0
Perfluoroundecanoic acid	N.D.	0.40	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18172015	Sample number(s): 9671430								
6:2 fluorotelomersulfonate	15.17	11.9	15.17	12.68	78	84	66-155	6	30
8:2 fluorotelomersulfonate	15.33	12.53	15.33	13.44	82	88	66-148	7	30
NEtFOSAA	5.44	5.49	5.44	5.73	101	105	55-169	4	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Reported: 06/22/2018 11:39

Group Number: 1957825

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
NEtPFOSA	5.44	5.29	5.44	5.15	97	95	70-130	3	30
NEtPFOSAE	5.44	5.35	5.44	5.35	98	98	70-130	0	30
NMeFOSAA	5.44	6.13	5.44	5.98	113	110	62-167	3	30
NMePFOSA	5.44	6.22	5.44	5.42	114	100	70-130	14	30
NMePFOSAE	5.44	3.39	5.44	3.78	62*	69*	70-130	11	30
Perfluorobutanesulfonate	4.81	5.41	4.81	5.38	112	112	73-128	1	30
Perfluorobutanoic acid	5.44	5.97	5.44	6.00	110	110	74-142	0	30
Perfluorodecanesulfonate	5.24	5.31	5.24	5.44	101	104	60-135	2	30
Perfluorodecanoic acid	5.44	5.21	5.44	5.20	96	96	69-148	0	30
Perfluorododecanoic acid	5.44	5.78	5.44	5.58	106	103	75-136	3	30
Perfluoroheptanesulfonate	5.18	4.95	5.18	5.33	96	103	64-135	7	30
Perfluoroheptanoic acid	5.44	6.24	5.44	6.07	115	112	76-140	3	30
Perfluorohexadecanoic acid	5.44	5.76	5.44	5.63	106	104	21-151	2	30
Perfluorohexanesulfonate	5.14	5.04	5.14	5.40	98	105	71-131	7	30
Perfluorohexanoic acid	5.44	6.00	5.44	6.18	110	114	75-135	3	30
Perfluorononanoic acid	5.44	5.42	5.44	5.94	100	109	72-148	9	30
Perfluorooctanesulfonamide	5.44	5.37	5.44	6.12	99	112	65-164	13	30
Perfluoro-octanesulfonate	5.20	5.71	5.20	5.48	110	105	67-138	4	30
Perfluorooctanoic acid	5.44	6.05	5.44	6.62	111	122	72-138	9	30
Perfluoropentanoic acid	5.44	5.85	5.44	5.92	108	109	74-134	1	30
Perfluorotetradecanoic acid	5.44	5.98	5.44	6.13	110	113	74-135	2	30
Perfluorotridecanoic acid	5.44	6.07	5.44	6.13	112	113	61-145	1	30
Perfluoroundecanoic acid	5.44	5.37	5.44	5.36	99	98	75-146	0	30

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18172015

	13C4-PFBA	13C5-PFPeA	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA
9671430	83	85	81	84	81	91
Blank	76	71	71	75	79	75
LCS	97	95	88	99	96	96
LCSD	94	90	83	95	95	103
Limits:	33-123	39-135	26-148	31-128	34-126	35-126

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
9671430	97	85	81	75	83	125
Blank	83	78	72	70	79	112

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Reported: 06/22/2018 11:39

Group Number: 1957825

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18172015

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
LCS	118	99	100	106	99	135
LCSD	119	96	96	93	92	134
Limits:	39-140	43-112	43-115	32-134	40-115	39-137

	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA	13C2-PFTeDA	13C8-PFOSA
9671430	76	89	104	86	81	76
Blank	75	79	88	78	71	69*
LCS	95	104	111	99	93	93
LCSD	91	100	101	97	92	85
Limits:	17-120	30-128	21-135	28-127	26-119	70-130

	d7-NMePFOSAE	d3-NMePFOSA	d9-NEtPFOSAE	d5-NEtPFOSA
9671430	123	52*	78	55*
Blank	106	40*	68*	42*
LCS	132*	69*	95	71
LCSD	116	66*	88	71
Limits:	70-130	70-130	70-130	70-130

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # 42988 Group # 1957825 Sample # 9671430

| | | |

eurofins | Lancaster Laboratories Environmental

Sample Administration Receipt Documentation Log

Doc Log ID: 219727

Group Number(s): 1957825

Client: GEOSPHERE ENV.

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	06/21/2018 10:00
Number of Packages:	1	Number of Projects:	1
State/Province of Origin:	NH		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Suegeily Mendez (14058) at 10:39 on 06/21/2018

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	0.6	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17605-2425
T 717-656-2300
F 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mg**	milligram(s)
C	degrees Celsius	**mL**	milliliter(s)
cfu	colony forming units	**MPN**	Most Probable Number
CP Units	cobalt-chloroplatinate units	**N.D.**	non-detect
F	degrees Fahrenheit	**ng**	nanogram(s)
g	gram(s)	**NTU**	nephelometric turbidity units
IU	International Units	**pg/L**	picogram/liter
kg	kilogram(s)	**RL**	Reporting Limit
L	liter(s)	**TNTC**	Too Numerous To Count
lb.	pound(s)	**µg**	microgram(s)
m3	cubic meter(s)	**µL**	microliter(s)
meq	milliequivalents	**umhos/cm**	micromhos/cm

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Laboratory Report
Lancaster Laboratories Environmental (Eurofins)

Well 22 – Day 3
June 22, 2018

Analysis:

- Perfluorinated Compounds

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Geosphere Environmental Mgmt
51 Portsmouth Avenue
Exeter NH 03833

Report Date: June 25, 2018 15:21

Project: 12217 - Aquarion Well 22 Pump Test

Account #: 42988
Group Number: 1958827
PO Number: 12217
State of Sample Origin: NH

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our current scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . To request copies of prior scopes of accreditation, contact your project manager.

Electronic Copy To Geosphere Environmental Mgmt Attn: Ray Talkington

Respectfully Submitted,

Lyssa M. Longenecker
Specialist

(717) 556-7321

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
MTBE_Well 22 Grab Potable Water	06/22/2018 16:20	9675584

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Sample Description: **MTBE_Well 22 Grab Potable Water**
Aquarion Well 22 Pump Test
NH

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 06/23/2018 10:05
Collection Date/Time: 06/22/2018 16:20

Geosphere Environmental Mgmt
ELLE Sample #: PW 9675584
ELLE Group #: 1958827
Matrix: Potable Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	**ng/l**	
14473	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.92	1.8	1
14473	8:2 fluorotelomersulfonate	39108-34-4	N.D.	1.8	5.5	1
14473	NEtFOSAA	2991-50-6	N.D.	0.92	2.8	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.					
14473	NEtPFOSA	4151-50-2	N.D.	2.8	8.3	1
	NEtPFOSA is the acronym for N-ethylperfluoro-1-octanesulfonamide					
14473	NEtPFOSAE	1691-99-2	N.D.	0.92	2.8	1
	NEtPFOSAE is the acronym for 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol					
14473	NMeFOSAA	2355-31-9	N.D.	0.92	2.8	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.					
14473	NMePFOSA	31506-32-8	N.D.	2.8	8.3	1
	NMePFOSA is the acronym for N-methylperfluoro-1-octanesulfonamide					
14473	NMePFOSAE	24448-09-7	N.D.	0.92	2.8	1
	NMePFOSAE is the acronym for 2-(N-methylperfluoro-1-octanesulfonamido)-ethanol					
14473	Perfluorobutanesulfonate	375-73-5	N.D.	0.28	0.92	1
14473	Perfluorobutanoic acid	375-22-4	N.D.	1.8	5.5	1
14473	Perfluorodecanesulfonate	335-77-3	N.D.	0.55	1.8	1
14473	Perfluorodecanoic acid	335-76-2	N.D.	0.92	1.8	1
14473	Perfluorododecanoic acid	307-55-1	N.D.	0.28	0.92	1
14473	Perfluoroheptanesulfonate	375-92-8	N.D.	0.37	1.8	1
14473	Perfluoroheptanoic acid	375-85-9	N.D.	0.28	0.92	1
14473	Perfluorohexadecanoic acid	67905-19-5	N.D.	0.28	0.92	1
14473	Perfluorohexanesulfonate	355-46-4	0.50 J	0.37	1.8	1
14473	Perfluorohexanoic acid	307-24-4	N.D.	0.37	1.8	1
14473	Perfluorononanoic acid	375-95-1	N.D.	0.37	1.8	1
14473	Perfluorooctanesulfonamide	754-91-6	N.D.	0.92	2.8	1
14473	Perfluoro-octanesulfonate	1763-23-1	0.41 J	0.37	1.8	1
14473	Perfluorooctanoic acid	335-67-1	0.58 J	0.28	0.92	1
14473	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	5.5	1
14473	Perfluorotetradecanoic acid	376-06-7	N.D.	0.28	0.92	1
14473	Perfluorotridecanoic acid	72629-94-8	N.D.	0.28	0.92	1
14473	Perfluoroundecanoic acid	2058-94-8	N.D.	0.37	1.8	1

The stated QC limits are advisory only until sufficient data points can be obtained to calculate statistical limits.

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

Sample Description: **MTBE_Well 22 Grab Potable Water**
Aquarion Well 22 Pump Test
NH

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 06/23/2018 10:05
Collection Date/Time: 06/22/2018 16:20

Geosphere Environmental Mgmt
ELLE Sample #: PW 9675584
ELLE Group #: 1958827
Matrix: Potable Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18175001	06/25/2018 10:03	Devon M Whooley	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	18175001	06/24/2018 09:05	Danielle D McCully	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Geosphere Environmental Mgmt Group Number: 1958827
Reported: 06/25/2018 15:21

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	ng/l	ng/l	ng/l
Batch number: 18175001	Sample number(s): 9675584		
6:2 fluorotelomersulfonate	N.D.	1.0	2.0
8:2 fluorotelomersulfonate	N.D.	2.0	6.0
NEtFOSAA	N.D.	1.0	3.0
NEtPFOSA	N.D.	3.0	9.0
NEtPFOSAE	N.D.	1.0	3.0
NMeFOSAA	N.D.	1.0	3.0
NMePFOSA	N.D.	3.0	9.0
NMePFOSAE	N.D.	1.0	3.0
Perfluorobutanesulfonate	N.D.	0.30	1.0
Perfluorobutanoic acid	N.D.	2.0	6.0
Perfluorodecanesulfonate	N.D.	0.60	2.0
Perfluorodecanoic acid	N.D.	1.0	2.0
Perfluorododecanoic acid	N.D.	0.30	1.0
Perfluoroheptanesulfonate	N.D.	0.40	2.0
Perfluoroheptanoic acid	N.D.	0.30	1.0
Perfluorohexadecanoic acid	N.D.	0.30	1.0
Perfluorohexanesulfonate	N.D.	0.40	2.0
Perfluorohexanoic acid	N.D.	0.40	2.0
Perfluorononanoic acid	N.D.	0.40	2.0
Perfluorooctanesulfonamide	N.D.	1.0	3.0
Perfluoro-octanesulfonate	N.D.	0.40	2.0
Perfluorooctanoic acid	N.D.	0.30	1.0
Perfluoropentanoic acid	N.D.	2.0	6.0
Perfluorotetradecanoic acid	N.D.	0.30	1.0
Perfluorotridecanoic acid	N.D.	0.30	1.0
Perfluoroundecanoic acid	N.D.	0.40	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18175001	Sample number(s): 9675584								
6:2 fluorotelomersulfonate	15.17	15.09	15.17	15.87	100	105	66-155	5	30
8:2 fluorotelomersulfonate	15.33	12.89	15.33	12.51	84	82	66-148	3	30
NEtFOSAA	5.44	4.69	5.44	4.71	86	87	55-169	0	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Reported: 06/25/2018 15:21

Group Number: 1958827

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
NEtPFOSA	5.44	4.99	5.44	5.14	92	95	70-130	3	30
NEtPFOSAE	5.44	5.63	5.44	5.76	104	106	70-130	2	30
NMeFOSAA	5.44	5.85	5.44	5.70	108	105	62-167	3	30
NMePFOSA	5.44	5.80	5.44	4.68	107	86	70-130	21	30
NMePFOSAE	5.44	2.97	5.44	2.81	55*	52*	70-130	6	30
Perfluorobutanesulfonate	4.81	4.73	4.81	4.64	98	96	73-128	2	30
Perfluorobutanoic acid	5.44	5.88	5.44	5.67	108	104	74-142	4	30
Perfluorodecanesulfonate	5.24	5.21	5.24	5.23	99	100	60-135	0	30
Perfluorodecanoic acid	5.44	5.05	5.44	5.08	93	93	69-148	1	30
Perfluorododecanoic acid	5.44	5.59	5.44	5.52	103	101	75-136	1	30
Perfluoroheptanesulfonate	5.18	4.69	5.18	5.01	91	97	64-135	7	30
Perfluoroheptanoic acid	5.44	5.79	5.44	5.78	106	106	76-140	0	30
Perfluorohexadecanoic acid	5.44	5.39	5.44	5.31	99	98	21-151	1	30
Perfluorohexanesulfonate	5.14	4.83	5.14	4.72	94	92	71-131	2	30
Perfluorohexanoic acid	5.44	5.61	5.44	5.41	103	99	75-135	4	30
Perfluorononanoic acid	5.44	5.87	5.44	5.54	108	102	72-148	6	30
Perfluorooctanesulfonamide	5.44	5.42	5.44	5.64	100	104	65-164	4	30
Perfluoro-octanesulfonate	5.20	5.09	5.20	5.17	98	99	67-138	2	30
Perfluorooctanoic acid	5.44	5.64	5.44	5.52	104	101	72-138	2	30
Perfluoropentanoic acid	5.44	5.58	5.44	5.49	103	101	74-134	2	30
Perfluorotetradecanoic acid	5.44	5.49	5.44	5.52	101	102	74-135	1	30
Perfluorotridecanoic acid	5.44	5.43	5.44	5.26	100	97	61-145	3	30
Perfluoroundecanoic acid	5.44	4.99	5.44	4.83	92	89	75-146	3	30

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18175001

	13C4-PFBA	13C5-PFPeA	13C3-PFBS	13C2-4:2-FTS	13C5-PFHxA	13C3-PFHxS
9675584	83	84	85	82	78	80
Blank	98	96	96	99	90	90
LCS	82	83	79	92	84	81
LCSD	95	97	95	101	92	90
Limits:	33-123	39-135	26-148	46-118	31-128	34-126

	13C4-PFHpA	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA
9675584	83	90	78	83	88	84
Blank	89	101	91	97	98	98

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Group Number: 1958827
Reported: 06/25/2018 15:21

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18175001

	13C4-PFHpA	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA
LCS	81	100	85	82	86	78
LCSD	94	105	98	103	101	95
Limits:	35-126	39-140	43-112	43-115	32-134	40-115

	13C2-8:2-FTS	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA	13C2-PFTeDA
9675584	120	70	84	86	83	79
Blank	122	79	91	90	89	82
LCS	103	64	76	73	71	68
LCSD	126	86	97	95	93	87
Limits:	39-137	17-120	30-128	21-135	28-127	26-119

	13C8-PFOSA	d7-NMePFOSAE	d3-NMePFOSA	d9-NEtPFOSAE	d5-NEtPFOSA
9675584	70	102	28*	60*	27*
Blank	73	116	31*	69*	31*
LCS	68*	97	32*	58*	26*
LCSD	83	134*	50*	75	43*
Limits:	70-130	70-130	70-130	70-130	70-130

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Environmental Analysis Request/Chain of Custody

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Acct. # 42988 Group # 1958827 Sample # 9675584

Client: Geosphere Environmental Management			
Project Name/#: Aquarion Well 22 Pump Test	Site ID #: 12217		
Project Manager: Ray Talkington	P.O. #:		
Sampler: Matt Krapf	PWSID #:		
Phone #: 603-773-0075	Quote #:		
State where samples were collected: NH	For Compliance: Yes ☐ No ☐		

DO NOT SEND RESULTS TO NEW HAMPSHIRE DES. ONLY RAY TALKINGTON

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil	Sediment	Tissue	Water: Potable	Ground	Surface	NPDES	Other:	Total # of Containers	Analyses Requested: PFCs by EPA Method
Well 22	6/22/18	420 pm	X						X				2	X

Preservation and Filtration Codes

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; F = Field Filtered; O = Other

Remarks: Trizma

For Lab Use Only: SF #: ; SCR #:

Turnaround Time Requested (TAT) (please check): Standard ☐ Rush ☒ 24 Hrs

(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed: 6/23/18

Rush results requested by (please check): E-Mail ☒ Phone ☐

E-mail Address: rtalkington@geospherenh.com

Phone: (508)-944-8765

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐
Type VI (Raw Data Only)	☐	TX TRRP-13	☐
NJ DKQP	☐	NYSDEC Category	☐ A or ☐ B

EDD Required? Yes ☐ No ☒ If yes, format: _____

Relinquished by:	Date	Time	Received by:	Date	Time
Matthew W. Krapf	6/22/18	445 pm	FED EX	6/22/18	445 pm
			Felix Gonzalez	6/23/18	10:05

Relinquished by Commercial Carrier: UPS _____ FedEx X Other _____

Temperature upon receipt 0.7 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 220006

Group Number(s): 1958827

Client: Geosphere Environmental

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	06/23/2018 10:05
Number of Packages:	1	Number of Projects:	1
State/Province of Origin:	NH		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Felix Gonzalez (13 783) at 10:54 on 06/23/2018

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-01	0.7	DT	Wet	Y	Bagged	N

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Lancaster, PA 17605-2425
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www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mg**	milligram(s)
C	degrees Celsius	**mL**	milliliter(s)
cfu	colony forming units	**MPN**	Most Probable Number
CP Units	cobalt-chloroplatinate units	**N.D.**	non-detect
F	degrees Fahrenheit	**ng**	nanogram(s)
g	gram(s)	**NTU**	nephelometric turbidity units
IU	International Units	**pg/L**	picogram/liter
kg	kilogram(s)	**RL**	Reporting Limit
L	liter(s)	**TNTC**	Too Numerous To Count
lb.	pound(s)	**µg**	microgram(s)
m3	cubic meter(s)	**µL**	microliter(s)
meq	milliequivalents	**umhos/cm**	micromhos/cm

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Laboratory Report
Lancaster Laboratories Environmental (Eurofins)

Well 22 – Day 5
June 24, 2018

Analysis:

- Perfluorinated Compounds

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Geosphere Environmental Mgmt
51 Portsmouth Avenue
Exeter NH 03833

Report Date: June 28, 2018 09:50

Project: 12217 - Aquarion Well 22 Pump Test

Account #: 42988
Group Number: 1959289
PO Number: 12217
State of Sample Origin: NH

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our current scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . To request copies of prior scopes of accreditation, contact your project manager.

Electronic Copy To Geosphere Environmental Mgmt Attn: Ray Talkington

Respectfully Submitted,

Lyssa M. Longenecker
Specialist

(717) 556-7321

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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
Well 22 Grab Potable Water	06/24/2018 16:30	9677554

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Sample Description: **Well 22 Grab Potable Water**
Aquarion Well 22 Pump Test
NH

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 06/26/2018 10:10
Collection Date/Time: 06/24/2018 16:30

Geosphere Environmental Mgmt
ELLE Sample #: PW 9677554
ELLE Group #: 1959289
Matrix: Potable Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	**ng/l**	
14473	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.85	1.7	1
14473	8:2 fluorotelomersulfonate	39108-34-4	N.D.	1.7	5.1	1
14473	NEtFOSAA	2991-50-6	N.D.	0.85	2.6	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.					
14473	NEtPFOSA	4151-50-2	N.D.	2.6	7.7	1
	NEtPFOSA is the acronym for N-ethylperfluoro-1-octanesulfonamide					
14473	NEtPFOSAE	1691-99-2	N.D.	0.85	2.6	1
	NEtPFOSAE is the acronym for 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol					
14473	NMeFOSAA	2355-31-9	N.D.	0.85	2.6	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.					
14473	NMePFOSA	31506-32-8	N.D.	2.6	7.7	1
	NMePFOSA is the acronym for N-methylperfluoro-1-octanesulfonamide					
14473	NMePFOSAE	24448-09-7	N.D.	0.85	2.6	1
	NMePFOSAE is the acronym for 2-(N-methylperfluoro-1-octanesulfonamido)-ethanol					
14473	Perfluorobutanesulfonate	375-73-5	N.D.	0.26	0.85	1
14473	Perfluorobutanoic acid	375-22-4	N.D.	1.7	5.1	1
14473	Perfluorodecanesulfonate	335-77-3	N.D.	0.51	1.7	1
14473	Perfluorodecanoic acid	335-76-2	N.D.	0.85	1.7	1
14473	Perfluorododecanoic acid	307-55-1	N.D.	0.26	0.85	1
14473	Perfluoroheptanesulfonate	375-92-8	N.D.	0.34	1.7	1
14473	Perfluoroheptanoic acid	375-85-9	N.D.	0.26	0.85	1
14473	Perfluorohexadecanoic acid	67905-19-5	N.D.	0.26	0.85	1
14473	Perfluorohexanesulfonate	355-46-4	0.44 J	0.34	1.7	1
14473	Perfluorohexanoic acid	307-24-4	N.D.	0.34	1.7	1
14473	Perfluorononanoic acid	375-95-1	N.D.	0.34	1.7	1
14473	Perfluorooctanesulfonamide	754-91-6	N.D.	0.85	2.6	1
14473	Perfluoro-octanesulfonate	1763-23-1	0.44 J	0.34	1.7	1
14473	Perfluorooctanoic acid	335-67-1	0.60 J	0.26	0.85	1
14473	Perfluoropentanoic acid	2706-90-3	N.D.	1.7	5.1	1
14473	Perfluorotetradecanoic acid	376-06-7	N.D.	0.26	0.85	1
14473	Perfluorotridecanoic acid	72629-94-8	N.D.	0.26	0.85	1
14473	Perfluoroundecanoic acid	2058-94-8	N.D.	0.34	1.7	1

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

Sample Description: **Well 22 Grab Potable Water**
Aquarion Well 22 Pump Test
NH

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 06/26/2018 10:10
Collection Date/Time: 06/24/2018 16:30

Geosphere Environmental Mgmt
ELLE Sample #: PW 9677554
ELLE Group #: 1959289
Matrix: Potable Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18177021	06/27/2018 01:07	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	18177021	06/26/2018 15:15	Anthony C Polaski	1

*=This limit was used in the evaluation of the final result

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Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Group Number: 1959289
Reported: 06/28/2018 09:50

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ng/l	MDL** ng/l	LOQ ng/l
Batch number: 18177021	Sample number(s): 9677554		
6:2 fluorotelomersulfonate	N.D.	1.0	2.0
8:2 fluorotelomersulfonate	N.D.	2.0	6.0
NEtFOSAA	N.D.	1.0	3.0
NEtPFOSA	N.D.	3.0	9.0
NEtPFOSAE	N.D.	1.0	3.0
NMeFOSAA	N.D.	1.0	3.0
NMePFOSA	N.D.	3.0	9.0
NMePFOSAE	N.D.	1.0	3.0
Perfluorobutanesulfonate	N.D.	0.30	1.0
Perfluorobutanoic acid	N.D.	2.0	6.0
Perfluorodecanesulfonate	N.D.	0.60	2.0
Perfluorodecanoic acid	N.D.	1.0	2.0
Perfluorododecanoic acid	N.D.	0.30	1.0
Perfluoroheptanesulfonate	N.D.	0.40	2.0
Perfluoroheptanoic acid	N.D.	0.30	1.0
Perfluorohexadecanoic acid	N.D.	0.30	1.0
Perfluorohexanesulfonate	N.D.	0.40	2.0
Perfluorohexanoic acid	N.D.	0.40	2.0
Perfluorononanoic acid	N.D.	0.40	2.0
Perfluorooctanesulfonamide	N.D.	1.0	3.0
Perfluoro-octanesulfonate	N.D.	0.40	2.0
Perfluorooctanoic acid	N.D.	0.30	1.0
Perfluoropentanoic acid	N.D.	2.0	6.0
Perfluorotetradecanoic acid	N.D.	0.30	1.0
Perfluorotridecanoic acid	N.D.	0.30	1.0
Perfluoroundecanoic acid	N.D.	0.40	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18177021	Sample number(s): 9677554								
6:2 fluorotelomersulfonate	15.17	15.22	15.17	14.35	100	95	66-155	6	30
8:2 fluorotelomersulfonate	15.33	11.19	15.33	11.55	73	75	66-148	3	30
NEtFOSAA	5.44	3.82	5.44	3.48	70	64	55-169	9	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Reported: 06/28/2018 09:50

Group Number: 1959289

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
NEtPFOSA	5.44	5.17	5.44	4.45	95	82	70-130	15	30
NEtPFOSAE	5.44	5.04	5.44	4.81	93	88	70-130	5	30
NMeFOSAA	5.44	5.05	5.44	4.69	93	86	62-167	7	30
NMePFOSA	5.44	5.07	5.44	4.95	93	91	70-130	2	30
NMePFOSAE	5.44	2.56	5.44	2.56	47*	47*	70-130	0	30
Perfluorobutanesulfonate	4.81	4.27	4.81	4.17	89	87	73-128	2	30
Perfluorobutanoic acid	5.44	5.04	5.44	5.01	93	92	74-142	1	30
Perfluorodecanesulfonate	5.24	4.74	5.24	5.17	90	99	60-135	9	30
Perfluorodecanoic acid	5.44	4.96	5.44	4.74	91	87	69-148	5	30
Perfluorododecanoic acid	5.44	5.31	5.44	4.95	98	91	75-136	7	30
Perfluoroheptanesulfonate	5.18	4.20	5.18	4.01	81	77	64-135	5	30
Perfluoroheptanoic acid	5.44	4.76	5.44	5.09	87	94	76-140	7	30
Perfluorohexadecanoic acid	5.44	4.81	5.44	4.60	88	84	21-151	4	30
Perfluorohexanesulfonate	5.14	4.40	5.14	4.33	86	84	71-131	2	30
Perfluorohexanoic acid	5.44	5.06	5.44	4.76	93	88	75-135	6	30
Perfluorononanoic acid	5.44	5.33	5.44	5.14	98	94	72-148	4	30
Perfluorooctanesulfonamide	5.44	4.76	5.44	5.38	88	99	65-164	12	30
Perfluoro-octanesulfonate	5.20	4.68	5.20	4.61	90	89	67-138	2	30
Perfluorooctanoic acid	5.44	5.15	5.44	5.34	95	98	72-138	4	30
Perfluoropentanoic acid	5.44	5.07	5.44	4.77	93	88	74-134	6	30
Perfluorotetradecanoic acid	5.44	4.89	5.44	4.97	90	91	74-135	2	30
Perfluorotridecanoic acid	5.44	5.04	5.44	4.84	93	89	61-145	4	30
Perfluoroundecanoic acid	5.44	4.52	5.44	4.49	83	82	75-146	1	30

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18177021

	13C4-PFBA	13C5-PFPeA	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA
9677554	80	81	81	74	70	73
Blank	85	84	85	80	71	83
LCS	84	85	80	81	76	87
LCSD	83	87	82	80	79	80
Limits:	33-123	39-135	26-148	31-128	34-126	35-126

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
9677554	93	79	81	89	76	116
Blank	94	83	90	91	83	121

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Group Number: 1959289
Reported: 06/28/2018 09:50

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18177021

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
LCS	103	83	87	97	81	124
LCSD	98	79	84	94	84	119
Limits:	39-140	43-112	43-115	32-134	40-115	39-137

	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA	13C2-PFTeDA	13C8-PFOSA
9677554	62	72	67	71	70	61*
Blank	69	83	80	81	75	72
LCS	67	80	79	77	70	72
LCSD	72	80	81	80	78	71
Limits:	17-120	30-128	21-135	28-127	26-119	70-130

	d7-NMePFOSAE	d3-NMePFOSA	d9-NEtPFOSAE	d5-NEtPFOSA
9677554	94	52*	58*	53*
Blank	112	67*	65*	62*
LCS	107	59*	64*	57*
LCSD	108	57*	67*	61*
Limits:	70-130	70-130	70-130	70-130

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # 42988 Group # 1959289 Sample # 9677554

| | | |

eurofins | Lancaster Laboratories Environmental

Sample Administration Receipt Documentation Log

Doc Log ID: 220120

Group Number(s): 1959289

Client: Geosphere Enviromental Management

Aquarian Well 22 Pump Test

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	06/26/2018 10:10
Number of Packages:	1	Number of Projects:	1
State/Province of Origin:	NH		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Nicole Reiff (25684) at 10:35 on 06/26/2018

Samples Chilled Details: Aquarian Well 22 Pump Test

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT146	0.4	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17605-2425
T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Laboratory Reports- Eastern Analytical, Inc.

Well 22 – MidTest
June 27, 2018

Analyses:

- Secondary Parameters
- Inorganic Compounds
- Volatile Organic Compounds
- Nitrate

Eastern Analytical, Inc.

professional laboratory and drilling services

Matt Krapf
Geosphere Environmental Management Inc.
51 Portsmouth Avenue
Exeter , NH 03833

Subject: Laboratory Report

Eastern Analytical, Inc. ID: 183580
Client Identification: New Drinking Water Source, Hampton, NH
Date Received: 6/27/2018

Dear Mr. Krapf :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.easternanalytical.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

Solid samples are reported on a dry weight basis, unless otherwise noted
< : "less than" followed by the reporting limit
> : "greater than" followed by the reporting limit
%R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012) and New York (12072).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample (s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw, Lab Director | 6.29.18 Date | 10 # of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **183580**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Temperature upon receipt (°C): 1.8 **Received on ice or cold packs (Yes/No): Y**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
183580.01	Well 22 Round 2	6/27/18	6/27/18	aqueous		Adheres to Sample Acceptance Policy
183580.02	Trip Blank	6/27/18	4/6/18	aqueous		Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.
Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.

All results contained in this report relate only to the above listed samples.

References include:

1) EPA 600/4-79-020, 1983
2) Standard Methods for Examination of Water and Wastewater,20th Edition, 1998 and 22nd Edition, 2012
3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
4) Hach Water Analysis Handbook, 2nd edition, 1992

LABORATORY REPORT

EAI ID#: **183580**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Sample ID:	Well 22 Round 2	Trip Blank
Lab Sample ID:	183580.01	183580.02
Matrix:	aqueous	aqueous
Date Sampled:	6/27/18	4/6/18
Date Received:	6/27/18	6/27/18
Units:	ug/L	ug/L
Date of Analysis:	6/28/18	6/28/18
Analyst:	BAM	BAM
Method:	524.2	524.2
Dilution Factor:	1	1
Dichlorodifluoromethane	< 0.5	< 0.5
Chloromethane	< 0.5	< 0.5
Vinyl chloride	< 0.5	< 0.5
Bromomethane	< 0.5	< 0.5
Chloroethane	< 0.5	< 0.5
Trichlorofluoromethane	< 0.5	< 0.5
Diethyl Ether	< 5	< 5
Acetone	< 10	< 10
1,1-Dichloroethene	< 0.5	< 0.5
tert-Butyl Alcohol (TBA)	< 30	< 30
Methylene chloride	< 0.5	< 0.5
Carbon disulfide	< 2	< 2
Methyl-t-butyl ether(MTBE)	< 0.5	< 0.5
Ethyl-t-butyl ether(ETBE)	< 0.5	< 0.5
Isopropyl ether(DIPE)	< 0.5	< 0.5
tert-amyl methyl ether(TAME)	< 0.5	< 0.5
trans-1,2-Dichloroethene	< 0.5	< 0.5
Vinyl acetate	< 10	< 10
1,1-Dichloroethane	< 0.5	< 0.5
2,2-Dichloropropane	< 0.5	< 0.5
cis-1,2-Dichloroethene	< 0.5	< 0.5
2-Butanone(MEK)	< 5	< 5
Bromochloromethane	< 0.5	< 0.5
Tetrahydrofuran(THF)	< 5	< 5
Chloroform	< 0.5	< 0.5
1,1,1-Trichloroethane	< 0.5	< 0.5
Carbon tetrachloride	< 0.5	< 0.5
1,1-Dichloropropene	< 0.5	< 0.5
Benzene	< 0.5	< 0.5
1,2-Dichloroethane	< 0.5	< 0.5
Trichloroethene	< 0.5	< 0.5
1,2-Dichloropropane	< 0.5	< 0.5
Dibromomethane	< 0.5	< 0.5
Bromodichloromethane	< 0.5	< 0.5
4-Methyl-2-pentanone(MIBK)	< 5	< 5
cis-1,3-Dichloropropene	< 0.3	< 0.3
Toluene	< 0.5	< 0.5
trans-1,3-Dichloropropene	< 0.3	< 0.3
1,1,2-Trichloroethane	< 0.5	< 0.5
2-Hexanone	< 5	< 5
Tetrachloroethene	< 0.5	< 0.5
1,3-Dichloropropane	< 0.5	< 0.5
Dibromochloromethane	< 0.5	< 0.5
1,2-Dibromoethane(EDB)	< 0.5	< 0.5
Chlorobenzene	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane	< 0.5	< 0.5
Ethylbenzene	< 0.5	< 0.5

LABORATORY REPORT

EAI ID#: **183580**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Sample ID:	Well 22 Round 2	Trip Blank
Lab Sample ID:	183580.01	183580.02
Matrix:	aqueous	aqueous
Date Sampled:	6/27/18	4/6/18
Date Received:	6/27/18	6/27/18
Units:	ug/L	ug/L
Date of Analysis:	6/28/18	6/28/18
Analyst:	BAM	BAM
Method:	524.2	524.2
Dilution Factor:	1	1
mp-Xylene	< 0.5	< 0.5
o-Xylene	< 0.5	< 0.5
Styrene	< 0.5	< 0.5
Bromoform	< 0.5	< 0.5
IsoPropylbenzene	< 0.5	< 0.5
Bromobenzene	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	< 0.5	< 0.5
1,2,3-Trichloropropane	< 0.5	< 0.5
n-Propylbenzene	< 0.5	< 0.5
2-Chlorotoluene	< 0.5	< 0.5
4-Chlorotoluene	< 0.5	< 0.5
1,3,5-Trimethylbenzene	< 0.5	< 0.5
tert-Butylbenzene	< 0.5	< 0.5
1,2,4-Trimethylbenzene	< 0.5	< 0.5
sec-Butylbenzene	< 0.5	< 0.5
1,3-Dichlorobenzene	< 0.5	< 0.5
p-Isopropyltoluene	< 0.5	< 0.5
1,4-Dichlorobenzene	< 0.5	< 0.5
1,2-Dichlorobenzene	< 0.5	< 0.5
n-Butylbenzene	< 0.5	< 0.5
1,2-Dibromo-3-chloropropane	< 0.5	< 0.5
1,3,5-Trichlorobenzene	< 0.5	< 0.5
1,2,4-Trichlorobenzene	< 0.5	< 0.5
Hexachlorobutadiene	< 0.5	< 0.5
Naphthalene	< 0.5	< 0.5
1,2,3-Trichlorobenzene	< 0.5	< 0.5
4-Bromofluorobenzene (surr)	**94 %R**	**94 %R**
1,2-Dichlorobenzene-d4 (surr)	**97 %R**	**97 %R**

QC REPORT

EAI ID#: **183580**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Dichlorodifluoromethane	< 0.5	8.9 (89 %R)	8.9 (89 %R) (0 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Chloromethane	< 0.5	9.9 (99 %R)	10 (101 %R) (1 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Vinyl chloride	< 0.5	9.7 (97 %R)	11 (105 %R) (8 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Bromomethane	< 0.5	* 6.3 (63 %R)	7.4 (74 %R) (16 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Chloroethane	< 0.5	11 (115 %R)	11 (114 %R) (0 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Trichlorofluoromethane	< 0.5	11 (108 %R)	11 (114 %R) (5 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Diethyl Ether	< 5	12 (115 %R)	12 (119 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Acetone	< 10	11 (108 %R)	11 (111 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,1-Dichloroethene	< 0.5	9.5 (95 %R)	9.8 (98 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
tert-Butyl Alcohol (TBA)	< 30	49 (99 %R)	49 (97 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Methylene chloride	< 0.5	9.1 (91 %R)	9.4 (94 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Carbon disulfide	< 2	10 (104 %R)	11 (110 %R) (5 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Methyl-t-butyl ether(MTBE)	< 0.5	9.1 (91 %R)	9.2 (92 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Ethyl-t-butyl ether(ETBE)	< 0.5	8.7 (87 %R)	8.9 (89 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Isopropyl ether(DIPE)	< 0.5	9.6 (96 %R)	9.9 (99 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
tert-amyl methyl ether(TAME)	< 0.5	8.7 (87 %R)	8.9 (89 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
trans-1,2-Dichloroethene	< 0.5	8.7 (87 %R)	9.2 (92 %R) (6 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Vinyl acetate	< 10	< 10 (75 %R)	< 10 (78 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,1-Dichloroethane	< 0.5	9.2 (92 %R)	9.4 (94 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
2,2-Dichloropropane	< 0.5	* 6.6 (66 %R)	* 6.9 (69 %R) (5 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
cis-1,2-Dichloroethene	< 0.5	10 (102 %R)	10 (104 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
2-Butanone(MEK)	< 5	8.3 (83 %R)	8.3 (83 %R) (0 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Bromochloromethane	< 0.5	9.3 (93 %R)	9.4 (94 %R) (0 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Tetrahydrofuran(THF)	< 5	11 (106 %R)	10 (101 %R) (5 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Chloroform	< 0.5	9.1 (91 %R)	9.5 (95 %R) (5 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,1,1-Trichloroethane	< 0.5	7.9 (79 %R)	8.3 (83 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Carbon tetrachloride	< 0.5	* 6.9 (69 %R)	7.2 (72 %R) (5 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,1-Dichloropropene	< 0.5	8.9 (89 %R)	9.1 (91 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Benzene	< 0.5	9.3 (93 %R)	9.7 (97 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,2-Dichloroethane	< 0.5	9.4 (94 %R)	9.7 (97 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Trichloroethene	< 0.5	9.0 (90 %R)	9.4 (94 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,2-Dichloropropane	< 0.5	9.5 (95 %R)	9.9 (99 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Dibromomethane	< 0.5	9.4 (94 %R)	9.4 (94 %R) (0 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Bromodichloromethane	< 0.5	9.4 (94 %R)	10 (100 %R) (6 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
4-Methyl-2-pentanone(MIBK)	< 5	8.3 (83 %R)	8.6 (86 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
cis-1,3-Dichloropropene	< 0.3	8.4 (84 %R)	8.7 (87 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Toluene	< 0.5	9.3 (93 %R)	9.7 (97 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
trans-1,3-Dichloropropene	< 0.3	7.3 (73 %R)	7.8 (78 %R) (6 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,1,2-Trichloroethane	< 0.5	9.1 (91 %R)	9.5 (95 %R) (5 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
2-Hexanone	< 5	8.1 (81 %R)	8.3 (83 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Tetrachloroethene	< 0.5	9.3 (93 %R)	9.4 (94 %R) (1 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,3-Dichloropropane	< 0.5	9.2 (92 %R)	9.3 (93 %R) (1 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Dibromochloromethane	< 0.5	9.2 (92 %R)	9.6 (96 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,2-Dibromoethane(EDB)	< 0.5	8.8 (88 %R)	9.2 (92 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Chlorobenzene	< 0.5	9.2 (92 %R)	9.6 (96 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,1,1,2-Tetrachloroethane	< 0.5	7.5 (75 %R)	7.8 (78 %R) (5 RPD)	6/28/2018	ug/L	70 - 130	30	524.2

QC REPORT

EAI ID#: **183580**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Ethylbenzene	< 0.5	9.2 (92 %R)	9.5 (95 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
mp-Xylene	< 0.5	18 (91 %R)	19 (95 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
o-Xylene	< 0.5	9.0 (90 %R)	9.5 (95 %R) (5 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Styrene	< 0.5	9.0 (90 %R)	9.2 (92 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Bromoform	< 0.5	8.5 (85 %R)	8.8 (88 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
IsoPropylbenzene	< 0.5	9.1 (91 %R)	9.5 (95 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Bromobenzene	< 0.5	8.9 (89 %R)	9.1 (91 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,1,2,2-Tetrachloroethane	< 0.5	8.7 (87 %R)	9.0 (90 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,2,3-Trichloropropane	< 0.5	8.9 (89 %R)	9.3 (93 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
n-Propylbenzene	< 0.5	9.3 (93 %R)	9.5 (95 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
2-Chlorotoluene	< 0.5	8.7 (87 %R)	9.1 (91 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
4-Chlorotoluene	< 0.5	8.6 (86 %R)	8.9 (89 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,3,5-Trimethylbenzene	< 0.5	9.0 (90 %R)	9.3 (93 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
tert-Butylbenzene	< 0.5	9.0 (90 %R)	9.3 (93 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,2,4-Trimethylbenzene	< 0.5	9.1 (91 %R)	9.4 (94 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
sec-Butylbenzene	< 0.5	9.3 (93 %R)	9.4 (94 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,3-Dichlorobenzene	< 0.5	9.0 (90 %R)	9.1 (91 %R) (1 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
p-Isopropyltoluene	< 0.5	9.2 (92 %R)	9.5 (95 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,4-Dichlorobenzene	< 0.5	8.8 (88 %R)	8.9 (89 %R) (1 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,2-Dichlorobenzene	< 0.5	8.8 (88 %R)	9.0 (90 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
n-Butylbenzene	< 0.5	9.4 (94 %R)	9.6 (96 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,2-Dibromo-3-chloropropane	< 0.5	7.4 (74 %R)	7.3 (73 %R) (1 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,3,5-Trichlorobenzene	< 0.5	8.8 (88 %R)	9.0 (90 %R) (2 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,2,4-Trichlorobenzene	< 0.5	8.5 (85 %R)	8.8 (88 %R) (3 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Hexachlorobutadiene	< 0.5	7.7 (77 %R)	8.0 (80 %R) (4 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
Naphthalene	< 0.5	8.8 (88 %R)	8.9 (89 %R) (1 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
1,2,3-Trichlorobenzene	< 0.5	8.7 (87 %R)	8.7 (87 %R) (0 RPD)	6/28/2018	ug/L	70 - 130	30	524.2
4-Bromofluorobenzene (surr)	96 %R	97 %R	97 %R	6/28/2018	% Rec	70 - 130		524.2
1,2-Dichlorobenzene-d4 (surr)	101 %R	102 %R	102 %R	6/28/2018	% Rec	70 - 130		524.2

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.
Analytes that exceed limits high but are not detected in the field samples do not impact the data. For analytes that show low recovery and are not detected in the field samples, a low point calibration standard has been analyzed to support the reporting limit.

LABORATORY REPORT

EAI ID#: **183580**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Sample ID: Well 22 Round 2

Lab Sample ID:	183580.01
Matrix:	aqueous
Date Sampled:	6/27/18
Date Received:	6/27/18

		Analysis			
		Units	**Date**	**Time**	**Method**	**Analyst**
Chloride	**61**	mg/L	6/27/18	16:10	4500ClE-97	KD
Nitrate-N	< 0.5	mg/L	6/27/18	16:10	353.2	KD
Specific Conductance	**450**	uS/cm	6/27/18	18:30	120.1	KL

QC REPORT

EAI ID#: **183580**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Parameter Name	Blank	LCS	LCSD	Units	Date of Analysis	Limits	RPD	Method
Chloride	< 1	25 (100 %R)	26 (103 %R) (3 RPD)	mg/L	6/27/18	90 - 110	20	4500CIE-97
Nitrate-N	< 0.5	5.4 (107 %R)	5.5 (110 %R) (3 RPD)	mg/L	6/27/18	90 - 110	20	353.2
Specific Conductance	< 1	1400 (98 %R)	1400 (99 %R) (1 RPD)	uS/cm	6/27/18	90 - 110	20	120.1

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.

LABORATORY REPORT

EAI ID#: **183580**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Sample ID: Well 22 Round 2

Lab Sample ID: 183580.01
Matrix: aqueous
Date Sampled: 6/27/18
Date Received: 6/27/18

		Analytical Matrix	Units	Date of Analysis	Method	Analyst
Calcium	**0.56**	AqTot	mg/L	6/28/18	200.7	RJ
Iron	**0.056**	AqTot	mg/L	6/28/18	200.7	RJ
Magnesium	**0.41**	AqTot	mg/L	6/28/18	200.7	RJ
Manganese	**0.024**	AqTot	mg/L	6/28/18	200.7	RJ
Sodium	**87**	AqTot	mg/L	6/28/18	200.7	RJ
Total Hardness (as CaCO3)	**3.1**	AqTot	mg/L	6/28/18	200.7	RJ

QC REPORT

EAI ID#: **183580**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **New Drinking Water Source, Hampton, NH**

Parameter Name	Blank	LCS	LCSD	Units	Date of Analysis	Limits	RPD	Method
Calcium	< 0.05	11 (99 %R)		mg/L	6/28/18	85 - 115	20	200.7
Iron	< 0.05	11 (99 %R)		mg/L	6/28/18	85 - 115	20	200.7
Magnesium	< 0.05	11 (102 %R)		mg/L	6/28/18	85 - 115	20	200.7
Manganese	< 0.005	1.0 (102 %R)		mg/L	6/28/18	85 - 115	20	200.7
Sodium	< 5	11 (100 %R)		mg/L	6/28/18	85 - 115	20	200.7

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.

Eastern Analytical, Inc. CHAIN-OF-CUSTODY RECORD

183580

Sample IDs	Date/Time (Composites need start and stop dates/times)	Matrix	Parameters and Sample Notes	# of containers
Well 22 Rand2	6/27/18 7:40	aqueous (Grab) or Comp	AqTot/VNH524FullList/NO3/Cl/SpecCon/ICPMets.Fe.Mn.Na.HardTot Please Incl. Ca + Mg in metals analysis	2
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐
Trip Blank	6/27/18 7:40	aqueous (Grab) or Comp	AqTot/VNH524FullList	2
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐

Please ensure this auto COC is accurate, adheres to permit or sampling requirements for this sampling event, and modify as necessary.

EAI Project ID

Project Name: New Drinking Water Source, Hampton, NH

State: NH

Client (Pro Mgr): Matt Krapf

Customer: Geosphere Environmental

Address: 51 Portsmouth Avenue

City: Exeter NH 03833

Phone: 773-0075 Fax: 773-0077(14)

Email: mkrapf@geospherenh.com

Direct

Results Needed by: Preferred date 6/28/18

Notes: 24-hour turn around

Round 2

QC deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ PC

ReportingOptions

☒ HC ☐ NO FAX

☒ EDD PDF ☐ Partial FAX

☒ EDD email ☐ PDF Invoice

☒ PDF prelim, NO FAX ☐ EQUIS

☐ e-mail Login Confirmation

PO# Verbal

Quote#:

Temp 1.8 °C

Ice Y ☒ N ☐

Samples Collected by: Lauren Baader 6/27/18 8:10am

Relinquished by	Date/Time	Received by
	6/27 10:40	
	6/27 1443	

Laboratory Report
Lancaster Laboratories Environmental (Eurofins)

Well 22 – MidTest
June 27, 2018

Analysis:

- Perfluorinated Compounds

eurofins | Lancaster Laboratories Environmental

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Geosphere Environmental Mgmt
51 Portsmouth Avenue
Exeter NH 03833

Report Date: June 28, 2018 10:20

Project: 12217 - Aquarion Well 22 Pump Test

Account #: 42988
Group Number: 1959782
PO Number: 12217
State of Sample Origin: NH

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our current scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . To request copies of prior scopes of accreditation, contact your project manager.

Electronic Copy To Geosphere Environmental Mgmt Attn: Ray Talkington

Respectfully Submitted,

Lyssa M. Longenecker
Specialist

(717) 556-7321

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
Well_22(Day 7) Grab Potable Water	06/26/2018 16:30	9679596

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Sample Description: **Well_22(Day 7) Grab Potable Water**
Aquarion Well 22 Pump Test

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 06/27/2018 10:00
Collection Date/Time: 06/26/2018 16:30

Geosphere Environmental Mgmt
ELLE Sample #: PW 9679596
ELLE Group #: 1959782
Matrix: Potable Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	**ng/l**	
14473	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.86	1.7	1
14473	8:2 fluorotelomersulfonate	39108-34-4	N.D.	1.7	5.1	1
14473	NEtFOSAA	2991-50-6	N.D.	0.86	2.6	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.					
14473	NEtPFOSA	4151-50-2	N.D.	2.6	7.7	1
	NEtPFOSA is the acronym for N-ethylperfluoro-1-octanesulfonamide					
14473	NEtPFOSAE	1691-99-2	N.D.	0.86	2.6	1
	NEtPFOSAE is the acronym for 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol					
14473	NMeFOSAA	2355-31-9	N.D.	0.86	2.6	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.					
14473	NMePFOSA	31506-32-8	N.D.	2.6	7.7	1
	NMePFOSA is the acronym for N-methylperfluoro-1-octanesulfonamide					
14473	NMePFOSAE	24448-09-7	N.D.	0.86	2.6	1
	NMePFOSAE is the acronym for 2-(N-methylperfluoro-1-octanesulfonamido)-ethanol					
14473	Perfluorobutanesulfonate	375-73-5	0.30 J	0.26	0.86	1
14473	Perfluorobutanoic acid	375-22-4	N.D.	1.7	5.1	1
14473	Perfluorodecanesulfonate	335-77-3	N.D.	0.51	1.7	1
14473	Perfluorodecanoic acid	335-76-2	N.D.	0.86	1.7	1
14473	Perfluorododecanoic acid	307-55-1	N.D.	0.26	0.86	1
14473	Perfluoroheptanesulfonate	375-92-8	N.D.	0.34	1.7	1
14473	Perfluoroheptanoic acid	375-85-9	N.D.	0.26	0.86	1
14473	Perfluorohexadecanoic acid	67905-19-5	N.D.	0.26	0.86	1
14473	Perfluorohexanesulfonate	355-46-4	0.54 J	0.34	1.7	1
14473	Perfluorohexanoic acid	307-24-4	N.D.	0.34	1.7	1
14473	Perfluorononanoic acid	375-95-1	N.D.	0.34	1.7	1
14473	Perfluorooctanesulfonamide	754-91-6	N.D.	0.86	2.6	1
14473	Perfluoro-octanesulfonate	1763-23-1	0.61 J	0.34	1.7	1
14473	Perfluorooctanoic acid	335-67-1	0.88	0.26	0.86	1
14473	Perfluoropentanoic acid	2706-90-3	N.D.	1.7	5.1	1
14473	Perfluorotetradecanoic acid	376-06-7	N.D.	0.26	0.86	1
14473	Perfluorotridecanoic acid	72629-94-8	N.D.	0.26	0.86	1
14473	Perfluoroundecanoic acid	2058-94-8	N.D.	0.34	1.7	1

The stated QC limits are advisory only until sufficient data points can be obtained to calculate statistical limits.

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

Sample Description: **Well_22(Day 7) Grab Potable Water**
Aquarion Well 22 Pump Test

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 06/27/2018 10:00
Collection Date/Time: 06/26/2018 16:30

Geosphere Environmental Mgmt
ELLE Sample #: PW 9679596
ELLE Group #: 1959782
Matrix: Potable Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18178018	06/27/2018 22:55	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	18178018	06/27/2018 16:15	Anthony C Polaski	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Geosphere Environmental Mgmt Group Number: 1959782
Reported: 06/28/2018 10:20

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	MDL**	LOQ
	ng/l	ng/l	ng/l
Batch number: 18178018	Sample number(s): 9679596		
6:2 fluorotelomersulfonate	N.D.	1.0	2.0
8:2 fluorotelomersulfonate	N.D.	2.0	6.0
NEtFOSAA	N.D.	1.0	3.0
NEtPFOSA	N.D.	3.0	9.0
NEtPFOSAE	N.D.	1.0	3.0
NMeFOSAA	N.D.	1.0	3.0
NMePFOSA	N.D.	3.0	9.0
NMePFOSAE	N.D.	1.0	3.0
Perfluorobutanesulfonate	N.D.	0.30	1.0
Perfluorobutanoic acid	N.D.	2.0	6.0
Perfluorodecanesulfonate	N.D.	0.60	2.0
Perfluorodecanoic acid	N.D.	1.0	2.0
Perfluorododecanoic acid	N.D.	0.30	1.0
Perfluoroheptanesulfonate	N.D.	0.40	2.0
Perfluoroheptanoic acid	N.D.	0.30	1.0
Perfluorohexadecanoic acid	N.D.	0.30	1.0
Perfluorohexanesulfonate	N.D.	0.40	2.0
Perfluorohexanoic acid	N.D.	0.40	2.0
Perfluorononanoic acid	N.D.	0.40	2.0
Perfluorooctanesulfonamide	N.D.	1.0	3.0
Perfluoro-octanesulfonate	N.D.	0.40	2.0
Perfluorooctanoic acid	N.D.	0.30	1.0
Perfluoropentanoic acid	N.D.	2.0	6.0
Perfluorotetradecanoic acid	N.D.	0.30	1.0
Perfluorotridecanoic acid	N.D.	0.30	1.0
Perfluoroundecanoic acid	N.D.	0.40	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18178018	Sample number(s): 9679596								
6:2 fluorotelomersulfonate	15.17	17.64	15.17	18.34	116	121	66-155	4	30
8:2 fluorotelomersulfonate	15.33	17.87	15.33	19.25	117	126	66-148	7	30
NEtFOSAA	5.44	5.32	5.44	6.21	98	114	55-169	15	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Reported: 06/28/2018 10:20

Group Number: 1959782

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
NEtPFOSA	5.44	6.09	5.44	6.23	112	115	70-130	2	30
NEtPFOSAE	5.44	5.79	5.44	5.77	107	106	70-130	0	30
NMeFOSAA	5.44	5.43	5.44	5.98	100	110	62-167	10	30
NMePFOSA	5.44	5.28	5.44	6.90	97	127	70-130	27	30
NMePFOSAE	5.44	5.17	5.44	4.93	95	91	70-130	5	30
Perfluorobutanesulfonate	4.81	5.03	4.81	5.13	104	107	73-128	2	30
Perfluorobutanoic acid	5.44	5.82	5.44	5.95	107	109	74-142	2	30
Perfluorodecanesulfonate	5.24	4.77	5.24	5.73	91	109	60-135	18	30
Perfluorodecanoic acid	5.44	5.44	5.44	5.40	100	99	69-148	1	30
Perfluorododecanoic acid	5.44	6.07	5.44	6.26	112	115	75-136	3	30
Perfluoroheptanesulfonate	5.18	5.25	5.18	5.68	101	110	64-135	8	30
Perfluoroheptanoic acid	5.44	5.92	5.44	6.09	109	112	76-140	3	30
Perfluorohexadecanoic acid	5.44	5.51	5.44	5.80	101	107	21-151	5	30
Perfluorohexanesulfonate	5.14	5.14	5.14	5.37	100	104	71-131	4	30
Perfluorohexanoic acid	5.44	5.61	5.44	6.29	103	116	75-135	11	30
Perfluorononanoic acid	5.44	5.83	5.44	6.50	107	119	72-148	11	30
Perfluorooctanesulfonamide	5.44	6.23	5.44	5.92	114	109	65-164	5	30
Perfluoro-octanesulfonate	5.20	5.42	5.20	5.46	104	105	67-138	1	30
Perfluorooctanoic acid	5.44	6.20	5.44	5.88	114	108	72-138	5	30
Perfluoropentanoic acid	5.44	6.06	5.44	6.11	111	112	74-134	1	30
Perfluorotetradecanoic acid	5.44	5.71	5.44	6.02	105	111	74-135	5	30
Perfluorotridecanoic acid	5.44	5.59	5.44	5.84	103	107	61-145	4	30
Perfluoroundecanoic acid	5.44	5.19	5.44	5.42	95	100	75-146	4	30

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18178018

	13C4-PFBA	13C5-PFPeA	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA
9679596	84	79	81	78	81	80
Blank	81	80	76	78	69	81
LCS	75	71	68	76	70	71
LCSD	80	78	74	74	71	74
Limits:	33-123	39-135	26-148	31-128	34-126	35-126

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
9679596	84	84	85	98	84	78
Blank	93	85	85	85	73	73

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Group Number: 1959782
Reported: 06/28/2018 10:20

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18178018

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
LCS	87	76	79	87	75	74
LCSD	94	83	79	85	80	85
Limits:	39-140	43-112	43-115	32-134	40-115	39-137

	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA	13C2-PFTeDA	13C8-PFOSA
9679596	62	82	66	79	76	68*
Blank	61	74	59	72	68	62*
LCS	60	70	58	68	66	58*
LCSD	65	79	69	77	73	65*
Limits:	17-120	30-128	21-135	28-127	26-119	70-130

	d7-NMePFOSAE	d3-NMePFOSA	d9-NEtPFOSAE	d5-NEtPFOSA
9679596	60*	33*	59*	33*
Blank	62*	57*	60*	51*
LCS	57*	47*	57*	37*
LCSD	63*	43*	63*	39*
Limits:	70-130	70-130	70-130	70-130

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
P###### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

Environmental Analysis Request/Chain of Custody

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Acct. # 42988 Group # 1959782 Sample # 9679596

Client: Geosphere Environmental Management

Project Name/#: Aquarion Well 22 Pump Test | Site ID #: 12217

Project Manager: Ray Talkington | P.O. #:

Sampler: Matt Knapf | PWSID #:

Phone #: 603-773-0075 | Quote #:

State where samples were collected: ____ | For Compliance: Yes ☐ No ☐

Please do not send results to NHDES. Only send to Ray Talkington

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil	Sediment	Tissue	Water: Potable	Ground	Surface	NPDES	Other:	Total # of Containers	Analyses Requested: PFC EPA Method	Remarks
Well 22 (Day 7)	6/26/18	4:30pm	X						X				2	X	Trizma

Preservation and Filtration Codes

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; F = Field Filtered; O = Other

For Lab Use Only: SF #: ____ SCR #: ____

Turnaround Time Requested (TAT) (please check): Standard ☐ Rush ☒ 24 hrs

(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed: ~~6/28/18~~ 6/28/18

Rush results requested by (please check): E-Mail ☒ Phone ☐

E-mail Address: rtalkington@geospherenh.com

Phone: 603-773-0075

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type VI (Raw Data Only) ☐ TX TRRP-13 ☐

NJ DKQP ☐ NYSDEC Category ☐ A or ☐ B

EDD Required? Yes ☐ No ☐ If yes, format: ____

Relinquished by:	Date	Time	Received by:	Date	Time
Matthew W. Knapf	6/26/18	4:45pm	FED EX	6/26/18	4:45pm
			MMR	6/27/18	1000

Relinquished by Commercial Carrier: UPS ____ FedEx X Other ____

Temperature upon receipt 0.4 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 220212

Group Number(s): 1959782

Client: Geosphere Enviromental

Aquarion Well 22 Pump Test

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	06/27/2018 10:00
Number of Packages:	1	Number of Projects:	1

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Nicole Reiff (25684) at 10:53 on 06/27/2018

Samples Chilled Details: Aquarion Well 22 Pump Test

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT146	0.4	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17605-2425
T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Laboratory Reports- Eastern Analytical, Inc.

Well 22 – Final Day
July 17, 2018

Analyses:

- Required Parameters per ENV-DW 707
- 1,4-Dioxane
- Radon

Eastern Analytical, Inc.

professional laboratory and drilling services

Matt Krapf
Geosphere Environmental Management Inc.
51 Portsmouth Avenue
Exeter , NH 03833

Subject: Laboratory Report

Eastern Analytical, Inc. ID: 184366
Client Identification: Round 3 NHDES Analytical Requirements for Community Public Water
Date Received: 7/17/2018

Dear Mr. Krapf :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.easternanalytical.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

Solid samples are reported on a dry weight basis, unless otherwise noted
< : "less than" followed by the reporting limit
> : "greater than" followed by the reporting limit
%R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012) and New York (12072).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample (s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw, Lab Director

8.14.18
Date

87
# of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Temperature upon receipt (°C): 0.7 **Received on ice or cold packs (Yes/No): Y**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
184366.01	Well 22	7/17/18	7/17/18	aqueous		Adheres to Sample Acceptance Policy
184366.02	Trip Blank - 524	7/17/18	4/9/18	aqueous		Adheres to Sample Acceptance Policy
184366.03	Trip Blank - 1,4 Dioxane	7/17/18	3/30/18	aqueous		Adheres to Sample Acceptance Policy
184366.04	Trip Blank - SOC	7/17/18	3/30/18	aqueous		Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.
Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.
All results contained in this report relate only to the above listed samples.
References include:
1) EPA 600/4-79-020, 1983
2) Standard Methods for Examination of Water and Wastewater, 20th, 21st, 22nd & 23rd Edition or noted Revision year.
3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
4) Hach Water Analysis Handbook, 4th edition, 1992

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID:	Well 22	Trip Blank - 524
Lab Sample ID:	184366.01	184366.02
Matrix:	aqueous	aqueous
Date Sampled:	7/17/18	4/9/18
Date Received:	7/17/18	7/17/18
Units:	ug/L	ug/L
Date of Analysis:	7/18/18	7/18/18
Analyst:	BAM	BAM
Method:	524.2	524.2
Dilution Factor:	1	1
Dichlorodifluoromethane	< 0.5	< 0.5
Chloromethane	< 0.5	< 0.5
Vinyl chloride	< 0.5	< 0.5
Bromomethane	< 0.5	< 0.5
Chloroethane	< 0.5	< 0.5
Trichlorofluoromethane	< 0.5	< 0.5
Diethyl Ether	< 5	< 5
Acetone	< 10	< 10
1,1-Dichloroethene	< 0.5	< 0.5
tert-Butyl Alcohol (TBA)	< 30	< 30
Methylene chloride	< 0.5	< 0.5
Carbon disulfide	< 2	< 2
Methyl-t-butyl ether(MTBE)	< 0.5	< 0.5
Ethyl-t-butyl ether(ETBE)	< 0.5	< 0.5
Isopropyl ether(DIPE)	< 0.5	< 0.5
tert-amyl methyl ether(TAME)	< 0.5	< 0.5
trans-1,2-Dichloroethene	< 0.5	< 0.5
Vinyl acetate	< 10	< 10
1,1-Dichloroethane	< 0.5	< 0.5
2,2-Dichloropropane	< 0.5	< 0.5
cis-1,2-Dichloroethene	< 0.5	< 0.5
2-Butanone(MEK)	< 5	< 5
Bromochloromethane	< 0.5	< 0.5
Tetrahydrofuran(THF)	< 5	< 5
Chloroform	< 0.5	< 0.5
1,1,1-Trichloroethane	< 0.5	< 0.5
Carbon tetrachloride	< 0.5	< 0.5
1,1-Dichloropropene	< 0.5	< 0.5
Benzene	< 0.5	< 0.5
1,2-Dichloroethane	< 0.5	< 0.5
Trichloroethene	< 0.5	< 0.5
1,2-Dichloropropane	< 0.5	< 0.5
Dibromomethane	< 0.5	< 0.5
Bromodichloromethane	< 0.5	< 0.5
4-Methyl-2-pentanone(MIBK)	< 5	< 5
cis-1,3-Dichloropropene	< 0.3	< 0.3
Toluene	< 0.5	< 0.5
trans-1,3-Dichloropropene	< 0.3	< 0.3
1,1,2-Trichloroethane	< 0.5	< 0.5
2-Hexanone	< 5	< 5
Tetrachloroethene	< 0.5	< 0.5
1,3-Dichloropropane	< 0.5	< 0.5
Dibromochloromethane	< 0.5	< 0.5
1,2-Dibromoethane(EDB)	< 0.5	< 0.5
Chlorobenzene	< 0.5	< 0.5
1,1,1,2-Tetrachloroethane	< 0.5	< 0.5
Ethylbenzene	< 0.5	< 0.5

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID:	Well 22	Trip Blank - 524
Lab Sample ID:	184366.01	184366.02
Matrix:	aqueous	aqueous
Date Sampled:	7/17/18	4/9/18
Date Received:	7/17/18	7/17/18
Units:	ug/L	ug/L
Date of Analysis:	7/18/18	7/18/18
Analyst:	BAM	BAM
Method:	524.2	524.2
Dilution Factor:	1	1
mp-Xylene	< 0.5	< 0.5
o-Xylene	< 0.5	< 0.5
Styrene	< 0.5	< 0.5
Bromoform	< 0.5	< 0.5
IsoPropylbenzene	< 0.5	< 0.5
Bromobenzene	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	< 0.5	< 0.5
1,2,3-Trichloropropane	< 0.5	< 0.5
n-Propylbenzene	< 0.5	< 0.5
2-Chlorotoluene	< 0.5	< 0.5
4-Chlorotoluene	< 0.5	< 0.5
1,3,5-Trimethylbenzene	< 0.5	< 0.5
tert-Butylbenzene	< 0.5	< 0.5
1,2,4-Trimethylbenzene	< 0.5	< 0.5
sec-Butylbenzene	< 0.5	< 0.5
1,3-Dichlorobenzene	< 0.5	< 0.5
p-Isopropyltoluene	< 0.5	< 0.5
1,4-Dichlorobenzene	< 0.5	< 0.5
1,2-Dichlorobenzene	< 0.5	< 0.5
n-Butylbenzene	< 0.5	< 0.5
1,2-Dibromo-3-chloropropane	< 0.5	< 0.5
1,3,5-Trichlorobenzene	< 0.5	< 0.5
1,2,4-Trichlorobenzene	< 0.5	< 0.5
Hexachlorobutadiene	< 0.5	< 0.5
Naphthalene	< 0.5	< 0.5
1,2,3-Trichlorobenzene	< 0.5	< 0.5
4-Bromofluorobenzene (surr)	**101 %R**	**102 %R**
1,2-Dichlorobenzene-d4 (surr)	**105 %R**	**106 %R**

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Dichlorodifluoromethane	< 0.5	8.4 (84 %R)	7.9 (79 %R) (6 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Chloromethane	< 0.5	10 (102 %R)	10 (101 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Vinyl chloride	< 0.5	* 13 (132 %R)	13 (130 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Bromomethane	< 0.5	* 6.1 (61 %R)	* 6.2 (62 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Chloroethane	< 0.5	13 (128 %R)	* 13 (133 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Trichlorofluoromethane	< 0.5	12 (125 %R)	12 (121 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Diethyl Ether	< 5	* 14 (142 %R)	* 14 (137 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Acetone	< 10	11 (115 %R)	12 (124 %R) (8 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,1-Dichloroethene	< 0.5	11 (109 %R)	11 (108 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
tert-Butyl Alcohol (TBA)	< 30	54 (107 %R)	54 (109 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Methylene chloride	< 0.5	11 (106 %R)	10 (101 %R) (5 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Carbon disulfide	< 2	11 (111 %R)	11 (109 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Methyl-t-butyl ether(MTBE)	< 0.5	9.1 (91 %R)	8.9 (89 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Ethyl-t-butyl ether(ETBE)	< 0.5	8.7 (87 %R)	8.7 (87 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Isopropyl ether(DIPE)	< 0.5	11 (107 %R)	11 (105 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
tert-amyl methyl ether(TAME)	< 0.5	8.5 (85 %R)	8.5 (85 %R) (0 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
trans-1,2-Dichloroethene	< 0.5	9.4 (94 %R)	9.1 (91 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Vinyl acetate	< 10	< 10 (85 %R)	< 10 (80 %R) (6 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,1-Dichloroethane	< 0.5	10 (101 %R)	9.9 (99 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
2,2-Dichloropropane	< 0.5	* 6.1 (61 %R)	* 5.8 (58 %R) (5 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
cis-1,2-Dichloroethene	< 0.5	11 (112 %R)	11 (107 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
2-Butanone(MEK)	< 5	9 (90 %R)	8.6 (86 %R) (5 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Bromochloromethane	< 0.5	9.8 (98 %R)	9.5 (95 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Tetrahydrofuran(THF)	< 5	11 (112 %R)	12 (117 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Chloroform	< 0.5	10 (100 %R)	9.7 (97 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,1,1-Trichloroethane	< 0.5	8.4 (84 %R)	8.4 (84 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Carbon tetrachloride	< 0.5	8.8 (88 %R)	8.2 (82 %R) (8 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,1-Dichloropropene	< 0.5	9.6 (96 %R)	9.5 (95 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Benzene	< 0.5	11 (105 %R)	10 (105 %R) (0 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,2-Dichloroethane	< 0.5	10 (103 %R)	10 (102 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Trichloroethene	< 0.5	9.6 (96 %R)	9.3 (93 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,2-Dichloropropane	< 0.5	11 (108 %R)	10 (104 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Dibromomethane	< 0.5	10 (101 %R)	10 (104 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Bromodichloromethane	< 0.5	11 (112 %R)	11 (110 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
4-Methyl-2-pentanone(MIBK)	< 5	8.6 (86 %R)	8.8 (88 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
cis-1,3-Dichloropropene	< 0.3	9.1 (91 %R)	8.7 (87 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Toluene	< 0.5	10 (105 %R)	10 (102 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
trans-1,3-Dichloropropene	< 0.3	7.8 (78 %R)	7.7 (77 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,1,2-Trichloroethane	< 0.5	10 (101 %R)	9.6 (96 %R) (5 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
2-Hexanone	< 5	8.5 (85 %R)	8.4 (84 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Tetrachloroethene	< 0.5	9.8 (98 %R)	9.2 (92 %R) (7 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,3-Dichloropropane	< 0.5	11 (105 %R)	10 (102 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Dibromochloromethane	< 0.5	12 (116 %R)	11 (112 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,2-Dibromoethane(EDB)	< 0.5	9.8 (98 %R)	9.6 (96 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Chlorobenzene	< 0.5	10 (102 %R)	10 (100 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,1,1,2-Tetrachloroethane	< 0.5	9.5 (95 %R)	9.2 (92 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Ethylbenzene	< 0.5	10 (103 %R)	10 (101 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
mp-Xylene	< 0.5	21 (103 %R)	20 (100 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
o-Xylene	< 0.5	10 (100 %R)	9.6 (96 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Styrene	< 0.5	10 (101 %R)	9.7 (97 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Bromoform	< 0.5	11 (115 %R)	11 (109 %R) (5 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
IsoPropylbenzene	< 0.5	10 (101 %R)	9.9 (99 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Bromobenzene	< 0.5	9.3 (93 %R)	9.2 (92 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,1,2,2-Tetrachloroethane	< 0.5	9.7 (97 %R)	9.7 (97 %R) (0 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,2,3-Trichloropropane	< 0.5	9.1 (91 %R)	9.6 (96 %R) (5 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
n-Propylbenzene	< 0.5	10 (104 %R)	10 (100 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
2-Chlorotoluene	< 0.5	9.8 (98 %R)	9.6 (96 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
4-Chlorotoluene	< 0.5	9.5 (95 %R)	9.3 (93 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,3,5-Trimethylbenzene	< 0.5	10 (100 %R)	9.7 (97 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
tert-Butylbenzene	< 0.5	10 (101 %R)	9.9 (99 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,2,4-Trimethylbenzene	< 0.5	10 (102 %R)	9.9 (99 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
sec-Butylbenzene	< 0.5	10 (104 %R)	9.9 (99 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,3-Dichlorobenzene	< 0.5	9.7 (97 %R)	9.5 (95 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
p-Isopropyltoluene	< 0.5	10 (103 %R)	9.8 (98 %R) (5 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,4-Dichlorobenzene	< 0.5	9.7 (97 %R)	9.3 (93 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,2-Dichlorobenzene	< 0.5	9.6 (96 %R)	9.6 (96 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
n-Butylbenzene	< 0.5	10 (105 %R)	10 (101 %R) (4 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,2-Dibromo-3-chloropropane	< 0.5	9.7 (97 %R)	8.1 (81 %R) (18 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,3,5-Trichlorobenzene	< 0.5	9.3 (93 %R)	9.1 (91 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,2,4-Trichlorobenzene	< 0.5	8.8 (88 %R)	8.5 (85 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Hexachlorobutadiene	< 0.5	8.0 (80 %R)	7.4 (74 %R) (9 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
Naphthalene	< 0.5	9.4 (94 %R)	9.2 (92 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
1,2,3-Trichlorobenzene	< 0.5	9.0 (90 %R)	9.0 (90 %R) (0 RPD)	7/18/2018	ug/L	70 - 130	30	524.2
4-Bromofluorobenzene (surr)	98 %R	102 %R	102 %R	7/18/2018	% Rec	70 - 130		524.2
1,2-Dichlorobenzene-d4 (surr)	104 %R	112 %R	113 %R	7/18/2018	% Rec	70 - 130		524.2

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.
Analytes that exceed limits high but are not detected in the field samples do not impact the data. For analytes that show low recovery and are not detected in the field samples, a low point calibration standard has been analyzed to support the reporting limit.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID:	Well 22	Trip Blank - 1,4 Dioxane
Lab Sample ID:	184366.01	184366.03
Matrix:	aqueous	aqueous
Date Sampled:	7/17/18	3/30/18
Date Received:	7/17/18	7/17/18
Units:	ug/L	ug/L
Date of Analysis:	7/20/18	7/20/18
Analyst:	VG	VG
Method:	8260B SIM	8260B SIM
Dilution Factor:	1	1
1,4-Dioxane	< 0.25	< 0.25
4-Bromofluorobenzene (surr)	**106 %R**	**109 %R**
Toluene-d8 (surr)	**102 %R**	**103 %R**

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Units	Date of Analysis	Limits	RPD	Method
1,4-Dioxane	< 0.25	5.8 (116 %R)	5.6 (111 %R) (4 RPD)	ug/L	7/20/18	70 - 130	20	8260B SIM
4-Bromofluorobenzene (surr)	106 %R	108 %R	108 %R	% Rec	7/20/18	70 - 130	50	8260B SIM
Toluene-d8 (surr)	102 %R	103 %R	102 %R	% Rec	7/20/18	70 - 130	50	8260B SIM

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID:	Well 22	Trip Blank - SOC
Lab Sample ID:	184366.01	184366.04
Matrix:	aqueous	aqueous
Date Sampled:	7/17/18	3/30/18
Date Received:	7/17/18	7/17/18
Units:	ug/L	ug/L
Date of Extraction/Prep:	7/18/18	7/18/18
Date of Analysis:	7/18/18	7/18/18
Analyst:	JMR	JMR
Method:	8011/504	8011/504
Dilution Factor:	1	1
1,2-Dibromoethane(EDB)	< 0.02	< 0.02
Dibromochloropropane (DBCP)	< 0.02	< 0.02
1,1,1,2-Tetrachloroethane (surr)	**109 %R**	**110 %R**

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.** **Batch ID:** 636674-95090/A071818EDBDB1

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
1,2-Dibromoethane(EDB)	< 0.02	0.11 (110 %R)	0.11 (111 %R) (1 RPD)	7/18/2018	ug/L	70 - 130	20	8011/504
Dibromochloropropane (DBCP)	< 0.02	0.097 (97 %R)	0.099 (99 %R) (2 RPD)	7/18/2018	ug/L	70 - 130	20	8011/504
1,1,1,2-Tetrachloroethane (surr)	108 %R	109 %R	109 %R	7/18/2018	% Rec	65 - 135	20	8011/504

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID:	Well 22
Lab Sample ID:	184366.01
Matrix:	aqueous
Date Sampled:	7/17/18
Date Received:	7/17/18
Units:	ug/L
Date of Extraction/Prep:	7/18/18
Date of Analysis:	7/18/18
Analyst:	JMR
Method:	505
Dilution Factor:	1

Chlordane	< 0.5
Toxaphene	< 2
1,1,1,2-Tetrachloroethane (surr)	**109 %R**

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.** **Batch ID:** 636674-95124/A071818E5051

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Chlordane	< 0.5	0.91 (91 %R)	0.93 (93 %R) (3 RPD)	7/18/2018	ug/L	70 - 130	20	505
Toxaphene	< 2	< 2 (%R N/A)	< 2 (%R N/A) (RPD N/A)	7/18/2018	ug/L			505
1,1,1,2-Tetrachloroethane (surr)	108 %R	109 %R	109 %R	7/18/2018	% Rec	65 - 135	20	505

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID:	Well 22
Lab Sample ID:	184366.01
Matrix:	aqueous
Date Sampled:	7/17/18
Date Received:	7/17/18
Units:	ug/L
Date of Extraction/Prep:	7/26/18
Date of Analysis:	7/26/18
Analyst:	AR
Method:	515.4
Dilution Factor:	1

Pentachlorophenol	< 1
2,4-D	< 5
2,4,5-TP (Silvex)	< 5
Dinoseb	< 5
Picloram	< 5
2,4-DCAA	**98 %R**

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.** **Batch ID:** 63668193639/A072618E5151

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Pentachlorophenol	< 1	19 (97 %R)	19 (96 %R) (1 RPD)	7/26/2018	ug/L	70 - 130	30	515.4
2,4-D	< 5	20 (99 %R)	20 (98 %R) (1 RPD)	7/26/2018	ug/L	70 - 130	30	515.4
2,4,5-TP (Silvex)	< 5	20 (98 %R)	20 (99 %R) (0 RPD)	7/26/2018	ug/L	70 - 130	30	515.4
Dinoseb	< 5	20 (98 %R)	20 (98 %R) (0 RPD)	7/26/2018	ug/L	70 - 130	30	515.4
Picloram	< 5	19 (97 %R)	19 (97 %R) (0 RPD)	7/26/2018	ug/L	70 - 130	30	515.4
2,4-DCAA	100 %R	97 %R	94 %R	7/26/2018	ug/L	70 - 130	30	515.4

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID:	Well 22
Lab Sample ID:	184366.01
Matrix:	aqueous
Date Sampled:	7/17/18
Date Received:	7/17/18
Units:	ug/L
Date of Extraction/Prep:	7/19/18
Date of Analysis:	7/19/18
Analyst:	JMR
Method:	525.2
Dilution Factor:	1

Hexachlorocyclopentadiene	< 1
Hexachlorobenzene	< 1
bis(2-Ethylhexyl)adipate	< 1
bis(2-Ethylhexyl)phthalate	< 1
Benzo[a]pyrene	< 0.2
Simazine	< 1
Atrazine	< 1
Alachlor	< 1
Lindane(gamma-BHC)	< 0.2
Endrin	< 1
Heptachlor	< 0.4
Heptachlor Epoxide	< 0.2
Methoxychlor	< 1
1,3-Dimethyl-2-nitrobenzene(surr)	**92 %R**
Pyrene-d10(surr)	**104 %R**
Triphenylphosphate(surr)	**112 %R**
Perylene-d12(surr)	**94 %R**

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.** **Batch ID:** 636675-80926/A071918E5251

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Hexachlorocyclopentadiene	< 1	4.8 (96 %R)	4.8 (96 %R) (1 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Hexachlorobenzene	< 1	5.1 (102 %R)	5.1 (103 %R) (0 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
bis(2-Ethylhexyl)adipate	< 1	5.9 (118 %R)	5.8 (116 %R) (2 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
bis(2-Ethylhexyl)phthalate	< 1	5.7 (113 %R)	5.5 (110 %R) (3 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Benzo[a]pyrene	< 0.2	5.4 (108 %R)	5.3 (107 %R) (1 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Simazine	< 1	5.2 (103 %R)	5.2 (104 %R) (1 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Atrazine	< 1	5.7 (114 %R)	5.6 (112 %R) (2 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Alachlor	< 1	5.3 (107 %R)	5.3 (105 %R) (1 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Lindane(gamma-BHC)	< 0.2	5.3 (107 %R)	5.2 (104 %R) (2 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Endrin	< 1	5 (100 %R)	4.9 (99 %R) (1 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Heptachlor	< 0.4	5.2 (104 %R)	5.1 (101 %R) (2 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Heptachlor Epoxide	< 0.2	5.0 (100 %R)	5.0 (99 %R) (1 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
Methoxychlor	< 1	5.8 (116 %R)	5.6 (111 %R) (4 RPD)	7/19/2018	ug/L	70 - 130	30	525.2
1,3-Dimethyl-2-nitrobenzene(surr)	96 %R	95 %R	96 %R	7/19/2018	ug/L	70 - 130		525.2
Pyrene-d10(surr)	104 %R	103 %R	104 %R	7/19/2018	ug/L	70 - 130		525.2
Triphenylphosphate(surr)	114 %R	115 %R	113 %R	7/19/2018	ug/L	70 - 130		525.2
Perylene-d12(surr)	93 %R	94 %R	94 %R	7/19/2018	ug/L	70 - 130		525.2

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID:	Well 22
Lab Sample ID:	184366.01
Matrix:	aqueous
Date Sampled:	7/17/18
Date Received:	7/17/18
Units:	ug/L
Date of Analysis:	7/23/18
Analyst:	JAK
Method:	531.2
Dilution Factor:	1
Aldicarb	< 0.5
Aldicarb Sulfone	< 0.5
Aldicarb Sulfoxide	< 0.5
Carbaryl	< 0.5
Carbofuran	< 0.5
3-Hydroxycarbofuran	< 0.5
Methiocarb	< 0.5
Methomyl	< 0.5
Oxamyl	< 0.5
Propoxur	< 0.5
BMDC (surr)	**102 %R**

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD		Units	Date of Analysis	Limits	RPD	Method
Aldicarb	< 0.5	< 0.5 (94 %R)		*	ug/L	7/23/18	50 - 150		531.2
Aldicarb Sulfone	< 0.5	< 0.5 (87 %R)		*	ug/L	7/23/18	50 - 150		531.2
Aldicarb Sulfoxide	< 0.5	< 0.5 (86 %R)		*	ug/L	7/23/18	50 - 150		531.2
Carbaryl	< 0.5	< 0.5 (91 %R)		*	ug/L	7/23/18	50 - 150		531.2
Carbofuran	< 0.5	< 0.5 (92 %R)		*	ug/L	7/23/18	50 - 150		531.2
3-Hydroxycarbofuran	< 0.5	< 0.5 (87 %R)		*	ug/L	7/23/18	50 - 150		531.2
Methiocarb	< 0.5	< 0.5 (91 %R)		*	ug/L	7/23/18	50 - 150		531.2
Methomyl	< 0.5	< 0.5 (89 %R)		*	ug/L	7/23/18	50 - 150		531.2
Oxamyl	< 0.5	< 0.5 (88 %R)		*	ug/L	7/23/18	50 - 150		531.2
Propoxur	< 0.5	< 0.5 (92 %R)		*	ug/L	7/23/18	50 - 150		531.2
BMDC (surr)	92 %R	96 %R		*	% Rec	7/23/18	70 - 130		531.2

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID:	Well 22
Lab Sample ID:	184366.01
Matrix:	aqueous
Date Sampled:	7/17/18
Date Received:	7/17/18
Units:	ug/L
Date of Extraction/Prep:	7/19/18
Date of Analysis:	7/19/18
Analyst:	AR
Method:	552.3
Dilution Factor:	1

Monochloroacetic Acid (MCAA)	< 2
Monobromoacetic Acid (MBAA)	< 1
Dichloroacetic Acid (DCAA)	< 1
Trichloroacetic Acid (TCAA)	< 1
Dibromoacetic Acid (DBAA)	< 1
Total Haloacetic Acids	< 6
2,3-Dibromopropanoic Acid (surr)	**112 %R**

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.** **Batch ID:** 63667584015/A071918EHAA51

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Monochloroacetic Acid (MCAA)	< 2	8.7 (87 %R)	8.7 (87 %R) (0 RPD)	7/19/2018	ug/L	70 - 130	30	552.3
Monobromoacetic Acid (MBAA)	< 1	9.7 (97 %R)	9.9 (99 %R) (2 RPD)	7/19/2018	ug/L	70 - 130	30	552.3
Dichloroacetic Acid (DCAA)	< 1	10 (100 %R)	10 (101 %R) (1 RPD)	7/19/2018	ug/L	70 - 130	30	552.3
Trichloroacetic Acid (TCAA)	< 1	8.7 (87 %R)	8.7 (87 %R) (0 RPD)	7/19/2018	ug/L	70 - 130	30	552.3
Dibromoacetic Acid (DBAA)	< 1	9 (90 %R)	9 (90 %R) (0 RPD)	7/19/2018	ug/L	70 - 130	30	552.3
Total Haloacetic Acids	< 6	< 6 (%R N/A)	< 6 (%R N/A) (RPD N/A)	7/19/2018	ug/L			552.3
2,3-Dibromopropanoic Acid (surr)	110 %R	112 %R	113 %R	7/19/2018	ug/L	70 - 130	30	552.3

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID: Well 22

Lab Sample ID: 184366.01
Matrix: aqueous
Date Sampled: 7/17/18
Date Received: 7/17/18

		Analysis			
	Units	Date	Time	Method	Analyst
Solids Dissolved	**300**	mg/L	7/23/18	14:25	2540C-97	ATA
Fluoride	**0.40**	mg/L	7/19/18	15:06	300.0	KD
Sulfate	**32**	mg/L	7/19/18	15:06	300.0	KD
Chloride	**75**	mg/L	7/18/18	8:43	4500CIE-11	KD
Nitrite-N	< 0.5	mg/L	7/18/18	8:43	353.2	KD
Nitrate-N	< 0.5	mg/L	7/18/18	8:43	353.2	KD
Alkalinity Total (CaCO3)	**92**	mg/L	7/20/18	10:36	2320B-11	ATA
Cyanide Total	< 0.02	mg/L	7/25/18	9:10	4500CNE-99	KD
Sulfide	< 0.05	mg/L	7/19/18	9:00	8131HACH	ATA
Color	< 5	PtCo	7/17/18	18:10	110.2	AMB
Odor	< 1	TON	7/17/18	16:00	140.1	AMB
pH	**8.23**	SU	7/17/18	14:30	4500H+B-11	AMB
Langelier Corrosivity	**-1.25**	SI	7/25/18	15:30	Langelier	KD
Total Coliform	< 1	MPN/100ml	7/17/18	15:15	9223B-04	SWC
E.coli	< 1	MPN/100ml	7/17/18	15:15	9223B-04	SWC

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Units	Date of Analysis	Limits	RPD	Method
Solids Dissolved	< 5	1000 (104 %R)	990 (103 %R) (1 RPD)	mg/L	7/23/18	85 - 115	20	2540C-97
Fluoride	< 0.1	2.1 (106 %R)	2.1 (105 %R) (0 RPD)	mg/L	7/19/18	90 - 110	20	300.0
Sulfate	< 1	22 (108 %R)	22 (108 %R) (0 RPD)	mg/L	7/19/18	90 - 110	20	300.0
Chloride	1.18	26 (103 %R)	27 (106 %R) (3 RPD)	mg/L	7/18/18	90 - 110	20	4500ClE-11
Nitrite-N	.0576	5.4 (109 %R)	5.4 (108 %R) (0 RPD)	mg/L	7/18/18	90 - 110	20	353.2
Nitrate-N	.0536	5.4 (108 %R)	5.4 (108 %R) (0 RPD)	mg/L	7/18/18	90 - 110	20	353.2
Alkalinity Total (CaCO3)	< 1	10 (102 %R)	11 (109 %R) (7 RPD)	mg/L	7/20/18	85 - 115	20	2320B-11
Cyanide Total	0.007	0.28 (112 %R)	0.28 (113 %R) (1 RPD)	mg/L	7/25/18	85 - 115	20	4500CNE-99
Sulfide	< 0.05	0.38 (95 %R)	0.39 (98 %R) (3 RPD)	mg/L	7/19/18	80 - 120	20	8131HACH
Color	< 5	10 (100 %R)	10 (100 %R) (0 RPD)	PtCo	7/17/18	90 - 110	20	110.2
Odor	< 1	NA	NA	TON	7/17/18			140.1
pH		6.05 (101 %R)	6.05 (101 %R) (0 RPD)	SU	7/17/18	5.95 - 6.07	10	4500H+B-11

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID: Well 22

Lab Sample ID: 184366.01
Matrix: aqueous
Date Sampled: 7/17/18
Date Received: 7/17/18

		Analytical Matrix	Units	Date of Analysis	Method	Analyst
Aluminum	< 0.05	AqTot	mg/L	7/19/18	200.8	DS
Antimony	< 0.001	AqTot	mg/L	7/19/18	200.8	DS
Arsenic	**0.023**	AqTot	mg/L	7/19/18	200.8	DS
Barium	**0.0090**	AqTot	mg/L	7/19/18	200.8	DS
Beryllium	< 0.001	AqTot	mg/L	7/19/18	200.8	DS
Calcium	**0.86**	AqTot	mg/L	7/19/18	200.8	DS
Cadmium	< 0.001	AqTot	mg/L	7/19/18	200.8	DS
Chromium	< 0.001	AqTot	mg/L	7/19/18	200.8	DS
Copper	**0.0066**	AqTot	mg/L	7/19/18	200.8	DS
Iron	**0.068**	AqTot	mg/L	7/19/18	200.8	DS
Lead	< 0.001	AqTot	mg/L	7/19/18	200.8	DS
Magnesium	**0.53**	AqTot	mg/L	7/19/18	200.8	DS
Manganese	**0.031**	AqTot	mg/L	7/19/18	200.8	DS
Mercury	**0.00010**	AqTot	mg/L	7/19/18	200.8	DS
Nickel	< 0.001	AqTot	mg/L	7/19/18	200.8	DS
Selenium	< 0.001	AqTot	mg/L	7/19/18	200.8	DS
Silver	< 0.001	AqTot	mg/L	7/19/18	200.8	DS
Sodium	**98**	AqTot	mg/L	7/19/18	200.8	DS
Thallium	< 0.001	AqTot	mg/L	7/19/18	200.8	DS
Uranium	< 0.1	AqTot	ug/L	7/23/18	200.8	DS
Zinc	**0.019**	AqTot	mg/L	7/19/18	200.8	DS
Total Hardness (as CaCO3)	**4.3**	AqTot	mg/L	7/19/18	200.8	DS

QC REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Parameter Name	Blank	LCS	LCSD	Units	Date of Analysis	Limits	RPD	Method
Aluminum	< 0.05	9.8 (96 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Antimony	< 0.001	0.19 (95 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Arsenic	< 0.001	0.20 (101 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Barium	< 0.001	0.20 (100 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Beryllium	< 0.001	0.22 (109 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Calcium	< 0.05	9.9 (97 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Cadmium	< 0.001	0.21 (105 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Chromium	< 0.001	0.21 (106 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Copper	< 0.001	0.21 (104 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Iron	< 0.05	10 (100 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Lead	< 0.001	0.20 (100 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Magnesium	< 0.05	10 (98 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Manganese	< 0.005	0.21 (103 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Mercury	< 0.0001	0.00099 (100 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Nickel	< 0.001	0.21 (105 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Selenium	< 0.001	0.21 (104 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Silver	< 0.001	0.17 (85 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Sodium	< 5	10 (102 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Thallium	< 0.001	0.20 (100 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8
Uranium	< 0.1	99 (99 %R)	NA	ug/L	7/23/18	85 - 115	20	200.8
Zinc	< 0.005	0.18 (92 %R)	NA	mg/L	7/19/18	85 - 115	20	200.8

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.

LABORATORY REPORT

EAI ID#: **184366**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Round 3 NHDES Analytical Requirements for Community Public Water System**

Sample ID: Well 22

Lab Sample ID: 184366.01
Matrix: aqueous
Date Sampled: 7/17/18
Date Received: 7/17/18

Parameter	Concentration	Units	Date of Analysis	Method
Gross Alpha	1.5	pCi/L	7/28/18	900
Uranium	ND	ug/L	7/23/18	200.8
Uranium*	ND	pCi/L	8/13/18	See Ref.
Adj. Gross Alpha**	1.5	pCi/L	8/13/18	See Ref.

Gross Alpha analyzed by a subcontracted lab, entire lab report enclosed.
*Uranium conversion factor = 0.67 pCi/ug
**Adj. (Compliance) Gross Alpha = Gross Alpha (pCi/L) - Uranium (pCi/L)
ND = None detected
Gross Alpha MCL = 15 pCi/L

References: 40 CFR parts 9, 141 and 142 - National Primary Drinking Water Regulations; Radionuclides; Final Rule, December 2000. Pages 76717 and 76725 (Table 1-8, footnote 12).

If requested, the potassium-40 beta particle activity is calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82.
Reference: MA DEP

August 10, 2018

Service Request No:E1800630

Customer Service
Eastern Analytical, Inc.
25 Chenell Drive
Concord, NH 03301

Laboratory Results for: EAI# 184366 - Dioxin 2378-TCDD Analysis

Dear Customer,

Enclosed are the results of the sample(s) submitted to our laboratory July 19, 2018
For your reference, these analyses have been assigned our service request number **E1800630.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current TNI standards, where applicable, and except as noted in the laboratory case narrative provided. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the final complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. In accordance to the TNI 2009 Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kristin Brown

ADDRESS 10450 Stancliff Rd., Suite 210, Houston, TX 77099
PHONE +1 713 266 1599 | FAX +1 713 266 0130
ALS Group USA, Corp.
dba ALS Environmental

ALS Environmental

Certificate of Analysis

ALS Environmental - Houston HRMS
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

ALS Environmental

Client:	Eastern Analytical	**Service Request No.:**	E1800630
Project:	EAI# 184366	**Date Received:**	07/19/18
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed in adherence to the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

One water sample was received for analysis at ALS Environmental in Houston on 07/19/18.

The sample was received at 5.6 °C in good condition and is consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

Data Validation Notes and Discussion

MS/MSD

EQ1800300: Laboratory Control Spike/Duplicate Laboratory Control Spike (LCS/DLCS) samples were analyzed and reported in lieu of an MS/MSD for this extraction batch.

Y flags – Labeled Standards

Quantification of the native 2,3,7,8-substituted congeners is based on isotopic dilution, which automatically corrects for variation in extraction efficiency and provides accurate values even with poor recovery. Samples that had recoveries of labeled standards outside the acceptance limits are qualified with 'Y' flags on the Labeled Compound summary pages. In all cases, the signal-to-noise ratios are greater than 10:1 and detection limits were below the Method Reporting Limits.

Detection Limits

Detection limits are calculated for each analyte in each sample by measuring the height of the noise level for each quantitation ion for the associated labeled standard. The concentration equivalent to 2.5 times the height of the noise is then calculated using the appropriate response factor and the weight of the sample. The calculated concentration equals the detection limit.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS group USA Corp dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials")

whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

Client: Eastern Analytical, Inc. **Service Request:**E1800630
Project: EAI# 184366 - Dioxin 2378-TCDD Analysis

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
E1800630-001	Well 22	7/17/2018	0845

Service Request Summary

Folder #: **E1800630**
Client Name: Eastern Analytical, Inc.
Project Name: EAI# 184366 - Dioxin 2378-TCDD Analysis
Project Number:

Report To: Customer Service
Eastern Analytical, Inc.
25 Chenell Drive
Concord, NH 03301
USA

Phone Number:
Cell Number:
Fax Number:
E-mail: customerservice@easternanalytical.com

Project Chemist: Kristin Brown
Originating Lab: HOUSTON
Logged By: NBROWN
Date Received: 07/19/18
Internal Due Date: 8/9/2018
QAP: LAB QAP
Qualifier Set: HRMS Qualifier Set
Formset: Lab Standard
Merged?: N
Report to MDL?: Y
P.O. Number: 48431
EDD: No EDD Specified

2 1000 ml-Glass Bottle NM AMBER Teflon Liner Unpreserved
Location: E-Disposed, EHRMS-WIC 8D
Pressure Gas:

Lab Samp No.	Client Samp No	Matrix	Collected	Dioxins Furans/1613B (HOUSTON)
E1800630-001	Well 22	Water	07/17/18 0845	II

Folder Comments:

CC report to customerservice@eailabs.com

Service Request Summary

Folder #: **E1800630**
Client Name: Eastern Analytical, Inc.
Project Name: EAI# 184366 - Dioxin 2378-TCDD Analysis
Project Number:

Report To: Customer Service
Eastern Analytical, Inc.
25 Chenell Drive
Concord, NH 03301
USA

Phone Number:
Cell Number:
Fax Number:
E-mail: customerservice@easternanalytical.com

Project Chemist: Kristin Brown
Originating Lab: HOUSTON
Logged By: NBROWN
Date Received: 07/19/18
Internal Due Date: 8/9/2018
QAP: LAB QAP
Qualifier Set: HRMS Qualifier Set
Formset: Lab Standard
Merged?: N
Report to MDL?: Y
P.O. Number: 48431
EDD: No EDD Specified

2 1000 ml-Glass Bottle NM AMBER Teflon Liner Unpreserved
Location: E-Disposed, EHRMS-WIC 8D
Pressure Gas:

Test Comments:

Group	Test/Method	Samples	Comments
Semivoa GCMS	Dioxins Furans/1613B	1	TCDD only

Data Qualifiers

HRMS Qualifier Set

B Indicates the associated analyte was found in the method blank at >1/10th the reported value.
E Estimated value. The reported concentration is above the calibration range of the instrument.
H Sample extracted and/or analyzed out of suggested holding time.
J Estimated value. The reported concentration is below the MRL.
K The ion abundance ratio between the primary and secondary ions were outside of theoretical acceptance limits.The concentration of this analyte should be considered as an estimate.
P Chlorodiphenyl ether interference was present at the retention time of the target analyte. Reported result should be considered an estimate.
Q Monitored lock-mass indicates matrix-interference. Reported result is estimated.
S Signal saturated detector. Result reported from dilution.
U Compound was analyzed for, but was not detected (ND).
X See Case Narrative.
Y Isotopically Labeled Standard recovery outside of acceptance limits. In all cases, the signal-to-nois ratios are greater than 10:1, making the recoveries acceptable.
i The MDL/MRL have been elevated due to a matrix interference.

Acronyms

Cal	Calibration
Conc	CONCentration
Dioxin(s)	Polychlorinated dibenzo-p-dioxin(s)
EDL	Estimated Detection Limit
EMPC	Estimated Maximum Possible Concentration
Flags	Data qualifiers
Furan(s)	Polychlorinated dibenzofuran(s)
g	Grams
ICAL	Initial CALibration
ID	IDentifier
Ions	Masses monitored for the analyte during data acquisition
L	Liter (s)
LCS	Laboratory Control Sample
DLCS	Duplicate Laboratory Control Sample
MB	Method Blank
MCL	Method Calibration Limit
MDL	Method Detection Limit
mL	Milliliters
MS	Matrix Spiked sample
DMS	Duplicate Matrix Spiked sample
NO	Number of peaks meeting all identification criteria
PCDD(s)	Polychlorinated dibenzo-p-dioxin(s)
PCDF(s)	Polychlorinated dibenzofuran(s)
ppb	Parts per billion
ppm	Parts per million
ppq	Parts per quadrillion
ppt	Parts per trillion
QA	Quality Assurance
QC	Quality Control
Ratio	Ratio of areas from monitored ions for an analyte
% Rec.	Percent recovery
RPD	Relative Percent Difference
RRF	Relative Response Factor
RT	Retention Time
SDG	Sample Delivery Group
S/N	Signal-to-noise ratio
TEF	Toxicity Equivalence Factor
TEQ	Toxicity Equivalence Quotient

ALS Environmental

State Certifications, Accreditations, and Licenses

Agency	Number	Expire Date
American Association for Laboratory Accreditation	2897.01	11/30/2019
Arizona Department of Health Services	AZ0793	5/27/2019
Arkansas Department of Environmental Quality	17-027-0	3/27/2019
California Department of Health Services	2452	4/30/2019
Illinois Environmental Protection Agency	004112	5/29/2019
Louisiana Department of Environmental Quality	03048	6/30/2019
Louisiana Department of Health and Hospitals	LA150026	12/31/2018
Maine Center for Disease Control and Prevention	2014019	6/5/2020
Minnesota Department of Health	840911	12/31/2018
New Jersey Department of Environmental Protection	NLC140001	6/30/2019
New York Department of Health	11707	4/1/2019
Oklahoma Department of Environmental Quality	2014 124	8/31/2018
Texas Commision on Environmental Quality	TX104704231-17-18	4/30/2019
Washington Department of Health	c819	11/14/2018

ALS ENVIRONMENTAL – Houston
Data Processing/Form Production and Peer Review Signatures

SR# Unique ID: E800630 | DB-5MSUI | SPB-Octyl

First Level - Data Processing - to be filled by person generating the forms

Date:	Analyst:	Samples:
08/10/18	JC	001

Second Level - Data Review – to be filled by person doing peer review

Date:	Analyst:	Samples:
08/10/18	LM	001

ALS Environmental

Chain of Custody

ALS Environmental - Houston HRMS
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

CHAIN-OF-CUSTODY RECORD

Eastern Analytical, Inc.
professional laboratory and drilling services

EAI ID# 184366 Page 1

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
Well 22	7/17/2018 8:45	aqueous	Subcontract - 2,3,7,8 TCDD Dioxin Method 1613 WW or DW	E1800630 5 Eastern Analytical, Inc. EAI# 184366 - Dioxin 2378-TCDD Analysis

EAI ID# 184366 Project State: NH

Project ID:

Company ALS Environmental – Houston
Address 10450 Stancliff Road, Suite
Address Houston, TX 77099
Account #
Phone # 1 281-530-5656

Results Needed: Preferred Date: Standard

RUSH Due Date: _____

QC Deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ MA MCP

Notes about project:

Email login confirmation, pdf of results and invoice to customerservice@easternanalytical.com.

PO #: 48431 EAI ID# 184366

Data Deliverable (circle)

Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied.

Samples Collected by: _____

Relinquished by	Date/Time	Received by
	7/18/18 1500	
	7/19/18 1015	
Relinquished by	Date/Time	Received by

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 Phone: (603)228-0525 1-800-287-0525 customerservice@easternanalytical.com

As a subcontract lab to EAI, you will defend, indemnify and hold Eastern Analytical, Inc., its officers, employees, and agents harmless from and against any and all liability, loss, expense or claims for injury or damages arising out of the performance against this chain of custody but only in proportion to and to the extent such liability, loss, expense, or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of you as a subcontract lab, your officers, agents or employees

Cooler Receipt Form

ALS Environmental

Project Chemist KN

Client/Project EA Analytical / EAI # 184366 Thermometer ID SM04

Date/Time Received: 7/19/18 1015 Initials: MB Date/Time Logged in: 7/19/18 1536 Initials MB

1. Method of delivery: ○ US Mail ○ Fed Ex ✓ UPS ○ DHL ○ Courier ○ Client

2. Samples received in: ✓ Cooler ○ Box ○ Envelope ○ Other _____

3. Were custody seals on coolers? ○ Yes ✓ No If yes, how many and where? _____

Were they intact? ○ Yes ○ No ✓ N/A

Were they signed and dated? ○ Yes ○ No ✓ N/A

4. Packing Material: ○ Inserts ○ Baggies ✓ Bubble Wrap ○ Gel Packs ✓ Wet Ice ○ Sleeves ○ Other _____

5. Foreign or Regulated Soil? ○ Yes ✓ No Location of Sampling: _____

Cooler Tracking Number	COC ID	Date Opened	Time Opened	Opened By	Temp. °C	Temp Blank?
IR X46 5990 1 9657 0749		7/19/18	1536	MB	5.6/6.0	☐
						☐
						☐
						☐

6. Were custody papers properly filled out (ink, signed, dated, etc)? ✓ Yes ○ No

7. Did all bottles arrive in good condition (not broken, no signs of leakage)? ✓ Yes ○ No

8. Were all sample labels complete (i.e., sample ID, analysis, preservation, etc)? ✓ Yes ○ No

9. Were appropriate bottles/containers and volumes received for the requested tests? ✓ Yes ○ No

10. Did sample labels and tags agree with custody documents? ✓ Yes ○ No

Notes, Discrepancies, & Resolutions:

Service request Label:

E1800630 5
Eastern Analytical, Inc.
EAI# 184366 - Dioxin 2378-TCDD Analysis

10450 Stancliff Rd., Suite 210
Houston, TX 77099
T: +1 713 266 1599
F: +1 713 266 1599
www.alsglobal.com

SAMPLE ACCEPTANCE POLICY

This policy outlines the criteria samples must meet to be accepted by ALS Environmental - Houston HRMS.

Cooler Custody Seals (desirable, mandatory if specified in SAP):

- ✓ Intact on outside of cooler, signed and dated

Chain-of-Custody (COC) documentation (mandatory):

The following is required on each COC:

- ✓ Sample ID, the location, date and time of collection, collector's name, preservation type, sample type, and any other special remarks concerning the sampleThe COC must be completed in ink.
- ✓ Signature and date of relinquishing party.

In the absence of a COC at sample receipt, the COC will be requested from the client.

Sample Integrity (mandatory):

Samples are inspected upon arrival to ensure that sample integrity was not compromised during transfer to the laboratory.

- ✓ Sample containers must arrive in good condition (not broken or leaking).
- ✓ Samples must be labeled appropriately, including Sample IDs, and requested test using durable labels and indelible ink.
- ✓ The correct type of sample bottle must be used for the method requested.
- ✓ An appropriate sample volume, or weight, must be received.
- ✓ Sample IDs and number of containers must reconcile with the COC.
- ✓ Samples must be received within the method defined holding time.

Temperature Requirement (varies by sample matrix):

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6°C.
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10°C.
- ✓ Air samples are shipped and stored cold, at 0 to 6°C
- ✓ The sample temperature must be recorded on the COC

All cooler inspections are documented on the Cooler Receipt Form (CRF). A separate CRF is completed for each service request. Any samples not meeting the above criteria are noted on the CRF and the Project Manager notified. The Project Manager must resolve any sample integrity issues with the client prior to proceeding with the analysis. Such resolutions are documented in writing and filed with the project folder. Data associated with samples received outside of this acceptance policy will be qualified on the case narrative of the final report

ALS Environmental

Preparation Information Benchsheets

ALS Environmental - Houston HRMS
10450 Stancliff Rd., Suite 210, Houston, TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

Preparation Information Benchsheet

41

Prep Run#: 318681
Team: Semivoa GCMS/ALOPEZ

Prep WorkFlow: OrgExtAq(365)
Prep Method: Method Sep Funnel/Jar

Status: Prepped
Prep Date/Time: 7/28/18 11:00 AM

#	Lab Code	Client ID	B#	Method /Test	pH	CI	Matrix	Amt. Ext.	Sample Description
1	E1800624-001	FEFF071718+1D	.01	1613B/Dioxin Furans Unadjusted	8	x	Wastewater	1005.4	Light brown
2	E1800626-001	18G0553-01	.01	1613B/Dioxins Furans	7	x	Water	957mL	Clear
3	E1800627-001	18G0552-01	.01	1613B/Dioxins Furans	7	x	Water	968mL	Clear
4	E1800629-001	1807767-004A	.01	1613B/Dioxins Furans	7	x	Wastewater	971mL	Dark Brown
5	E1800630-001	Well 22	.01	1613B/Dioxins Furans	7	x	Water	967mL	Clear
6	E1800634-001	1807007-01	.01	1613B/Dioxins Furans	8	x	Wastewater	988mL	Clear
7	E1800637-001	Effluent Grab	.01	1613B/Dioxins Furans	7	x	Water	991mL	Clear
8	E1800644-001	WR1807171620JTM	.01	1613B/Dioxins Furans	7	x	Water	955mL	Clear
9	E1800645-001	WR1807171600JTM	.01	1613B/Dioxins Furans	7	x	Water	974mL	Clear
10	E1800646-001	WR1807171515JTM	.01	1613B/Dioxins Furans	7	x	Water	959mL	Clear
11	E1800647-001	WR1807171445JTM	.01	1613B/Dioxins Furans	7	x	Water	964mL	Clear
12	E1800648-001	WR1807171420JTM	.01	1613B/Dioxins Furans	7	x	Water	959mL	Clear
13	E1800649-001	WR1807171100JTM	.01	1613B/Dioxins Furans	7	x	Water	933mL	Clear
14	E1800650-001	WR1807170950JTM	.01	1613B/Dioxins Furans	7	x	Water	967mL	Clear
15	E1800651-001	WR1807170930JTM	.01	1613B/Dioxins Furans	7	x	Water	965mL	Clear
16	E1800652-001	WR1807171050JTM	.01	1613B/Dioxins Furans	7	x	Water	951mL	Clear
17	E1800653-001	WR1807171145JTM	.01	1613B/Dioxins Furans	7	x	Water	932mL	Clear
18	E1800654-001	WR1807171220JTM	.01	1613B/Dioxins Furans	7	x	Water	974mL	Clear
19	E1800655-001	WR1807171300JTM	.01	1613B/Dioxins Furans	7	x	Water	970mL	Clear
20	E1800656-001	2327299 001	.01	1613B/Dioxins Furans	7	x	Drinking Water	605mL	Clear
21	EQ1800300-01	MB		1613B/Dioxins Furans	5	x	Liquid	1000.0	
22	EQ1800300-02	LCS		1613B/Dioxins Furans	5	x	Liquid	1000.0	
23	EQ1800300-03	DLCS		1613B/Dioxins Furans	5	x	Liquid	1000.0	

Spiking Solutions

Name: 1613B Matrix Working Standard Inventory ID 191659 Logbook Ref: 191659 AL 7/13/18 2-20 ng/mL Expires On: 01/09/2019

EQ1800300-01	100.00µL	EQ1800300-01	100.00µL	EQ1800300-02	100.00µL	EQ1800300-02	100.00µL	EQ1800300-03	100.00µL	EQ1800300-03	100.00µL

Name: 1613B Labeled Working Standard Inventory ID 191931 Logbook Ref: 191931 AL 7/25/18 2-4 ng/mL Expires On: 01/09/2019

E1800624-001	1,000.00µL	E1800626-001	1,000.00µL	E1800627-001	1,000.00µL	E1800629-001	1,000.00µL	E1800630-001	1,000.00µL	E1800634-001	1,000.00µL
E1800637-001	1,000.00µL	E1800644-001	1,000.00µL	E1800645-001	1,000.00µL	E1800646-001	1,000.00µL	E1800647-001	1,000.00µL	E1800648-001	1,000.00µL
E1800649-001	1,000.00µL	E1800650-001	1,000.00µL	E1800651-001	1,000.00µL	E1800652-001	1,000.00µL	E1800653-001	1,000.00µL	E1800654-001	1,000.00µL
E1800655-001	1,000.00µL	E1800656-001	1,000.00µL	EQ1800300-01	1,000.00µL	EQ1800300-01	1,000.00µL	EQ1800300-02	1,000.00µL	EQ1800300-02	1,000.00µL
EQ1800300-03	1,000.00µL	EQ1800300-03	1,000.00µL								

Preparation Information Benchsheet

42

Prep Run#: 318681
Team: Semivoa GCMS/ALOPEZ

Prep WorkFlow: OrgExtAq(365)
Prep Method: Method Sep Funnel/Jar

Status: Prepped
Prep Date/Time: 7/28/18 11:00 AM

Name: 8290/1613B Cleanup Working Standard Inventory ID 191999 Logbook Ref: tw 07/27/18 8ng/ml Expires On: 10/27/2018

E1800624-001	100.00µL	E1800626-001	100.00µL	E1800627-001	100.00µL	E1800629-001	100.00µL	E1800630-001	100.00µL	E1800634-001	100.00µL
E1800637-001	100.00µL	E1800644-001	100.00µL	E1800645-001	100.00µL	E1800646-001	100.00µL	E1800647-001	100.00µL	E1800648-001	100.00µL
E1800649-001	100.00µL	E1800650-001	100.00µL	E1800651-001	100.00µL	E1800652-001	100.00µL	E1800653-001	100.00µL	E1800654-001	100.00µL
E1800655-001	100.00µL	E1800656-001	100.00µL	EQ1800300-01	100.00µL	EQ1800300-01	100.00µL	EQ1800300-02	100.00µL	EQ1800300-02	100.00µL
EQ1800300-03	100.00µL	EQ1800300-03	100.00µL								

Preparation Materials

Sensafe Free Chlorine WTR CHK	LM 3/19/15 (79756)	Carbon, High Purity	tw carbon 7/31/18 (192126)	Ethyl Acetate 99.9% Minimum EtOAc	AL 4/13/18 (189332)
Glass Wool	AL 4/20/18 (189514)	Hexanes 95%	AL 7/30/18 (192057)	ColorpHast pH-Indicator Strips	AL 4/13/18 (189335)
Silica Gel	AL 7/30/18 (192039)	Toluene 99.9% Minimum	AL 7/25/18 (191930)	Sodium Sulfate Anhydrous Reagent Grade Na2SO4	AL 5/23/18 (190453)
Dichloromethane (Methylene Chloride) 99.9% MeCl2	AL 6/28/18 (191236)	Tridecane (n-Tridecane)	AL 6/29/18 (191263)	Sodium Hydroxide 1N NaOH	TW 6/14/18 (191093)
sulfuric acid	SULFURIC ACID (190871)				

Preparation Steps

Step:	Extraction	Step:	Acid Clean	Step:	Silica Gel Clean	Step:	Final Volume
Started:	7/28/18 11:00	Started:	8/6/18 12:00	Started:	8/7/18 09:00	Started:	8/8/18 08:00
Finished:	7/29/18 14:00	Finished:	8/6/18 13:00	Finished:	8/7/18 12:00	Finished:	8/8/18 11:00
By:	ALOPEZ	By:	TWOODS	By:	TWOODS	By:	TWOODS
Comments		Comments		Comments		Comments	

Comments: _____

Reviewed By: _____ Date: _____

Chain of Custody

Relinquished By: _____ Date: _____

Received By: _____ Date: _____

Extracts Examined
Yes No

ALS Environmental

Analytical Results

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www.alsglobal.com

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Eastern Analytical, Inc.	**Service Request:**	E1800630
Project:	EAI# 184366 - Dioxin 2378-TCDD Analysis	**Date Collected:**	07/17/18 08:45
Sample Matrix:	Water	**Date Received:**	07/19/18 10:15
Sample Name:	Well 22	**Units:**	pg/L
Lab Code:	E1800630-001	**Basis:**	NA

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	08/10/18 03:05
Prep Method:	Method Sep Funnel/Jar	**Date Extracted:**	7/28/18
Sample Amount:	967mL	**Instrument Name:**	E-HRMS-07
		GC Column:	DB-5MSUI
Data File Name:	P516876	**Blank File Name:**	P613923
ICAL Date:	01/24/18	**Cal Ver. File Name:**	P516865

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	4.07	5.17			1

Client:	Eastern Analytical, Inc.	**Service Request:**	E1800630
Project:	EAI# 184366 - Dioxin 2378-TCDD Analysis	**Date Collected:**	07/17/18 08:45
Sample Matrix:	Water	**Date Received:**	07/19/18 10:15
Sample Name:	Well 22	**Units:**	Percent
Lab Code:	E1800630-001	**Basis:**	NA

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	08/10/18 03:05
Prep Method:	Method Sep Funnel/Jar	**Date Extracted:**	7/28/18
Sample Amount:	967mL	**Instrument Name:**	E-HRMS-07
		GC Column:	DB-5MSUI
Data File Name:	P516876	**Blank File Name:**	P613923
ICAL Date:	01/24/18	**Cal Ver. File Name:**	P516865

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	590.327	30	Y	31-137	0.82	1.020
37Cl-2,3,7,8-TCDD	800	395.440	49		42-164	NA	1.021

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Eastern Analytical, Inc.	**Service Request:**	E1800630
Project:	EAI# 184366 - Dioxin 2378-TCDD Analysis	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	pg/L
Lab Code:	EQ1800300-01	**Basis:**	NA

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	08/10/18 13:31
Prep Method:	Method Sep Funnel/Jar	**Date Extracted:**	7/28/18
Sample Amount:	1000.0mL	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P613923	**Blank File Name:**	P613923
ICAL Date:	03/29/18	**Cal Ver. File Name:**	P613914

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	2.46	5.00			1

Client:	Eastern Analytical, Inc.	**Service Request:**	E1800630
Project:	EAI# 184366 - Dioxin 2378-TCDD Analysis	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	Percent
Lab Code:	EQ1800300-01	**Basis:**	NA

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	08/10/18 13:31
Prep Method:	Method Sep Funnel/Jar	**Date Extracted:**	7/28/18
Sample Amount:	1000.0mL	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P613923	**Blank File Name:**	P613923
ICAL Date:	03/29/18	**Cal Ver. File Name:**	P613914

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	275.434	14	Y	31-137	0.80	1.021
37Cl-2,3,7,8-TCDD	800	180.157	23	Y	42-164	NA	1.022

ALS Environmental

Accuracy & Precision

ALS Environmental - Houston HRMS
10450 Stancliff Rd., Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

Client:	Eastern Analytical, Inc.	**Service Request:**	E1800630
Project:	EAI# 184366 - Dioxin 2378-TCDD Analysis	**Date Analyzed:**	08/10/18
Sample Matrix:	Water	**Date Extracted:**	07/28/18

Duplicate Lab Control Sample Summary
Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Units:**	pg/L
Prep Method:	Method Sep Funnel/Jar	**Basis:**	NA
		Analysis Lot:	602077

	Lab Control Sample EQ1800300-02			Duplicate Lab Control Sample EQ1800300-03					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
2,3,7,8-TCDD	271	200	136	269	200	134	73-146	1	50

Client:	Eastern Analytical, Inc.	**Service Request:**	E1800630
Project:	EAI# 184366 - Dioxin 2378-TCDD Analysis	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	pg/L
Lab Code:	EQ1800300-02	**Basis:**	NA

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	08/10/18 11:03
Prep Method:	Method Sep Funnel/Jar	**Date Extracted:**	7/28/18
Sample Amount:	1000.0mL	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P613920	**Blank File Name:**	P613923
ICAL Date:	03/29/18	**Cal Ver. File Name:**	P613914

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	271		2.03	5.00	0.78	1.001	1

Client:	Eastern Analytical, Inc.	**Service Request:**	E1800630
Project:	EAI# 184366 - Dioxin 2378-TCDD Analysis	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	Percent
Lab Code:	EQ1800300-02	**Basis:**	NA

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	08/10/18 11:03
Prep Method:	Method Sep Funnel/Jar	**Date Extracted:**	7/28/18
Sample Amount:	1000.0mL	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P613920	**Blank File Name:**	P613923
ICAL Date:	03/29/18	**Cal Ver. File Name:**	P613914

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	816.576	41		31-137	0.79	1.021
37Cl-2,3,7,8-TCDD	800	507.732	63		42-164	NA	1.022

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Eastern Analytical, Inc.	**Service Request:**	E1800630
Project:	EAI# 184366 - Dioxin 2378-TCDD Analysis	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	pg/L
Lab Code:	EQ1800300-03	**Basis:**	NA

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	08/10/18 11:52
Prep Method:	Method Sep Funnel/Jar	**Date Extracted:**	7/28/18
Sample Amount:	1000.0mL	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P613921	**Blank File Name:**	P613923
ICAL Date:	03/29/18	**Cal Ver. File Name:**	P613914

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	269		1.97	5.00	0.77	1.001	1

Client:	Eastern Analytical, Inc.	**Service Request:**	E1800630
Project:	EAI# 184366 - Dioxin 2378-TCDD Analysis	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	Percent
Lab Code:	EQ1800300-03	**Basis:**	NA

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analysis Method:	1613B	**Date Analyzed:**	08/10/18 11:52
Prep Method:	Method Sep Funnel/Jar	**Date Extracted:**	7/28/18
Sample Amount:	1000.0mL	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P613921	**Blank File Name:**	P613923
ICAL Date:	03/29/18	**Cal Ver. File Name:**	P613914

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	747.460	37		31-137	0.79	1.022
37Cl-2,3,7,8-TCDD	800	368.347	46		42-164	NA	1.022

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.EMSL.com / cinnasblab@EMSL.com

EMSL Order ID:	041821565
Customer ID:	ESTA42
Customer PO:	48427
Project ID:	

Attn: Eastern Analytical, Inc.
25 Chenell Dr.
Concord, NH 03301

Phone:	(603) 228-0525
Fax:	(603) 228-4591
Collected:	07/17/2018
Received:	07/18/2018
Analyzed:	08/01/2018

Proj: 184366

Test Report: Determination of Asbestos Structures >10µm in Drinking Water Performed by the 100.2 Method (EPA 600/R-94/134)

Sample ID Client / EMSL	Sample Filtration Date/Time	Original Sample Vol. Filtered (ml)	Effective Filter Area (mm^2)	Area Analyzed (mm^2)	ASBESTOS Asbestos Types	Fibers Detected	Analytical Sensitivity	Concentration	Confidence Limits
							MFL (million fibers per liter)		
Well 22 041821565-0001	7/18/2018 11:15 AM	100	1387	0.0762	None Detected	ND	0.18	<0.18	0.00 - 0.67

Analyst(s)
Wayne Froehlich (1)

Benjamin Ellis, Laboratory Manager
or Other Approved Signatory

Any questions please contact Benjamin Ellis.

Initial report from: 08/01/2018 23:28:23

Sample collection and containers provided by the client, acceptable bottle blank level is defined as ≤0.01MFL>10um. ND=None Detected. This report may not be reproduced, except in full, without written permission by EMSL Analytical, Inc. The test results contained within this report meet the requirements of NELAC unless otherwise noted. This report relates only to the samples reported above. Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NELAC NYS ELAP 10872, NJ DEP 03036, FL DOH E87975, PA ID# 68-00367

CHAIN-OF-CUSTODY RECORD

Eastern Analytical, Inc.
professional laboratory and drilling services

041821565

EAI ID# 184366

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
Well 22	7/17/2018 8:45	aqueous	Subcontract - Asbestos in Water 100.2 (Fibers >10 microns)	8.2°C

RECEIVED
EMSL
CINNAMINSON, N.J.
2018 JUL 18 A 10:27

EAI ID# 184366 Project State: NH

Project ID:

Company EMSL ANALYTICAL, INC.
Address 200 ROUTE 130 NORTH
Address CINNAMINSON, NJ 08077
Account #
Phone # (856) 303-2500

Results Needed: Preferred Date: Standard

RUSH Due Date: _____

QC Deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ MA MCP

Notes about project:

Email login confirmation, pdf of results and invoice to customerservice@easternanalytical.com.

[redacted]

PO #:48427 EAI ID# 184366

Data Deliverable (circle)

Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied.

Samples Collected by: _____

Relinquished by	Date/Time	Received by
[signature]	7/17/18 1600	UPS
	7-18-18	VLG UPS
Relinquished by	Date/Time	Received by
		10:30

OrderID: 041821565

As a subcontract lab to EAI, you will defend, indemnify and hold Eastern Analytical, Inc., its officers, employees, and agents harmless from and against any and all liability, loss, expense or claims for injury or damages arising out of the performance against this chain of custody but only in proportion to and to the extent such liability, loss, expense, or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of you as a subcontract lab, your officers, agents or employees

KNL ENVIRONMENTAL TESTING

FL DOH Certification #E84025
NH Laboratory ID #2530

Report Date: August 1, 2018

Eastern Analytical, Inc.
25 Chenell Dr.
Concord, NH 03301

Field Custody:	Client
Client/Field ID:	184366
	Well 22
	PO# 48429
Sample Collection:	07-17-18/0845
Lab ID No:	18.7895
Lab Custody Date:	07-23-18/1050
Sample description:	Water

CERTIFICATE OF ANALYSIS

Contam Code	Parameter	Units	Results	Analysis Date/Time	Method	Detection Limit
4002	Analytical gross alpha (aga)	pCi/L	1.5 ± 0.9	7-28-18/1058	EPA 900.0	2.1
	Gross Beta	pCi/L	3.0 ± 1.6	7-28-18/1058	EPA 900.0	3.3
4010	Radium-226 + Radium-228	pCi/L	0.6 ± 0.4	Calc	Calc	0.7
4020	Radium-226	pCi/L	0.6 ± 0.3	7-26-18/1204	EPA 903.1	0.5
4030	Radium-228	pCi/L	0.0 ± 0.4	7-31-18/1059	EPA Ra-05	0.7

Alpha Standard: Th-230
Beta Standard: Cs-137

James W. Hayes
Laboratory Manager

Test results meet all requirements of the NELAC standards.
Contact person: Jim Hayes (813) 229-2879.

CHAIN-OF-CUSTODY RECORD

Eastern Analytical, Inc.
professional laboratory and drilling services

EAI ID# 184366 Page 1

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
Well 22	7/17/2018 8:45	aqueous	Subcontract - Gross Alpha & Beta KNL	18.7E95
Well 22	7/17/2018 8:45	aqueous	Subcontract - Radium 226 & Radium 228 Combined KNL	

EAI ID# 184366 **Project State: NH**

Project ID:

Company KNL Environmental Testing
Address 3202 N. Florida Ave.
Address Tampa, FL 33603
Account #
Phone # 813-229-2879

Results Needed: **Preferred Date: Standard**

RUSH Due Date: _____

QC Deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ MA MCP

Notes about project:

Email login confirmation, pdf of results and invoice to customerservice@easternanalytical.com.

PO #:48429 **EAI ID# 184366**

Data Deliverable (circle)

Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied.

Samples Collected by:

Relinquished by	Date/Time	Received by
	7/18/18 1500	
	7/18/18 1050	KNL
Relinquished by	**Date/Time**	**Received by**

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 Phone: (603)228-0525 1-800-287-0525 customerservice@easternanalytical.com

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SEACOAST ANALYTICAL SERVICES
Route 125 & Pinkham Road
Lee, New Hampshire
603 868 1457
(Mail to: PO Box 555, Barrington, NH 03825)

SUPERIOR QUALITY & SERVICE SINCE 1989

RADON TEST RESULTS

Date: July 20, 2018

Reference #: S07188GR

Client: Easter Analytical, Inc
EAI# 184366

YOUR RADON IN WATER RESULTS

Test Site: Well 22

2,138 pCi/L

Seacoast Analytical Services is a National Radon Safety Board Accredited Radon Laboratory (NRSB # ARL0008) in New Hampshire, Maine, Massachusetts, Vermont, Rhode Island, and Connecticut. We are also registered (#ME07800C) as required with the State of Maine.

Reading the attached sheet "Understanding Your Radon Test Results" should help you interpret this report. Further information and advice is available by contacting any of the state radon programs (phone numbers are listed below) and through the EPA internet site (www.epa.gov/radon/index.html). New Hampshire has closed its radon office, and refers calls to EPA Boston.

EPA Boston	(888-372-7341)	Maine	(207-287-5676)
Massachusetts	(413-586-7525)	Vermont	(802-865-7730)
Rhode Island	(401-222-7756)	Connecticut	(860-509-7367)

Two national organization web sites list accredited radon mitigation companies. Follow the links to radon mitigation. (www.nrsb.org) (www.radongas.org)

Seacoast Analytical Services - TRUE COPY
Katy Anderson, Technical Director

CHAIN-OF-CUSTODY RECORD

COPY

Eastern Analytical, Inc.
professional laboratory and drilling services

EAI ID# 184366

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
Well 22	7/17/2018 8:45	aqueous	Subcontract - Radon SAS	

EAI ID# 184366 **Project State: NH**

Project ID:

Company Seacoast Analytical
Address Route 125 & Pinkham Road
Address Lee, NH 03824
Account #
Phone # 868-1457

Results Needed: Preferred Date: Standard

RUSH Due Date: _____

QC Deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ MA MCP

Notes about project:

Email login confirmation, pdf of results and invoice to customerservice@easternanalytical.com.

PO #:48428 **EAI ID# 184366**

Data Deliverable (circle)

Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied.

Samples Collected by: _____

Relinquished by	Date/Time	Received by
[signature]	7-18 7:15	[signature]
[signature]	7-18 8:30	[signature]

Relinquished by **Date/Time** **Received by**

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Pace Analytical Services, LLC
110 South Bayview Blvd.
Oldsmar , FL 34677
(813)881-9401

August 02, 2018

Customer Service
Eastern Analytical Inc.
25 Chenell Drive
Concord, NH 03301

RE: Project: 184366
Pace Project No.: 35405160

Dear Customer Service:
Enclosed are the analytical results for sample(s) received by the laboratory between July 19, 2018 and July 20, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Amy Weinberg
amy.weinberg@pacelabs.com
(813) 881-9401
Project Manager

Enclosures

cc: Alison Blay
Jennifer Laramie, Eastern Analytical Inc.

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CERTIFICATIONS

Project: 184366
Pace Project No.: 35405160

Ormond Beach Certification IDs
8 East Tower Circle, Ormond Beach, FL 32174
Alabama Certification #: 41320
Connecticut Certification #: PH-0216
Florida Certification #: E83079
Georgia Certification #: 955
Guam Certification: FL NELAC Reciprocity
Hawaii Certification: FL NELAC Reciprocity
Illinois Certification #: 200068
Indiana Certification: FL NELAC Reciprocity
Kansas Certification #: E-10383
Kentucky Certification #: 90050
Louisiana Certification #: FL NELAC Reciprocity
Louisiana Environmental Certificate #: 05007
Maryland Certification: #346
Michigan Certification #: 9911
Mississippi Certification: FL NELAC Reciprocity
Missouri Certification #: 236
Montana Certification #: Cert 0074
Nebraska Certification: NE-OS-28-14
Nevada Certification: FL NELAC Reciprocity
New Hampshire Certification #: 2958
New Jersey Certification #: FL022
New York Certification #: 11608
North Carolina Environmental Certificate #: 667
North Carolina Certification #: 12710
North Dakota Certification #: R-216
Oklahoma Certification #: D9947
Pennsylvania Certification #: 68-00547
Puerto Rico Certification #: FL01264
South Carolina Certification: #96042001
Tennessee Certification #: TN02974
Texas Certification: FL NELAC Reciprocity
US Virgin Islands Certification: FL NELAC Reciprocity
Virginia Environmental Certification #: 460165
Wyoming Certification: FL NELAC Reciprocity
West Virginia Certification #: 9962C
Wisconsin Certification #: 399079670
Wyoming (EPA Region 8): FL NELAC Reciprocity

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SAMPLE SUMMARY

Project: 184366
Pace Project No.: 35405160

Lab ID	Sample ID	Matrix	Date Collected	Date Received
35405160001	**Well 22**	Drinking Water	07/17/18 08:45	07/19/18 10:40
35405160002	**Well 22**	Drinking Water	07/17/18 08:45	07/20/18 10:20

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SAMPLE ANALYTE COUNT

Project: 184366
Pace Project No.: 35405160

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
35405160001	**Well 22**	EPA 508.1	LJM	9	PASI-O
		EPA 515.3	LJM	2	PASI-O
		EPA 547	LAJ	1	PASI-O
		EPA 549.2	NS1	1	PASI-O
		EPA 300.1	CMB	1	PASI-O
		EPA 300.1	CMB	1	PASI-O
35405160002	**Well 22**	EPA 548.1	CB1	1	PASI-O

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 184366
Pace Project No.: 35405160

Sample: Well 22 **Lab ID: 35405160001** Collected: 07/17/18 08:45 Received: 07/19/18 10:40 Matrix: Drinking Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
508.1 GCS Pesticides	Analytical Method: EPA 508.1 Preparation Method: EPA 508.1								
PCB-1016 (Aroclor 1016)	**0.077 U**	ug/L	0.096	0.077	1	07/25/18 15:10	07/26/18 03:38	12674-11-2	
PCB-1221 (Aroclor 1221)	**0.028 U**	ug/L	0.096	0.028	1	07/25/18 15:10	07/26/18 03:38	11104-28-2	
PCB-1232 (Aroclor 1232)	**0.028 U**	ug/L	0.096	0.028	1	07/25/18 15:10	07/26/18 03:38	11141-16-5	
PCB-1242 (Aroclor 1242)	**0.049 U**	ug/L	0.096	0.049	1	07/25/18 15:10	07/26/18 03:38	53469-21-9	
PCB-1248 (Aroclor 1248)	**0.059 U**	ug/L	0.096	0.059	1	07/25/18 15:10	07/26/18 03:38	12672-29-6	
PCB-1254 (Aroclor 1254)	**0.022 U**	ug/L	0.096	0.022	1	07/25/18 15:10	07/26/18 03:38	11097-69-1	
PCB-1260 (Aroclor 1260)	**0.063 U**	ug/L	0.096	0.063	1	07/25/18 15:10	07/26/18 03:38	11096-82-5	
PCB, Total	**0.077 U**	ug/L	0.096	0.077	1	07/25/18 15:10	07/26/18 03:38	1336-36-3	
Surrogates									
Decachlorobiphenyl (S)	111	%	70-130		1	07/25/18 15:10	07/26/18 03:38	2051-24-3	
515.3 Chlorinated Herbicides	Analytical Method: EPA 515.3 Preparation Method: EPA 515.3								
Dalapon	**0.89 U**	ug/L	1.0	0.89	1	07/24/18 00:04	07/27/18 17:57	75-99-0	
Surrogates									
2,4-DCAA (S)	92	%	70-130		1	07/24/18 00:04	07/27/18 17:57	19719-28-9	
547 HPLC Glyphosate	Analytical Method: EPA 547								
Glyphosate	**4.2 U**	ug/L	6.0	4.2	1		07/20/18 13:42		J(M3)
549.2 HPLC Paraquat Diquat	Analytical Method: EPA 549.2 Preparation Method: EPA 549.2								
Diquat	**0.30 U**	ug/L	0.40	0.30	1	07/20/18 23:17	07/25/18 21:09	85-00-7	J(L2)
300.1 Oxihalide IC Anions 14d	Analytical Method: EPA 300.1								
Chlorite	**12.8 U**	ug/L	50.0	12.8	10		07/30/18 11:39		D3
300.1 Oxihalide IC Anions 28d	Analytical Method: EPA 300.1								
Bromate	**6.4 U**	ug/L	10.0	6.4	10		07/30/18 11:39	15541-45-4	

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ANALYTICAL RESULTS

Project: 184366
Pace Project No.: 35405160

Sample: Well 22 **Lab ID: 35405160002** Collected: 07/17/18 08:45 Received: 07/20/18 10:20 Matrix: Drinking Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
548.1 GCS Endothall	Analytical Method: EPA 548.1 Preparation Method: EPA 548.1								
Endothall	**4.3 U**	ug/L	9.0	4.3	1	07/24/18 08:31	07/25/18 18:52		J(IR)

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QUALITY CONTROL DATA

Project: 184366
Pace Project No.: 35405160

QC Batch: 462922
QC Batch Method: EPA 547
Analysis Method: EPA 547
Analysis Description: 547 HPLC Glyphosate
Associated Lab Samples: 35405160001

METHOD BLANK: 2504441
Matrix: Water
Associated Lab Samples: 35405160001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Glyphosate	ug/L	4.2 U	6.0	4.2	07/20/18 09:33	

LABORATORY CONTROL SAMPLE: 2504442

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Glyphosate	ug/L	50	49.0	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2504443 2504444

Parameter	Units	35403894001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Glyphosate	ug/L	4.2 U	50	50	4.2 U	4.2 U	0	0	80-120		30	J(M3)

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2504445 2504446

Parameter	Units	35405160001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Glyphosate	ug/L	4.2 U	50	50	4.2 U	4.2 U	0	0	80-120		30	J(M3)

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QUALITY CONTROL DATA

Project: 184366
Pace Project No.: 35405160

QC Batch: 464059
QC Batch Method: EPA 508.1
Analysis Method: EPA 508.1
Analysis Description: 508 GCS Pest / PCB
Associated Lab Samples: 35405160001

METHOD BLANK: 2509865
Matrix: Water
Associated Lab Samples: 35405160001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L	0.080 U	0.10	0.080	07/25/18 23:48	
PCB-1221 (Aroclor 1221)	ug/L	0.029 U	0.10	0.029	07/25/18 23:48	
PCB-1232 (Aroclor 1232)	ug/L	0.029 U	0.10	0.029	07/25/18 23:48	
PCB-1242 (Aroclor 1242)	ug/L	0.051 U	0.10	0.051	07/25/18 23:48	
PCB-1248 (Aroclor 1248)	ug/L	0.062 U	0.10	0.062	07/25/18 23:48	
PCB-1254 (Aroclor 1254)	ug/L	0.023 U	0.10	0.023	07/25/18 23:48	
PCB-1260 (Aroclor 1260)	ug/L	0.066 U	0.10	0.066	07/25/18 23:48	
Decachlorobiphenyl (S)	%	109	70-130		07/25/18 23:48	

LABORATORY CONTROL SAMPLE: 2509866

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/L		0.080 U			
PCB-1221 (Aroclor 1221)	ug/L		0.029 U			
PCB-1232 (Aroclor 1232)	ug/L		0.029 U			
PCB-1242 (Aroclor 1242)	ug/L		0.051 U			
PCB-1248 (Aroclor 1248)	ug/L		0.062 U			
PCB-1254 (Aroclor 1254)	ug/L		0.023 U			
PCB-1260 (Aroclor 1260)	ug/L		0.066 U			
Decachlorobiphenyl (S)	%			108	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2510254 2510255

Parameter	Units	35405152001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
PCB-1016 (Aroclor 1016)	ug/L	<0.080			0.079 U	0.081 U					40	
PCB-1221 (Aroclor 1221)	ug/L	<0.029			0.029 U	0.029 U					40	
PCB-1232 (Aroclor 1232)	ug/L	<0.029			0.029 U	0.029 U					40	
PCB-1242 (Aroclor 1242)	ug/L	<0.051			0.050 U	0.052 U					40	
PCB-1248 (Aroclor 1248)	ug/L	<0.062			0.061 U	0.063 U					40	
PCB-1254 (Aroclor 1254)	ug/L	<0.023			0.023 U	0.023 U					40	
PCB-1260 (Aroclor 1260)	ug/L	<0.066			0.065 U	0.067 U					40	
Decachlorobiphenyl (S)	%						109	112	70-130		40	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 184366
Pace Project No.: 35405160

QC Batch: 463571
QC Batch Method: EPA 515.3
Analysis Method: EPA 515.3
Analysis Description: 5153 GCS Herbicides
Associated Lab Samples: 35405160001

METHOD BLANK: 2507590
Matrix: Water
Associated Lab Samples: 35405160001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Dalapon	ug/L	0.89 U	1.0	0.89	07/27/18 10:11	
2,4-DCAA (S)	%	96	70-130		07/27/18 10:11	

LABORATORY CONTROL SAMPLE: 2507591

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Dalapon	ug/L	4	4.3	107	70-130	
2,4-DCAA (S)	%			90	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2507794 2507795

Parameter	Units	4614741005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Dalapon	ug/L	<1.0	4	4	5.6	5.4	140	136	70-130	3	40	J(M1)
2,4-DCAA (S)	%						101	101	70-130			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2507796 2507797

Parameter	Units	35405508003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Dalapon	ug/L	0.89 U	4	4	4.6	4.6	114	115	70-130	1	40	
2,4-DCAA (S)	%						87	87	70-130			

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REPORT OF LABORATORY ANALYSIS

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Oldsmar , FL 34677
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QUALITY CONTROL DATA

Project: 184366
Pace Project No.: 35405160

QC Batch: 463586 Analysis Method: EPA 548.1
QC Batch Method: EPA 548.1 Analysis Description: 548 GCS Endothall
Associated Lab Samples: 35405160002

METHOD BLANK: 2507636 Matrix: Water
Associated Lab Samples: 35405160002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Endothall	ug/L	4.3 U	9.0	4.3	07/25/18 12:24	J(IR)

LABORATORY CONTROL SAMPLE: 2507637

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endothall	ug/L	50	39.2	78	64-137	

LABORATORY CONTROL SAMPLE: 2507638

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Endothall	ug/L	9	8.7 I	97	50-150	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2508098 2508099

Parameter	Units	35405809001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Endothall	ug/L	<4.3	50	50	39.9	41.2	80	82	64-137	3	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2508100 2508101

Parameter	Units	35405809002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Endothall	ug/L	<4.3	50	50	38.2	41.5	76	83	64-137	8	30	J(IR)

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
110 South Bayview Blvd.
Oldsmar , FL 34677
(813)881-9401

QUALITY CONTROL DATA

Project: 184366
Pace Project No.: 35405160

QC Batch: 463153 Analysis Method: EPA 549.2
QC Batch Method: EPA 549.2 Analysis Description: 549 HPLC Paraquat Diquat
Associated Lab Samples: 35405160001

METHOD BLANK: 2505563 Matrix: Water
Associated Lab Samples: 35405160001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Diquat	ug/L	0.30 U	0.40	0.30	07/25/18 19:14	

LABORATORY CONTROL SAMPLE: 2505564

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Diquat	ug/L	2	0.89	45	70-130	J(L2)

LABORATORY CONTROL SAMPLE: 2505565

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Diquat	ug/L	.4	0.35 I	88	50-150	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2506029 2506030

Parameter	Units	35405386001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Diquat	ug/L	<0.30	2	2	1.2	1.4	58	69	70-130	17	30	J(M1)

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2506031 2506032

Parameter	Units	35405386002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Diquat	ug/L	<0.30	2	2	1.0	1.1	51	54	70-130	6	30	J(M1)

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Oldsmar , FL 34677
(813)881-9401

QUALITY CONTROL DATA

Project: 184366
Pace Project No.: 35405160

QC Batch: 465251
QC Batch Method: EPA 300.1
Analysis Method: EPA 300.1
Analysis Description: 300.1 Oxihalides IC Anions
Associated Lab Samples: 35405160001

METHOD BLANK: 2516465
Matrix: Water
Associated Lab Samples: 35405160001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chlorite	ug/L	1.3 U	5.0	1.3	07/30/18 09:33	

LABORATORY CONTROL SAMPLE: 2516466

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chlorite	ug/L	40	40.9	102	85-115	

MATRIX SPIKE SAMPLE: 2516473

Parameter	Units	35406111001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chlorite	ug/L	128 U	2000	2010	101	75-125	

SAMPLE DUPLICATE: 2516472

Parameter	Units	35406111001 Result	Dup Result	RPD	Max RPD	Qualifiers
Chlorite	ug/L	128 U	128 U		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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Oldsmar , FL 34677
(813)881-9401

QUALITY CONTROL DATA

Project: 184366
Pace Project No.: 35405160

QC Batch: 465252 Analysis Method: EPA 300.1
QC Batch Method: EPA 300.1 Analysis Description: 300.1 Oxihalides IC Anions
Associated Lab Samples: 35405160001

METHOD BLANK: 2516481 Matrix: Water
Associated Lab Samples: 35405160001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Bromate	ug/L	0.64 U	1.0	0.64	07/30/18 09:33	

LABORATORY CONTROL SAMPLE: 2516482

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Bromate	ug/L	8	8.1	101	85-115	

MATRIX SPIKE SAMPLE: 2516488

Parameter	Units	35406111001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Bromate	ug/L	64.0 U	400	410	102	75-125	

SAMPLE DUPLICATE: 2516487

Parameter	Units	35406111001 Result	Dup Result	RPD	Max RPD	Qualifiers
Bromate	ug/L	64.0 U	64.0 U		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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Oldsmar , FL 34677
(813)881-9401

QUALIFIERS

Project: 184366
Pace Project No.: 35405160

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-O	Pace Analytical Services - Ormond Beach

ANALYTE QUALIFIERS

I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U	Compound was analyzed for but not detected.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
J(IR)	Estimated Value. The internal standard recovery associated with this result exceeds the upper control limit. The reported result should be considered an estimated value.
J(L2)	Estimated Value. Analyte recovery in the laboratory control sample (LCS) was below QC limits. Results for this analyte in associated samples may be biased low.
J(M1)	Estimated Value. Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
J(M3)	Estimated Value. Matrix spike recovery was outside laboratory control limits due to matrix interferences.

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110 South Bayview Blvd.
Oldsmar , FL 34677
(813)881-9401

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 184366
Pace Project No.: 35405160

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
35405160001	**Well 22**	EPA 508.1	464059	EPA 508.1	464228
35405160001	**Well 22**	EPA 515.3	463571	EPA 515.3	463915
35405160001	**Well 22**	EPA 547	462922		
35405160001	**Well 22**	EPA 549.2	463153	EPA 549.2	464135
35405160002	**Well 22**	EPA 548.1	463586	EPA 548.1	463963
35405160001	**Well 22**	EPA 300.1	465251		
35405160001	**Well 22**	EPA 300.1	465252		

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CHAIN-OF-CUSTODY RECORD

Eastern Analytical, Inc.
professional laboratory and drilling services

EAI ID# 184366 Page 1

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
Well 22	7/17/2018 8:45	aqueous	Subcontract - Diquat - Drinking water SALI	
Well 22	7/17/2018 8:45	aqueous	Subcontract - Endothall - Drinking water SALI	
Well 22	7/17/2018 8:45	aqueous	Subcontract - SOCs Herbicides EPA Method 515.3 (Dalapon Only)	
Well 22	7/17/2018 8:45	aqueous	Subcontract - PCBs EPA Method 508.1 (SALI)	

WO# : 35405160

35405160

EAI ID# 184366 **Project State: NH**

Project ID:

Company Pace Analytical (FL)
Address 110 Bayview BLVD
Address Oldsmar, FL 34677
Account #
Phone # 813-855-1844

Results Needed: **Preferred Date: Standard**

RUSH Due Date: _____

QC Deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ MA MCP

Notes about project:

Email login confirmation, pdf of results and invoice to customerservice@easternanalytical.com.

PO #: 48430 **EAI ID# 184366**

Data Deliverable (circle)

Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied.

Samples Collected by:

7/18 1500 UPS

Relinquished by **Date/Time** **Received by**

UPS 7-19-18 [illegible]

Relinquished by **Date/Time** **Received by**

T20? 0.5

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 *Phone: (603)228-0525* *1-800-287-0525* *customerservice@easternanalytical.com*

As a subcontract lab to EAI, you will defend, indemnify and hold Eastern Analytical, Inc., its officers, employees, and agents harmless from and against any and all liability, loss, expense or claims for injury or damage arising out of the performance against this chain of custody but only in proportion to and to the extent such liability, loss, expense, or claims for injury or damages are caused by or result from the negligent or intention acts or omissions of you as a subcontract lab, your officers, agents or employees

CHAIN-OF-CUSTODY RECORD

Eastern Analytical, Inc.
professional laboratory and drilling services

EAI ID# 184366 Page 2

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
Well 22	7/17/2018 8:45	aqueous	Subcontract - Bromate 300.0	
Well 22	7/17/2018 8:45	aqueous	Subcontract - Chlorite 300.0	
Well 22	7/17/2018 8:45	aqueous	Subcontract - Glyphosate EPA Method 547	

EAI ID# 184366 Project State: NH
Project ID:

Company Pace Analytical (FL)
Address 110 Bayview BLVD
Address Oldsmar, FL 34677
Account #
Phone # 813-855-1844

Results Needed: Preferred Date: Standard
RUSH Due Date: _____

QC Deliverables
☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ MA MCP

Notes about project:
Email login confirmation, pdf of results and invoice to customerservice@easternanalytical.com.

PO #: 48430 EAI ID# 184366

Data Deliverable (circle)
Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied.

Samples Collected by: [signature] 7/18/18 1500 UPS

Relinquished by	Date/Time	Received by
UPS	7-19-18	MNC Glen / PACE
Relinquished by	Date/Time	Received by
		1203

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 Phone: (603)228-0525 1-800-287-0525 customerservice@easternanalytical.com

As a subcontract lab to EAI, you will defend, indemnify and hold Eastern Analytical, Inc., its officers, employees, and agents harmless from and against any and all liability, loss, expense or claims for injury or damage arising out of the performance against this chain of custody but only in proportion to and to the extent such liability, loss, expense, or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of you as a subcontract lab, your officers, agents or employees.

Pace Analytical Florida Laboratory	Document Name: Sample Condition Upon Receipt Form	Document Revised: May 30, 2018
	Document No.: F-FL-C-007 rev. 13	Issuing Authority: Pace Florida Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project # WO# : 35405160

Project Manager: PM: ADA Due Date: 08/02/18

Client: CLIENT: 37-EASANA

Date and Initials of person:
Examining contents:_____
Label:_____
Deliver:_____
pH:_____

Thermometer Used: T-203 Date: 7-19-18 Time: 1640 Initials: MJL

State of Origin: FL ☐ For WV projects, all containers verified to ≤6 °C

Cooler #1 Temp.°C	0.5 (Visual)	0.0 (Correction Factor)	0.5 (Actual)	☑ Samples on ice, cooling process has begun
Cooler #2 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun
Cooler #3 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun
Cooler #4 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun
Cooler #5 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun
Cooler #6 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other_____

Shipping Method: ☐ First Overnight ☐ Priority Overnight ☐ Standard Overnight ☐ Ground ☐ International Priority ☑ Other Next day

Billing: ☐ Recipient ☐ Sender ☐ Third Party ☐ Credit Card ☑ Unknown

Tracking # 12 X46 599 01 9965 5[illegible]

Custody Seal on Cooler/Box Present: ☐ Yes ☑ No **Seals intact:** ☐ Yes ☐ No **Ice:** (Wet) Blue Dry None

Packing Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other_____

Samples shorted to lab (If Yes, complete) Shorted Date:_____ Shorted Time:_____ Qty:_____

		Comments:
Chain of Custody Present	☑Yes ☐No ☐N/A	
Chain of Custody Filled Out	☑Yes ☐No ☐N/A	
Relinquished Signature & Sampler Name COC	☑Yes ☐No ☐N/A	
Samples Arrived within Hold Time	☑Yes ☐No ☐N/A	
Rush TAT requested on COC	☐Yes ☑No ☐N/A	
Sufficient Volume	☑Yes ☐No ☐N/A	
Correct Containers Used	☑Yes ☐No ☐N/A	
Containers Intact	☐Yes ☑No ☐N/A	*
Sample Labels match COC (sample IDs & date/time of collection)	☑Yes ☐No ☐N/A	
All containers needing acid/base preservation have been checked.	☑Yes ☐No ☐N/A	Preservation Information:
All Containers needing preservation are found to be in compliance with EPA recommendation: Exceptions: VOA, Coliform, TOC, O&G, Carbamates	☑Yes ☐No ☐N/A	Preservative:_____ Lot #/Trace #:_____ Date:_____ Time:_____ Initials:_____
Headspace in VOA Vials? (>6mm):	☐Yes ☐No ☑N/A	
Trip Blank Present:	☐Yes ☐No ☑N/A	

Client Notification/ Resolution:
Person Contacted:_____ Date/Time:_____

Comments/ Resolution (use back for additional comments): 548 - Endothall Bottle arrived Broken

Project Manager Review:_____ Date:_____

CHAIN-OF-CUSTODY RECORD

Eastern Analytical, Inc.
professional laboratory and drilling services

EAI ID# 184366 Page 1

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
Well 22	7/17/2018 8:45	aqueous	Subcontract - Endothall - Drinking water SALI	

EAI ID# 184366 **Project State: NH**

Project ID:

Company Phoenix Environmental Labs
Address 587 East Middle Turnpike
Address Manchester , CT 06040
Account #
Phone # (860) 645-1102

Results Needed: **Preferred Date: Standard**

RUSH Due Date: _____

QC Deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ MA MCP

Notes about project:

Email login confirmation, pdf of results and invoice to customerservice@easternanalytical.com.

Please add to job submitted 7/19/18

PO #:

EAI ID# 184366

Data Deliverable (circle)

Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied.

Samples Collected by: 7/19/18 1500

Relinquished by	Date/Time	Received by
UPS	7-20-18 10:00	Dreinstaget
Relinquished by	**Date/Time**	**Received by**

As a subcontract lab to EAI, you will defend, indemnify and hold Eastern Analytical, Inc., its officers, employees, and agents harmless from and against any and all liability, loss, expense or claims for injury or damages arising out of the performance against this chain of custody but only in proportion to and to the extent such liability, loss, expense, or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of you as a subcontract lab, your officers, agents or employees

Pace Analytical Florida Laboratory	Document Name: Sample Condition Upon Receipt Form	Document Revised: May 30, 2018
	Document No.: F-FL-C-007 rev. 13	Issuing Authority: Pace Florida Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project # WO# : 35405160

Project Manager: PM: ADA **Due Date:** 08/02/18

Client: CLIENT: 37-ERSANA

Date and Initials of person:
Examining contents: DS 7/20/18
Label:
Deliver:
pH:

Thermometer Used: T-203 Date: 7/20/18 Time: 10:20 Initials: DS

State of Origin: FL ☐ For WV projects, all containers verified to ≤6 °C

Cooler #1 Temp.°C	1.7 (Visual)	0.0 (Correction Factor)	1.7 (Actual)	☐ Samples on ice, cooling process has begun
Cooler #2 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun
Cooler #3 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun
Cooler #4 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun
Cooler #5 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun
Cooler #6 Temp.°C	(Visual)	(Correction Factor)	(Actual)	☐ Samples on ice, cooling process has begun

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other

Shipping Method: ☐ First Overnight ☐ Priority Overnight ☐ Standard Overnight ☐ Ground ☐ International Priority ☐ Other

Billing: ☐ Recipient ☐ Sender ☐ Third Party ☐ Credit Card ☐ Unknown

Tracking # 12 X46 5990 9384 1868

Custody Seal on Cooler/Box Present: ☐ Yes ☑ No **Seals intact:** ☐ Yes ☑ No **Ice:** (Wet) Blue Dry None

Packing Material: ☑ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other

Samples shorted to lab (if Yes, complete) Shorted Date: Shorted Time: Qty:

		Comments:
Chain of Custody Present	☑Yes ☐No ☐N/A	
Chain of Custody Filled Out	☑Yes ☐No ☐N/A	
Relinquished Signature & Sampler Name COC	☑Yes ☐No ☐N/A	
Samples Arrived within Hold Time	☑Yes ☐No ☐N/A	
Rush TAT requested on COC	☐Yes ☑No ☐N/A	
Sufficient Volume	☑Yes ☐No ☐N/A	
Correct Containers Used	☑Yes ☐No ☐N/A	
Containers Intact	☑Yes ☐No ☐N/A	
Sample Labels match COC (sample IDs & date/time of collection)	☑Yes ☐No ☐N/A	
All containers needing acid/base preservation have been checked.	☐Yes ☐No ☑N/A	Preservation Information:
All Containers needing preservation are found to be in compliance with EPA recommendation: Exceptions: VOA, Coliform, TOC, O&G, Carbamates	☐Yes ☐No ☑N/A	Preservative: Lot #/Trace #: Date: Time: Initials:
Headspace in VOA Vials? (>6mm):	☐Yes ☐No ☑N/A	
Trip Blank Present:	☐Yes ☐No ☑N/A	

Client Notification/ Resolution:
Person Contacted: Date/Time:

Comments/ Resolution (use back for additional comments): replacement EndoThrill That was received Broken

Project Manager Review: Date:

PHOENIX
Environmental Laboratories, Inc.

Tuesday, July 24, 2018

Attn: Front Office
Eastern Analytical
25 Chenell Drive
Concord, NH 03301

Project ID: 184366
Sample ID#s: CA93480

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

Phyllis Shiller

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
UT Lab Registration #CT00007
VT Lab Registration #VT11301

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

SDG Comments

July 24, 2018

SDG I.D.: GCA93480

Sample CA93480 was received past hold time for MBAS (SM5540 C).

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

July 24, 2018

FOR: Attn: Front Office
Eastern Analytical
25 Chenell Drive
Concord, NH 03301

Sample Information		Custody Information		Date	Time
Matrix:	WATER	Collected by:		07/17/18	8:45
Location Code:	EASTANAL	Received by:	CP	07/19/18	11:00
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	48426				

Laboratory Data

SDG ID: GCA93480
Phoenix ID: CA93480

Project ID: 184366
Client ID: WELL 22

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
MBAS	< 0.05	0.05	mg/L	1	07/21/18 03:17	TH	SM5540 C-11

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low

Comments:

The LAS standard used for the MBAS analysis has a molecular weight of 342 g/mol.

If there are any questions regarding this data, please call Phoenix Client Services.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
July 24, 2018
Reviewed and Released by: Rashmi Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

QA/QC Report

July 24, 2018

QA/QC Data

SDG I.D.: GCA93480

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 439879 (mg/L), QC Sample No: CA94410 (CA93480)													
MBAS	BRL	0.05	<0.05	<0.05	NC	88.2			76.1			85 - 115	20
Comment:													
Additional criteria matrix spike acceptance range is 75-125%.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
July 24, 2018

Tuesday, July 24, 2018

Criteria: None

State: NH

Sample Criteria Exceedances Report

GCA93480 - EASTANAL

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Comments

July 24, 2018 SDG I.D.: GCA93480

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

CHAIN-OF-CUSTODY RECORD

22.0 °C
IC

Eastern Analytical, Inc.
professional laboratory and drilling services

EAI ID# 184366 Page 1

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
Well 22	7/17/2018 8:45	aqueous	Subcontract - Surfactants / MBAS Method SM5540C	

93480

EAI ID# 184366 **Project State: NH**

Project ID:

Company Phoenix Environmental Labs
Address 587 East Middle Turnpike
Address Manchester , CT 06040
Account #
Phone # (860) 645-1102

Results Needed: Preferred Date: Standard
RUSH Due Date: _____

QC Deliverables
☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ MA MCP

Notes about project:
Email login confirmation, pdf of results and invoice to customerservice@easternanalytical.com.

[redacted]

PO #:48426 **EAI ID# 184366**

Data Deliverable (circle)
Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied.

Samples Collected by: _____

Relinquished by	Date/Time	Received by
[signature]	7/17/18 1600	UPS
UPS	7/19/18 1100	[signature]

Eastern Analytical, Inc. 25 Chenell Dr. Concord, NH 03301 *Phone: (603)228-0525* *1-800-287-0525* *customerservice@easternanalytical.com*

As a subcontract lab to EAI, you will defend, indemnify and hold Eastern Analytical, Inc., its officers, employees, and agents harmless from and against any and all liability, loss, expense or claims for injury or damages arising out of the performance against this chain of custody but only in proportion to and to the extent such liability, loss, expense, or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of you as a subcontract lab, your officers, agents or employees

Eastern Analytical, Inc. CHAIN-OF-CUSTODY RECORD

184366

Sample IDs	Date/Time (Composites need start and stop dates/times)	Matrix	Parameters and Sample Notes	# of containers
Well: Well 22	7/17/18 845 AM	aqueous Grab or Comp	AqTot/TColi/EColi/Color/Odor/CyanT/NO3/NO2/AlkT/pH/Cl/F/SO4/S2/TDS/LangelierCorrosivity/ICPMets.Al.Sb.As.Ba.Be.Ca.Cd.Cr.Cu.Fe.Pb.Mn.Hg.Ni.Se.Ag.Na.Tl.Zn.U. add Magnesium Add Alkalinity HardTot/VNH524FullList/V8260SIM14DIOXANE/EAISOCsNH/EHAA5/SurfactantsMBASSubPEL/RadonAqSubSAS/Adj GrossAlpha/GrossAlphaBetaSubKNL/Rad226Rad228ComboSubKNL/DiquatDWSubSALI/EndothallDWSubSALI/Dioxin	Many
☒ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐
Trip Blanks		aqueous Grab or Comp	AqTot/VNH524FullList/V8260SIM14DIOXANE/EDBDBCP	
☐ Sampler confirms ID and parameters are accurate			*Circle preservative/s:* HCL HNO_3 H_2SO_4 NaOH MEOH $Na_2S_2O_3$ ICE	Dissolved Sample Field Filtered ☐

Please ensure this auto COC is accurate, adheres to permit or sampling requirements for this sampling event, and modify as necessary.

EAI Project ID

Project Name: Round 3 NHDES Analytical Requirements for Community Public

State: NH

Client (Pro Mgr): Matt Krapf

Customer: Geosphere Environmental

Address: 51 Portsmouth Avenue

City: Exeter NH 03833

Phone: 773-0075 Fax: 773-0077(14)

Email: mkrapf@geospherenh.com

Direct

Results Needed by: Preferred date Std T/A

Notes:

Round 3 Refer to BO #7811 for full suite of analyses

QC deliverables

☐ A ☐ A+ ☒ B ☐ B+ ☐ C ☐ PC

ReportingOptions

☒ HC ☐ NO FAX

☒ EDD PDF ☐ Partial FAX

☒ EDD email ☐ PDF Invoice

☒ PDF prelim, NO FAX ☐ EQUIS

☐ e-mail Login Confirmation

PO# Verbal

Quote#:

Temp 0.7°C

Ice Y ☒ N ☐

Samples Collected by: Matt Krapf

Relinquished by	Date/Time	Received by
Donna Nordvedt	7-17-18 1230p	
	7/17/18 1405	
Relinquished by	Date/Time	Received by

Laboratory Report
Lancaster Laboratories Environmental (Eurofins)

Well 22 – Final Day
July 17, 2018

Analysis:

- Perfluorinated Compounds

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Geosphere Environmental Mgmt
51 Portsmouth Avenue
Exeter NH 03833

Report Date: July 27, 2018 08:02

Project: 12217 - Aquarion Well 22 Pump Test

Account #: 42988
Group Number: 1966949
PO Number: 17214
State of Sample Origin: NH

Electronic Copy To Geosphere Environmental Mgmt Attn: Ray Talkington

Respectfully Submitted,

Lyssa M. Longenecker
Specialist

(717) 556-7321

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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
Well 22 Final Sample Grab Potable Water	07/17/2018 09:25	9709153

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Sample Description: **Well 22 Final Sample Grab Potable Water**
Aquarion Well 22 Pump Test

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 07/18/2018 10:00
Collection Date/Time: 07/17/2018 09:25

Geosphere Environmental Mgmt
ELLE Sample #: PW 9709153
ELLE Group #: 1966949
Matrix: Potable Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	**ng/l**	
14473	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.91	1.8	1
14473	8:2 fluorotelomersulfonate	39108-34-4	N.D.	1.8	5.5	1
14473	NEtFOSAA	2991-50-6	N.D.	0.91	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.					
14473	NEtPFOSA	4151-50-2	N.D.	2.7	8.2	1
	NEtPFOSA is the acronym for N-ethylperfluoro-1-octanesulfonamide					
14473	NEtPFOSAE	1691-99-2	N.D.	1.1	2.7	1
	NEtPFOSAE is the acronym for 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol					
14473	NMeFOSAA	2355-31-9	N.D.	0.91	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.					
14473	NMePFOSA	31506-32-8	N.D.	2.7	8.2	1
	NMePFOSA is the acronym for N-methylperfluoro-1-octanesulfonamide					
14473	NMePFOSAE	24448-09-7	N.D.	0.91	2.7	1
	NMePFOSAE is the acronym for 2-(N-methylperfluoro-1-octanesulfonamido)-ethanol					
14473	Perfluorobutanesulfonate	375-73-5	0.58 J	0.27	0.91	1
14473	Perfluorobutanoic acid	375-22-4	N.D.	1.8	5.5	1
14473	Perfluorodecanesulfonate	335-77-3	N.D.	0.55	1.8	1
14473	Perfluorodecanoic acid	335-76-2	N.D.	0.82	1.8	1
14473	Perfluorododecanoic acid	307-55-1	N.D.	0.46	1.8	1
14473	Perfluoroheptanesulfonate	375-92-8	N.D.	0.36	1.8	1
14473	Perfluoroheptanoic acid	375-85-9	0.38 J	0.36	0.91	1
14473	Perfluorohexadecanoic acid	67905-19-5	N.D.	0.27	0.91	1
14473	Perfluorohexanesulfonate	355-46-4	0.77 J	0.36	1.8	1
14473	Perfluorohexanoic acid	307-24-4	0.57 J	0.36	1.8	1
14473	Perfluorononanoic acid	375-95-1	N.D.	0.36	1.8	1
14473	Perfluorooctanesulfonamide	754-91-6	N.D.	0.46	2.7	1
14473	Perfluoro-octanesulfonate	1763-23-1	1.1 J	0.36	1.8	1
14473	Perfluorooctanoic acid	335-67-1	1.6	0.27	0.91	1
14473	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	5.5	1
14473	Perfluorotetradecanoic acid	376-06-7	N.D.	0.27	0.91	1
14473	Perfluorotridecanoic acid	72629-94-8	N.D.	0.36	0.91	1
14473	Perfluoroundecanoic acid	2058-94-8	N.D.	0.36	1.8	1

The stated QC limits are advisory only until sufficient data points can be obtained to calculate statistical limits.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor

*=This limit was used in the evaluation of the final result

Sample Description: **Well 22 Final Sample Grab Potable Water**
Aquarion Well 22 Pump Test

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 07/18/2018 10:00
Collection Date/Time: 07/17/2018 09:25

Geosphere Environmental Mgmt
ELLE Sample #: PW 9709153
ELLE Group #: 1966949
Matrix: Potable Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18200012	07/20/2018 18:16	Devon M Whooley	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	18200012	07/19/2018 18:00	Anthony C Polaski	1

*=This limit was used in the evaluation of the final result

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Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Group Number: 1966949
Reported: 07/27/2018 08:02

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ng/l	MDL** ng/l	LOQ ng/l
Batch number: 18200012	Sample number(s): 9709153		
6:2 fluorotelomersulfonate	N.D.	1.0	2.0
8:2 fluorotelomersulfonate	N.D.	2.0	6.0
NEtFOSAA	N.D.	1.0	3.0
NEtPFOSA	N.D.	3.0	9.0
NEtPFOSAE	N.D.	1.2	3.0
NMeFOSAA	N.D.	1.0	3.0
NMePFOSA	N.D.	3.0	9.0
NMePFOSAE	N.D.	1.0	3.0
Perfluorobutanesulfonate	N.D.	0.30	1.0
Perfluorobutanoic acid	N.D.	2.0	6.0
Perfluorodecanesulfonate	N.D.	0.60	2.0
Perfluorodecanoic acid	N.D.	0.90	2.0
Perfluorododecanoic acid	N.D.	0.50	2.0
Perfluoroheptanesulfonate	N.D.	0.40	2.0
Perfluoroheptanoic acid	N.D.	0.40	1.0
Perfluorohexadecanoic acid	N.D.	0.30	1.0
Perfluorohexanesulfonate	N.D.	0.40	2.0
Perfluorohexanoic acid	N.D.	0.40	2.0
Perfluorononanoic acid	N.D.	0.40	2.0
Perfluorooctanesulfonamide	N.D.	0.50	3.0
Perfluoro-octanesulfonate	N.D.	0.40	2.0
Perfluorooctanoic acid	N.D.	0.30	1.0
Perfluoropentanoic acid	N.D.	2.0	6.0
Perfluorotetradecanoic acid	N.D.	0.30	1.0
Perfluorotridecanoic acid	N.D.	0.40	1.0
Perfluoroundecanoic acid	N.D.	0.40	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18200012	Sample number(s): 9709153								
6:2 fluorotelomersulfonate	15.17	15.07	15.17	14.39	99	95	66-155	5	30
8:2 fluorotelomersulfonate	15.33	15.76	15.33	15.64	103	102	66-148	1	30
NEtFOSAA	5.44	5.01	5.44	5.93	92	109	55-169	17	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Reported: 07/27/2018 08:02

Group Number: 1966949

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
NEtPFOSA	5.44	6.84	5.44	7.08	126	130	70-130	3	30
NEtPFOSAE	5.44	4.99	5.44	5.49	92	101	70-130	10	30
NMeFOSAA	5.44	5.82	5.44	6.29	107	116	62-167	8	30
NMePFOSA	5.44	6.69	5.44	5.26	123	97	70-130	24	30
NMePFOSAE	5.44	6.96	5.44	6.42	128	118	70-130	8	30
Perfluorobutanesulfonate	4.81	5.15	4.81	5.38	107	112	73-128	4	30
Perfluorobutanoic acid	5.44	5.78	5.44	5.73	106	105	74-142	1	30
Perfluorodecanesulfonate	5.24	4.94	5.24	4.73	94	90	60-135	4	30
Perfluorodecanoic acid	5.44	6.28	5.44	6.24	115	115	69-148	1	30
Perfluorododecanoic acid	5.44	6.30	5.44	6.07	116	112	75-136	4	30
Perfluoroheptanesulfonate	5.18	5.65	5.18	5.93	109	115	64-135	5	30
Perfluoroheptanoic acid	5.44	5.99	5.44	6.16	110	113	76-140	3	30
Perfluorohexadecanoic acid	5.44	6.11	5.44	6.07	112	112	21-151	1	30
Perfluorohexanesulfonate	5.14	5.17	5.14	5.38	101	105	71-131	4	30
Perfluorohexanoic acid	5.44	6.26	5.44	6.33	115	116	75-135	1	30
Perfluorononanoic acid	5.44	6.15	5.44	5.93	113	109	72-148	4	30
Perfluorooctanesulfonamide	5.44	5.48	5.44	5.10	101	94	65-164	7	30
Perfluoro-octanesulfonate	5.20	5.70	5.20	5.68	110	109	67-138	0	30
Perfluorooctanoic acid	5.44	6.14	5.44	5.92	113	109	72-138	4	30
Perfluoropentanoic acid	5.44	6.05	5.44	6.11	111	112	74-134	1	30
Perfluorotetradecanoic acid	5.44	6.39	5.44	5.88	117	108	74-135	8	30
Perfluorotridecanoic acid	5.44	6.36	5.44	5.98	117	110	61-145	6	30
Perfluoroundecanoic acid	5.44	6.07	5.44	5.00	112	92	75-146	19	30

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18200012

	13C4-PFBA	13C5-PFPeA	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA
9709153	102	100	101	82	88	79
Blank	102	95	99	81	84	78
LCS	108	100	104	90	95	89
LCSD	102	98	96	89	93	88
Limits:	33-123	39-135	26-148	31-128	34-126	35-126

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
9709153	88	82	80	78	81	89
Blank	82	80	85	84	80	86

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Group Number: 1966949
Reported: 07/27/2018 08:02

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18200012

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
LCS	92	88	93	85	85	88
LCSD	98	92	89	87	88	86
Limits:	39-140	43-112	43-115	32-134	40-115	39-137

	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA	13C2-PFTeDA	13C8-PFOSA
9709153	87	88	90	86	82	78
Blank	80	86	81	90	80	73
LCS	91	80	91	87	81	73
LCSD	84	88	92	87	81	75
Limits:	17-120	30-128	21-135	28-127	26-119	70-130

	d7-NMePFOSAE	d3-NMePFOSA	d9-NEtPFOSAE	d5-NEtPFOSA
9709153	77	52*	86	67*
Blank	69*	57*	75	64*
LCS	70	54*	90	58*
LCSD	59*	34*	67*	31*
Limits:	70-130	70-130	70-130	70-130

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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Acct. # 42988 Group # 1966949 Sample # 9709153

Client: Geosphere Environmental Management			
Project Name/#: Agawam Well 22 Pump Test	Site ID #: 12217		
Project Manager: Ray Talkington	P.O. #:		
Sampler: Matt Kropf	PWSID #:		
Phone #: (508) 944-8765	Quote #:		
State where samples were collected: NH	For Compliance: Yes ☐ No ☐		

DO NOT SEND RESULT TO DES ONLY RAY TALKINGTON

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil	Sediment	Tissue	Water: Potable	Ground	Surface	NPDES	Other:	Total # of Containers	Analyses Requested: Preservation and Filtration Codes: Pre EPA Method	Remarks
Well 22 Final Sample	7/17/18	925	X						X				2		Trizma

For Lab Use Only

SF #: _____

SCR #: _____

Preservation Codes

H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; F = Field Filtered; O = Other

Turnaround Time Requested (TAT) (please check): Standard ☒ Rush ☐

(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:

Results requested by (please check): E-Mail ☒ Phone ☐

E-mail Address: rtalkington@geosphere nh.com

Phone: 508-944-8765

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type VI (Raw Data Only) ☐ TX TRRP-13 ☐

NJ DKQP ☐ NYSDEC Category ☐ A or ☐ B

EDD Required? Yes ☐ No ☒ If yes, format: _____

	Relinquished by:	Date	Time	Received by:	Date	Time
1	Matthew Kropf	7/17/18	10 30 AM	FED EX	7/17/18	10 30 AM
2						
3						
4						
5				Emcher	7-18-18	1000

Relinquished by Commercial Carrier: UPS _____ FedEx ✓ Other _____

Temperature upon receipt 5.8 °C

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Sample Administration Receipt Documentation Log

Doc Log ID: 221848

Group Number(s): 1966949

Client: Geosphere Environmental Managemen

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	07/18/2018 10:00
Number of Packages:	1	Number of Projects:	1
State/Province of Origin:	NH		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Melvin Sanchez (8943) at 15:24 on 07/18/2018

Samples Chilled Details

Thermometer Types: *DT = Digital (Temp. Bottle)* *IR = Infrared (Surface Temp)* *All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT131	0.8	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17605-2425
T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Appendix I

NHDES-Required Private Well Monitoring
Laboratory Analysis Reports

VOCs – 31 Windmill Lane
July 2018

PFAS – 206 Woodland Road
July 2018

Eastern Analytical, Inc.

professional laboratory and drilling services

Ray Talkington
Geosphere Environmental Management Inc.
51 Portsmouth Avenue
Exeter, NH 03833

Subject: Laboratory Report

Eastern Analytical, Inc. ID: 183763
Client Identification: Well 22 Pumping Test | 12217
Date Received: 7/3/2018

Dear Mr. Talkington :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.easternanalytical.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

Solid samples are reported on a dry weight basis, unless otherwise noted
< : "less than" followed by the reporting limit
> : "greater than" followed by the reporting limit
%R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012) and New York (12072).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample (s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw, Lab Director | 7-6-18 Date | 6 # of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **183763**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Well 22 Pumping Test | 12217**

Temperature upon receipt (°C): 4.1 **Received on ice or cold packs (Yes/No): Y**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
183763.01	31 Windmill Ln Mid	7/3/18	7/2/18	aqueous		Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.
Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.
All results contained in this report relate only to the above listed samples.
References include:
1) EPA 600/4-79-020, 1983
2) Standard Methods for Examination of Water and Wastewater,20th Edition, 1998 and 22nd Edition, 2012
3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
4) Hach Water Analysis Handbook, 2nd edition, 1992

LABORATORY REPORT

EAI ID#: **183763**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Well 22 Pumping Test | 12217**

Sample ID:	31 Windmill Ln Mid
Lab Sample ID:	183763.01
Matrix:	aqueous
Date Sampled:	7/2/18
Date Received:	7/3/18
Units:	ug/L
Date of Analysis:	7/3/18
Analyst:	BAM
Method:	524.2
Dilution Factor:	1

Dichlorodifluoromethane	< 0.5
Chloromethane	< 0.5
Vinyl chloride	< 0.5
Bromomethane	< 0.5
Chloroethane	< 0.5
Trichlorofluoromethane	< 0.5
Diethyl Ether	< 5
Acetone	< 10
1,1-Dichloroethene	< 0.5
tert-Butyl Alcohol (TBA)	< 30
Methylene chloride	< 0.5
Carbon disulfide	< 2
Methyl-t-butyl ether(MTBE)	< 0.5
Ethyl-t-butyl ether(ETBE)	< 0.5
Isopropyl ether(DIPE)	< 0.5
tert-amyl methyl ether(TAME)	< 0.5
trans-1,2-Dichloroethene	< 0.5
Vinyl acetate	< 10
1,1-Dichloroethane	< 0.5
2,2-Dichloropropane	< 0.5
cis-1,2-Dichloroethene	< 0.5
2-Butanone(MEK)	< 5
Bromochloromethane	< 0.5
Tetrahydrofuran(THF)	< 5
Chloroform	< 0.5
1,1,1-Trichloroethane	< 0.5
Carbon tetrachloride	< 0.5
1,1-Dichloropropene	< 0.5
Benzene	< 0.5
1,2-Dichloroethane	< 0.5
Trichloroethene	< 0.5
1,2-Dichloropropane	< 0.5
Dibromomethane	< 0.5
Bromodichloromethane	< 0.5
4-Methyl-2-pentanone(MIBK)	< 5
cis-1,3-Dichloropropene	< 0.3
Toluene	< 0.5
trans-1,3-Dichloropropene	< 0.3
1,1,2-Trichloroethane	< 0.5
2-Hexanone	< 5
Tetrachloroethene	< 0.5
1,3-Dichloropropane	< 0.5
Dibromochloromethane	< 0.5
1,2-Dibromoethane(EDB)	< 0.5
Chlorobenzene	< 0.5
1,1,1,2-Tetrachloroethane	< 0.5
Ethylbenzene	< 0.5

LABORATORY REPORT

EAI ID#: **183763**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Well 22 Pumping Test | 12217**

Sample ID:	31 Windmill Ln Mid
Lab Sample ID:	183763.01
Matrix:	aqueous
Date Sampled:	7/2/18
Date Received:	7/3/18
Units:	ug/L
Date of Analysis:	7/3/18
Analyst:	BAM
Method:	524.2
Dilution Factor:	1
mp-Xylene	< 0.5
o-Xylene	< 0.5
Styrene	< 0.5
Bromoform	< 0.5
IsoPropylbenzene	< 0.5
Bromobenzene	< 0.5
1,1,2,2-Tetrachloroethane	< 0.5
1,2,3-Trichloropropane	< 0.5
n-Propylbenzene	< 0.5
2-Chlorotoluene	< 0.5
4-Chlorotoluene	< 0.5
1,3,5-Trimethylbenzene	< 0.5
tert-Butylbenzene	< 0.5
1,2,4-Trimethylbenzene	< 0.5
sec-Butylbenzene	< 0.5
1,3-Dichlorobenzene	< 0.5
p-Isopropyltoluene	< 0.5
1,4-Dichlorobenzene	< 0.5
1,2-Dichlorobenzene	< 0.5
n-Butylbenzene	< 0.5
1,2-Dibromo-3-chloropropane	< 0.5
1,3,5-Trichlorobenzene	< 0.5
1,2,4-Trichlorobenzene	< 0.5
Hexachlorobutadiene	< 0.5
Naphthalene	< 0.5
1,2,3-Trichlorobenzene	< 0.5
4-Bromofluorobenzene (surr)	**91 %R**
1,2-Dichlorobenzene-d4 (surr)	**94 %R**

QC REPORT

EAI ID#: **183763**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Well 22 Pumping Test | 12217**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Dichlorodifluoromethane	< 0.5	8.6 (86 %R)	9.3 (93 %R) (8 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Chloromethane	< 0.5	11 (106 %R)	11 (106 %R) (0 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Vinyl chloride	< 0.5	9.6 (96 %R)	9.9 (99 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Bromomethane	< 0.5	* 6.2 (62 %R)	* 6.7 (67 %R) (9 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Chloroethane	< 0.5	11 (113 %R)	12 (115 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Trichlorofluoromethane	< 0.5	11 (105 %R)	11 (111 %R) (5 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Diethyl Ether	< 5	12 (123 %R)	13 (125 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Acetone	< 10	11 (108 %R)	11 (109 %R) (0 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,1-Dichloroethene	< 0.5	9.6 (96 %R)	9.9 (99 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
tert-Butyl Alcohol (TBA)	< 30	61 (121 %R)	61 (123 %R) (1 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Methylene chloride	< 0.5	9.5 (95 %R)	10 (100 %R) (5 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Carbon disulfide	< 2	10 (104 %R)	11 (112 %R) (7 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Methyl-t-butyl ether(MTBE)	< 0.5	9.5 (95 %R)	9.8 (98 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Ethyl-t-butyl ether(ETBE)	< 0.5	9.3 (93 %R)	9.5 (95 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Isopropyl ether(DIPE)	< 0.5	9.7 (97 %R)	10 (100 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
tert-amyl methyl ether(TAME)	< 0.5	9.5 (95 %R)	9.6 (96 %R) (1 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
trans-1,2-Dichloroethene	< 0.5	8.6 (86 %R)	9.0 (90 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Vinyl acetate	< 10	< 10 (90 %R)	< 10 (90 %R) (0 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,1-Dichloroethane	< 0.5	9.4 (94 %R)	9.7 (97 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
2,2-Dichloropropane	< 0.5	7.4 (74 %R)	7.6 (76 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
cis-1,2-Dichloroethene	< 0.5	10 (102 %R)	11 (108 %R) (6 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
2-Butanone(MEK)	< 5	8.8 (88 %R)	8.8 (88 %R) (1 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Bromochloromethane	< 0.5	8.9 (89 %R)	9.6 (96 %R) (7 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Tetrahydrofuran(THF)	< 5	12 (117 %R)	12 (121 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Chloroform	< 0.5	9.1 (91 %R)	9.5 (95 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,1,1-Trichloroethane	< 0.5	8.0 (80 %R)	8.6 (86 %R) (7 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Carbon tetrachloride	< 0.5	7.4 (74 %R)	7.5 (75 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,1-Dichloropropene	< 0.5	8.9 (89 %R)	9.3 (93 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Benzene	< 0.5	9.4 (94 %R)	9.8 (98 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,2-Dichloroethane	< 0.5	9.8 (98 %R)	10 (100 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Trichloroethene	< 0.5	9.0 (90 %R)	9.3 (93 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,2-Dichloropropane	< 0.5	9.6 (96 %R)	10 (101 %R) (5 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Dibromomethane	< 0.5	9.7 (97 %R)	10 (101 %R) (5 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Bromodichloromethane	< 0.5	9.9 (99 %R)	10 (101 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
4-Methyl-2-pentanone(MIBK)	< 5	9 (90 %R)	9.1 (91 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
cis-1,3-Dichloropropene	< 0.3	8.9 (89 %R)	8.8 (88 %R) (0 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Toluene	< 0.5	9.5 (95 %R)	9.9 (99 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
trans-1,3-Dichloropropene	< 0.3	8.2 (82 %R)	8.5 (85 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,1,2-Trichloroethane	< 0.5	9.5 (95 %R)	9.5 (95 %R) (1 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
2-Hexanone	< 5	9 (90 %R)	9.1 (91 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Tetrachloroethene	< 0.5	9.2 (92 %R)	9.7 (97 %R) (5 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,3-Dichloropropane	< 0.5	9.6 (96 %R)	9.7 (97 %R) (1 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Dibromochloromethane	< 0.5	9.8 (98 %R)	10 (101 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,2-Dibromoethane(EDB)	< 0.5	9.5 (95 %R)	9.5 (95 %R) (0 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Chlorobenzene	< 0.5	9.3 (93 %R)	9.6 (96 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,1,1,2-Tetrachloroethane	< 0.5	8.3 (83 %R)	8.3 (83 %R) (1 RPD)	7/3/2018	ug/L	70 - 130	30	524.2

QC REPORT

EAI ID#: **183763**

Client: **Geosphere Environmental Management Inc.**

Client Designation: **Well 22 Pumping Test | 12217**

Parameter Name	Blank	LCS	LCSD	Analysis Date	Units	Limits	RPD	Method
Ethylbenzene	< 0.5	9.4 (94 %R)	9.6 (96 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
mp-Xylene	< 0.5	19 (94 %R)	19 (97 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
o-Xylene	< 0.5	9.2 (92 %R)	9.4 (94 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Styrene	< 0.5	9.3 (93 %R)	9.5 (95 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Bromoform	< 0.5	9.8 (98 %R)	10 (102 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
IsoPropylbenzene	< 0.5	9.4 (94 %R)	9.6 (96 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Bromobenzene	< 0.5	9.1 (91 %R)	9.3 (93 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,1,2,2-Tetrachloroethane	< 0.5	9.3 (93 %R)	9.7 (97 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,2,3-Trichloropropane	< 0.5	9.5 (95 %R)	9.7 (97 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
n-Propylbenzene	< 0.5	9.4 (94 %R)	9.7 (97 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
2-Chlorotoluene	< 0.5	9.0 (90 %R)	9.3 (93 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
4-Chlorotoluene	< 0.5	8.8 (88 %R)	9.0 (90 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,3,5-Trimethylbenzene	< 0.5	9.3 (93 %R)	9.4 (94 %R) (1 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
tert-Butylbenzene	< 0.5	9.4 (94 %R)	9.7 (97 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,2,4-Trimethylbenzene	< 0.5	9.3 (93 %R)	9.8 (98 %R) (5 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
sec-Butylbenzene	< 0.5	9.4 (94 %R)	9.7 (97 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,3-Dichlorobenzene	< 0.5	9.0 (90 %R)	9.6 (96 %R) (6 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
p-Isopropyltoluene	< 0.5	9.3 (93 %R)	9.8 (98 %R) (5 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,4-Dichlorobenzene	< 0.5	9.0 (90 %R)	9.3 (93 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,2-Dichlorobenzene	< 0.5	9.2 (92 %R)	9.4 (94 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
n-Butylbenzene	< 0.5	9.7 (97 %R)	9.9 (99 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,2-Dibromo-3-chloropropane	< 0.5	9.7 (97 %R)	9.7 (97 %R) (0 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,3,5-Trichlorobenzene	< 0.5	9.1 (91 %R)	9.6 (96 %R) (5 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,2,4-Trichlorobenzene	< 0.5	8.7 (87 %R)	9.0 (90 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Hexachlorobutadiene	< 0.5	8.1 (81 %R)	7.9 (79 %R) (3 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
Naphthalene	< 0.5	9.5 (95 %R)	9.9 (99 %R) (4 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
1,2,3-Trichlorobenzene	< 0.5	8.9 (89 %R)	9.1 (91 %R) (2 RPD)	7/3/2018	ug/L	70 - 130	30	524.2
4-Bromofluorobenzene (surr)	92 %R	96 %R	93 %R	7/3/2018	% Rec	70 - 130		524.2
1,2-Dichlorobenzene-d4 (surr)	95 %R	102 %R	99 %R	7/3/2018	% Rec	70 - 130		524.2

Samples were extracted and analyzed within holding time limits.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
Sample surrogate recoveries met the above stated criteria.
The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.
There were no exceptions in the analyses, unless noted.
*/! Flagged analyte recoveries deviated from the QA/QC limits. Unless noted below, flagged analytes that exceed acceptance limits in the Quality Control sample were not detected in the field samples.
Analytes that exceed limits high but are not detected in the field samples do not impact the data. For analytes that show low recovery and are not detected in the field samples, a low point calibration standard has been analyzed to support the reporting limit.

Page 1 of 1

CHAIN-OF-CUSTODY RECORD

BOLD FIELDS REQUIRED. PLEASE CIRCLE REQUESTED ANALYSIS.

183763

SAMPLE I.D.	SAMPLING DATE/TIME *IF COMPOSITE, INDICATE BOTH START & FINISH DATE/TIME	MATRIX (SEE BELOW)	GRAB/*COMPOSITE	VOC: 524.2 MTBE ONLY	VOC: 524.2 BTEX 524.2 VTICS	VOC: 8260 624 VTICS 1,4 DIOXANE	VOC: 8021 BTEX HALOS	VOC: 8015 GRO MAVPH	SVOC: 8270 625 SVTICS EDB DBCP ABN A BN PAH	SVOC: TPH8100 L1 L2	SVOC: 8015 DRO MAEPH	SVOC: PEST 608 PCB 608 PEST 8081 PCB 8082	SVOC: OIL & GREASE 1664 TPH 1664	TCLP: TCLP 1311 ABN METALS VOC PEST HERB	METALS: DISSOLVED METALS (LIST BELOW)	METALS: TOTAL METALS (LIST BELOW)	INORGANICS: TS TSS TDS SPEC. CON.	INORGANICS: BR CL F SO4 NO2 NO3 NO2NO3	INORGANICS: BOD CBOD T. ALK.	INORGANICS: TKN NH3 T. PHOS. O. PHOS.	INORGANICS: pH T. RES. CHLORINE	INORGANICS: COD PHENOLS TOC DOC	INORGANICS: TOTAL CYANIDE TOTAL SULFIDE	INORGANICS: REACTIVE CYANIDE REACTIVE SULFIDE FLASHPOINT IGNITABILITY	MICRO: TOTAL COLIFORM E. COLI FECAL COLIFORM ENTEROCOCCI HETEROTROPHIC PLATE COUNT	OTHER	# OF CONTAINERS	NOTES MEOH VIAL #
31 Windmill Ln Mid	7/2/18 14:00		G	2																							2	
MATRIX: A-AIR; S-SOIL; GW-GROUND WATER; SW-SURFACE WATER; DW-DRINKING WATER; WW-WASTE WATER				H																								
PRESERVATIVE: H-HCL; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH																												

PROJECT MANAGER: Ray Talkington
COMPANY: Geosphere Environmental Management
ADDRESS: 51 Portsmouth Ave
CITY: Exeter STATE: NH ZIP: 03833
PHONE: 603 773-0075 EXT.:
FAX: MKrapf@geospherenh.com
E-MAIL: ~~Rtalkington@Geospherenh.com~~
SITE NAME: Well 22 Pumping Test
PROJECT #: 12217
STATE: (NH) MA ME VT OTHER:
REGULATORY PROGRAM: NPDES: RGP POTW STORMWATER OR GWP, OIL FUND, BROWNFIELD OR OTHER:
QUOTE #: PO #:

DATE NEEDED: 7/5/18 24hr TOT

QA/QC
REPORTING LEVEL
A (B) C
OR
PRESUMPTIVE CERTAINTY

REPORTING OPTIONS
PRELIMS: YES OR NO

ELECTRONIC OPTIONS
E-MAIL PDF EQUIS EXCEL

TEMP. 4.1 °C
ICE? (YES) NO

SAMPLER(S): Lauren Baader

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
	7/2/18	1101	
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
	7-3-18	1315	
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:

METALS: 8 RCRA 13 PP FE, MN PB, CU
OTHER METALS:
SAMPLES FIELD FILTERED? ☐ YES ☐ NO
NOTES: (IE: SPECIAL DETECTION LIMITS, BILLING INFO, IF DIFFERENT)

SITE HISTORY:
SUSPECTED CONTAMINATION:
FIELD READINGS:

Eastern Analytical, Inc.
professional laboratory and drilling services
25 CHENELL DRIVE | CONCORD, NH 03301 | TEL: 603.228.0525 | 1.800.287.0525 | E-MAIL: CUSTOMERSERVICE@EASTERNANALYTICAL.COM | WWW.EASTERNANALYTICAL.COM

(WHITE: ORIGINAL GREEN: PROJECT MANAGER)

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Geosphere Environmental Mgmt
51 Portsmouth Avenue
Exeter NH 03833

Report Date: July 06, 2018 09:41

Project: 12217 - Aquarion Well 22 Pump Test

Account #: 42988
Group Number: 1961753
PO Number: 17214
State of Sample Origin: NH

To view our laboratory's current scopes of accreditation please go to http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ . Historical copies may be requested through your project manager.

Electronic Copy To Geosphere Environmental Mgmt Attn: Ray Talkington

Respectfully Submitted,

Lyssa M. Longenecker
Specialist

(717) 556-7321

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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
206 Woodland Mid Grab Potable Water	07/02/2018 13:15	9687289
Field Blank Grab Water	07/02/2018 13:05	9687290

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Sample Description: **206 Woodland Mid Grab Potable Water**
Aquarion Well 22 Pump

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 07/03/2018 10:15
Collection Date/Time: 07/02/2018 13:15

Geosphere Environmental Mgmt
ELLE Sample #: PW 9687289
ELLE Group #: 1961753
Matrix: Potable Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	**ng/l**	
14473	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.90	1.8	1
14473	8:2 fluorotelomersulfonate	39108-34-4	N.D.	1.8	5.4	1
14473	NEtFOSAA	2991-50-6	N.D.	0.90	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.					
14473	NEtPFOSA	4151-50-2	N.D.	2.7	8.1	1
	NEtPFOSA is the acronym for N-ethylperfluoro-1-octanesulfonamide					
14473	NEtPFOSAE	1691-99-2	N.D.	0.90	2.7	1
	NEtPFOSAE is the acronym for 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol					
14473	NMeFOSAA	2355-31-9	N.D.	0.90	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.					
14473	NMePFOSA	31506-32-8	N.D.	2.7	8.1	1
	NMePFOSA is the acronym for N-methylperfluoro-1-octanesulfonamide					
14473	NMePFOSAE	24448-09-7	N.D.	0.90	2.7	1
	NMePFOSAE is the acronym for 2-(N-methylperfluoro-1-octanesulfonamido)-ethanol					
14473	Perfluorobutanesulfonate	375-73-5	1.6	0.27	0.90	1
14473	Perfluorobutanoic acid	375-22-4	N.D.	1.8	5.4	1
14473	Perfluorodecanesulfonate	335-77-3	N.D.	0.54	1.8	1
14473	Perfluorodecanoic acid	335-76-2	N.D.	0.90	1.8	1
14473	Perfluorododecanoic acid	307-55-1	N.D.	0.27	0.90	1
14473	Perfluoroheptanesulfonate	375-92-8	N.D.	0.36	1.8	1
14473	Perfluoroheptanoic acid	375-85-9	1.6	0.27	0.90	1
14473	Perfluorohexadecanoic acid	67905-19-5	N.D.	0.27	0.90	1
14473	Perfluorohexanesulfonate	355-46-4	3.8	0.36	1.8	1
14473	Perfluorohexanoic acid	307-24-4	2.7	0.36	1.8	1
14473	Perfluorononanoic acid	375-95-1	N.D.	0.36	1.8	1
14473	Perfluorooctanesulfonamide	754-91-6	N.D.	0.90	2.7	1
14473	Perfluoro-octanesulfonate	1763-23-1	8.2	0.36	1.8	1
14473	Perfluorooctanoic acid	335-67-1	6.8	0.27	0.90	1
14473	Perfluoropentanoic acid	2706-90-3	2.2 J	1.8	5.4	1
14473	Perfluorotetradecanoic acid	376-06-7	N.D.	0.27	0.90	1
14473	Perfluorotridecanoic acid	72629-94-8	N.D.	0.27	0.90	1
14473	Perfluoroundecanoic acid	2058-94-8	N.D.	0.36	1.8	1

The stated QC limits are advisory only until sufficient data points can be obtained to calculate statistical limits.

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

Sample Description: **206 Woodland Mid Grab Potable Water**
Aquarion Well 22 Pump

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 07/03/2018 10:15
Collection Date/Time: 07/02/2018 13:15

Geosphere Environmental Mgmt
ELLE Sample #: PW 9687289
ELLE Group #: 1961753
Matrix: Potable Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18184016	07/05/2018 13:53	Joshua P Trost	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	18184016	07/03/2018 14:10	Danielle D McCully	1

*=This limit was used in the evaluation of the final result

Sample Description: **Field Blank Grab Water**
Aquarion Well 22 Pump

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 07/03/2018 10:15
Collection Date/Time: 07/02/2018 13:05

Geosphere Environmental Mgmt
ELLE Sample #: WW 9687290
ELLE Group #: 1961753
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	**ng/l**	
14473	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.90	1.8	1
14473	8:2 fluorotelomersulfonate	39108-34-4	N.D.	1.8	5.4	1
14473	NEtFOSAA	2991-50-6	N.D.	0.90	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.					
14473	NEtPFOSA	4151-50-2	N.D.	2.7	8.1	1
	NEtPFOSA is the acronym for N-ethylperfluoro-1-octanesulfonamide					
14473	NEtPFOSAE	1691-99-2	N.D.	0.90	2.7	1
	NEtPFOSAE is the acronym for 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol					
14473	NMeFOSAA	2355-31-9	N.D.	0.90	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.					
14473	NMePFOSA	31506-32-8	N.D.	2.7	8.1	1
	NMePFOSA is the acronym for N-methylperfluoro-1-octanesulfonamide					
14473	NMePFOSAE	24448-09-7	N.D.	0.90	2.7	1
	NMePFOSAE is the acronym for 2-(N-methylperfluoro-1-octanesulfonamido)-ethanol					
14473	Perfluorobutanesulfonate	375-73-5	N.D.	0.27	0.90	1
14473	Perfluorobutanoic acid	375-22-4	N.D.	1.8	5.4	1
14473	Perfluorodecanesulfonate	335-77-3	N.D.	0.54	1.8	1
14473	Perfluorodecanoic acid	335-76-2	N.D.	0.90	1.8	1
14473	Perfluorododecanoic acid	307-55-1	N.D.	0.27	0.90	1
14473	Perfluoroheptanesulfonate	375-92-8	N.D.	0.36	1.8	1
14473	Perfluoroheptanoic acid	375-85-9	N.D.	0.27	0.90	1
14473	Perfluorohexadecanoic acid	67905-19-5	N.D.	0.27	0.90	1
14473	Perfluorohexanesulfonate	355-46-4	N.D.	0.36	1.8	1
14473	Perfluorohexanoic acid	307-24-4	N.D.	0.36	1.8	1
14473	Perfluorononanoic acid	375-95-1	N.D.	0.36	1.8	1
14473	Perfluorooctanesulfonamide	754-91-6	N.D.	0.90	2.7	1
14473	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.36	1.8	1
14473	Perfluorooctanoic acid	335-67-1	N.D.	0.27	0.90	1
14473	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	5.4	1
14473	Perfluorotetradecanoic acid	376-06-7	N.D.	0.27	0.90	1
14473	Perfluorotridecanoic acid	72629-94-8	N.D.	0.27	0.90	1
14473	Perfluoroundecanoic acid	2058-94-8	N.D.	0.36	1.8	1

The stated QC limits are advisory only until sufficient data points can be obtained to calculate statistical limits.

Sample Comments

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

Sample Description: **Field Blank Grab Water**
Aquarion Well 22 Pump

Project Name: **12217 - Aquarion Well 22 Pump Test**

Submittal Date/Time: 07/03/2018 10:15
Collection Date/Time: 07/02/2018 13:05

Geosphere Environmental Mgmt
ELLE Sample #: WW 9687290
ELLE Group #: 1961753
Matrix: Water

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	PFAS in Water by LC/MS/MS	EPA 537 Version 1.1 Modified	1	18184016	07/05/2018 14:08	Joshua P Trost	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	18184016	07/03/2018 14:10	Danielle D McCully	1

*=This limit was used in the evaluation of the final result

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Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Group Number: 1961753
Reported: 07/06/2018 09:41

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ng/l	MDL** ng/l	LOQ ng/l
Batch number: 18184016	Sample number(s): 9687289-9687290		
6:2 fluorotelomersulfonate	N.D.	1.0	2.0
8:2 fluorotelomersulfonate	N.D.	2.0	6.0
NEtFOSAA	N.D.	1.0	3.0
NEtPFOSA	N.D.	3.0	9.0
NEtPFOSAE	N.D.	1.0	3.0
NMeFOSAA	N.D.	1.0	3.0
NMePFOSA	N.D.	3.0	9.0
NMePFOSAE	N.D.	1.0	3.0
Perfluorobutanesulfonate	N.D.	0.30	1.0
Perfluorobutanoic acid	N.D.	2.0	6.0
Perfluorodecanesulfonate	N.D.	0.60	2.0
Perfluorodecanoic acid	N.D.	1.0	2.0
Perfluorododecanoic acid	N.D.	0.30	1.0
Perfluoroheptanesulfonate	N.D.	0.40	2.0
Perfluoroheptanoic acid	N.D.	0.30	1.0
Perfluorohexadecanoic acid	N.D.	0.30	1.0
Perfluorohexanesulfonate	N.D.	0.40	2.0
Perfluorohexanoic acid	N.D.	0.40	2.0
Perfluorononanoic acid	N.D.	0.40	2.0
Perfluorooctanesulfonamide	N.D.	1.0	3.0
Perfluoro-octanesulfonate	N.D.	0.40	2.0
Perfluorooctanoic acid	N.D.	0.30	1.0
Perfluoropentanoic acid	N.D.	2.0	6.0
Perfluorotetradecanoic acid	N.D.	0.30	1.0
Perfluorotridecanoic acid	N.D.	0.30	1.0
Perfluoroundecanoic acid	N.D.	0.40	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18184016	Sample number(s): 9687289-9687290								
6:2 fluorotelomersulfonate	15.17	16.28	15.17	15.03	107	99	66-155	8	30
8:2 fluorotelomersulfonate	15.33	16.69	15.33	16.05	109	105	66-148	4	30
NEtFOSAA	5.44	5.84	5.44	6.00	107	110	55-169	3	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Reported: 07/06/2018 09:41

Group Number: 1961753

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
NEtPFOSA	5.44	6.87	5.44	6.60	126	121	70-130	4	30
NEtPFOSAE	5.44	5.72	5.44	6.21	105	114	70-130	8	30
NMeFOSAA	5.44	6.82	5.44	6.60	125	121	62-167	3	30
NMePFOSA	5.44	6.46	5.44	6.67	119	123	70-130	3	30
NMePFOSAE	5.44	6.25	5.44	6.70	115	123	70-130	7	30
Perfluorobutanesulfonate	4.81	4.81	4.81	4.68	100	97	73-128	3	30
Perfluorobutanoic acid	5.44	5.89	5.44	5.89	108	108	74-142	0	30
Perfluorodecanesulfonate	5.24	5.27	5.24	5.06	101	97	60-135	4	30
Perfluorodecanoic acid	5.44	6.20	5.44	5.81	114	107	69-148	7	30
Perfluorododecanoic acid	5.44	5.72	5.44	5.23	105	96	75-136	9	30
Perfluoroheptanesulfonate	5.18	5.57	5.18	5.34	108	103	64-135	4	30
Perfluoroheptanoic acid	5.44	6.21	5.44	6.53	114	120	76-140	5	30
Perfluorohexadecanoic acid	5.44	5.11	5.44	5.48	94	101	21-151	7	30
Perfluorohexanesulfonate	5.14	5.13	5.14	5.23	100	102	71-131	2	30
Perfluorohexanoic acid	5.44	6.01	5.44	6.22	111	114	75-135	3	30
Perfluorononanoic acid	5.44	4.98	5.44	4.97	92	91	72-148	0	30
Perfluorooctanesulfonamide	5.44	5.05	5.44	5.10	93	94	65-164	1	30
Perfluoro-octanesulfonate	5.20	5.18	5.20	5.26	100	101	67-138	2	30
Perfluorooctanoic acid	5.44	5.92	5.44	6.06	109	111	72-138	2	30
Perfluoropentanoic acid	5.44	6.50	5.44	6.36	119	117	74-134	2	30
Perfluorotetradecanoic acid	5.44	5.77	5.44	5.85	106	108	74-135	1	30
Perfluorotridecanoic acid	5.44	5.51	5.44	5.45	101	100	61-145	1	30
Perfluoroundecanoic acid	5.44	6.04	5.44	5.42	111	100	75-146	11	30

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18184016

	13C4-PFBA	13C5-PFPeA	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA
9687289	89	96	103	74	81	84
9687290	85	80	82	84	84	83
Blank	88	83	83	81	84	84
LCS	92	81	85	83	82	81
LCSD	98	93	96	90	91	89
Limits:	33-123	39-135	26-148	31-128	34-126	35-126

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
9687289	80	85	90	93	91	73

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Geosphere Environmental Mgmt
Reported: 07/06/2018 09:41

Group Number: 1961753

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: PFAS in Water by LC/MS/MS
Batch number: 18184016

	13C2-6:2-FTS	13C8-PFOA	13C8-PFOS	13C9-PFNA	13C6-PFDA	13C2-8:2-FTS
9687290	88	86	92	108	92	73
Blank	73	87	88	92	93	72
LCS	77	88	88	94	94	75
LCSD	86	97	97	103	101	85
Limits:	39-140	43-112	43-115	32-134	40-115	39-137

	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA	13C2-PFTeDA	13C8-PFOSA
9687289	75	92	86	99	85	79
9687290	76	77	74	99	87	67*
Blank	76	95	75	99	83	79
LCS	71	91	90	100	86	80
LCSD	86	112	94	113	91	90
Limits:	17-120	30-128	21-135	28-127	26-119	70-130

	d7-NMePFOSAE	d3-NMePFOSA	d9-NEtPFOSAE	d5-NEtPFOSA
9687289	74	51*	70	53*
9687290	55*	31*	51*	31*
Blank	72	63*	69*	65*
LCS	76	51*	75	51*
LCSD	78	60*	73	62*
Limits:	70-130	70-130	70-130	70-130

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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Acct. # 42988 Group # 1961753 Sample # 9687289-90

Client: GeoSphere Environmental Management
Project Name/#: Aquarion Well 27 Popp | Site ID #: 18217
Project Manager: Ray Talkington Test | P.O. #:
Sampler: Lauren Brodeur | PWSID #:
Phone #: 603-773-0075 | Quote #:
State where samples were collected: NH | For Compliance: Yes ☐ No ☐

Please Do not Send results to NHDES. Only send to Ray Talkington

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil/Sediment/Tissue	Matrix: Water: Potable/Ground/NPDES/Surface	Matrix: Other:	Total # of Containers	Analyses Requested: PFC EPA METHOD
209 Woodland Mid	7/2/18	13:15	✓			Ground		2	X
Field Blank	7/2/18	13:05	✓			Ground		1	X

Preservation and Filtration Codes

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; F = Field Filtered; O = Other

Remarks: Trizma; No 24Hr TAT

Turnaround Time Requested (TAT) (please check): Standard ☐ Rush ☑
(Rush TAT is subject to laboratory approval and surcharges.) 24 hrs

Date results are needed: 7/5/18

Rush results requested by (please check): E-Mail ☒ Phone ☐

E-mail Address: RTalkington@geosphere nh.com

Phone: 603 773 0075

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐
Type III (Reduced non-CLP) ☐ CT RCP ☐
Type VI (Raw Data Only) ☐ TX TRRP-13 ☐
NJ DKQP ☐ NYSDEC Category ☐ A or ☐ B

EDD Required? Yes ☐ No ☐ If yes, format: _____

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	7/2/18	4:00pm	FEDEX	7/2/18	4:00pm
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by: [signature]	7-3-18	10:15

Relinquished by Commercial Carrier: UPS _____ FedEx ✓ Other _____

Temperature upon receipt 2.0 °C

For Lab Use Only
SF #: _____
SCR #: _____

Lyssa Longenecker

Subject: FW: COC for 24 Hr Rush samples - Geosphere Environmental Management
Attachments: IMG_20180702_150906808.jpg

From: Lauren Baader [mailto:laurenmbaader@gmail.com]
Sent: Monday, July 02, 2018 6:12 PM
To: !US19_LancLabsEnv
Subject: COC for 24 Hr Rush samples - Geosphere Environmental Management

EXTERNAL EMAIL*

Hello,

I've attached a photo of the COC for a sample that was shipped overnight to the lab for analysis.

As indicated on the COC, we request 24 hr TOT for the water sample, but do not need 24 hr TOT for the field blank.

When filling out the COC, a mistake was made, and we request that you please indicate the location/sample ID on the lab report as **206** Woodland Mid, instead of 209 as it is written on the COC.
If there are any questions, please call 508-944-4740.

Please forward results to the e-mail address provided on the COC.

Thanks,

Lauren

Notify us here to report this email as spam.

* WARNING - EXTERNAL: This email originated from outside of Eurofins. Do not click any links or open any attachments unless you trust the sender and know that the content is safe!

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Sample Administration Receipt Documentation Log

Doc Log ID: 220729

Group Number(s): 1961753

Client: GEOSPHERE ENVIRONMENTAL

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	07/03/2018 10:15
Number of Packages:	1	Number of Projects:	1
State/Province of Origin:	NH		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Suegeily Mendez (14058) at 10:47 on 07/03/2018

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	2.0	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17605-2425
T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Appendix J

In-Field Water Quality Log Sheets

Salinity & Specific Conductivity

Geosphere Environmental Management, Inc

Field Measurements: ***Salinity and Conductivity*** **Address: Well 22**

Client:	**Aquarion Water Company of NH**	**Notes:**	
Project:	**Well 22 Pump Test**		**PPT = parts per thousand**
Address:	**Well 22**		**35 ppt = seawater**
Project #:	**12217**	**Field monitoring with**	**Oakton Ctester 50P - Calibration chkd daily**

Date	Time	Specific Conductance µS	Salinity (PPT)	Comments
6/19/2018	11:55	584	0.30	antecedent - standing water, collected using bailer, no flush
6/20/2018	11:55	255	0.20	pump @ 650 gpm
6/20/2018	14:49	382	0.20	
6/21/2018	9:31	393	0.20	
6/21/2018	12:24	395	0.20	pump @ 650 gpm
6/21/2018	14:35	397	0.10	
6/22/2018	17:24	393	0.20	pump @ 750 gpm
6/23/2018	14:10	424	0.30	pump @ 850 gpm
6/23/2018	17:40	423	0.30	pump @ 850 gpm
6/24/2018	11:00	427	0.20	pump @ 850 gpm
6/25/2018	12:30	434	0.30	pump @ 850 gpm
6/26/2018	13:50	425	0.30	pump @ 850 gpm
6/27/2018	10:00	433	0.20	pump @ 850 gpm
6/28/2018	10:35	462	0.20	pump @ 850 gpm
6/29/2018	10:50	477	0.20	pump @ 850 gpm
6/30/2018	12:00	462	0.20	pump @ 850 gpm
7/1/2018	11:40	468	0.20	pump @ 850 gpm
7/2/2018	10:30	487	0.20	pump @ 850 gpm
7/3/2018	12:33	473	0.20	pump @ 850 gpm
7/4/2018	12:20	490	0.20	pump @ 850 gpm
7/5/2018	13:56	493	0.20	pump @ 850 gpm
7/6/2018	16:13	496	0.20	pump @ 850 gpm
7/7/2018	12:47	449	0.20	pump @ 850 gpm
7/8/2018	12:25	464	0.20	pump @ 850 gpm
7/9/2018	10:45	485	0.20	pump @ 850 gpm
7/10/2018	10:34	484	0.20	pump @ 850 gpm
7/11/2018	12:52	489	0.20	pump @ 850 gpm
7/12/2018	8:33	499	0.20	pump @ 850 gpm
7/13/2018	16:14	488	0.20	pump @ 850 gpm
7/14/2018	13:24	487	0.20	pump @ 850 gpm
7/15/2018	14:04	508	0.20	pump @ 850 gpm
7/16/2018	15:00	501	0.20	pump @ 850 gpm
7/17/2018	9:52	471	0.20	pump off 11:01 am

Geosphere Environmental Management, Inc

Field Measurements: ***Salinity and Conductivity*** **Address: 10 Springhead**

Client:	**Aquarion Water Company of NH**	**Notes:**	
Project:	**Well 22 Pump Test**		**PPT = parts per thousand**
Address:	**10 Springhead Lane**		**35 ppt = seawater**
Project #:	**12217**	**Field monitoring with**	**Oakton Ctester 50P -** **Calibration chkd daily**

Date	Time	Specific Conductance µS	Salinity (PPT)	Comments
6/18/2018	15:35	461	0.20	antecedent
6/18/2018	15:48	444	0.20	antecedent, post 10 min flush
6/20/2018	13:19	485	0.20	
6/20/2018	13:27	477	0.20	post 10 min flush
6/21/2018	14:13	435	0.20	
6/21/2018	14:22	437	0.20	post 10 min flush
6/22/2018	15:25	396	0.20	post 10 min flush
6/23/2018	17:17	401	0.20	post 10 min flush
6/24/2018	9:23	393	0.20	"
6/25/2018	12:23	396	0.20	"
6/26/2018	13:00	388	0.20	"
6/27/2018	11:33	392	0.20	"
6/28/2018	14:10	393	0.20	"
6/29/2018	10:16	404	0.20	"
6/30/2018	11:09	389	0.20	"
7/1/2018	10:52	391	0.20	"
7/2/2018	9:30	396	0.20	"
7/3/2018	12:15	390	0.20	"
7/4/2018	12:05	385	0.20	"
7/5/2018	13:46	388	0.20	"
7/6/2018	15:02	384	0.20	"
7/7/2018	12:32	372	0.20	"
7/8/2018	12:14	368	0.20	"
7/9/2018	10:29	369	0.20	"
7/10/2018	10:22	370	0.20	"
7/11/2018	15:04	365	0.20	"
7/12/2018	15:16	375	0.20	"
7/13/2018	not measured			not measured
7/14/2018	13:05	378	0.20	post 10 min flush
7/15/2018	16:00	367	0.20	"
7/16/2018	15:23	371	0.20	"
7/18/2018	11:00	369	0.20	"
7/20/2018	9:12	377	0.20	Post 5 min flush

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Prefers visits 11a - 1pm

Field Measurements: ***Salinity and Conductivity***

Address: **3 Hilda Drive**

Client:	**Aquarion Water Company of NH**	**Notes:**	
Project:	**Well 22 Pump Test**		**PPT = parts per thousand**
Address:	**3 Hilda Drive**		**35 ppt = seawater**
Project #:	**12217**	**Field monitoring with**	**Oakton Ctester 50P - Calibration chkd daily**

Date	Time	Specific Conductance µS	Salinity (PPT)	Comments
6/18/2018	14:38	534	0.20	antecedent
6/20/2018	14:25	561	0.20	antecedent, p 10min purge
6/20/2018	14:35	573	0.30	post 10 min purge
6/21/2018	12:33	561	0.30	post 10 min purge
6/21/2018	13:02	603	0.30	post 10 min purge
6/22/2018	16:03	567	0.30	post 10 min purge
6/23/2018	14:36	578	0.40	post 10 min purge
6/24/2018	10:13	568	0.40	post 10 min purge
6/25/2018	11:40	575	0.40	post 10 min purge
6/26/2018	11:45	562	0.40	post 10 min purge
6/27/2018	10:47	582	0.30	post 10 min purge
6/28/2018	1:30	588	0.30	post 10 min purge
6/29/2018	9:40	563	0.30	post 10 min purge
6/30/2018	9:58	571	0.30	post 10 min purge
7/1/2018	9:59	596	0.30	post 10 min purge
7/2/2018	8:26	566	0.30	post 10 min purge
7/3/2018	11:08	574	0.30	post 10 min purge
7/4/2018	11:05	581	0.30	post 10 min purge
7/5/2018	12:17	584	0.30	post 10 min purge
7/6/2018	13:01	570	0.30	post 10 min purge
7/7/2018	10:49	533	0.20	post 10 min purge
7/8/2018	10:47	542	0.20	post 10 min purge
7/9/2018	8:59	541	0.20	post 10 min purge
7/10/2018	8:44	555	0.30	post 10 min purge
7/11/2018	15:20	553	0.30	post 10 min purge
7/12/2018	13:35	576	0.30	post 10 min purge
7/13/2018	14:42	574	0.30	post 10 min purge
7/14/2018	11:51	552	0.30	post 10 min purge
7/15/2018	15:30	564	0.30	post 10 min purge
7/16/2018	13:33	571	0.30	post 10 min purge
7/18/2018	13:30	563.0	0.30	post 10 min purge
7/20/2018	10:22	560.0	0.30	post 10 min purge

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Field Measurements: ***Salinity and Conductivity*** **Address:** 23 Esker Dr

Client:	**Aquarion Water Company of NH**	**Notes:**	
Project:	**Well 22 Pump Test**		**PPT = parts per thousand**
Address:	**23 Esker Drive**		**35 ppt = seawater**
Project #:	**12217**	**Field monitoring with**	**Oakton Ctester 50P - Calibration chkd daily**

Date	Time	Specific Conductance µS	Salinity (PPT)	Comments
6/19/2018	11:43	234	0.10	antecedent
6/19/2018	11:53	153.6	0.00	antecedent, post 10 min flush
6/20/2018	13:57	247	0.10	
6/20/2018	14:06	133.2	0.00	post 10 min flush
6/21/2018	13:49	243	0.10	
6/21/2018	13:57	159.1	0.00	post 10 min flush
6/22/2018	16:58	168.2	0.10	1 gal flush
6/23/2018	17:05	155.6	0.10	post 10 min flush
6/24/2018	10:26	174.2	0.10	5 min flush
6/25/2018	11:02	160.4		salinity not recorded
6/26/2018	12:15	164.5	0.10	
6/27/2018	11:16	168.8	0.10	
6/28/2018	12:30	166.2	0.00	1 gal flush
6/29/2018	8:40	172.5	0.00	
6/30/2018	10:30	171.2	0.00	1 gal flush
7/1/2018	10:26	167.5	0.00	"
7/2/2018	8:58	170.5	0.00	"
7/3/2018	11:38	167.3	0.00	"
7/4/2018	11:34	170.6	0.00	"
7/5/2018	12:49	173.9	0.00	"
7/6/2018	14:41	160.0	0.00	"
7/7/2018	11:45	164.1	0.00	"
7/8/2018	11:31	155.6	0.00	"
7/9/2018	9:44	169.3	0.00	"
7/10/2018	9:43	160.1	0.00	"
7/11/2018	2:21	157.4	0.00	"
7/12/2018	14:57	160.2	0.00	"
7/13/2018	15:41	152.9	0.00	"
7/14/2018	12:22	158.3	0.00	"
7/15/2018	15:10	242	0.10	4 min flush
7/16/2018	14:34	166.5	0.00	p 10 min purge
7/18/2018	12:50	169.8	0.00	post 6 min purge
7/20/2018	10:00	181.4	0.00	post 6 min purge

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Field Measurements: ***Salinity and Conductivity*** **Address: 31 Windmill Lane**

Client:	**Aquarion Water Company of NH**	**Notes:**	
Project:	**Well 22 Pump Test**		**PPT = parts per thousand**
Address:	**31 Windmill Lane**		**35 ppt = seawater**
Project #:	**12217**	**Field monitoring with Oakton Ctester 50P -**	**Calibration chkd daily**

Date	Time	Specific Conductance µS	Salinity (PPT)	Comments
6/18/2018	not measured			
6/18/2018	not measured			
6/20/2018	not measured			
6/20/2018	not measured			
6/21/2018	not measured			
6/21/2018	not measured			
6/22/2018	not measured			
6/23/2018	not measured			
6/24/2018	not measured			intermittent monitoring of this well was initiated 7/5/18
6/25/2018	not measured			
6/26/2018	not measured			
6/27/2018	not measured			
6/28/2018	not measured			
6/29/2018	not measured			
6/30/2018	not measured			
7/1/2018	not measured			
7/2/2018	not measured			
7/3/2018	not measured			
7/4/2018	not measured			
7/5/2018	13:30	432	0.20	post 10 min flush
7/6/2018	13:56	425	0.20	"
7/7/2018	11:10	401	0.20	"
7/8/2018	11:04	410	0.20	"
7/9/2018	9:15	425	0.20	"
7/10/2018	9:02	413	0.20	"
7/11/2018	13:50	441	0.20	"
7/12/2018	not measured			not measured
7/13/2018	16:00	456	0.2	post 10 min flush
7/14/2018	not measured			not measured
7/15/2018	not measured			not measured
7/16/2018	15:40	478	0.20	post 10m flush
7/17/2018	10:25	407	0.20	post 10 min flush
7/18/2018	11:45	465	0.20	post 10 min flush
7/19/2018	8:57	450	0.20	post 5 min flush

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Field Measurements: ***Salinity and Conductivity***

Address: 38 Edgewood

Client:	**Aquarion Water Company of NH**	**Notes:**	**antecedent: 459 uS 15:30 6/18/18**
Project:	**Well 22 Pump Test**		**PPT = parts per thousand**
Address:	**38 Edgewood**		**35 ppt = seawater**
Project #:	**12217**	**Field monitoring with Oakton Ctester 50P -**	**Calibration chkd daily**

Date	Time	Specific Conductance µS	Salinity (PPT)	Comments
6/18/2018	15:25	461	0.20	antecedent
6/18/2018	15:30	459	0.20	antecedent p 10 min purge
6/20/2018	12:33	499	0.20	
6/20/2018	12:42	499	0.20	post 10 min flush
6/21/2018	13:07	493	0.20	
6/21/2018	13:16	508	0.20	post 10 min flush
6/22/2018	15:46	493	0.30	10 min flush
6/23/2018	15:03	504	0.30	
6/23/2018	15:13	500	0.30	post 10 min purge
6/24/2018	9:36	502	0.30	"
6/25/2018	12:00	508	0.20	"
6/26/2018	12:50	497	0.30	"
6/27/2018	10:20	515	0.20	"
6/28/2018	13:50	515	0.20	"
6/29/2018	9:20	513	0.20	"
6/30/2018	10:52	510	0.20	"
7/1/2018	10:35	505	0.20	hose running for 20 min
7/2/2018	9:14	515	0.20	post 10 min purge
7/3/2018	11:58	509	0.20	"
7/4/2018	11:49	534	0.20	"
7/5/2018	13:05	515	0.20	"
7/6/2018	13:36	517	0.20	"
7/7/2018	12:15	492	0.20	"
7/8/2018	11:59	488	0.20	"
7/9/2018	10:12	498	0.20	"
7/10/2018	10:09	530	0.30	"
7/11/2018	14:51	494	0.20	"
7/12/2018	13:55	515	0.20	"
7/13/2018	15:12	504	0.20	"
7/14/2018	12:49	499	0.20	"
7/15/2018	15:40	508	0.20	"
7/16/2018	14:05	522	0.20	"
7/18/2018	12:17	517	0.20	"
7/20/2018	9:46	514	0.20	"

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Field Measurements: ***Salinity and Conductivity***

Address: **59 Edgewood**

Client:	**Aquarion Water Company of NH**	**Notes:**	**antecedent: 549 uS 15:00 6/18/18**
Project:	**Well 22 Pump Test**		**PPT = parts per thousand**
Address:	**59 Edgewood**		**35 ppt = seawater**
Project #:	**12217**	**Field monitoring with**	**Oakton Ctester 50P - Calibration chkd daily**

Date	Time	Specific Conductance µS	Salinity (PPT)	Comments
6/18/2018	15:00	549	0.30	antecedent
6/20/2018	12:17	611	0.30	irrigation on
6/20/2018	12:27	607	0.30	post 10 min purge
6/21/2018	12:53	581	0.30	
6/21/2018	13:02	603	0.30	post 10 min purge
6/22/2018	16:38	588	0.40	
6/23/2018	14:54	591	0.40	post 10 min purge
6/24/2018	9:50	591	0.30	"
6/25/2018	12:05	574	0.40	"
6/26/2018	12:34	572	0.30	"
6/27/2018	10:32	604	0.30	"
6/28/2018	could not read - pump off			** homeowners turned well off while they are away on vaca. Return 6/6/18*
6/29/2018	could not read - pump off			
6/30/2018	could not read - pump off			"
7/1/2018	could not read - pump off			"
7/2/2018	could not read - pump off			"
7/3/2018	could not read - pump off			"
7/4/2018	could not read - pump off			"
7/5/2018	could not read - pump off			"
7/6/2018	13:10	615	0.30	post 10 min purge
7/7/2018	12:00	582	0.30	"
7/8/2018	11:48	582	0.30	"
7/9/2018	10:00	582	0.30	"
7/10/2018	9:58	602	0.30	"
7/11/2018	2:38	589	0.30	"
7/12/2018	14:12	582	0.30	grab sample (while irrigating)
7/13/2018	14:58	594	0.30	post 10 min purge
7/14/2018	12:35	581	0.30	post 10 min purge
7/15/2018	15:55	609	0.30	post 10 min purge
7/16/2018	13:48	612	0.30	post 10 min purge
7/17/2018	10:39	571	0.30	post 6 min purge
7/18/2018	12:03	600	0.30	post 10 min purge
7/20/2018	9:34	599	0.30	sprinkler on

nm - not measured

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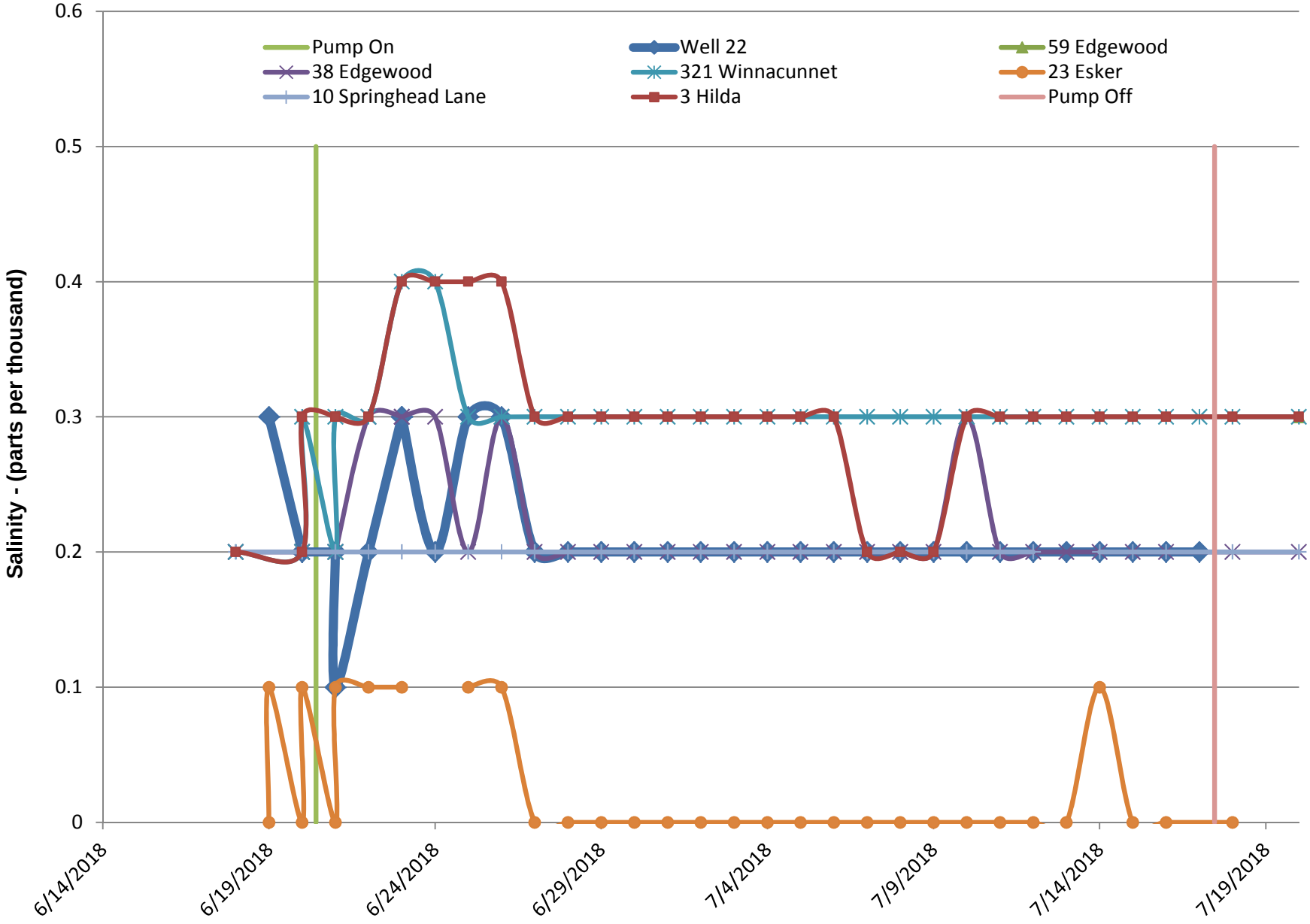
Field Measurements: ***Salinity and Conductivity*** **Address:** **321 Winnacunnet**

Client:	**Aquarion Water Company of NH**	**Notes:**	**antecedent: 556 uS 14:12 6/18/18**
Project:	**Well 22 Pump Test**		**PPT = parts per thousand**
Address:	**321 Winnacunnet**		**35 ppt = seawater**
Project #:	**12217**	**Field monitoring with Oakton Ctester 50P -**	**Calibration chkd daily**

Date	Time	Specific Conductance µS	Salinity (PPT)	Comments
6/18/2018	14:12	556	0.20	antecedent
6/20/2018	12:55	558	0.20	
6/20/2018	13:04	539	0.30	post 10 min flush
6/21/2018	13:24	625	0.20	
6/21/2018	13:32	611	0.30	post 10 min flush
6/22/2018	16:18	555	0.30	post 10 min flush
6/23/2018	16:42	613	0.40	post 10 min flush
6/24/2018	10:45	583	0.40	"
6/25/2018	11:20	551	0.30	"
6/26/2018	12:00	575	0.30	"
6/27/2018	11:02	580	0.30	"
6/28/2018	12:50	602	0.30	"
6/29/2018	9:01	581	0.30	no purge, sprinklers on
6/30/2018	10:16	600	0.30	post 10 min flush
7/1/2018	10:15	586	0.30	sprinklers on
7/2/2018	8:45	579	0.30	post 10 min purge
7/3/2018	11:23	620	0.30	"
7/4/2018	11;20	587	0.30	"
7/5/2018	12:35	630	0.30	"
7/6/2018	14:18	595	0.30	"
7/7/2018	11:30	561	0.30	"
7/8/2018	11:18	556	0.30	sprinklers on
7/9/2018	9:29	589	0.30	sprinklers on
7/10/2018	9:29	564	0.30	sprinklers on
7/11/2018	14:08	589	0.30	post 10 min purge
7/12/2018	14:37	593	0.30	post 10 min purge
7/13/2018	15:24	591	0.30	sprinklers on, grab sample
7/14/2018	12:08	581	0.30	post 10 min purge
7/15/2018	15:24	592	0.30	post 10 min purge
7/16/2018	14:12	630	0.30	sprinklers on
7/17/2018	10:51	599	0.30	post 8 min purge
7/18/2018	12:36	582	0.30	Sprinklers on
7/20/2018	10:12	593	0.30	Sprinklers on

Field Salinity Measurements through 7/15/18
Selected Wells - Well #22 Pumping Test



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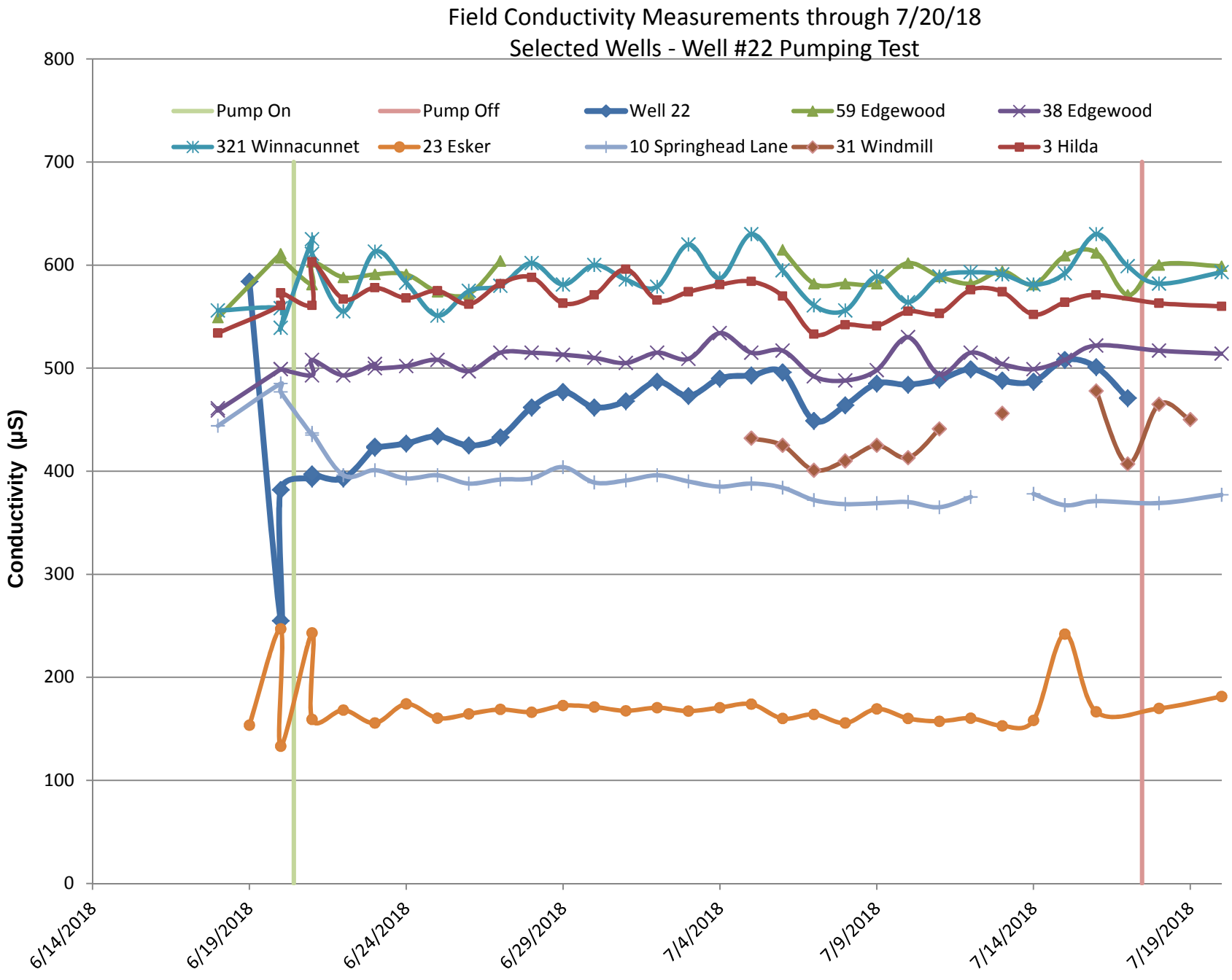

Geosphere Environmental Management, Inc.

Well 22 In-Field Monitoring Log

Manual Water Levels – Well 22

Flow Rate Readings – Well 22

pH, Odor, Color – Well 22

Manual Water Levels – Well 7

Geosphere Environmental Management, Inc.

Pumping Test Log

PT Stage:

Page **of**

Client: Aquarion
Project: Well 22 Pumping Test

Address:

Pumping Well: Well 22
Pumping Rate:
Start Time: **Stop Time:** (1)

NOTES: (2) VFD / SCADA (6)

(3)

Date	Time Actual	Minutes Elapsed	Hand Water Level	Flow Rate	pH Raw	pH Treated	Residual Cl Treated	Odor (Y/N)	Color (Y/N)	Well 7 Water Level
6/22	6 pm		145.40	747 / 747	8.2			N	N	6.1
	10 pm		145.70	745 / 746	8.2			N	N	6.1
6/23	2 am		145.30	742 / 742	8.2			N	N	6.1
	6 am		145.50	745 / 745	8.2			N	N	6.1
	10 am	ET = 72 hr	163.00	848 / 852	8.5			N	N	6.2
	2 pm		164.35	845 / 851	8.3			Sl H_2S?	N	6.2
	6 pm		164.64	842 / 835	8.3			Sl H_2S?	N	6.2
	10 pm		166.70	852 / 854	8.3			N	N	6.2
	2 AM		166.81	866 / 871.3	8.5			N	N	6.2
6/24	6 AM		168.50	855 / 856	8.0			N	N	6.3
	10 AM	96 hr	170.73	870 / 870	8.1			Slight H_2S?	N	6.3
	2 PM		166.58	842 / 850	8.2			H_2S ?	N	6.3
	6 PM		167.20	840 / 844	8.3			Sl H_2S	N	6.4
	10 PM		166.60	840 / 844	8.3			N	N	6.4
6/25	2 AM		168.40	841 / 845	8.3			N	N	6.4
	6 AM		168.30	854 / 851	8.3			N	N	6.3
	10 AM	120 hr	168.92	853 / 856	8.5			N	N	6.4
	2 PM		166.72	845 / 844	8.3			N	N	6.4
	6 PM		167.80	850 / 851	8.1			N	N	6.4
	10 PM		170.20	854 / 859	8.14			N	N	6.5
6/26	2 AM		168.80	853 / 858	8.3			N	N	6.5
	6 AM		168.10	851 / 851	8.3			N	N	6.5
	10 AM	144 hr	169.82	863 / 858	8.5			N	N	6.5
	2 PM		167.83	849 / 845	8.3			N	N	6.6
	6 PM		168.59	845 / 858	8.2			N	N	6.6
	10 PM		170.30	859 / 863	8.3			N	N	6.6
6/27	2 AM	168 hr	169.46	860 / 862	8.3			N	N	6.6
	6 AM		172.10	869 / 870	8.1			N	N	6.6
	10 AM		168.79	852 / 850	8.2			N	N	6.7
	2 PM		167.83	846 / 845	8.3			Slight H_2S	N	6.7

Geosphere Environmental Management, Inc.

Pumping Test Log

PT Stage:
Page **of**

Client: Aquarion **Project:** Well 22 Pumping Test	**Address:**
Pumping Well: Well 22 **Pumping Rate:** **Start Time:** **Stop Time:**	**NOTES:** pH meter calibrated on 7/6/18 with 4.01 + 7.01 Solution.

Date	Time Actual	Minutes Elapsed	Hand Water Level	Flow Rate	pH Raw	pH Treated	Residual Cl Treated	Odor (Y/N)	Color (Y/N)	Well 7 Water Level
6/27	6:00 pm		168.30	841	8.3			N	N	
	10:00 pm		170.20	862	8.3			N	N	
6/28	2:00 am		168.50	868	8.3			N	N	
	6:00 am		168.90	847	8.2			N	N	
	~~10:00 am~~ 10:35	192.5 min	170.02	~~859~~ 855				N	N	6.7
	2:00 pm									
	6:00 pm		168.40	842	7.9			N	N	
	10:00 pm		168.20	843	8.0			N	N	
6/29	2 AM		170.30	847	8.2			N	N	
	6 AM		169.10	852	7.7			N	N	
	~~10 AM~~ 10:45	216.75	170.39	~~852~~ 852	8.1			N	N	6.7
	~~2 PM~~	6PM	168.80	844	8.2			N	N	
	~~6PM~~									
	10 PM		170.42	849	8.2			N	N	
6/30	2 AM		170.04	851	8.1					
	6 AM		169.70	850	8.1			N	N	
	10 AM	210 hr								
	12 PM		169.15	~~845~~ 858	8.2			N	N	
	6 PM		171.10	858	8.4			N	N	
	10 PM		171.15	852	8.3			N	N	
7/1	2 AM		169.80	855	8.4			N	N	
	6 AM		171.40	854	8.4			N	N	
	10 AM	240 hr	+	~~851~~						
	12 PM		170.85	851	8.4			N	N	
	6 PM		170.80	856	7.8			N	N	
	10 PM		171.30	854	8.3			N	N	
7/2	2 AM		170.94	857	8.2			N	N	
	6 AM		174.40	866	8.4			N	N	
	10 AM	288 hr	170.85	846	8.4			N	N	
	2 PM									

Geosphere Environmental Management, Inc.

Pumping Test Log

PT Stage:
Page **of**

Client: Aquarion **Project:** Well 22 Pumping Test	**Address:**
Pumping Well: Well 22 **Pumping Rate:** **Start Time:** **Stop Time:**	**NOTES:**

Date	Time Actual	Minutes Elapsed	Hand Water Level	Flow Rate	pH Raw	pH Treated	Residual Cl Treated	Odor (Y/N)	Color (Y/N)	Well 7 Water Level
	6.8m									
	10 pm									
7/3	2 AM									
	6 AM									
	10 AM	312hr								
	12 PM		168.60	834	8.3			N	N	
	6 pm									
	10pm									
7/4	2 AM									
	6AM									
	10AM	336hr								
	12 PM		168.50	830	8.4			N	N	
	6 pm									
	10 PM									
7/5	2 AM									
	6 AM									
	2 PM		170.60	840	8.3			N	N	
7/6	12 25 pm		167.54	820	8.4			N	N	
7/7	12:42 pm		168.55	829	8.3			N	N	
7/8	12:25 pm		167.70	820	8.3			N	N	
7/9	10:40 AM		167.90	812	8.2			N	N	
7/10	10:32 AM		167.94	816	8.4			N	N	
7/11	12:50 PM		169.25	824	8.3			N	N	
7/12	8:31 AM		173.05	833	8.4			N	N	
7/13	9:58 AM		174.54	837	8.4			N	N	
7/14	1:20 PM		173.10	838	8.4			N	N	
7/15	12:00			862						
7/16	15:00		170.20	832	8.5			N	N	
7/17	Shutdown)									

Appendix K

Hager-Richter Downhole Geophysical Assessment Report of Well 22

HAGER-RICHTER
GEOSCIENCE,INC.

GEOPHYSICS FOR THE ENGINEERING COMMUNITY
SALEM, NEW HAMPSHIRE
Tel: 603.893.9944
FORDS, NEW JERSEY
Tel: 732.661.0555

BOREHOLE GEOPHYSICAL LOGGING - DATA REPORT
AQUARION WELL 22
LITTLE RIVER ROAD
HAMPTON, NEW HAMPSHIRE

Prepared for:

Geosphere Environmental Management, Inc.
51 Portsmouth Avenue
Exeter, New Hampshire 03833

Prepared by:

Hager-Richter Geoscience, Inc.
846 Main Street
Fords, New Jersey 08863

File 17RG113-18
November, 2018

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Tadpole	Structure Category (Symbol Color)	Description
	Fracture Rank 1 (Light Blue)	Minor Fracture - not distinct and may not be continuous around the borehole
	Fracture Rank 2 (Blue)	Intermediate Fracture - distinct and continuous around the borehole with little or no apparent aperture
	Fracture Rank 3 (Red)	Major Fracture - distinct and continuous around the borehole with apparent aperture

Figure 1. Key to bedrock structure categories.

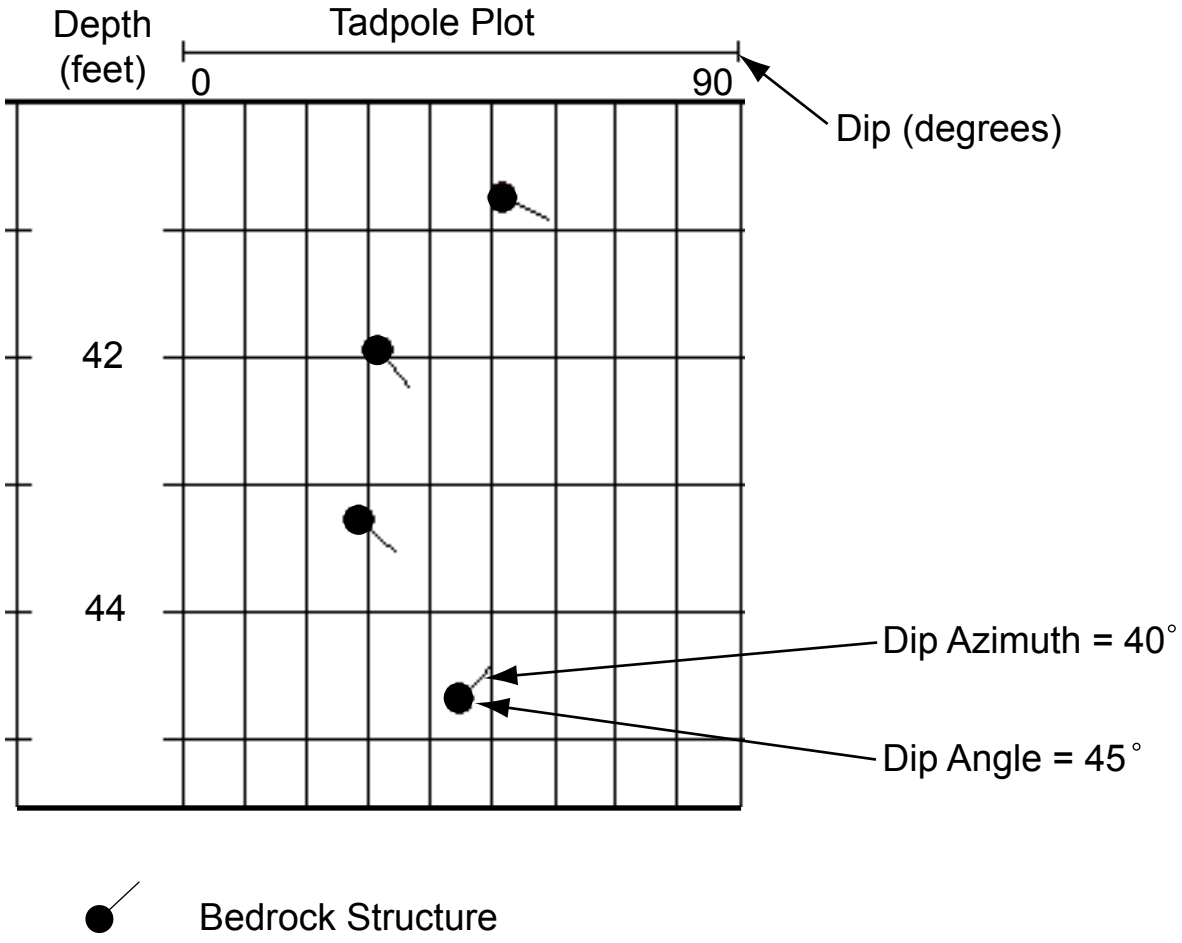


Figure 2. Tadpole plot explanation. The orientation of the bedrock structures is graphically displayed by a tadpole consisting of a circle, the head, and a line, the tail. The position of the head, left to right on the tadpole plot, gives the dip angle of the structure. The left side of the track indicates a dip angle of 0°, and the right side of the track indicates a dip angle of 90° from horizontal. The orientation of the tail gives the dip azimuth of the structure and can be read like a compass. The tail pointing directly up is 0°, north.

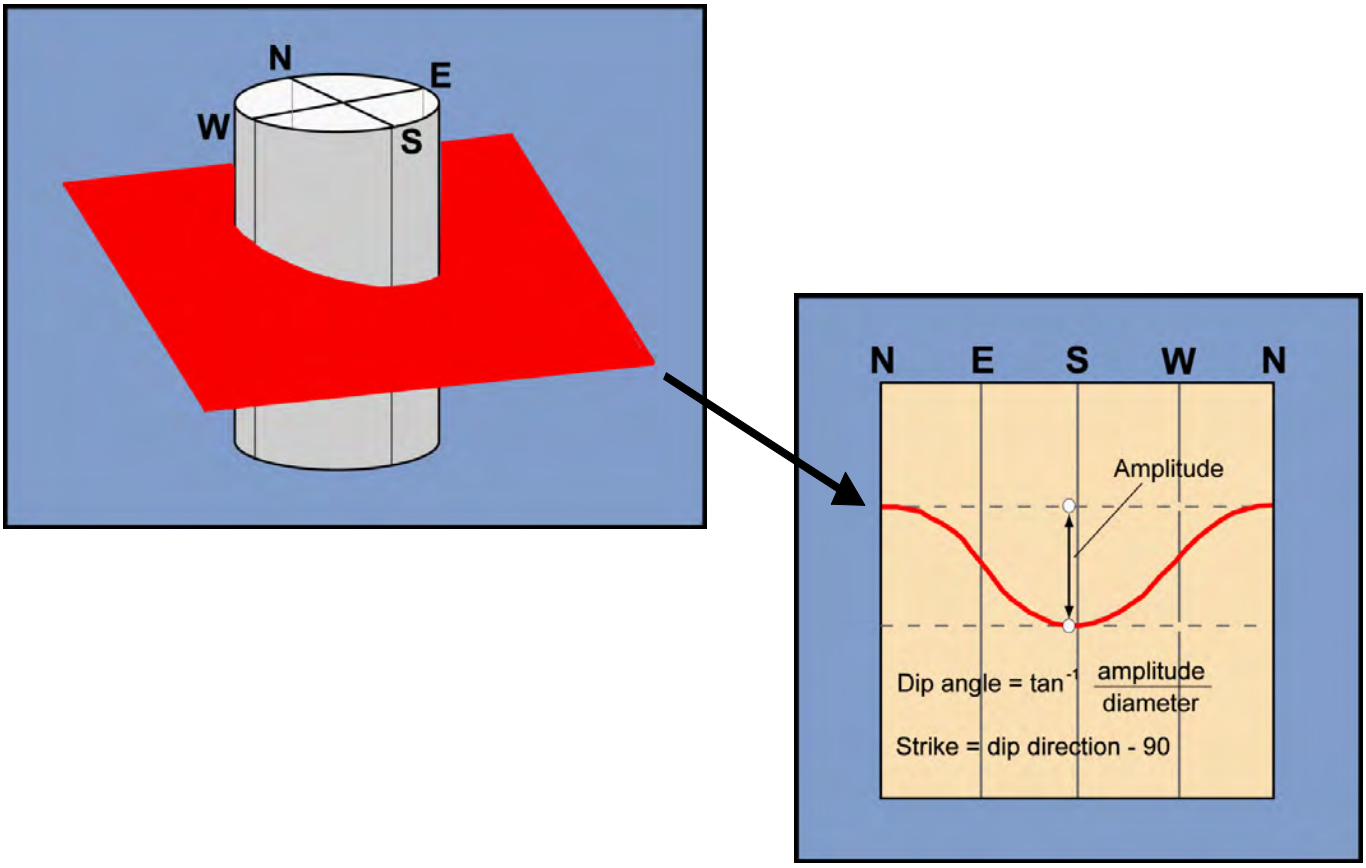


Figure 3. Televiewer explanation. The image on the left depicts a planar structure in red, such as a fracture or bedding plane, intersected by a borehole. The image on the right depicts the same structure unwrapped as it would be displayed in an optical televiewer (OTV) or acoustic televiewer (ATV) log.

Figure modified from: Garfield, R.L., Day-Lewis, F.D., Gray, M.B., Johnson, C.D., Williams, J.H. and Day-Lewis, A.D.F., 2003, Fractured-Rock Aquifer Characterization within a Regional Geologic Context: Results from the Bucknell University Hydrogeophysics Test Site, GSA Northeastern Section, 38th Annual Meeting, Paper No. 25-19.

HAGER-RICHTER GEOSCIENCE, INC.

Salem, New Hampshire
Tel: 603.893.9944

Fords, New Jersey
Tel: 732.661.0555

WELL 22 - BOREHOLE IMAGE LOGS

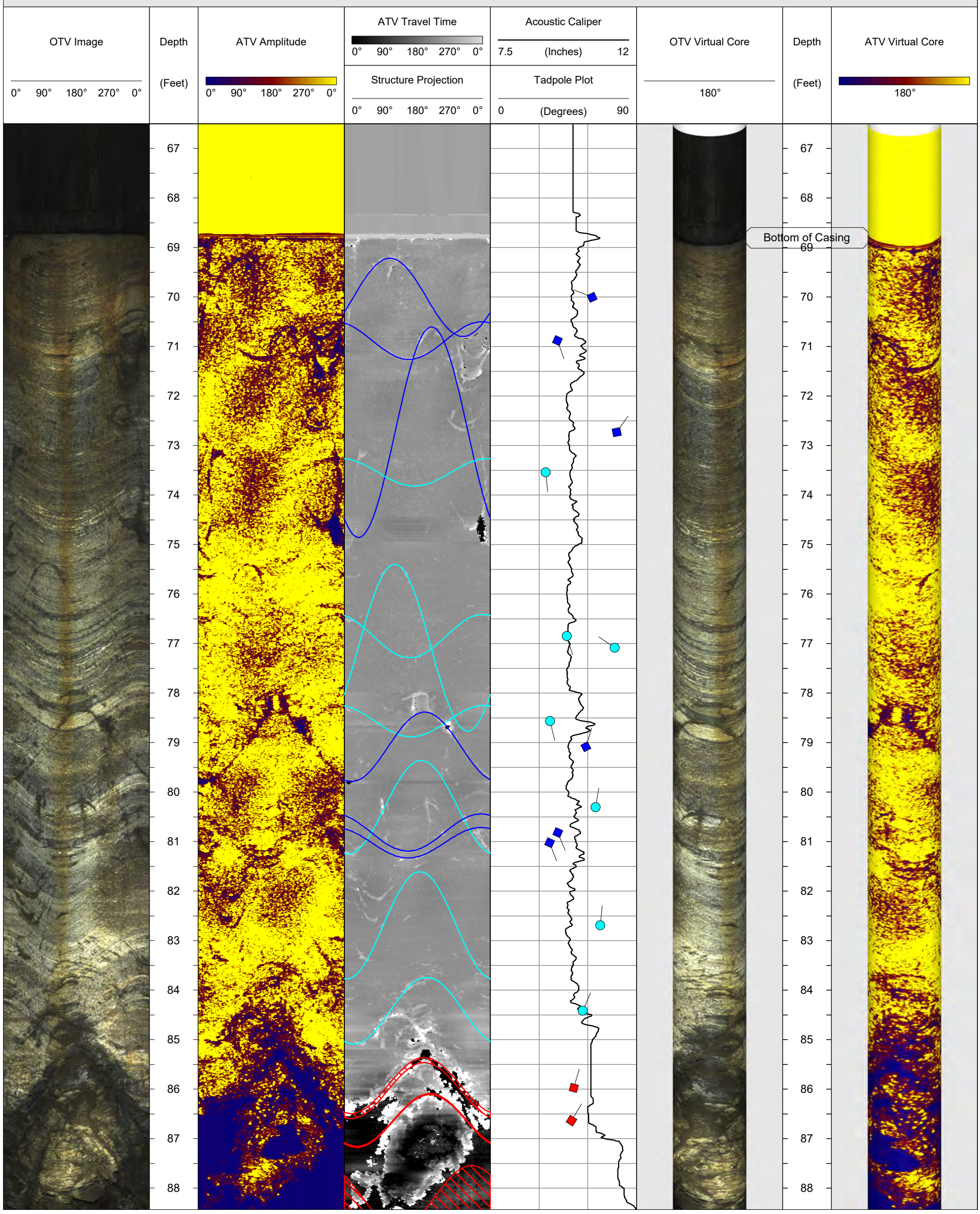
DATE LOGGED: September 27, 2018

CLIENT:	Geosphere Environmental Management Inc.	HAGER-RICHTER FILE:	17RG113-18
PROJECT:	Aquarion Well 22 - Borehole Geophysical Logging	LOG DATUM:	Top of the 10-Inch Steel Casing
LOCATION:	Little River Road, Hampton, New Hampshire	ORIENTATION REFERENCE:	True North (Magnetic Declination = 15° West)
LOGGING GEOPHYSICIST(S):	Nick DeCristofaro & Mark Jones	TOP OF CASING:	2.3 Feet Above the Ground Surface
PROJECT REP(S) ON-SITE:	Matt Krapf & Shawn Case	BOREHOLE DIAMETER:	10 Inches to 324.0 Feet; 8 Inches Below 324.0 Feet
LOGS PROCESSED BY:	Robert Garfield & Nick DeCristofaro	WATER LEVEL DEPTH:	11.2 Feet

STRUCTURE LEGEND

Fracture Rank 1 Fracture Rank 2 Fracture Rank 3

Well 22 - Borehole Image Logs



Well 22 - Borehole Image Logs

OTV Image

0° 90° 180° 270° 0°

Depth

(Feet)

ATV Amplitude

0° 90° 180° 270° 0°

ATV Travel Time

0° 90° 180° 270° 0°

Structure Projection

0° 90° 180° 270° 0°

Acoustic Caliper

7.5 (Inches) 12

Tadpole Plot

0 (Degrees) 90

OTV Virtual Core

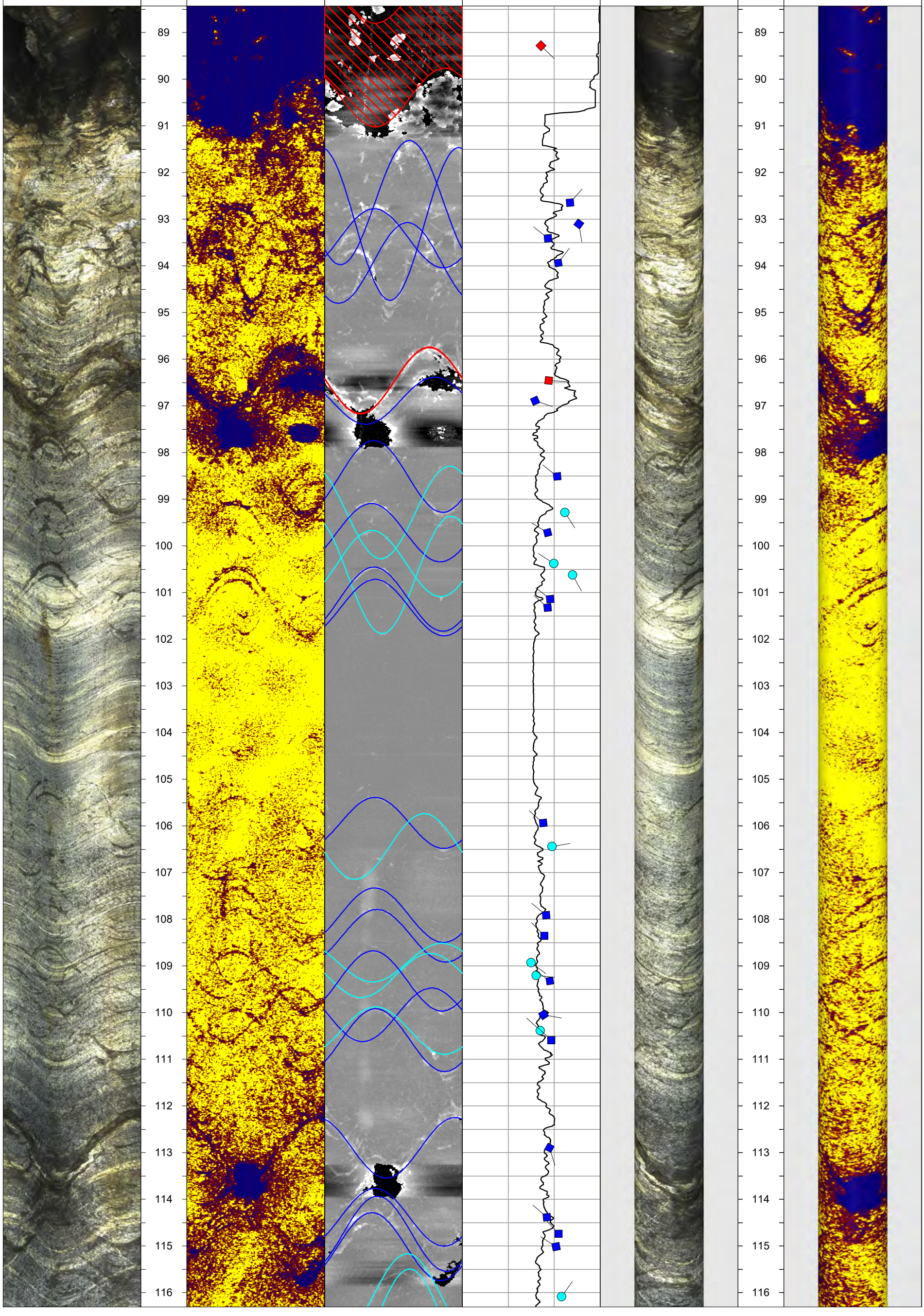
180°

Depth

(Feet)

ATV Virtual Core

180°



Well 22 - Borehole Image Logs

OTV Image

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Depth

(Feet)

ATV Amplitude

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ATV Travel Time

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Structure Projection

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Acoustic Caliper

7.5 (Inches) 12

Tadpole Plot

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OTV Virtual Core

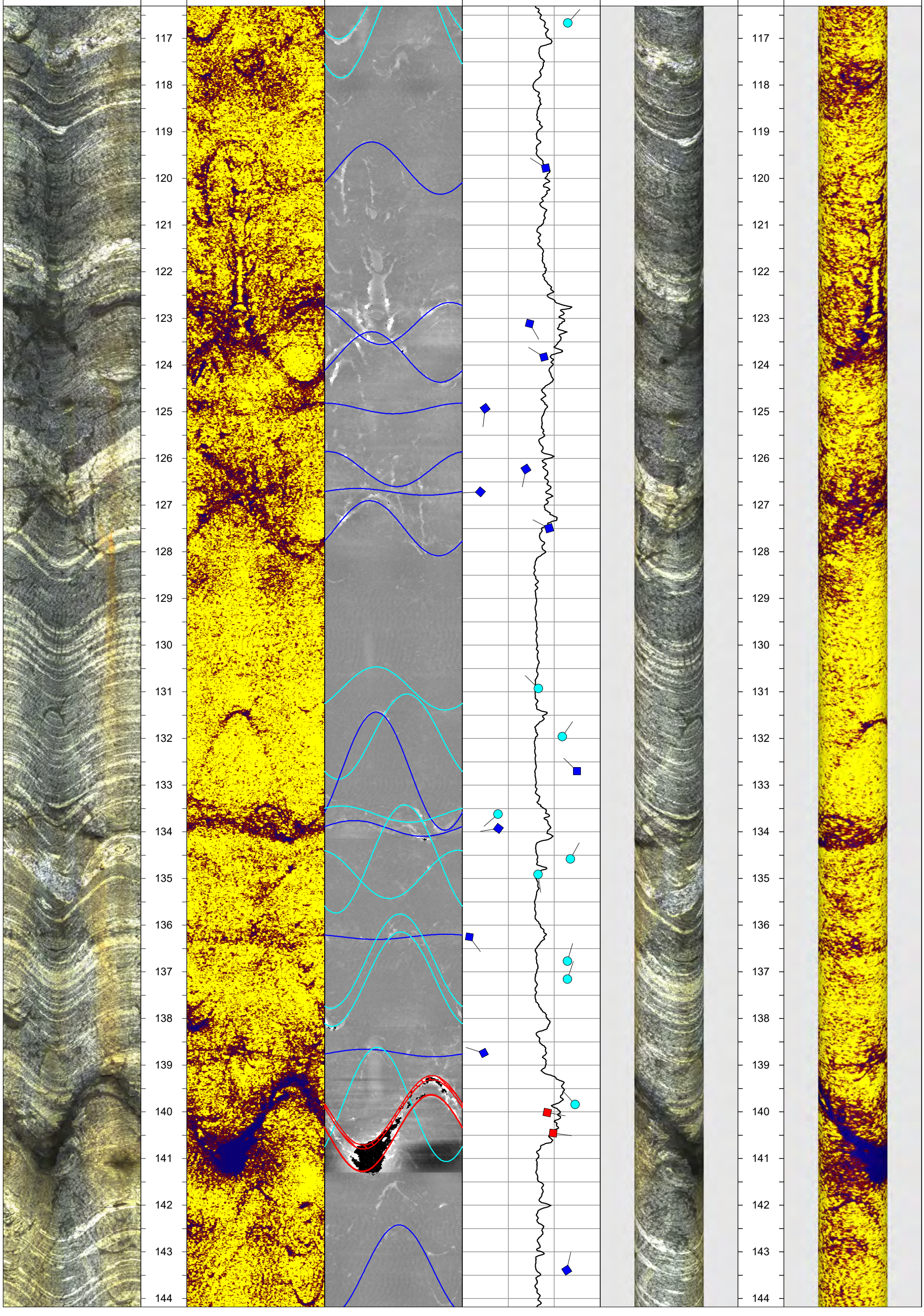
180°

Depth

(Feet)

ATV Virtual Core

180°



Well 22 - Borehole Image Logs

OTV Image

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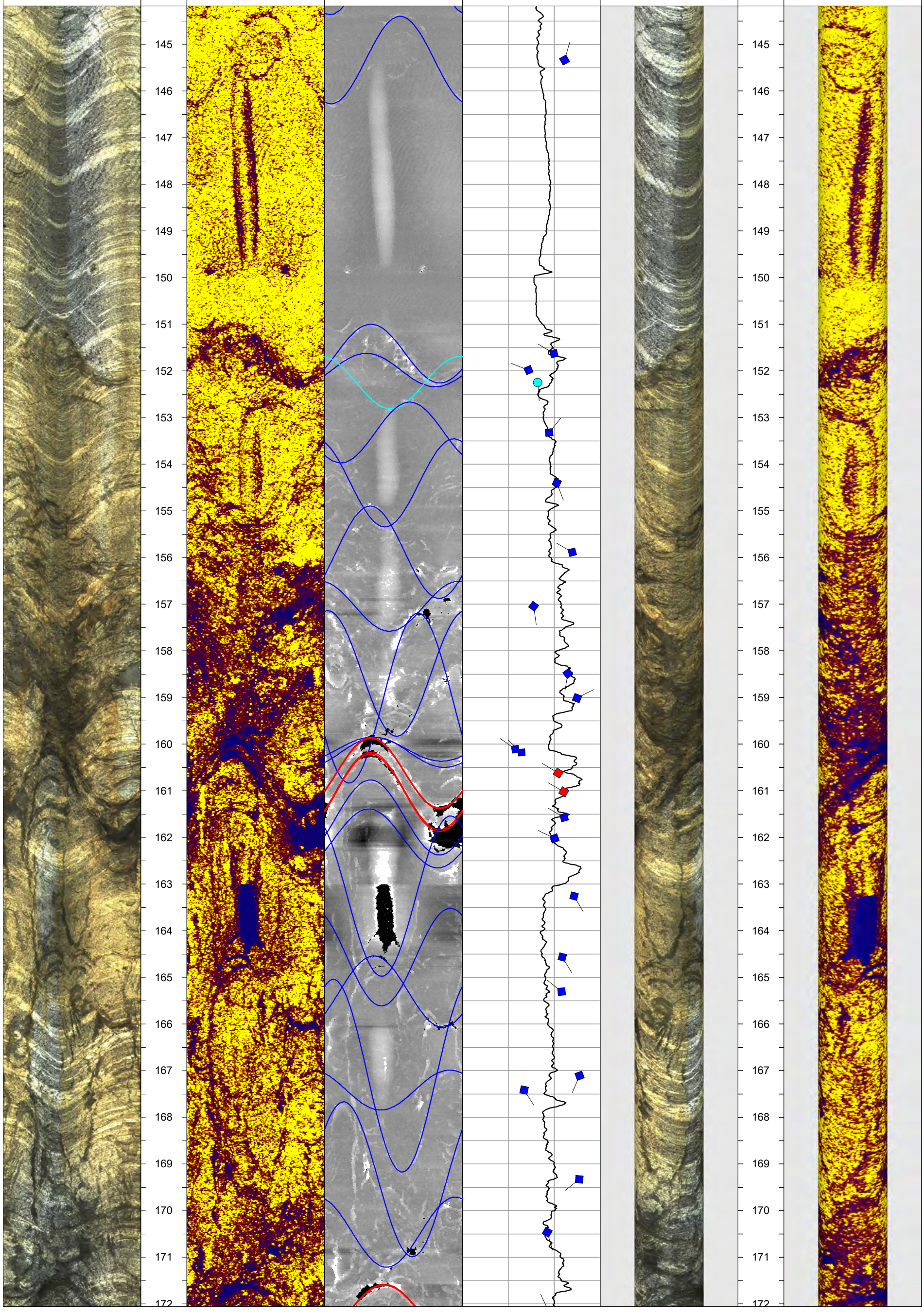

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Tadpole Plot
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OTV Virtual Core
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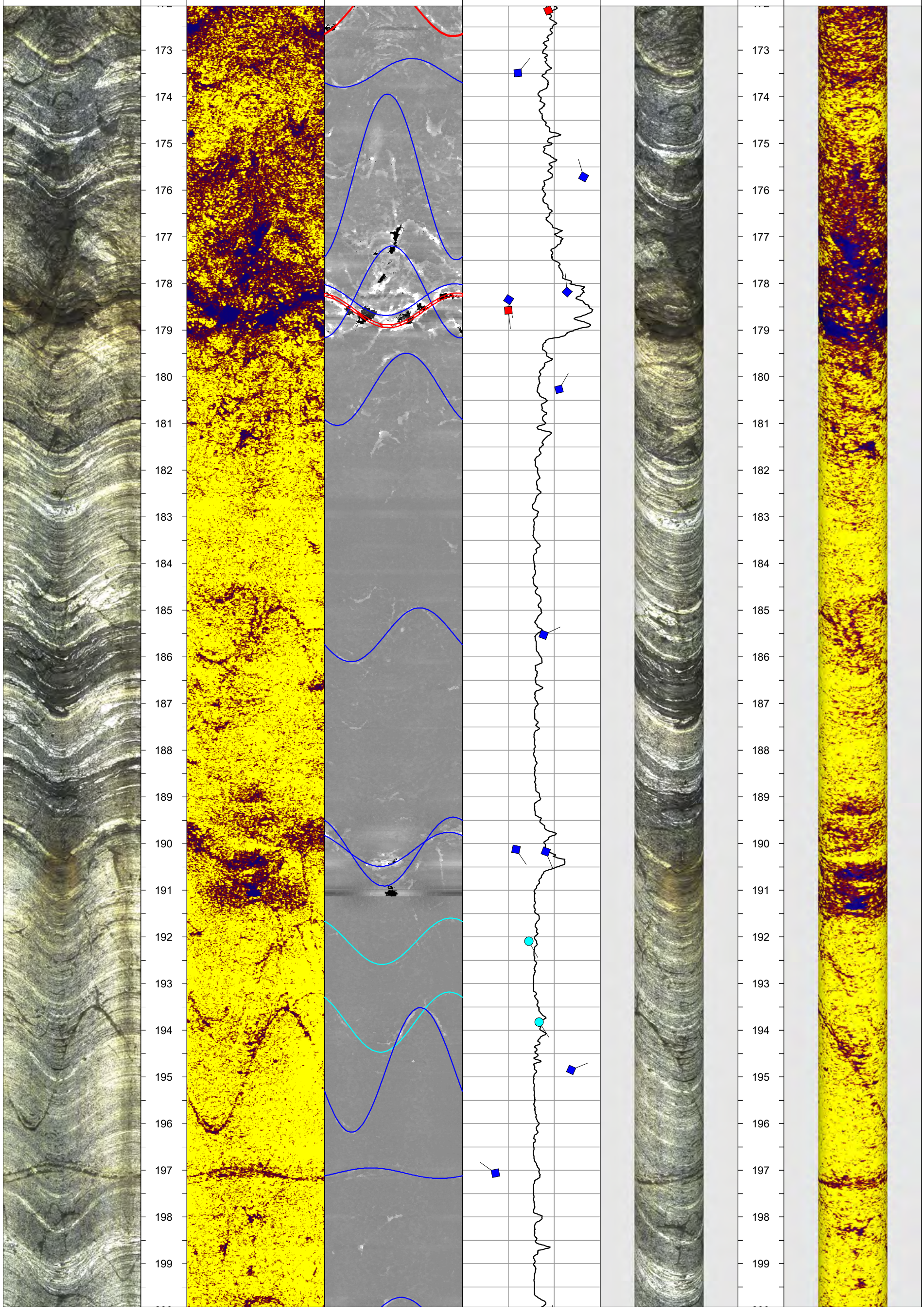
ATV Virtual Core
180°



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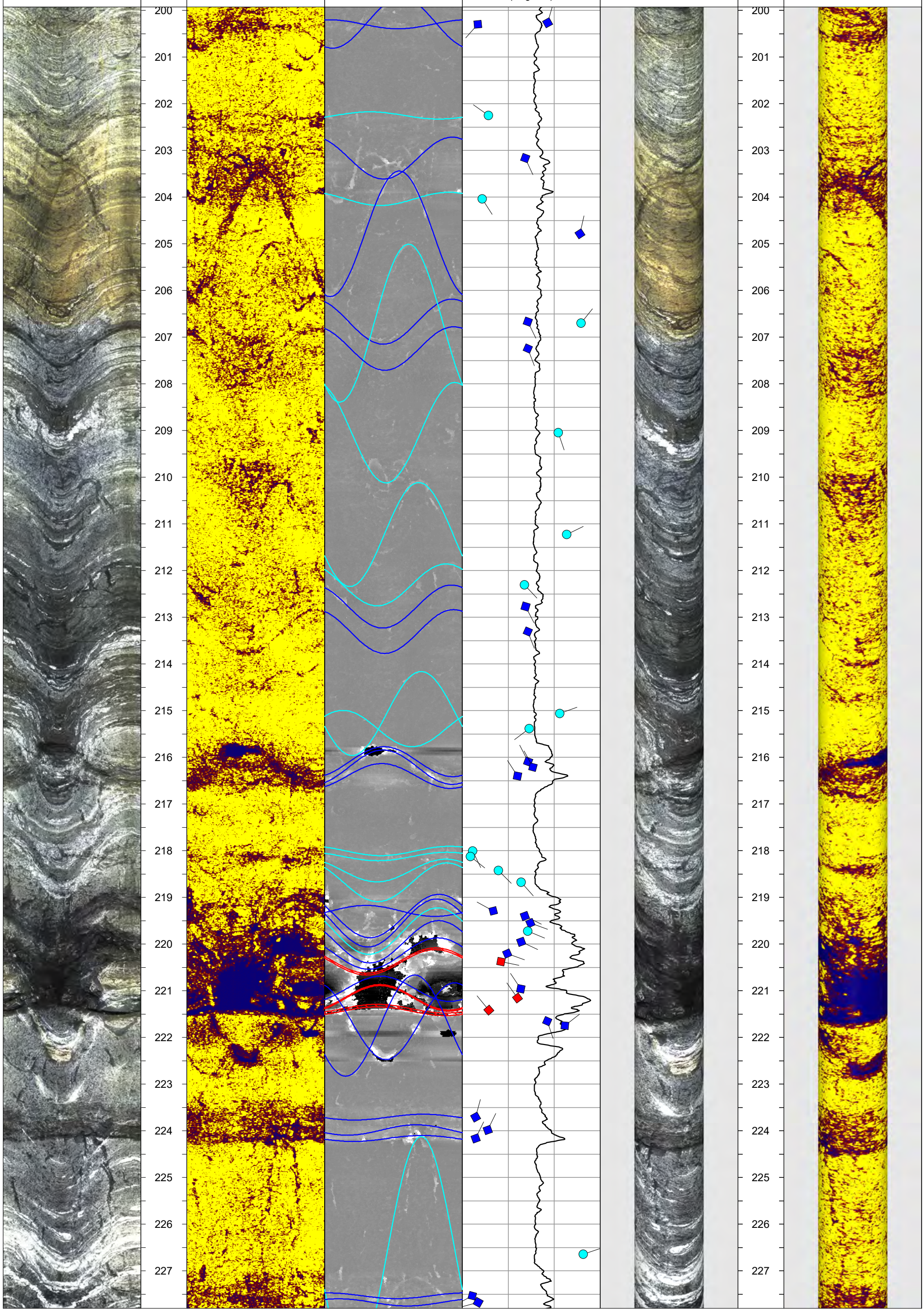
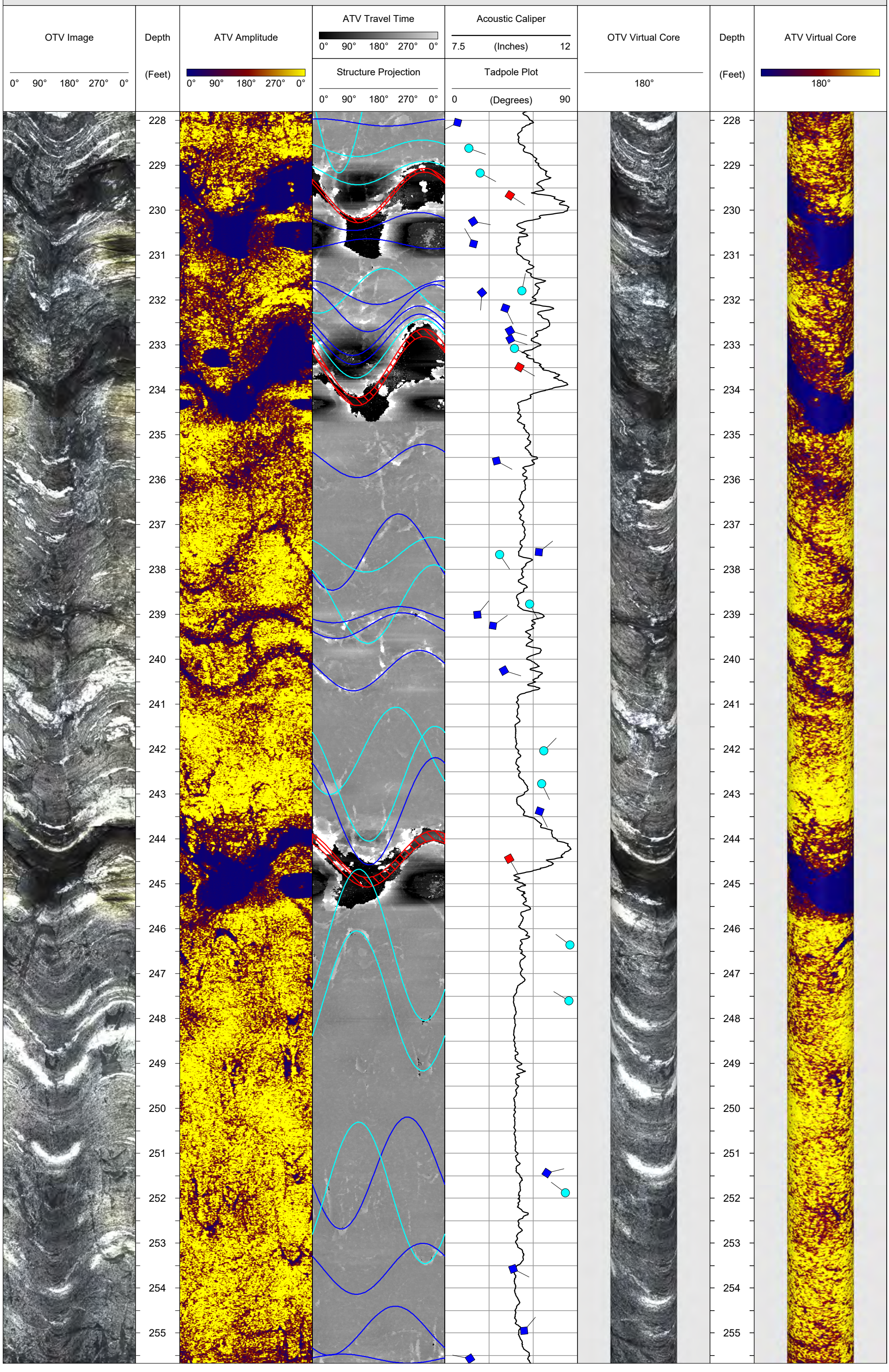
ATV Virtual Core

180°



Well 22 - Borehole Image Logs



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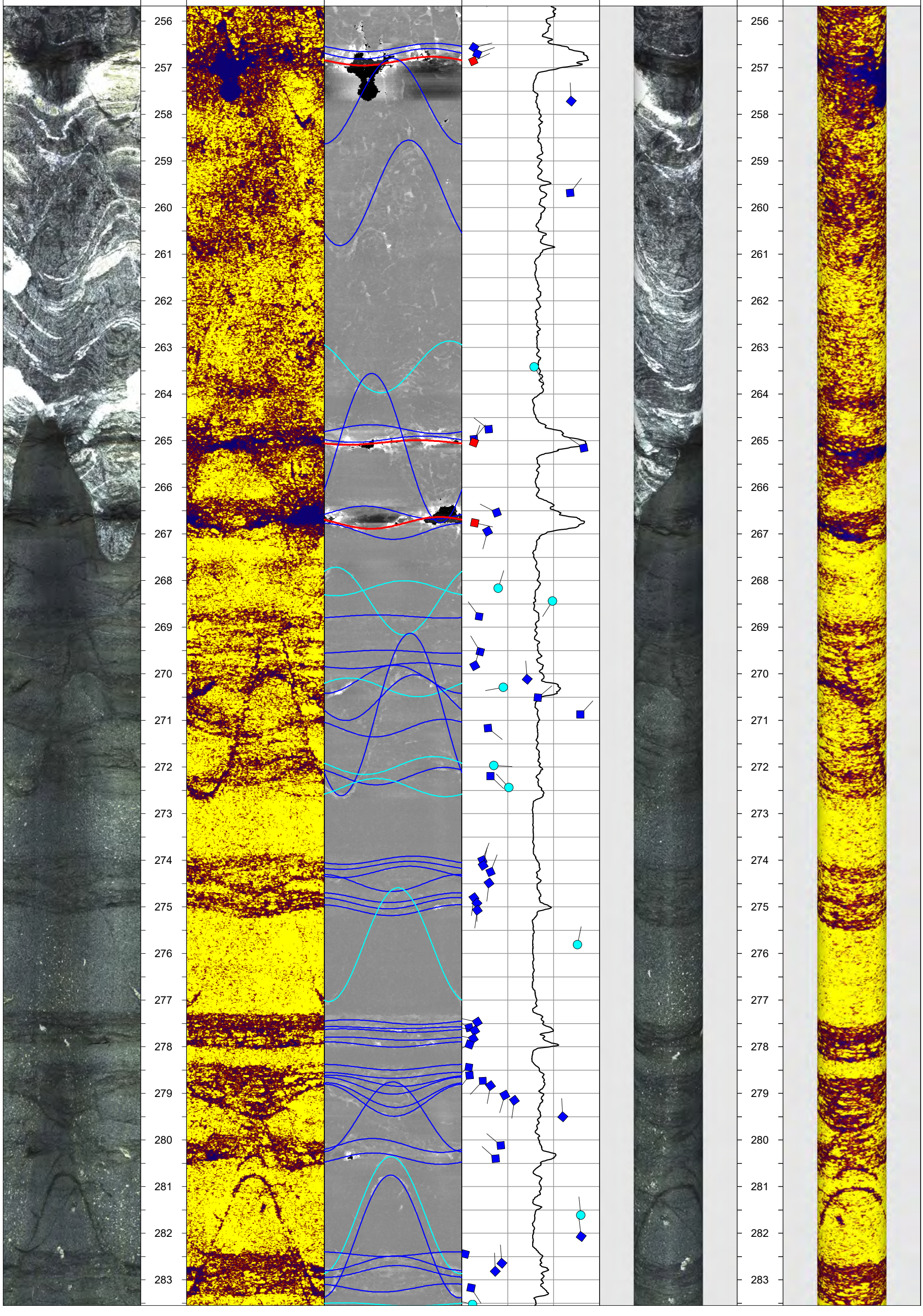

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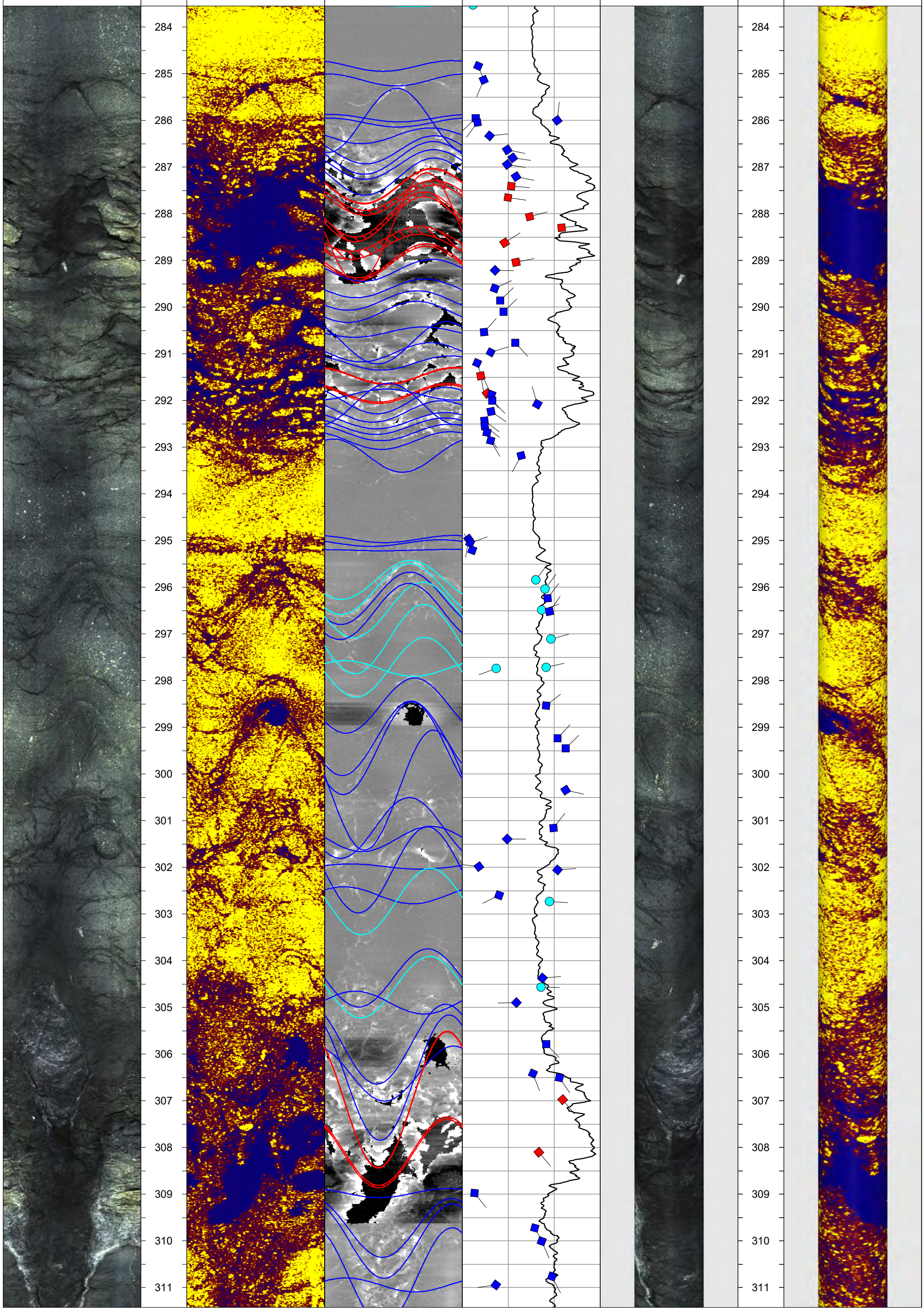
ATV Virtual Core

180°



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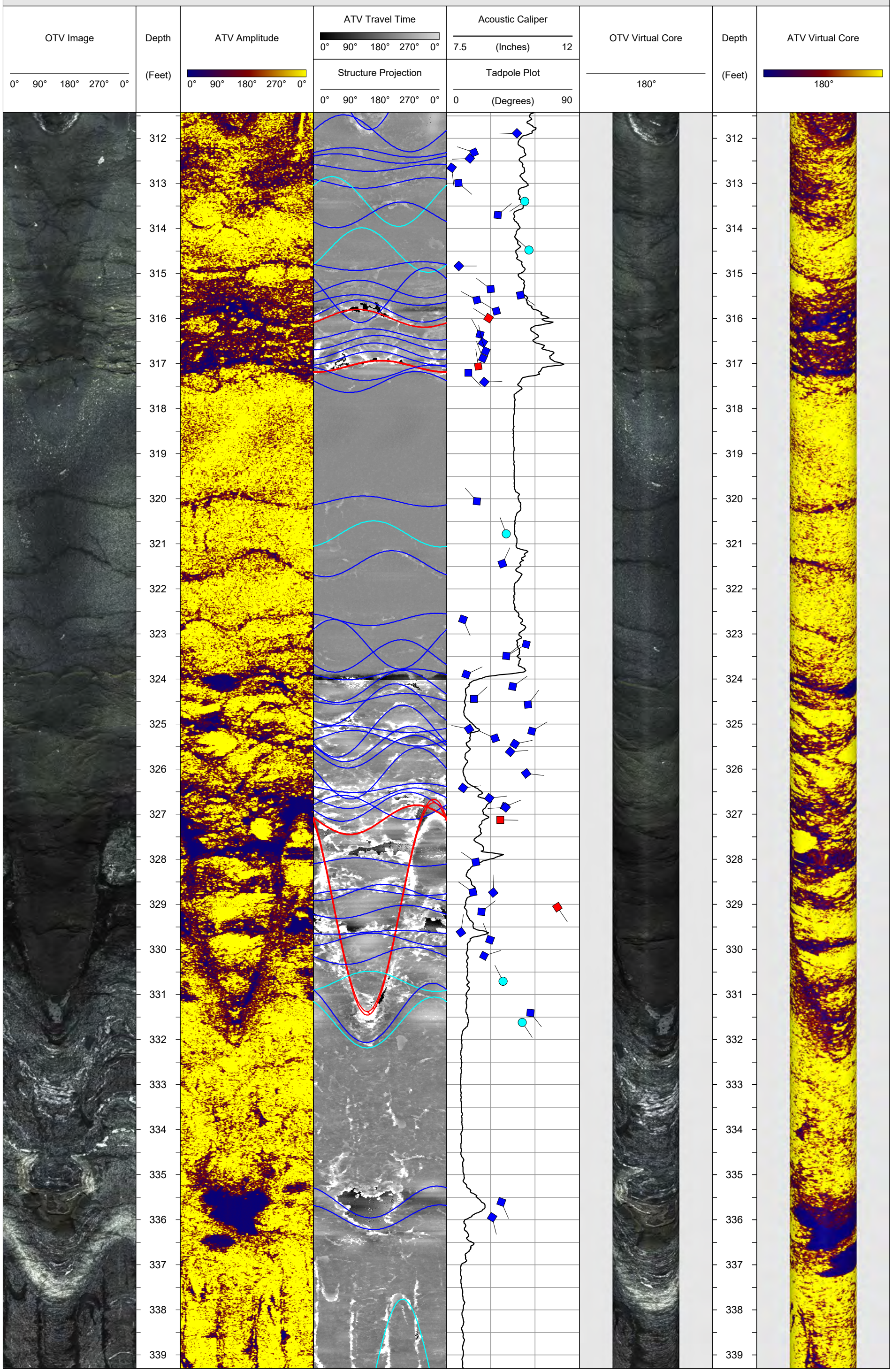

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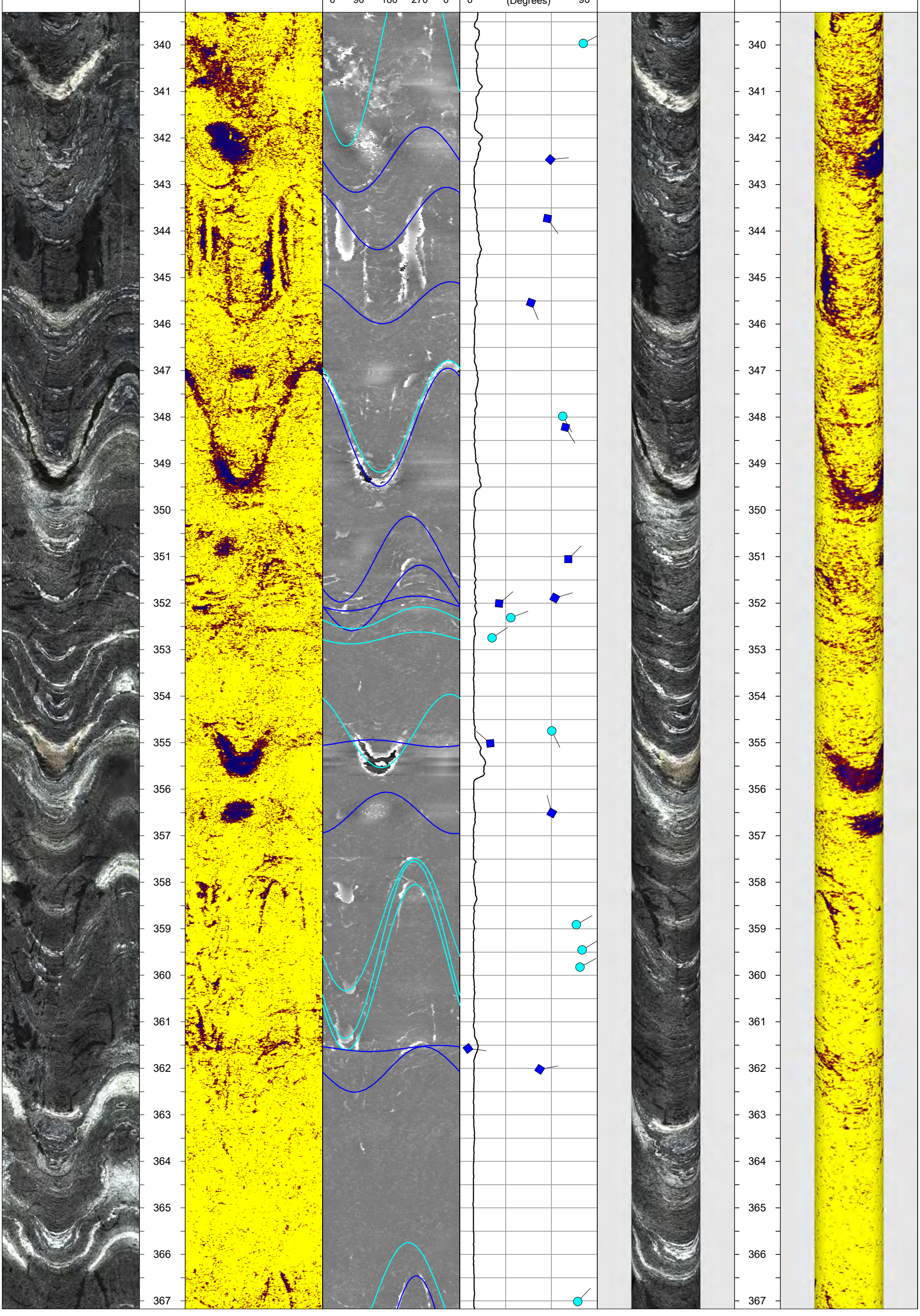

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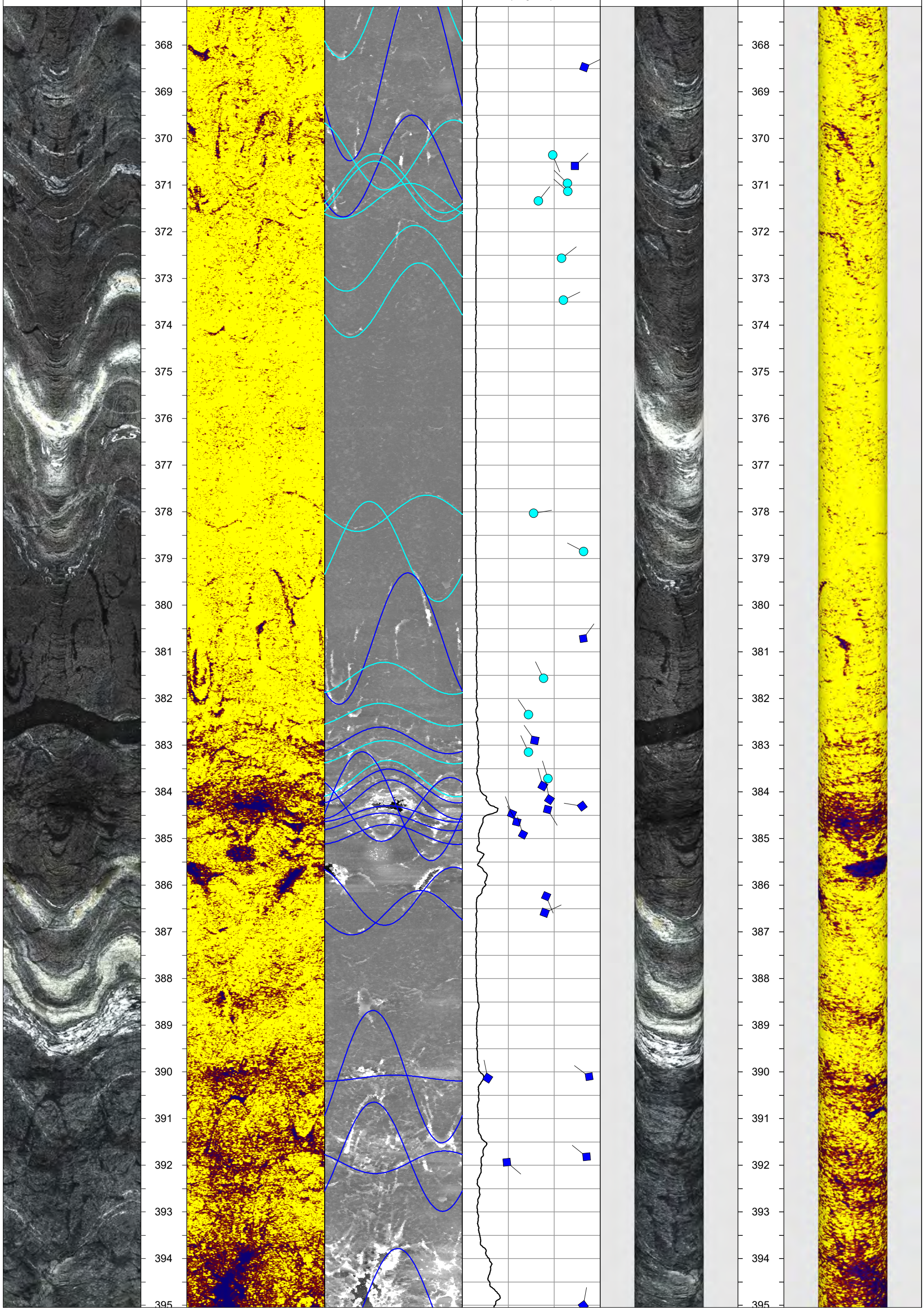

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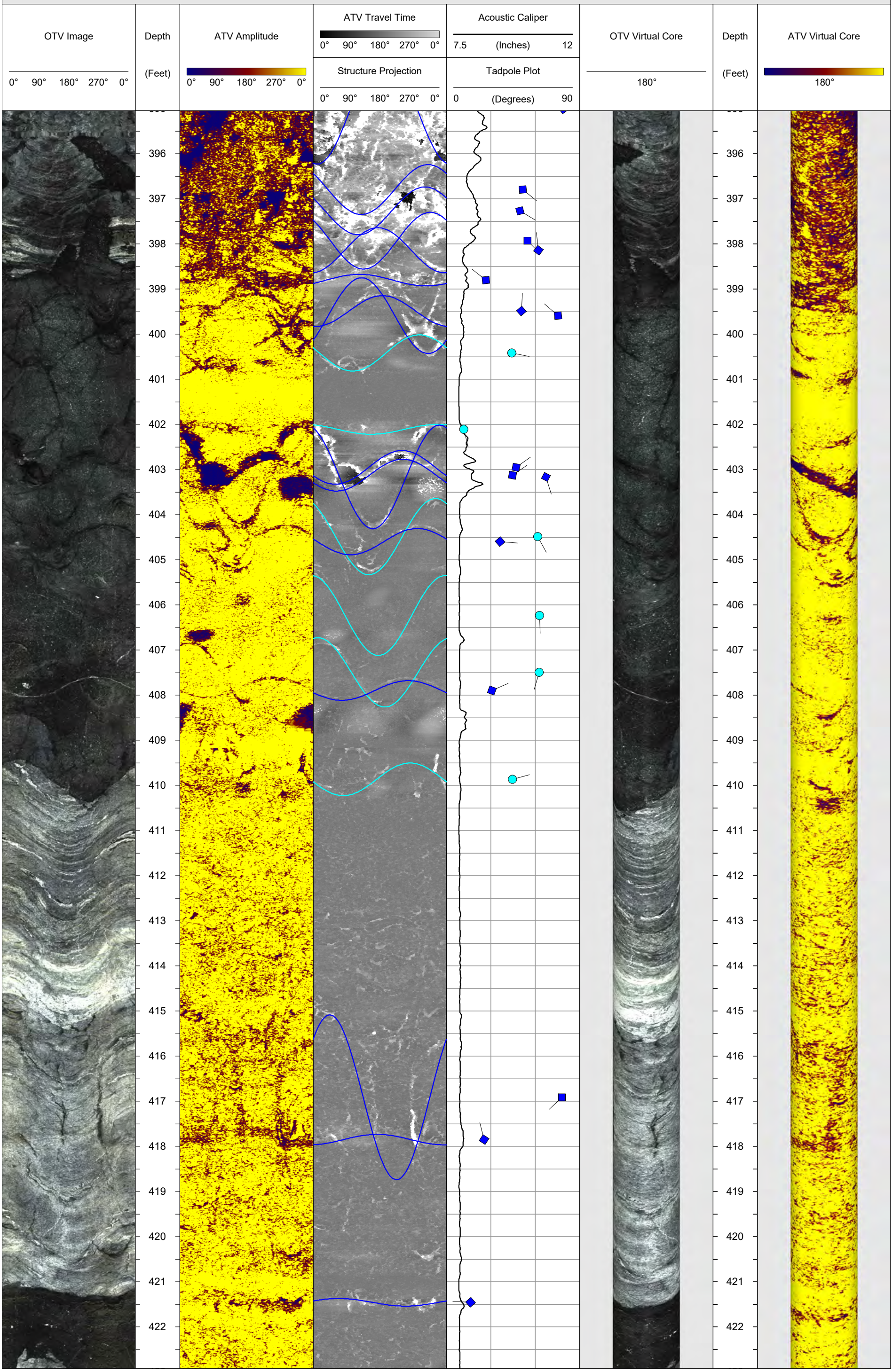

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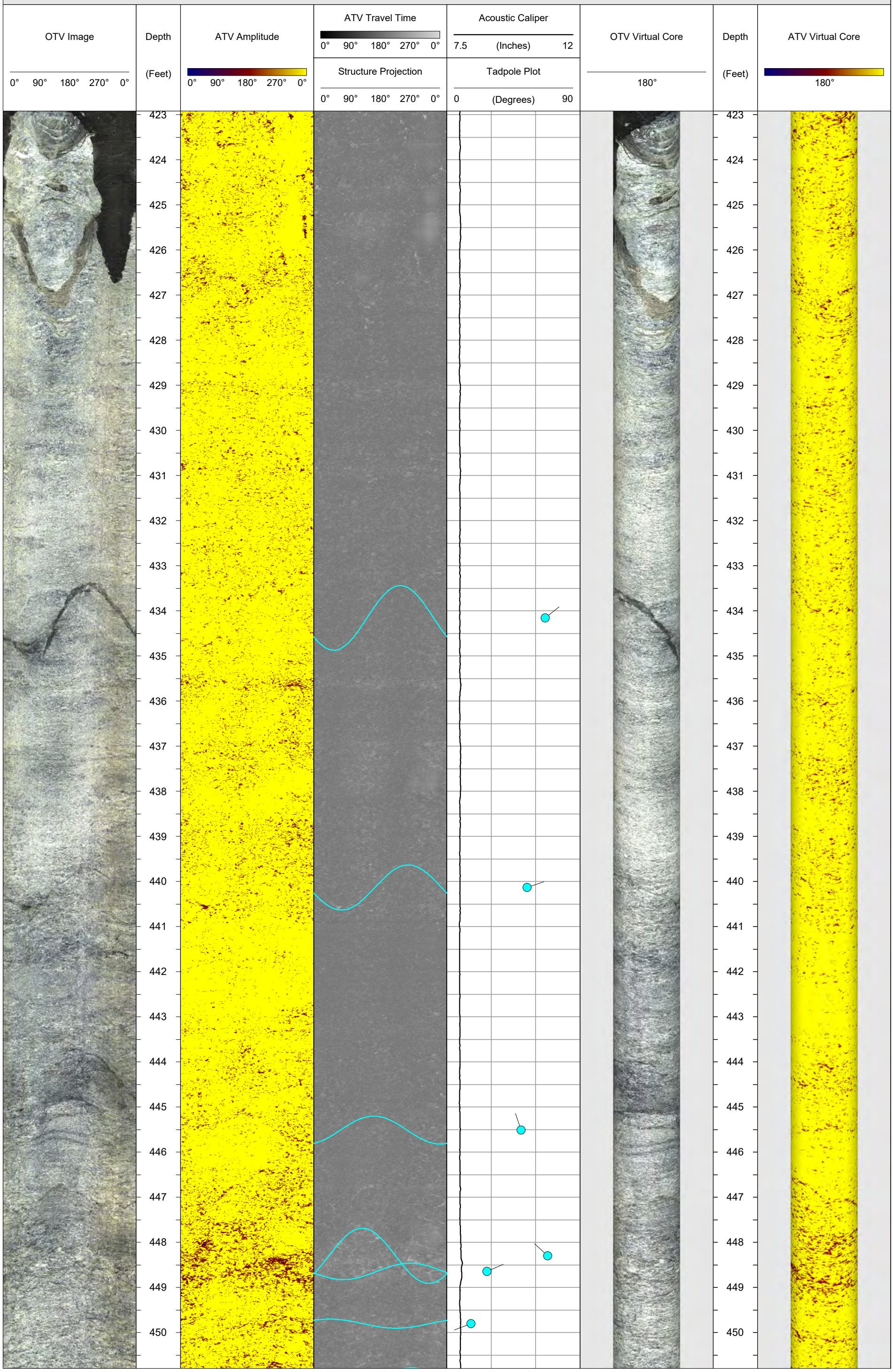

Well 22 - Borehole Image Logs

OTV Image

0° 90° 180° 270° 0°

Depth

(Feet)

ATV Amplitude

0° 90° 180° 270° 0°

ATV Travel Time

0° 90° 180° 270° 0°

Structure Projection

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Acoustic Caliper

7.5 (Inches) 12

Tadpole Plot

0 (Degrees) 90

OTV Virtual Core

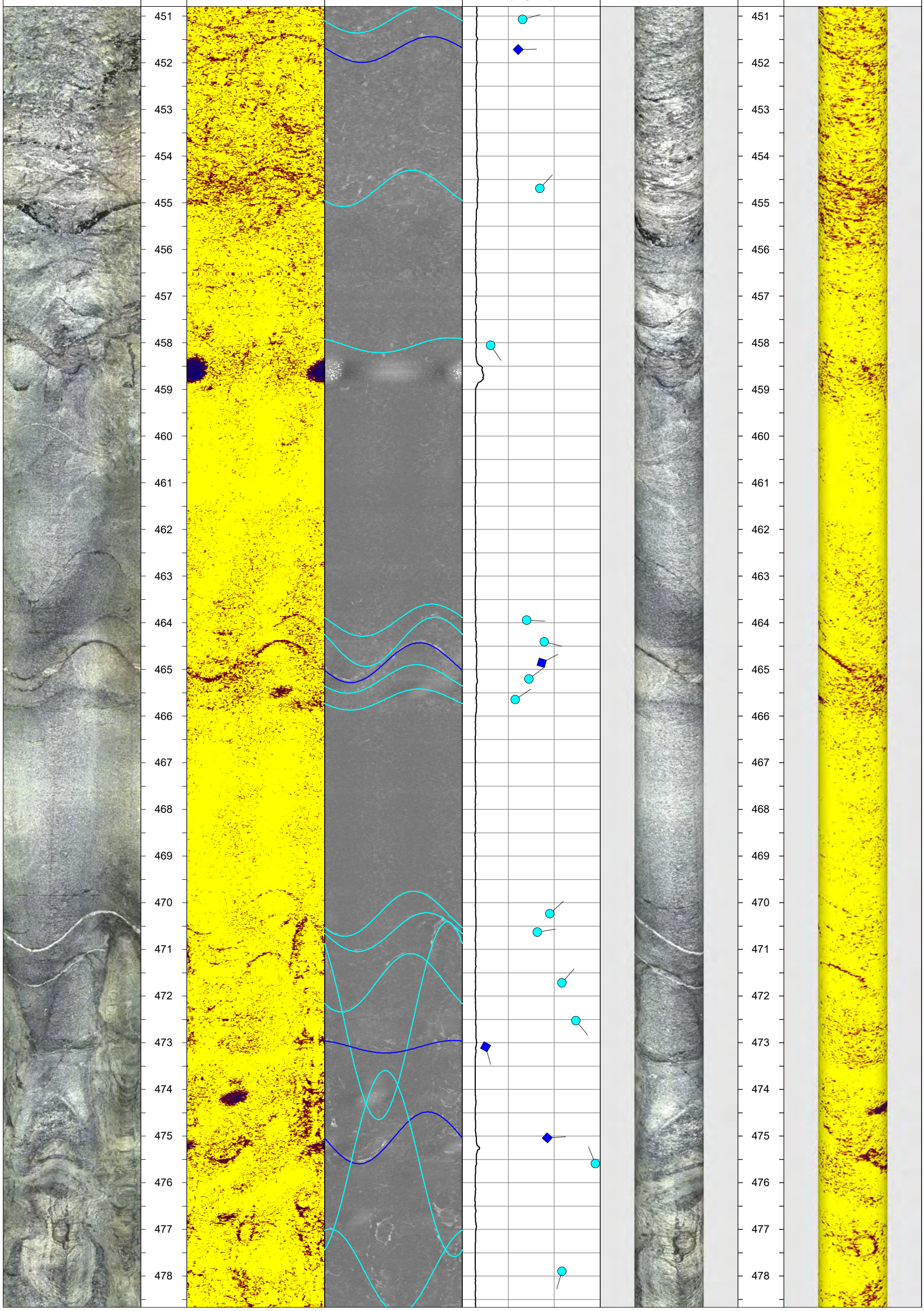
180°

Depth

(Feet)

ATV Virtual Core

180°



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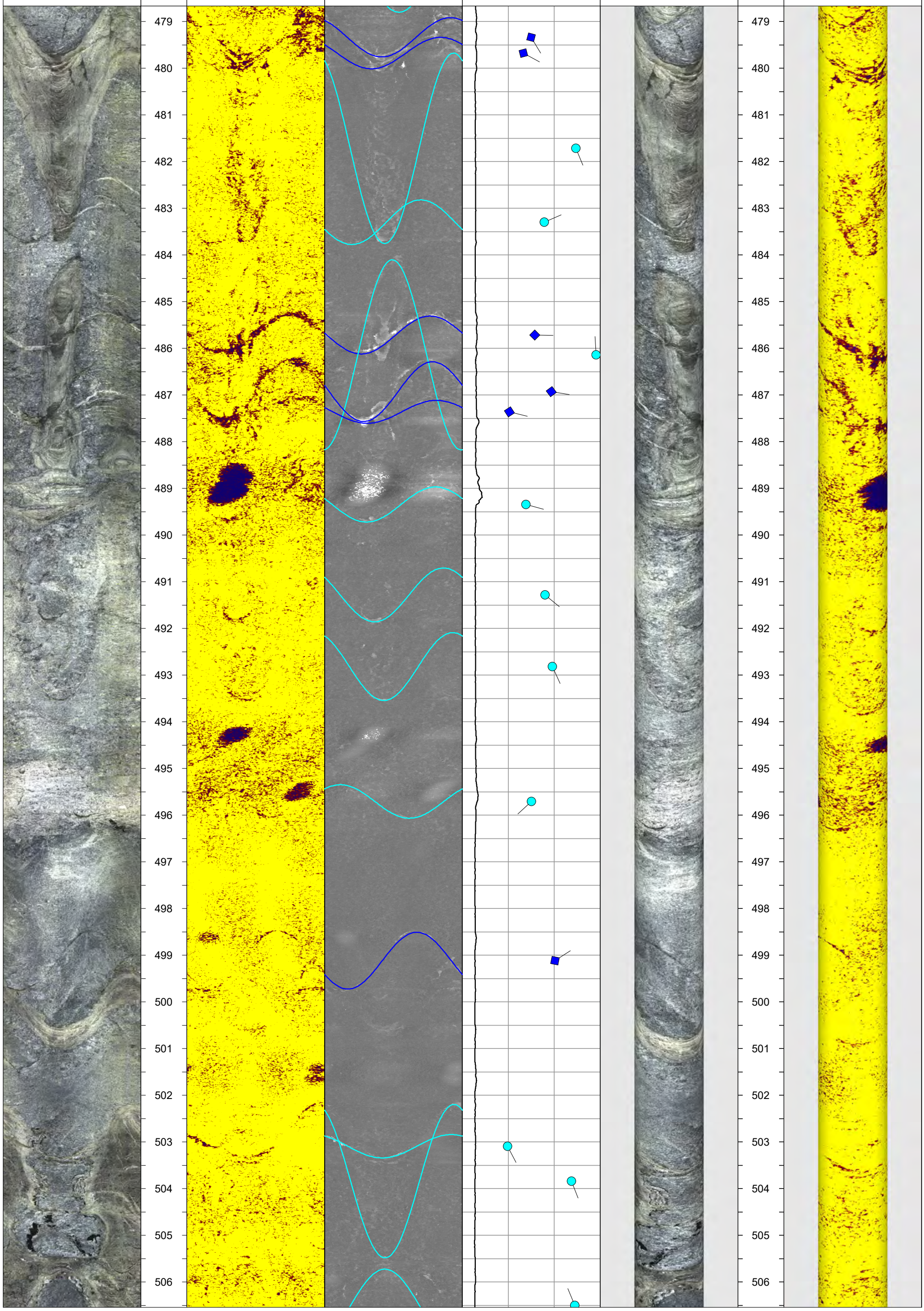

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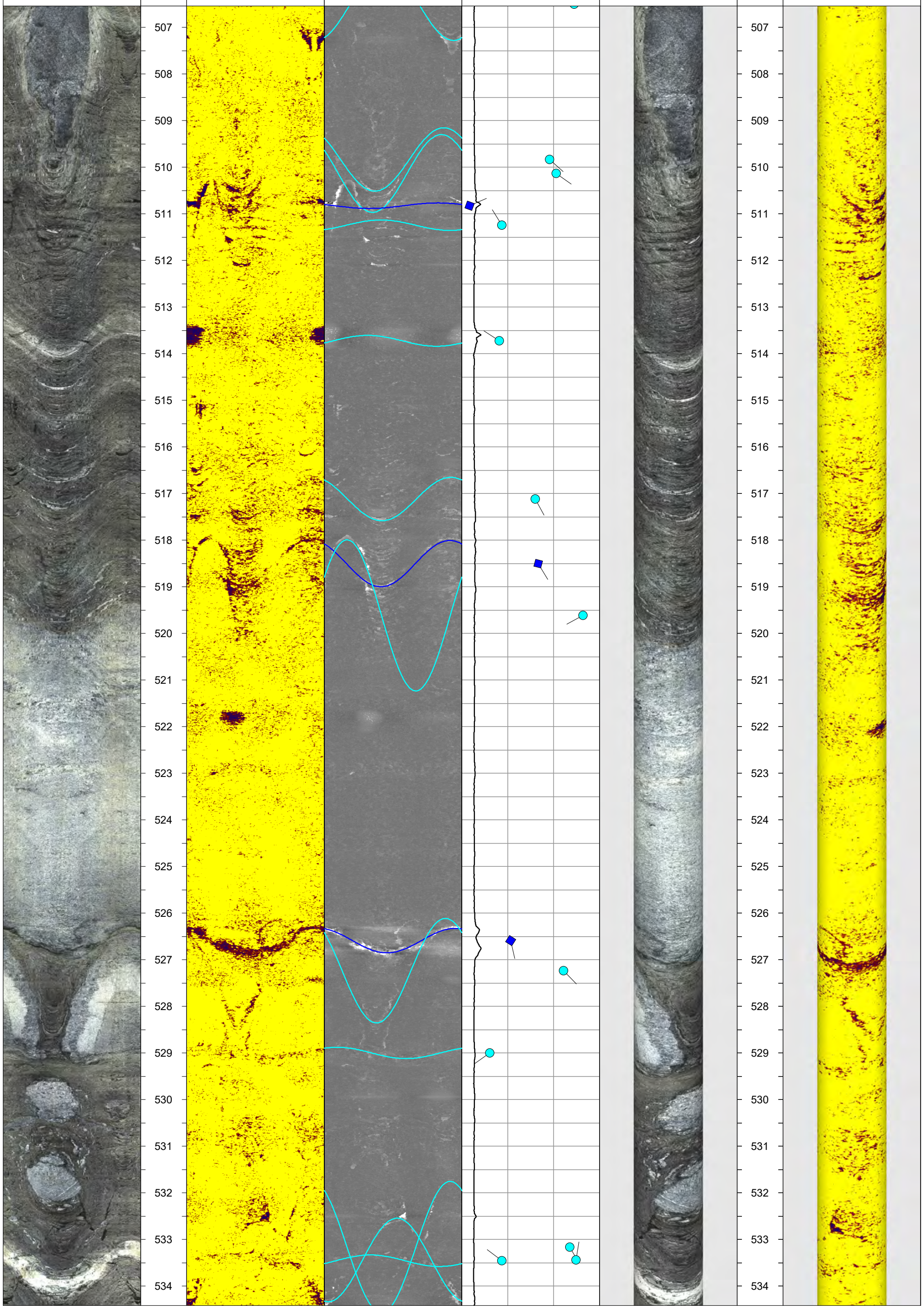
180°



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(Feet)

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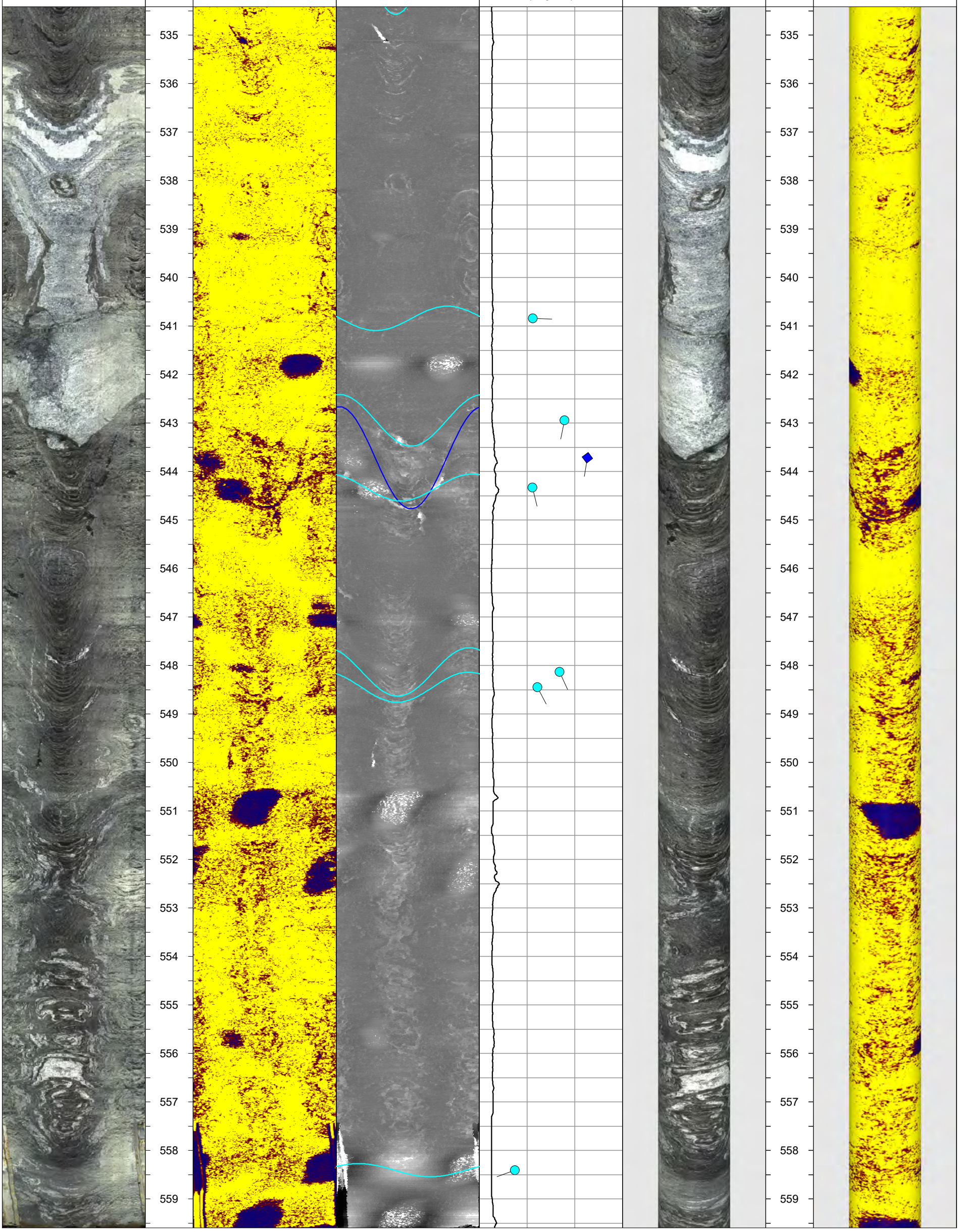


HAGER-RICHTER GEOSCIENCE, INC.

Salem, New Hampshire
Tel: 603.893.9944

Fords, New Jersey
Tel: 732.661.0555

WELL 22 - BOREHOLE GEOPHYSICAL LOGS

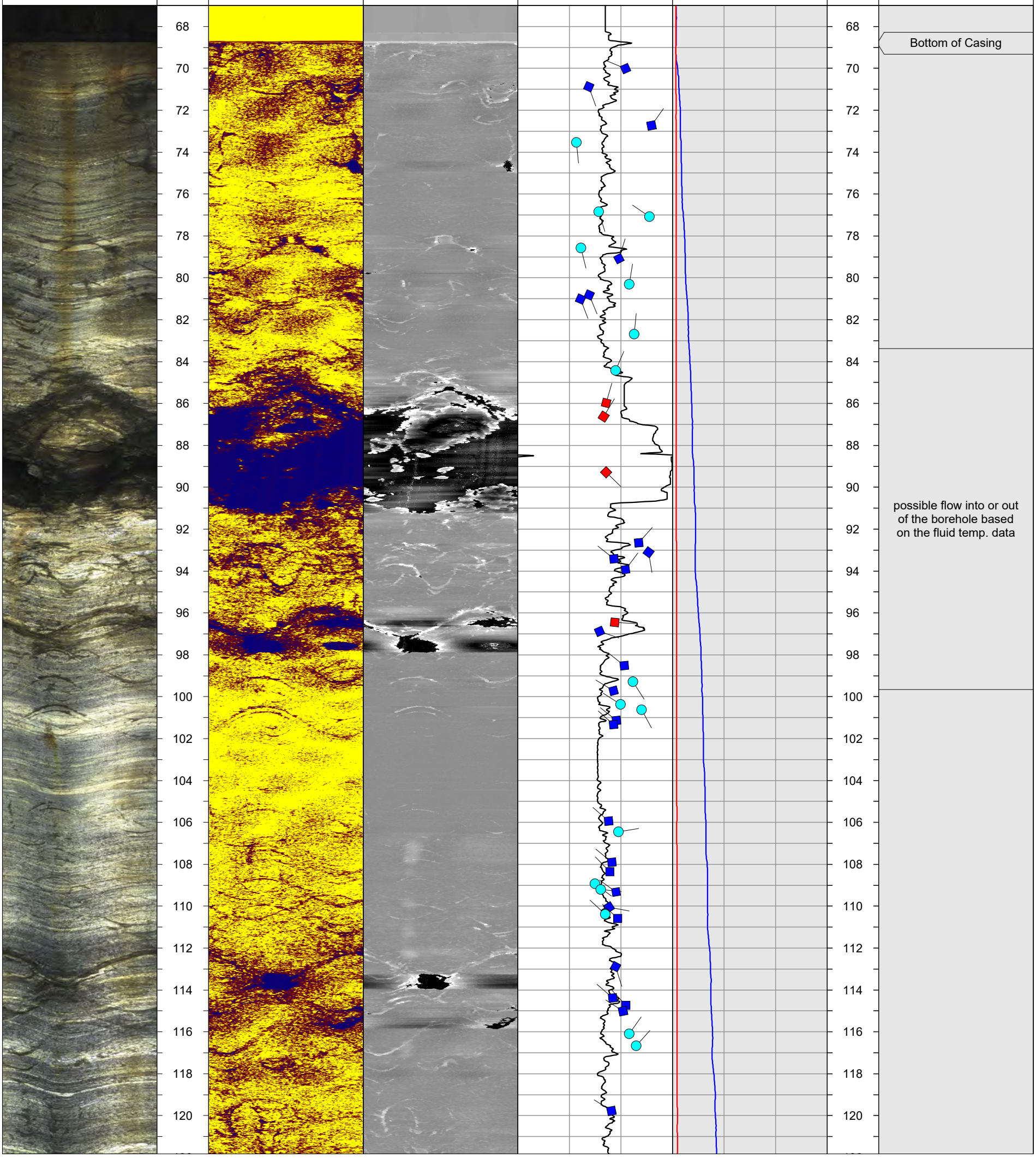
DATE LOGGED: September 27, 2018

CLIENT:	Geosphere Environmental Management Inc.	HAGER-RICHTER FILE:	17RG113-18
PROJECT:	Aquarion Well 22 - Borehole Geophysical Logging	LOG DATUM:	Top of the 10-Inch Steel Casing
LOCATION:	Little River Road, Hampton, New Hampshire	ORIENTATION REFERENCE:	True North (Magnetic Declination = 15° West)
LOGGING GEOPHYSICIST(S):	Nick DeCristofaro & Mark Jones	TOP OF CASING:	2.3 Feet Above the Ground Surface
PROJECT REP(S) ON-SITE:	Matt Krapf & Shawn Case	BOREHOLE DIAMETER:	10 Inches to 324.0 Feet; 8 Inches Below 324.0 Feet
LOGS PROCESSED BY:	Robert Garfield & Nick DeCristofaro	WATER LEVEL DEPTH:	11.2 Feet

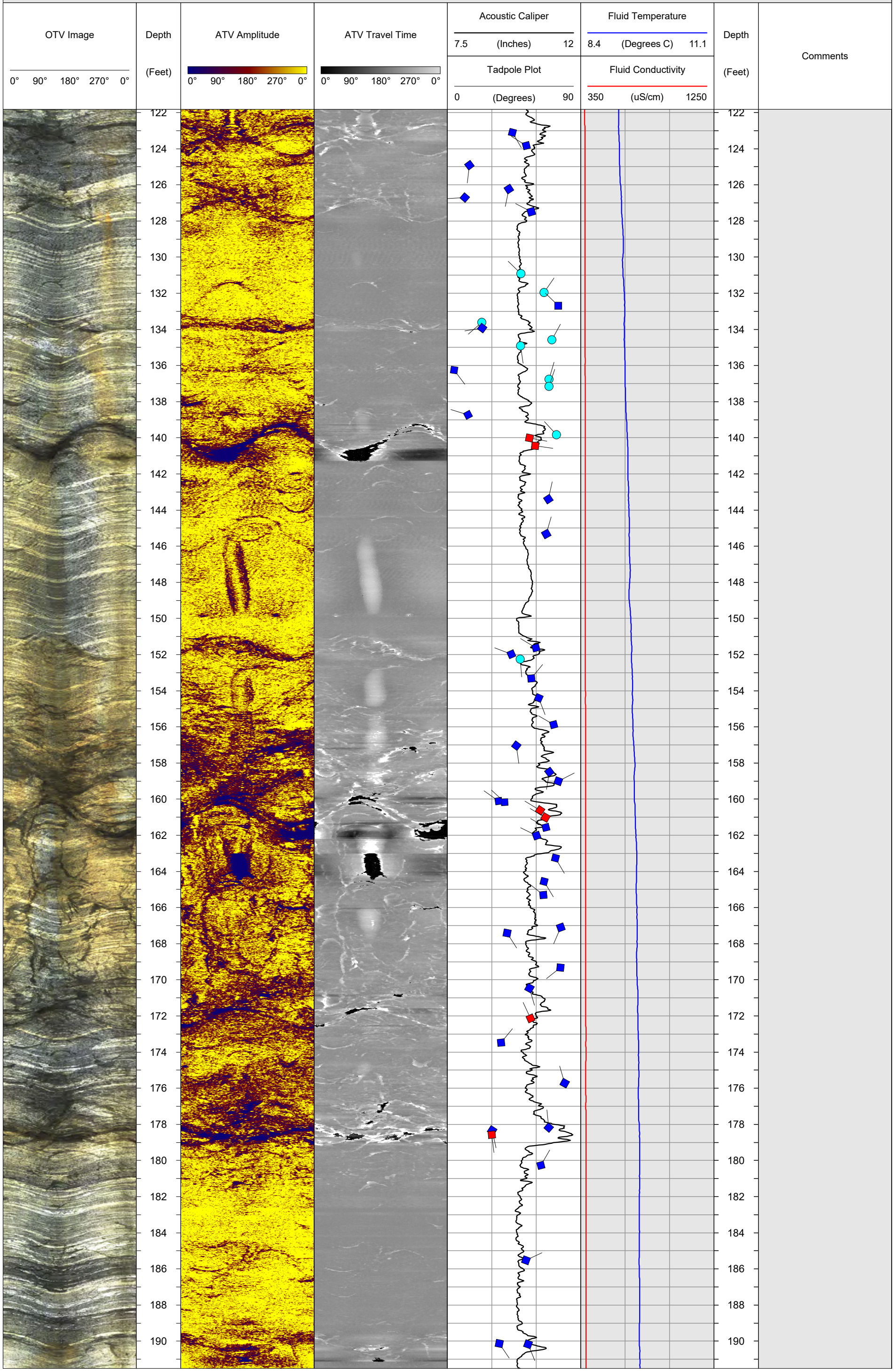
STRUCTURE LEGEND

Fracture Rank 1 Fracture Rank 2 Fracture Rank 3

Well 22 - Borehole Geophysical Logs

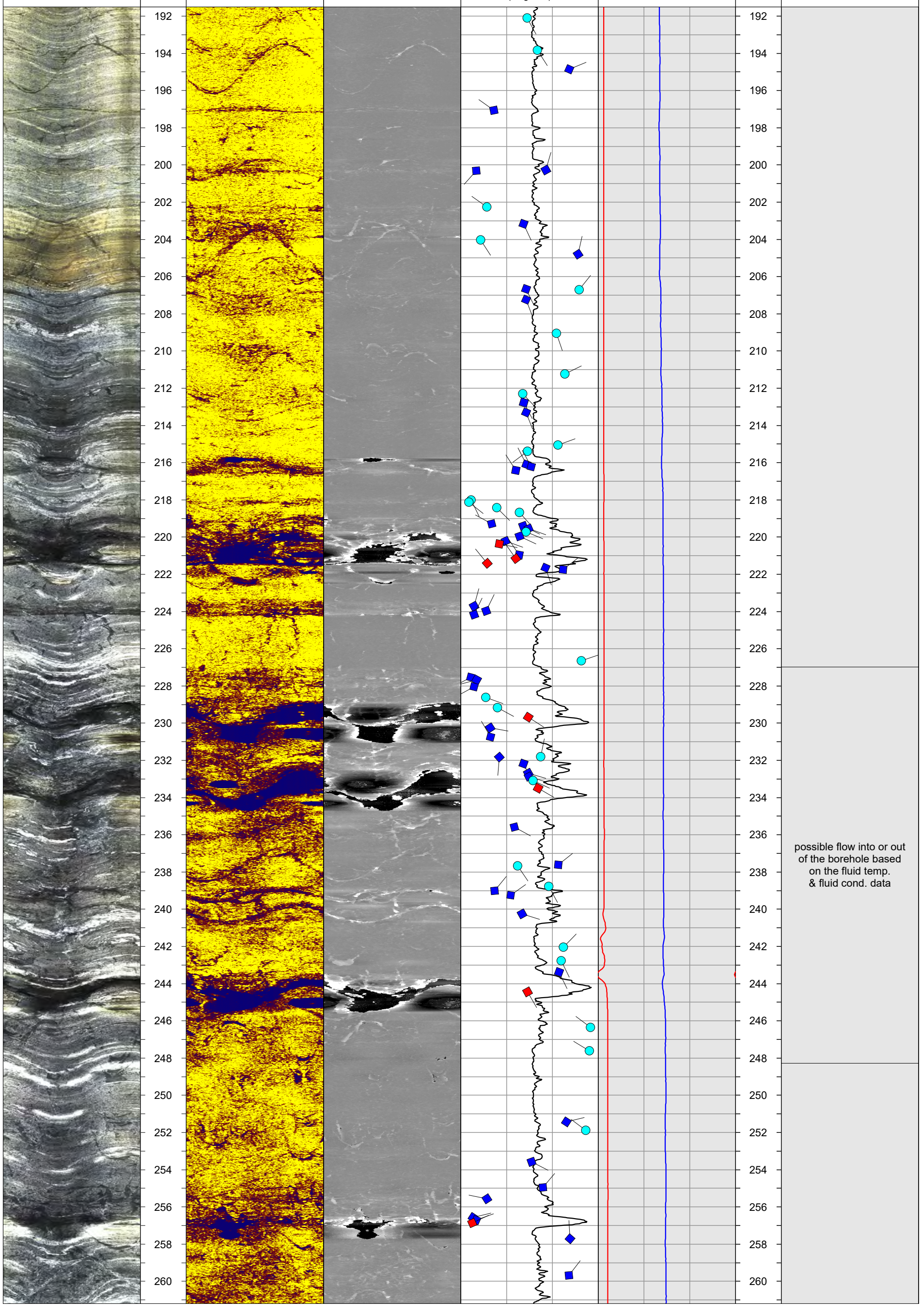


Well 22 - Borehole Geophysical Logs

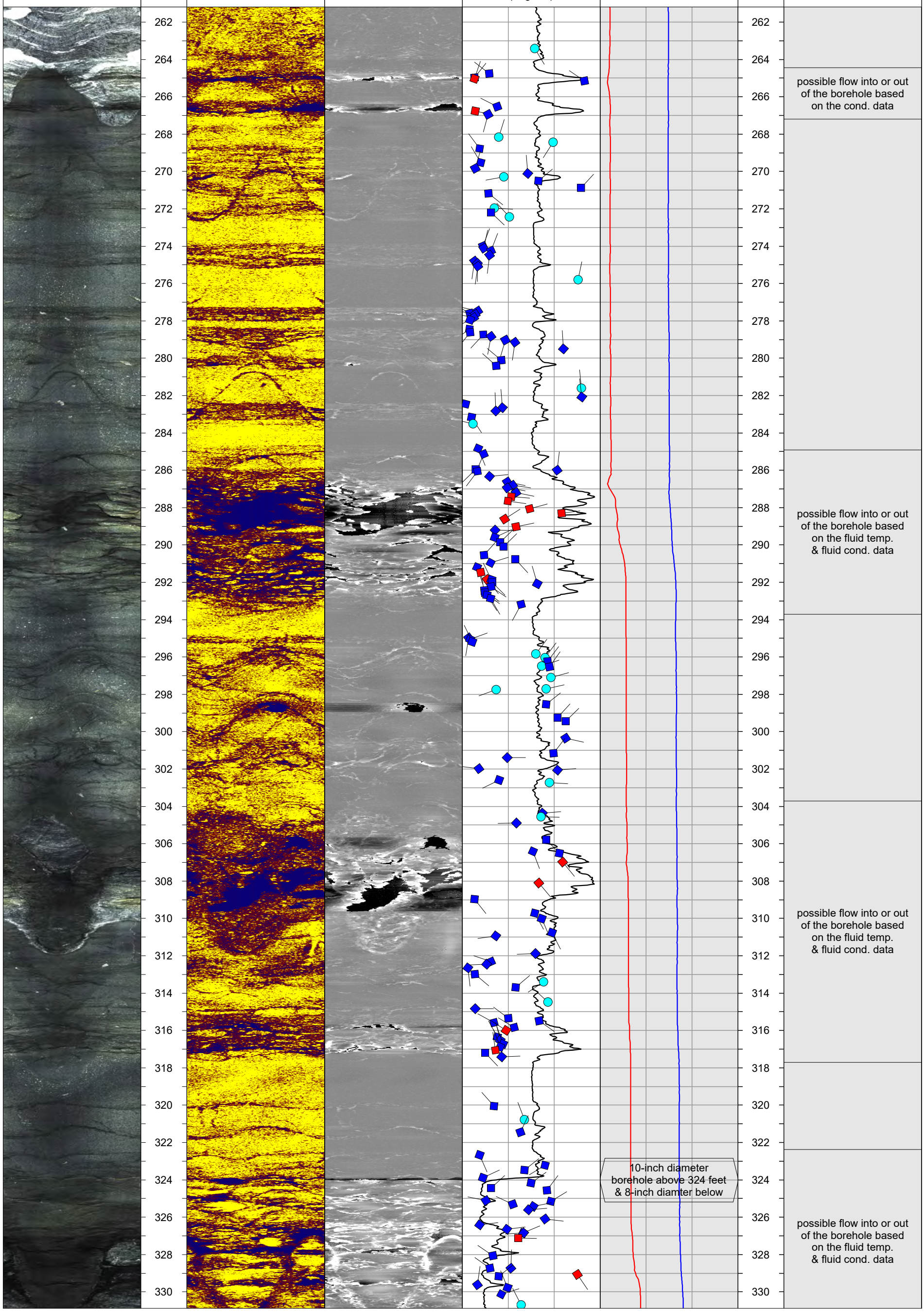


Well 22 - Borehole Geophysical Logs

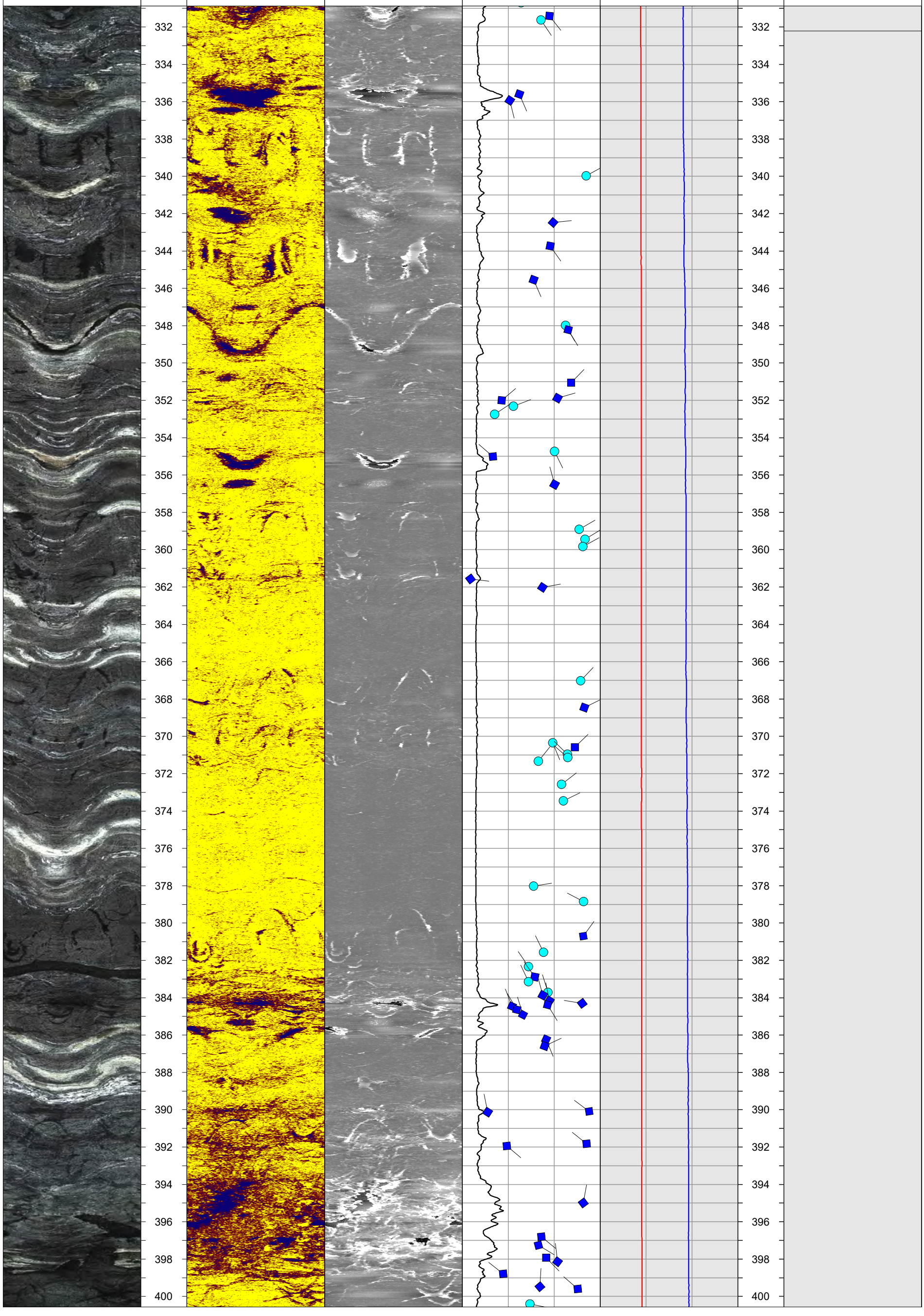
OTV Image	Depth (Feet)	ATV Amplitude	ATV Travel Time	Acoustic Caliper / Tadpole Plot	Fluid Temperature / Fluid Conductivity	Depth (Feet)	Comments
0° 90° 180° 270° 0°		0° 90° 180° 270° 0°	0° 90° 180° 270° 0°	7.5 (Inches) 12 0 (Degrees) 90	8.4 (Degrees C) 11.1 350 (uS/cm) 1250		



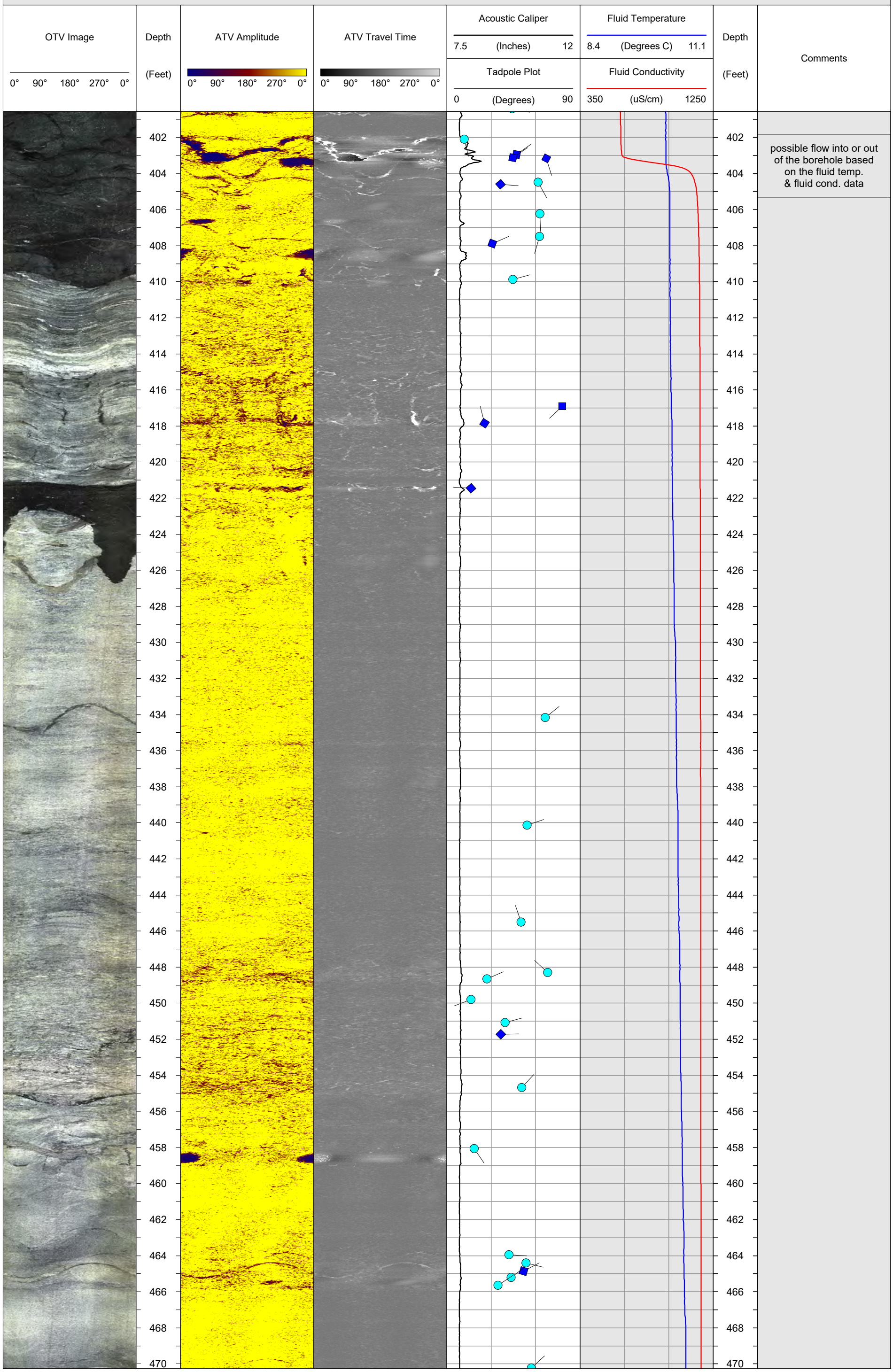
Well 22 - Borehole Geophysical Logs



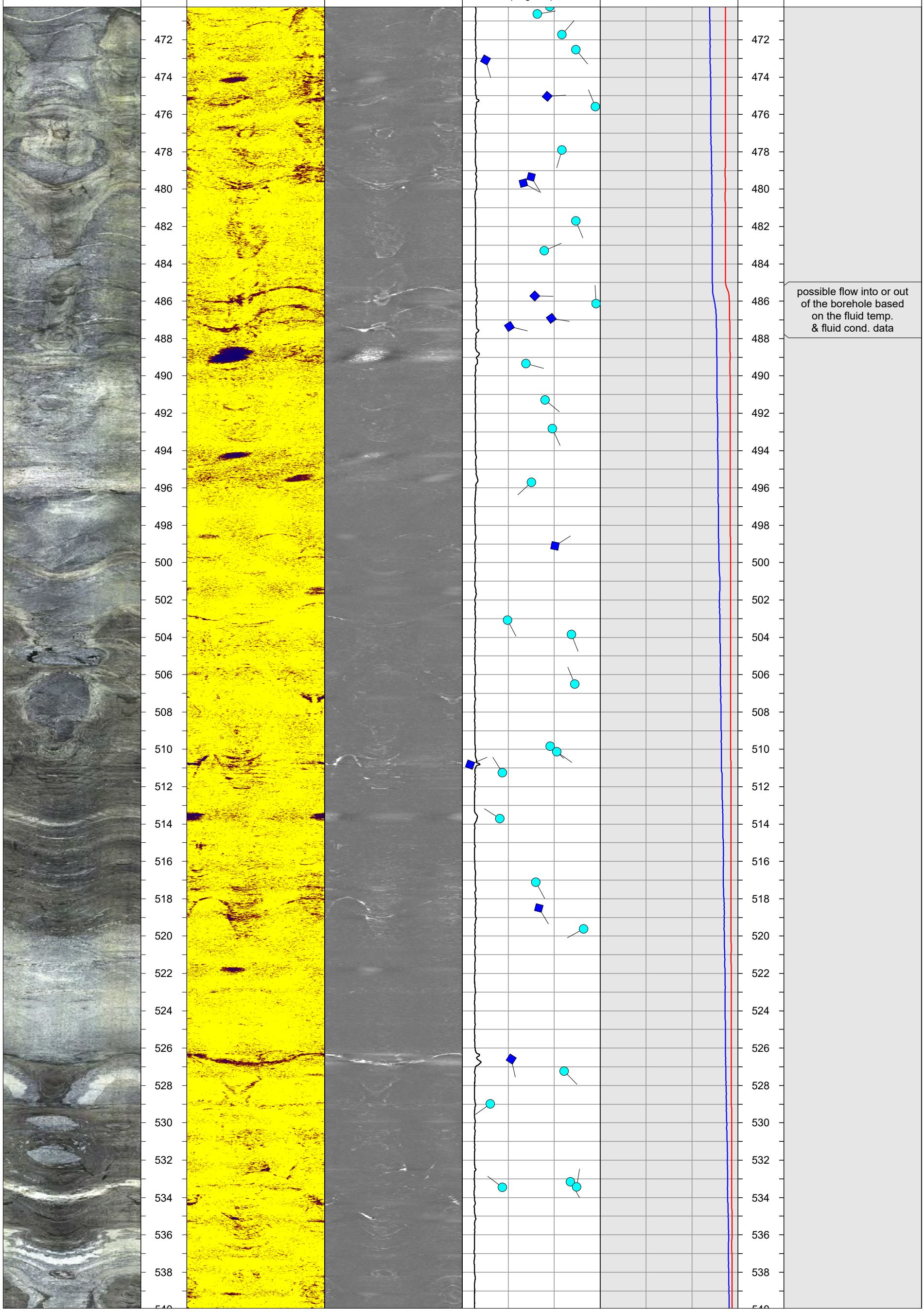
Well 22 - Borehole Geophysical Logs

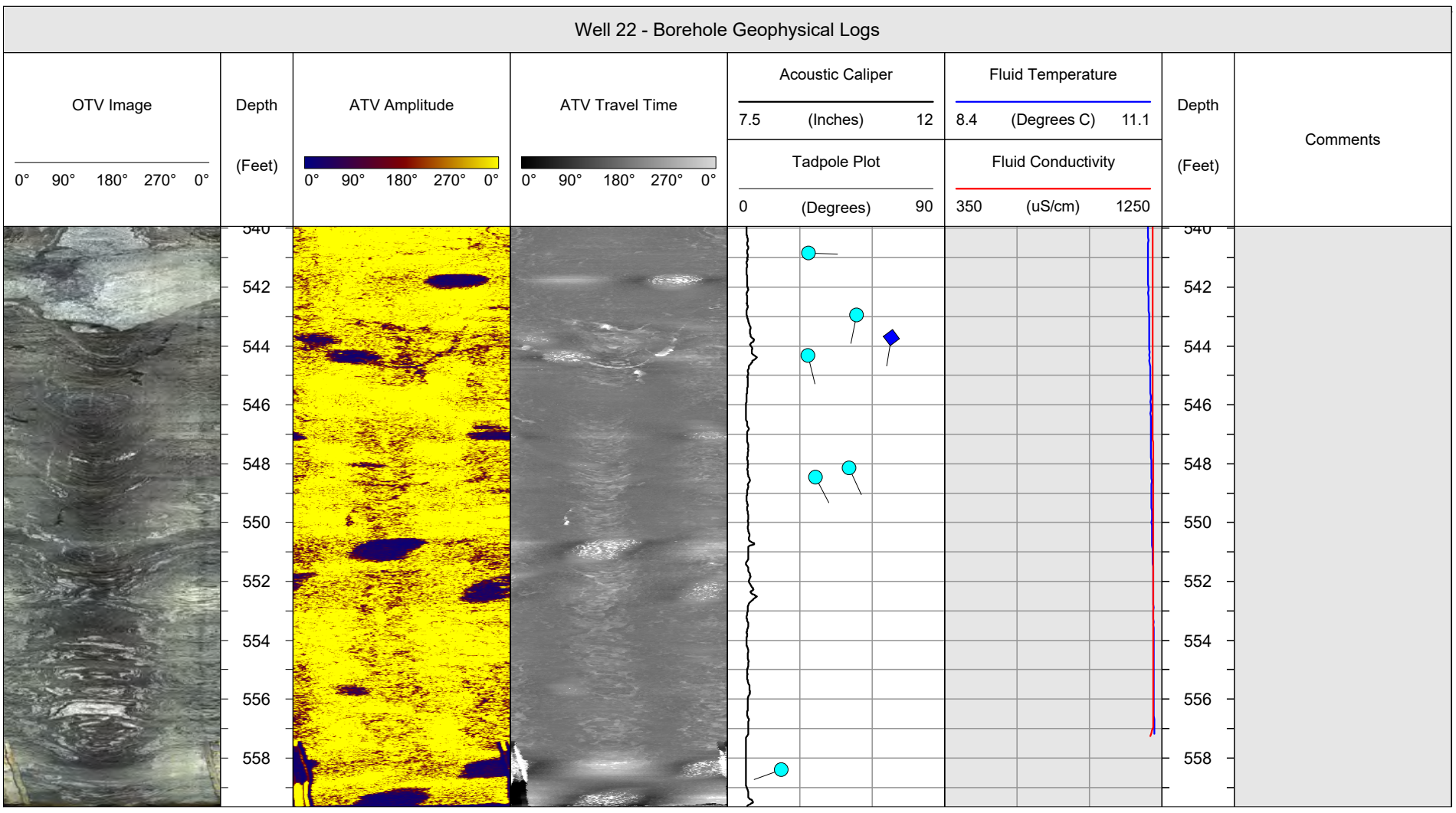


Well 22 - Borehole Geophysical Logs



Well 22 - Borehole Geophysical Logs




Well 22 - Borehole Geophysical Logs
OTV Image
0° 90° 180° 270° 0°
Depth
(Feet)
ATV Amplitude
0° 90° 180° 270° 0°
ATV Travel Time
0° 90° 180° 270° 0°
Acoustic Caliper
7.5 (Inches) 12
Tadpole Plot
0 (Degrees) 90
Fluid Temperature
8.4 (Degrees C) 11.1
Fluid Conductivity
350 (uS/cm) 1250
Depth
(Feet)
Comments
540
542
544
546
548
550
552
554
556
558

HAGER-RICHTER GEOSCIENCE, INC.

Salem, New Hampshire
Tel: 603.893.9944

Fords, New Jersey
Tel: 732.661.0555

WELL 22 - BOREHOLE GEOPHYSICAL LOGS

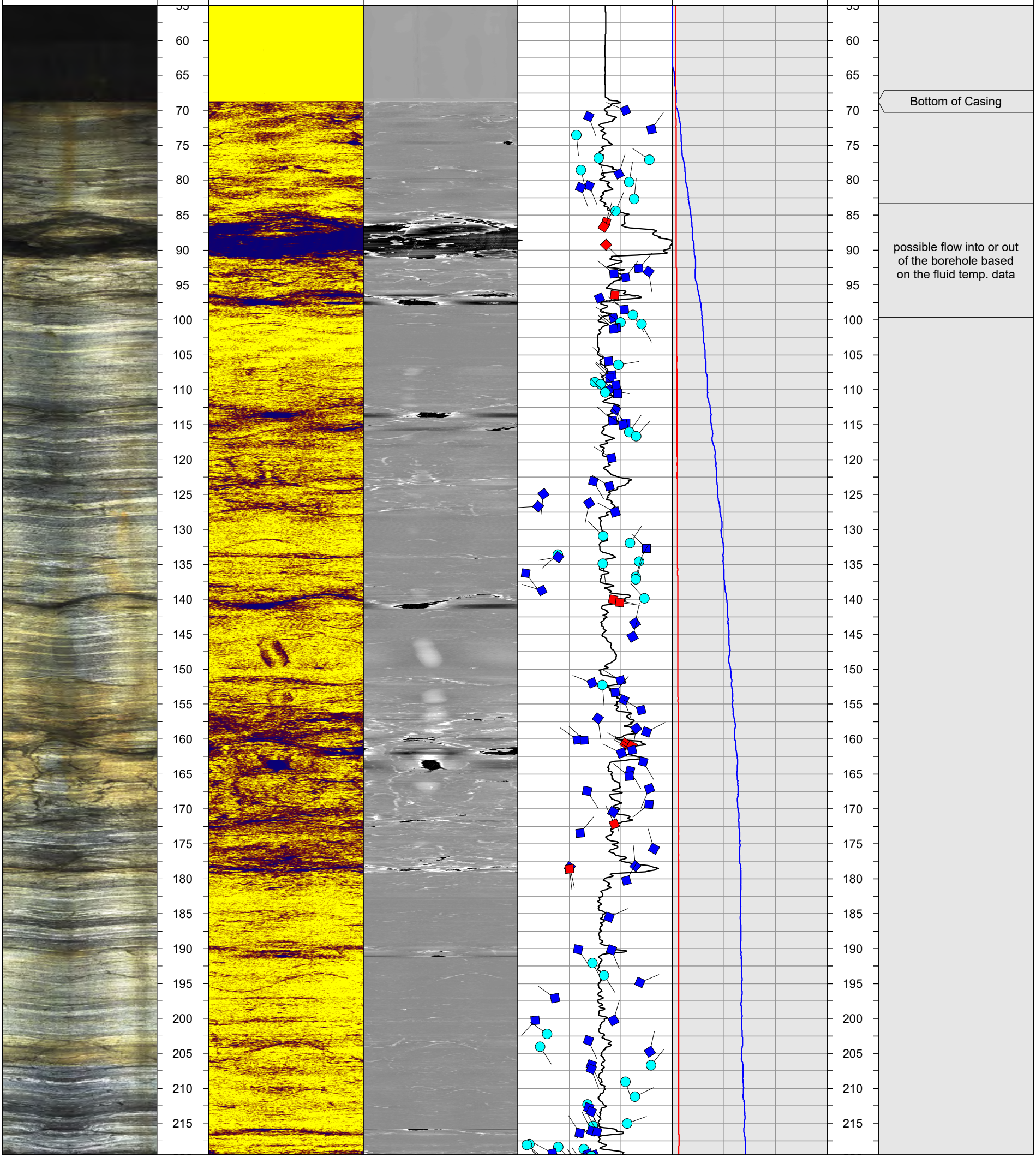
DATE LOGGED: September 27, 2018

CLIENT:	Geosphere Environmental Management Inc.	HAGER-RICHTER FILE:	17RG113-18
PROJECT:	Aquarion Well 22 - Borehole Geophysical Logging	LOG DATUM:	Top of the 10-Inch Steel Casing
LOCATION:	Little River Road, Hampton, New Hampshire	ORIENTATION REFERENCE:	True North (Magnetic Declination = 15° West)
LOGGING GEOPHYSICIST(S):	Nick DeCristofaro & Mark Jones	TOP OF CASING:	2.3 Feet Above the Ground Surface
PROJECT REP(S) ON-SITE:	Matt Krapf & Shawn Case	BOREHOLE DIAMETER:	10 Inches to 324.0 Feet; 8 Inches Below 324.0 Feet
LOGS PROCESSED BY:	Robert Garfield & Nick DeCristofaro	WATER LEVEL DEPTH:	11.2 Feet

STRUCTURE LEGEND

Fracture Rank 1 Fracture Rank 2 Fracture Rank 3

Well 22 - Borehole Geophysical Logs



Well 22 - Borehole Geophysical Logs

OTV Image

0° 90° 180° 270° 0°

Depth (Feet)

ATV Amplitude

0° 90° 180° 270° 0°

ATV Travel Time

0° 90° 180° 270° 0°

Acoustic Caliper

7.5 (Inches) 12

Tadpole Plot

0 (Degrees) 90

Fluid Temperature

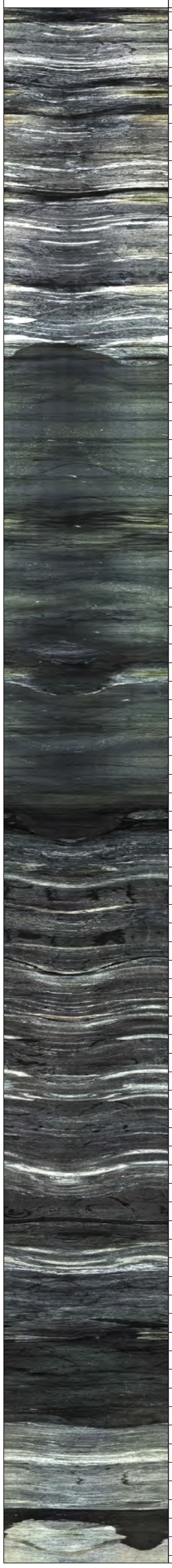
8.4 (Degrees C) 11.1

Fluid Conductivity

350 (uS/cm) 1250

Depth (Feet)

Comments



220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425

possible flow into or out of the borehole based on the fluid temp. & fluid cond. data

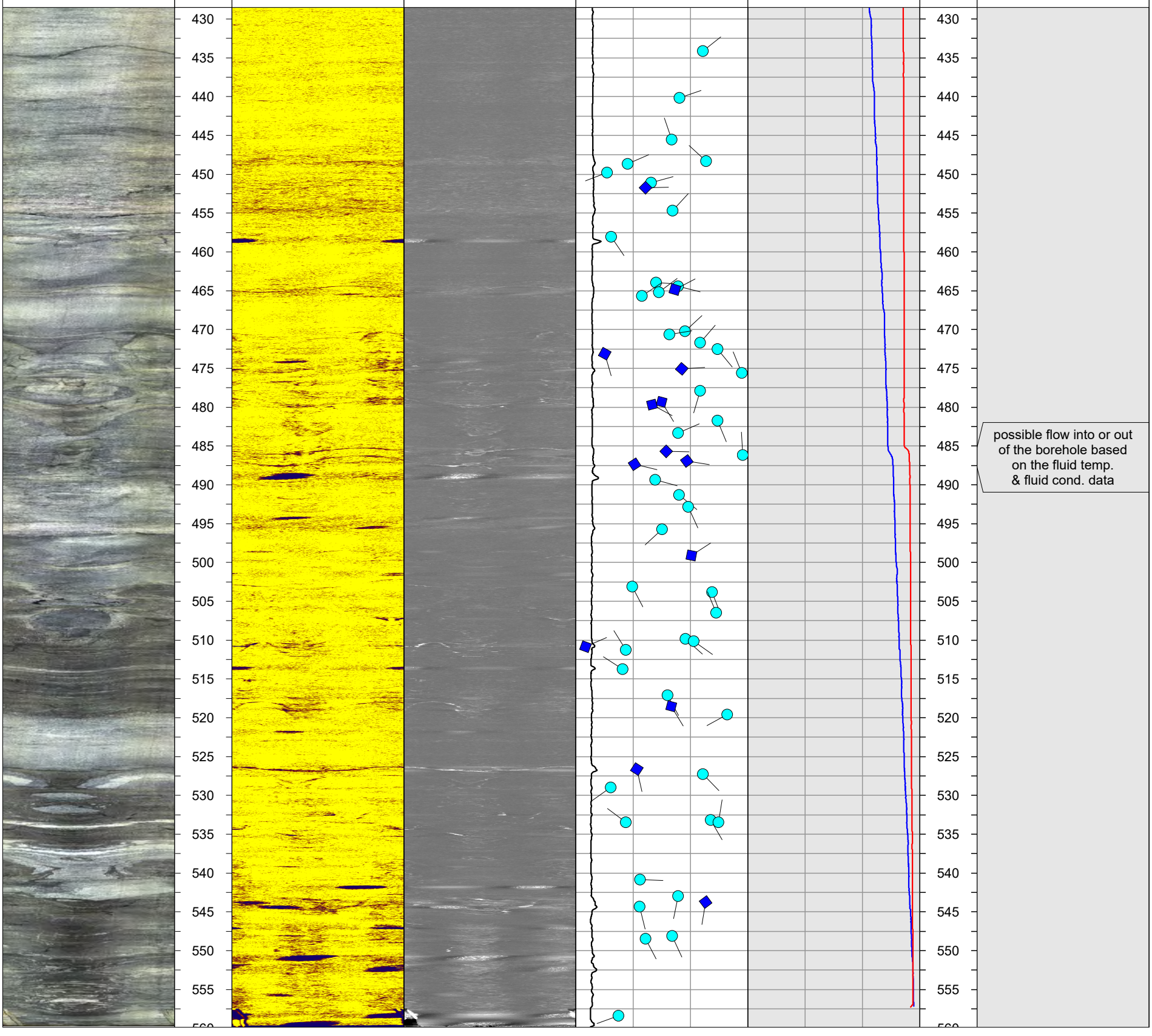
possible flow into or out of the borehole based on the cond. data

possible flow into or out of the borehole based on the fluid temp. & fluid cond. data

10-inch diameter borehole above 324 feet & 8-inch diamter below

possible flow into or out of the borehole based on the fluid temp. & fluid cond. data

Well 22 - Borehole Geophysical Logs



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Tel: 732.661.0555

WELL 22 - BEDROCK FRACTURE STATISTICS PLOTS

DATE(S) LOGGED: September 27, 2018

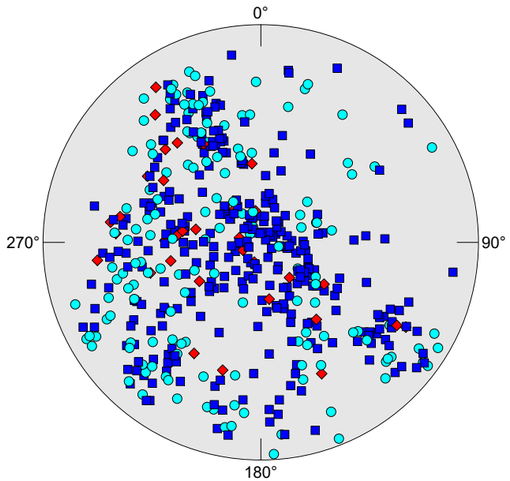
CLIENT: Geosphere Environmental Management Inc.
PROJECT: Aquarion Well 22 - Borehole Geophysical Logging
LOCATION: Little River Road, Hampton, New Hampshire

HAGER-RICHTER FILE: 18J60
ORIENTATION REFERENCE: True North
MAGNETIC DECLINATION: 15° West

STRUCTURE LEGEND

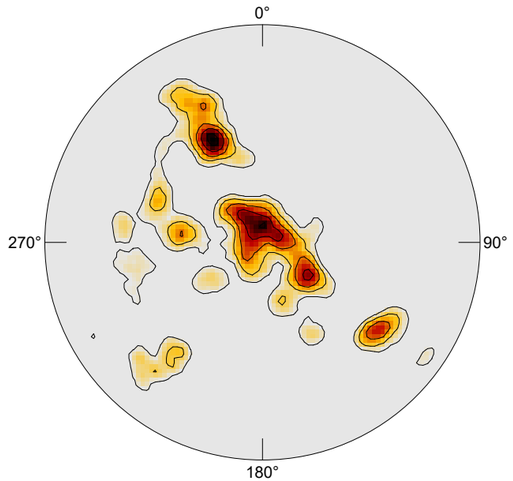
Fracture Rank 1 ■ Fracture Rank 2 ◆ Fracture Rank 3

Stereogram - Lower Hemisphere of Bedrock Fractures



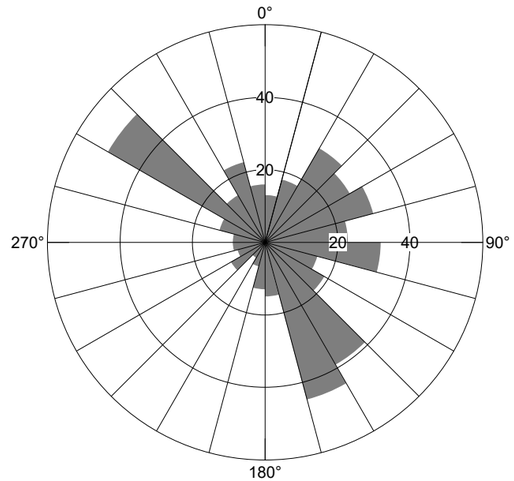
	Counts	Dip[deg]	Azi[deg]
Mean	486	43.14	73.18
■	306	39.14	57.56
●	147	52.06	86.00
◆	33	39.98	87.85

Contoured Stereogram - Lower Hemisphere of Bedrock Fractures



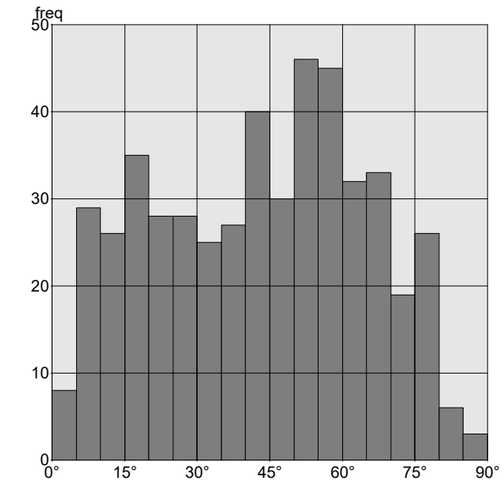
	Counts	Dip[deg]	Azi[deg]
Mean	486	43.14	73.18
■	306	39.14	57.56
●	147	52.06	86.00
◆	33	39.98	87.85

Dip Azimuth Rose Diagram of Bedrock Fractures



Components:	Azimuth
Counts:	486.00
Mean (2D):	73.18
Std.Dev.:	103.62
Min:	2.27
Max:	358.24

Dip Angle Histogram of Bedrock Fractures



Counts:	486.00
Mean (2D):	43.14
Std.Dev.:	21.72
Min:	2.13
Max:	87.38

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Tel: 732.661.0555

WELL 22 - BEDROCK FRACTURE STATISTICS PLOTS - POSSIBLE HYDRAULICALLY TRANSMISSIVE FRACTURES

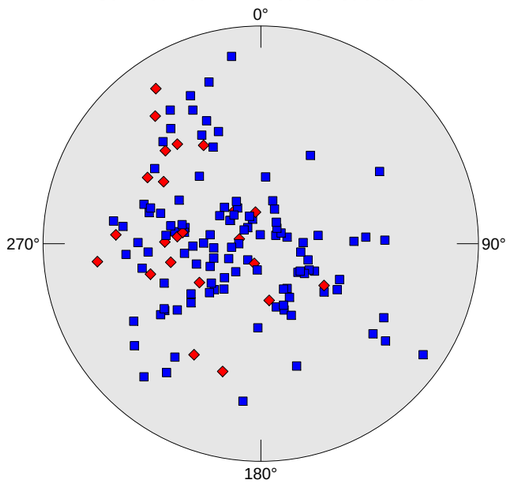
DATE(S) LOGGED: September 27, 2018

CLIENT:	Geosphere Environmental Management Inc.	HAGER-RICHTER FILE:	18J60
PROJECT:	Aquarion Well 22 - Borehole Geophysical Logging	ORIENTATION REFERENCE:	True North
LOCATION:	Little River Road, Hampton, New Hampshire	MAGNETIC DECLINATION:	15° West

STRUCTURE LEGEND

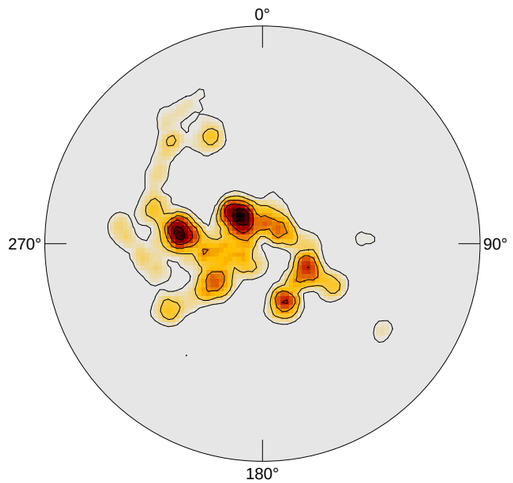
■ Fracture Rank 2 ◆ Fracture Rank 3

Stereogram - Lower Hemisphere of Bedrock Fractures



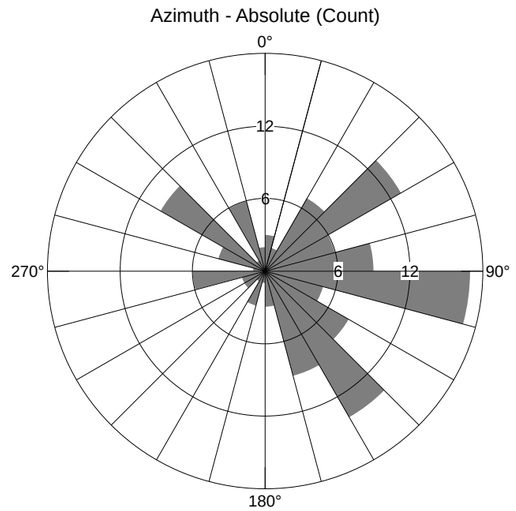
	Counts	Dip[deg]	Azi[deg]
Mean	135	33.77	90.65
◆	23	39.24	97.33
■	112	32.65	87.32

Contoured Stereogram - Lower Hemisphere of Bedrock Fractures



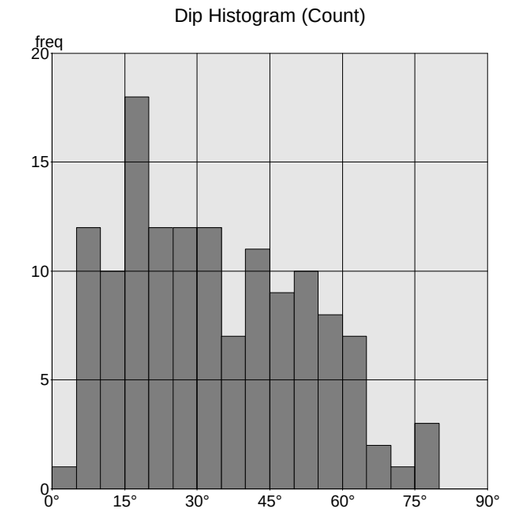
	Counts	Dip[deg]	Azi[deg]
Mean	135	33.77	90.65
◆	23	39.24	97.33
■	112	32.65	87.32

Dip Azimuth Rose Diagram of Bedrock Fractures



Components:	Azimuth
Counts:	135.00
Mean (2D):	90.65
Std.Dev.:	86.20
Min:	2.27
Max:	351.56

Dip Angle Histogram of Bedrock Fractures



Counts:	135.00
Mean (2D):	33.77
Std.Dev.:	18.34
Min:	3.50
Max:	79.71

HAGER-RICHTER GEOSCIENCE, INC.	
WELL 22 - TABLE OF BEDROCK FRACTURES	
CLIENT	Geosphere Environmental Management Inc.
PROJECT	Aquarion Well 22
LOCATION	Little River Road, Hampton, New Hampshire
H-R FILE	17RG113-18
DATE LOGGED	September 27, 2018
LOG DATUM	Top of the 10-Inch Steel Casing
DIP AZIMUTH	True North (Magnetic Declination = 15° West)
DIP ANGLE	Measured from Horizontal

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
70.0	292	63	Fracture Rank 2
70.9	160	41	Fracture Rank 2
72.7	35	78	Fracture Rank 2
73.5	174	34	Fracture Rank 1
76.9	162	47	Fracture Rank 1
77.1	304	77	Fracture Rank 1
78.6	166	37	Fracture Rank 1
79.1	18	59	Fracture Rank 2
80.3	9	65	Fracture Rank 1
80.8	158	41	Fracture Rank 2
81.0	159	36	Fracture Rank 2
82.7	6	68	Fracture Rank 1
84.4	23	57	Fracture Rank 1
86.0	17	51	Fracture Rank 3
86.6	31	50	Fracture Rank 3
89.3	134	51	Fracture Rank 3
92.6	41	70	Fracture Rank 2
93.1	171	76	Fracture Rank 2
93.4	309	56	Fracture Rank 2
93.9	36	63	Fracture Rank 2
96.5	94	56	Fracture Rank 3
96.9	109	47	Fracture Rank 2
98.5	308	62	Fracture Rank 2
99.3	148	67	Fracture Rank 1
99.7	301	56	Fracture Rank 2
100.4	303	60	Fracture Rank 1
100.6	151	72	Fracture Rank 1
101.1	308	57	Fracture Rank 2
101.3	312	56	Fracture Rank 2
105.9	311	53	Fracture Rank 2
106.4	80	59	Fracture Rank 1
107.9	309	55	Fracture Rank 2
108.4	316	54	Fracture Rank 2
108.9	127	45	Fracture Rank 1
109.2	96	48	Fracture Rank 1

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
109.3	306	57	Fracture Rank 2
110.1	100	53	Fracture Rank 2
110.4	313	51	Fracture Rank 1
110.6	312	58	Fracture Rank 2
112.9	162	57	Fracture Rank 2
114.4	311	55	Fracture Rank 2
114.7	317	63	Fracture Rank 2
115.0	303	61	Fracture Rank 2
116.1	35	65	Fracture Rank 1
116.7	42	69	Fracture Rank 1
119.8	302	54	Fracture Rank 2
123.1	149	44	Fracture Rank 2
123.8	302	53	Fracture Rank 2
124.9	187	15	Fracture Rank 2
126.2	192	41	Fracture Rank 2
126.7	267	12	Fracture Rank 2
127.5	297	57	Fracture Rank 2
130.9	314	50	Fracture Rank 1
132.0	34	65	Fracture Rank 1
132.7	314	75	Fracture Rank 2
133.6	229	23	Fracture Rank 1
133.9	261	24	Fracture Rank 2
134.6	28	70	Fracture Rank 1
134.9	171	49	Fracture Rank 1
136.3	143	4	Fracture Rank 2
136.8	16	69	Fracture Rank 1
137.2	18	69	Fracture Rank 1
138.7	288	14	Fracture Rank 2
139.8	317	74	Fracture Rank 1
140.0	101	56	Fracture Rank 3
140.5	98	59	Fracture Rank 3
143.4	13	68	Fracture Rank 2
145.3	16	67	Fracture Rank 2
151.6	301	60	Fracture Rank 2
152.0	291	43	Fracture Rank 2
152.3	175	49	Fracture Rank 1
153.3	39	57	Fracture Rank 2
154.4	158	62	Fracture Rank 2
155.9	300	72	Fracture Rank 2
157.0	172	47	Fracture Rank 2
158.5	189	69	Fracture Rank 2
159.0	63	75	Fracture Rank 2
160.1	306	35	Fracture Rank 2
160.2	312	39	Fracture Rank 2
160.6	301	63	Fracture Rank 3

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
161.0	300	66	Fracture Rank 3
161.6	300	66	Fracture Rank 2
162.0	296	60	Fracture Rank 2
163.3	149	73	Fracture Rank 2
164.6	149	65	Fracture Rank 2
165.3	309	65	Fracture Rank 2
167.1	204	77	Fracture Rank 2
167.4	148	40	Fracture Rank 2
169.3	231	76	Fracture Rank 2
170.5	164	56	Fracture Rank 2
172.1	335	56	Fracture Rank 3
173.5	39	36	Fracture Rank 2
175.7	344	79	Fracture Rank 2
178.2	354	68	Fracture Rank 2
178.3	167	30	Fracture Rank 2
178.6	173	30	Fracture Rank 3
180.3	30	63	Fracture Rank 2
185.5	65	53	Fracture Rank 2
190.1	146	35	Fracture Rank 2
190.2	157	55	Fracture Rank 2
192.1	151	44	Fracture Rank 1
193.8	147	50	Fracture Rank 1
194.9	68	71	Fracture Rank 2
197.1	305	22	Fracture Rank 2
200.3	17	56	Fracture Rank 2
200.3	222	10	Fracture Rank 2
202.3	306	17	Fracture Rank 1
203.2	155	41	Fracture Rank 2
204.0	147	13	Fracture Rank 1
204.8	13	77	Fracture Rank 2
206.7	154	43	Fracture Rank 2
206.7	38	78	Fracture Rank 1
207.2	159	43	Fracture Rank 2
209.1	161	63	Fracture Rank 1
211.2	63	68	Fracture Rank 1
212.3	137	41	Fracture Rank 1
212.8	153	41	Fracture Rank 2
213.3	158	43	Fracture Rank 2
215.1	70	64	Fracture Rank 1
215.4	233	44	Fracture Rank 1
216.1	333	43	Fracture Rank 2
216.2	332	46	Fracture Rank 2
216.4	327	36	Fracture Rank 2
218.0	153	7	Fracture Rank 1
218.1	129	5	Fracture Rank 1

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
218.4	135	23	Fracture Rank 1
218.7	138	38	Fracture Rank 1
219.3	298	20	Fracture Rank 2
219.4	116	41	Fracture Rank 2
219.6	110	44	Fracture Rank 2
219.7	113	43	Fracture Rank 1
220.0	115	38	Fracture Rank 2
220.2	109	29	Fracture Rank 2
220.4	102	25	Fracture Rank 3
221.0	326	38	Fracture Rank 2
221.2	324	36	Fracture Rank 3
221.4	321	17	Fracture Rank 3
221.7	161	55	Fracture Rank 2
221.7	52	67	Fracture Rank 2
223.7	15	9	Fracture Rank 2
224.0	26	16	Fracture Rank 2
224.2	27	9	Fracture Rank 2
226.6	72	79	Fracture Rank 1
227.5	241	7	Fracture Rank 2
227.7	255	10	Fracture Rank 2
228.0	242	9	Fracture Rank 2
228.6	110	16	Fracture Rank 1
229.2	119	24	Fracture Rank 1
229.7	122	44	Fracture Rank 3
230.3	100	19	Fracture Rank 2
230.8	329	20	Fracture Rank 2
231.8	11	52	Fracture Rank 1
231.8	184	25	Fracture Rank 2
232.2	154	41	Fracture Rank 2
232.7	106	44	Fracture Rank 2
232.9	108	44	Fracture Rank 2
233.1	115	47	Fracture Rank 1
233.5	120	51	Fracture Rank 3
235.6	118	35	Fracture Rank 2
237.6	51	64	Fracture Rank 2
237.7	146	37	Fracture Rank 1
238.8	151	58	Fracture Rank 1
239.0	40	22	Fracture Rank 2
239.3	54	33	Fracture Rank 2
240.3	107	40	Fracture Rank 2
242.0	44	67	Fracture Rank 1
242.8	154	66	Fracture Rank 1
243.4	154	64	Fracture Rank 2
244.4	150	44	Fracture Rank 3
246.4	307	85	Fracture Rank 1

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
247.6	301	84	Fracture Rank 1
251.4	76	69	Fracture Rank 2
251.9	306	82	Fracture Rank 1
253.6	117	46	Fracture Rank 2
255.0	40	54	Fracture Rank 2
255.6	281	17	Fracture Rank 2
256.6	76	8	Fracture Rank 2
256.7	71	10	Fracture Rank 2
256.9	65	7	Fracture Rank 3
257.7	357	71	Fracture Rank 2
259.7	38	71	Fracture Rank 2
263.4	149	47	Fracture Rank 1
264.8	308	18	Fracture Rank 2
265.0	39	8	Fracture Rank 2
265.0	19	8	Fracture Rank 3
265.2	304	80	Fracture Rank 2
266.5	297	23	Fracture Rank 2
266.8	103	8	Fracture Rank 3
266.9	196	17	Fracture Rank 2
268.2	17	24	Fracture Rank 1
268.4	213	59	Fracture Rank 1
268.8	324	11	Fracture Rank 2
269.5	329	12	Fracture Rank 2
269.8	16	8	Fracture Rank 2
270.1	356	43	Fracture Rank 2
270.3	260	27	Fracture Rank 1
270.5	50	50	Fracture Rank 2
270.9	43	77	Fracture Rank 2
271.2	129	17	Fracture Rank 2
272.0	93	21	Fracture Rank 1
272.2	134	19	Fracture Rank 2
272.4	318	31	Fracture Rank 1
274.0	21	13	Fracture Rank 2
274.1	13	14	Fracture Rank 2
274.3	20	19	Fracture Rank 2
274.5	186	18	Fracture Rank 2
274.8	188	8	Fracture Rank 2
274.9	180	10	Fracture Rank 2
275.1	188	10	Fracture Rank 2
275.8	11	76	Fracture Rank 1
277.5	283	10	Fracture Rank 2
277.6	299	5	Fracture Rank 2
277.7	281	8	Fracture Rank 2
277.8	282	7	Fracture Rank 2
278.0	244	5	Fracture Rank 2

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
278.4	233	5	Fracture Rank 2
278.6	218	5	Fracture Rank 2
278.7	222	14	Fracture Rank 2
278.8	190	19	Fracture Rank 2
279.0	196	28	Fracture Rank 2
279.2	189	34	Fracture Rank 2
279.5	357	66	Fracture Rank 2
280.1	310	26	Fracture Rank 2
280.4	312	22	Fracture Rank 2
281.6	354	78	Fracture Rank 1
282.1	353	78	Fracture Rank 2
282.5	239	2	Fracture Rank 2
282.6	355	26	Fracture Rank 2
282.8	358	22	Fracture Rank 2
283.2	148	6	Fracture Rank 2
283.5	284	7	Fracture Rank 1
284.8	158	10	Fracture Rank 2
285.1	202	14	Fracture Rank 2
286.0	226	9	Fracture Rank 2
286.0	7	62	Fracture Rank 2
286.1	216	10	Fracture Rank 2
286.3	85	18	Fracture Rank 2
286.6	102	29	Fracture Rank 2
286.8	98	33	Fracture Rank 2
286.9	99	29	Fracture Rank 2
287.2	101	35	Fracture Rank 2
287.4	95	32	Fracture Rank 3
287.7	98	30	Fracture Rank 3
288.1	74	44	Fracture Rank 3
288.3	84	65	Fracture Rank 3
288.6	58	27	Fracture Rank 3
289.0	78	35	Fracture Rank 3
289.2	91	21	Fracture Rank 2
289.6	66	21	Fracture Rank 2
289.9	46	25	Fracture Rank 2
290.1	46	27	Fracture Rank 2
290.5	42	14	Fracture Rank 2
290.8	138	34	Fracture Rank 2
291.0	73	19	Fracture Rank 2
291.2	161	10	Fracture Rank 2
291.5	170	12	Fracture Rank 3
291.9	142	16	Fracture Rank 3
291.9	334	19	Fracture Rank 2
292.0	135	19	Fracture Rank 2
292.1	344	49	Fracture Rank 2

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
292.2	125	19	Fracture Rank 2
292.4	128	14	Fracture Rank 2
292.6	127	15	Fracture Rank 2
292.7	147	16	Fracture Rank 2
292.9	150	19	Fracture Rank 2
293.2	209	38	Fracture Rank 2
295.0	190	4	Fracture Rank 2
295.1	71	5	Fracture Rank 2
295.2	333	6	Fracture Rank 2
295.8	37	48	Fracture Rank 1
296.0	37	54	Fracture Rank 1
296.2	37	56	Fracture Rank 2
296.5	71	52	Fracture Rank 1
296.5	35	57	Fracture Rank 2
297.1	76	58	Fracture Rank 1
297.7	77	55	Fracture Rank 1
297.7	250	22	Fracture Rank 1
298.5	51	55	Fracture Rank 2
299.2	43	62	Fracture Rank 2
299.4	46	68	Fracture Rank 2
300.4	102	67	Fracture Rank 2
301.2	38	59	Fracture Rank 2
301.4	90	29	Fracture Rank 2
302.0	277	11	Fracture Rank 2
302.1	86	62	Fracture Rank 2
302.6	244	24	Fracture Rank 2
302.7	94	57	Fracture Rank 1
304.4	85	52	Fracture Rank 2
304.6	91	51	Fracture Rank 1
304.9	268	35	Fracture Rank 2
305.8	136	55	Fracture Rank 2
306.4	159	46	Fracture Rank 2
306.5	146	63	Fracture Rank 2
307.0	140	65	Fracture Rank 3
308.1	140	50	Fracture Rank 3
309.0	141	8	Fracture Rank 2
309.7	151	47	Fracture Rank 2
310.0	156	52	Fracture Rank 2
310.8	153	58	Fracture Rank 2
310.9	262	22	Fracture Rank 2
311.9	268	48	Fracture Rank 2
312.3	289	19	Fracture Rank 2
312.5	268	16	Fracture Rank 2
312.7	173	4	Fracture Rank 2
313.0	130	8	Fracture Rank 2

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
313.4	236	53	Fracture Rank 1
313.7	50	35	Fracture Rank 2
314.5	313	56	Fracture Rank 1
314.8	90	8	Fracture Rank 2
315.3	307	30	Fracture Rank 2
315.5	125	50	Fracture Rank 2
315.6	299	21	Fracture Rank 2
315.8	301	34	Fracture Rank 2
316.0	303	29	Fracture Rank 3
316.4	332	23	Fracture Rank 2
316.5	346	25	Fracture Rank 2
316.7	341	27	Fracture Rank 2
316.9	339	25	Fracture Rank 2
317.1	352	22	Fracture Rank 3
317.2	137	15	Fracture Rank 2
317.4	88	26	Fracture Rank 2
320.1	318	21	Fracture Rank 2
320.8	339	41	Fracture Rank 1
321.4	25	38	Fracture Rank 2
322.7	157	11	Fracture Rank 2
323.2	239	54	Fracture Rank 2
323.5	52	41	Fracture Rank 2
323.9	65	13	Fracture Rank 2
324.2	55	45	Fracture Rank 2
324.4	47	19	Fracture Rank 2
324.6	37	55	Fracture Rank 2
325.1	282	15	Fracture Rank 2
325.2	59	58	Fracture Rank 2
325.3	295	33	Fracture Rank 2
325.4	78	46	Fracture Rank 2
325.6	86	43	Fracture Rank 2
326.1	97	54	Fracture Rank 2
326.4	83	11	Fracture Rank 2
326.6	83	29	Fracture Rank 2
326.8	68	40	Fracture Rank 2
326.9	266	40	Fracture Rank 2
327.1	91	36	Fracture Rank 3
328.1	305	20	Fracture Rank 2
328.7	305	18	Fracture Rank 2
328.7	2	32	Fracture Rank 2
329.1	146	75	Fracture Rank 3
329.2	51	24	Fracture Rank 2
329.6	8	10	Fracture Rank 2
329.8	337	29	Fracture Rank 2
330.1	72	25	Fracture Rank 2

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
330.7	333	38	Fracture Rank 1
331.4	142	57	Fracture Rank 2
331.6	147	51	Fracture Rank 1
335.6	157	37	Fracture Rank 2
335.9	166	31	Fracture Rank 2
340.0	61	81	Fracture Rank 1
342.5	84	59	Fracture Rank 2
343.7	145	57	Fracture Rank 2
345.5	157	46	Fracture Rank 2
348.0	150	68	Fracture Rank 1
348.2	149	69	Fracture Rank 2
351.1	44	71	Fracture Rank 2
351.9	73	62	Fracture Rank 2
352.0	50	26	Fracture Rank 2
352.3	69	33	Fracture Rank 1
352.8	56	21	Fracture Rank 1
354.7	154	60	Fracture Rank 1
355.0	311	20	Fracture Rank 2
356.5	345	60	Fracture Rank 2
358.9	60	76	Fracture Rank 1
359.5	58	80	Fracture Rank 1
359.8	61	79	Fracture Rank 1
361.6	97	5	Fracture Rank 2
362.0	80	52	Fracture Rank 2
367.0	43	77	Fracture Rank 1
368.5	64	80	Fracture Rank 2
370.4	157	59	Fracture Rank 1
370.6	46	74	Fracture Rank 2
371.0	314	69	Fracture Rank 1
371.1	311	69	Fracture Rank 1
371.3	38	50	Fracture Rank 1
372.6	52	65	Fracture Rank 1
373.5	64	66	Fracture Rank 1
378.0	81	47	Fracture Rank 1
378.9	298	79	Fracture Rank 1
380.7	36	79	Fracture Rank 2
381.6	334	53	Fracture Rank 1
382.3	326	43	Fracture Rank 1
382.9	325	47	Fracture Rank 2
383.2	335	43	Fracture Rank 1
383.7	343	56	Fracture Rank 1
383.9	345	53	Fracture Rank 2
384.2	348	57	Fracture Rank 2
384.3	279	78	Fracture Rank 2
384.4	149	56	Fracture Rank 2

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
384.5	339	32	Fracture Rank 2
384.6	330	35	Fracture Rank 2
384.9	343	40	Fracture Rank 2
386.2	158	55	Fracture Rank 2
386.6	65	54	Fracture Rank 2
390.1	306	83	Fracture Rank 2
390.1	348	16	Fracture Rank 2
391.8	309	81	Fracture Rank 2
391.9	130	29	Fracture Rank 2
395.0	10	79	Fracture Rank 2
396.8	129	52	Fracture Rank 2
397.3	121	50	Fracture Rank 2
397.9	136	55	Fracture Rank 2
398.1	353	62	Fracture Rank 2
398.8	308	27	Fracture Rank 2
399.5	3	51	Fracture Rank 2
399.6	311	75	Fracture Rank 2
400.4	102	44	Fracture Rank 1
402.1	166	12	Fracture Rank 1
403.0	55	47	Fracture Rank 2
403.1	56	45	Fracture Rank 2
403.2	162	67	Fracture Rank 2
404.5	151	62	Fracture Rank 1
404.6	95	36	Fracture Rank 2
406.2	178	63	Fracture Rank 1
407.5	196	63	Fracture Rank 1
407.9	67	31	Fracture Rank 2
409.9	75	45	Fracture Rank 1
416.9	227	78	Fracture Rank 2
417.8	346	26	Fracture Rank 2
421.5	273	16	Fracture Rank 2
434.2	51	67	Fracture Rank 1
440.1	71	54	Fracture Rank 1
445.5	341	50	Fracture Rank 1
448.3	312	68	Fracture Rank 1
448.6	67	27	Fracture Rank 1
449.8	249	16	Fracture Rank 1
451.1	75	39	Fracture Rank 1
451.7	89	36	Fracture Rank 2
454.7	42	51	Fracture Rank 1
458.1	146	18	Fracture Rank 1
463.9	94	42	Fracture Rank 1
464.4	104	54	Fracture Rank 1
464.9	62	52	Fracture Rank 2
465.2	52	43	Fracture Rank 1

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
465.6	56	34	Fracture Rank 1
470.2	47	57	Fracture Rank 1
470.6	80	49	Fracture Rank 1
471.7	41	65	Fracture Rank 1
472.5	141	74	Fracture Rank 1
473.1	163	15	Fracture Rank 2
475.0	86	56	Fracture Rank 2
475.6	338	87	Fracture Rank 1
477.9	197	65	Fracture Rank 1
479.3	149	45	Fracture Rank 2
479.7	119	40	Fracture Rank 2
481.7	157	74	Fracture Rank 1
483.3	66	54	Fracture Rank 1
485.7	91	47	Fracture Rank 2
486.1	356	87	Fracture Rank 1
486.9	99	58	Fracture Rank 2
487.4	104	31	Fracture Rank 2
489.3	105	42	Fracture Rank 1
491.3	129	54	Fracture Rank 1
492.8	156	59	Fracture Rank 1
495.7	228	45	Fracture Rank 1
499.1	57	60	Fracture Rank 2
503.1	153	30	Fracture Rank 1
503.8	158	71	Fracture Rank 1
506.5	337	73	Fracture Rank 1
509.8	132	57	Fracture Rank 1
510.1	125	62	Fracture Rank 1
510.8	67	5	Fracture Rank 2
511.2	328	26	Fracture Rank 1
513.7	302	25	Fracture Rank 1
517.1	152	48	Fracture Rank 1
518.5	148	50	Fracture Rank 2
519.6	241	79	Fracture Rank 1
526.6	167	32	Fracture Rank 2
527.2	136	67	Fracture Rank 1
529.0	235	18	Fracture Rank 1
533.2	150	70	Fracture Rank 1
533.4	9	75	Fracture Rank 1
533.5	307	26	Fracture Rank 1
540.8	92	34	Fracture Rank 1
542.9	191	54	Fracture Rank 1
543.7	190	68	Fracture Rank 2
544.3	167	33	Fracture Rank 1
548.1	156	50	Fracture Rank 1
548.5	153	36	Fracture Rank 1

WELL 22 - TABLE OF BEDROCK FRACTURES

Depth (Feet)	Dip Azimuth (Degrees)	Dip Angle (Degrees)	Bedrock Structure Category
558.4	250	22	Fracture Rank 1

Appendix L

Wellhead Protection Program

- Potential Contaminant Sources (PCS) Inventory Map
- Water Resource and Use Inventory Map

for the Revised Wellhead Protection Area

Updated December 2018

Potential Contaminant Source Inventory Map
This map shows the New Hampshire Department of Environmental Services (NHDES) geospatial data which is critical to groundwater withdrawal permitting. The tables below list data sites that intersect the 4000 foot buffer of the proposed new well location. A table will be blank if there is no data within the buffer.

Aboveground Storage Tanks

FACILITY NAME	ADDRESS	TOWN	SITE NUMBER	FACILITY TYPE	NUMBER OF TANKS
JIFFY LUBE 3021	27 LAFAYETTE RD	NORTH HAMPTON	200203007	OIL CHANGE FACILITY	

Automobile Salvage Yard Facility

FACILITY NAME	ADDRESS	TOWN	STATUS	DES ID

Local Potential Contaminant Sources

PCS NAME	ADDRESS	TOWN	PROJECT TYPE
ADVENTURE MOTOR SPORTS	9 ANNS LANE	HAMPTON	VSR
PLOUFFE	157 LITTLE RIVER RD	HAMPTON	GSR
CORE PHYSICIANS	879-881 LAFAYETTE RD	HAMPTON	LAB
OLSONS	7 CEDAR RD	NORTH HAMPTON	GSR
PH SILVER ANTIQUES	30 LAFAYETTE RD	NORTH HAMPTON	GSR
REGAL LIMO SERVICE	34 LAFAYETTE RD	NORTH HAMPTON	VSR
FAMILY DENTISTRY GN SIMMONDS DMD	220 HIGH ST	HAMPTON	LAB
JEFF'S CUSTOM TRAILERS	6 CEDAR RD	NORTH HAMPTON	GSR
APPLEDORE MEDICAL GROUP FAMILY PRACTICE	SEACOAST VILLAGE MALL 29 LAFAY	NORTH HAMPTON	LAB
MY STYLIST MITZI & CO	SEACOAST VILLAGE MALL 29 LAFAY	NORTH HAMPTON	CLN
ELIZABETH GRADY FACE FIRST	SEACOAST VILLAGE MALL 29 LAFAY	NORTH HAMPTON	CLN
M'LORDS HAIR STYLISTS	LAFAYETTE RD	NORTH HAMPTON	CLN
(NO NAME PROVIDED)	LAFAYETTE RD	NORTH HAMPTON	GSR
WJ YURCHESHEN PROFFESIONAL ASSOCIATES GENER	215 ATLANTIC AVE	NORTH HAMPTON	LAB
SIMMONS & SONS	82 LAFAYETTE RD	NORTH HAMPTON	GSR
GARY BLAKE CAR COMPANY	25 LAFAYETTE RD	NORTH HAMPTON	CARD
NORTHEAST MOTORS	15 LAFAYETTE ROAD	NORTH HAMPTON	CARD
HAMPTON VETRENARIAN HOSPITAL	871 LAFAYETTE RD	HAMPTON	LAB
MARGUERITES BEAUTY SALON	861 LAFAYETTE RD	HAMPTON	LAB
ALTERNATIVE IMAGES INC	819 LAFAYETTE RD	HAMPTON	CLN
REMICK & GENDRON FUNERAL HOME AND CREMATORY	811 LAFAYETTE ROAD	HAMPTON	LAB
CAROUSEL MOTORS	775 LAFAYETTE RD	HAMPTON	CARD
ROUTE 1 TRACTOR SALES	71 LAFAYETTE RD	NORTH HAMPSTON	VSR

Source Water Hazards Inventory and Remediation Sites

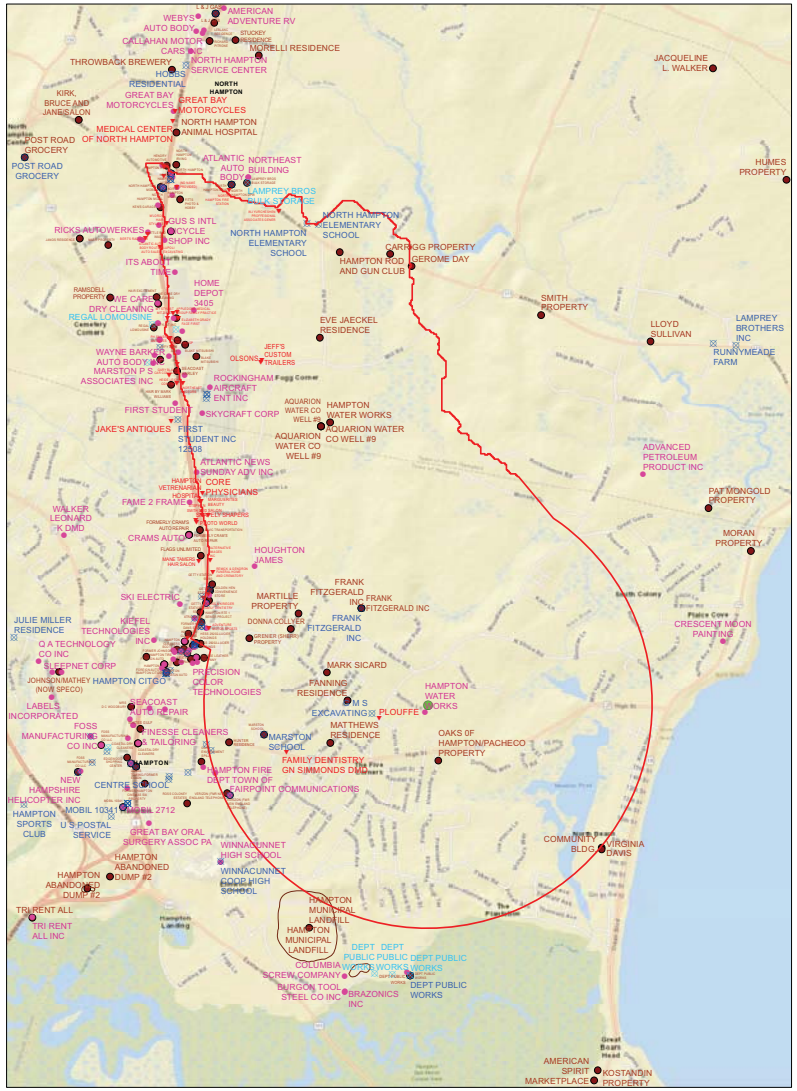
FACILITY	ADDRESS	TOWN	SITE NUMBER	PROJECT TYPE	RISK	STAFF
HESS 29202-LUCIER HOLDINGS	639 LAFAYETTE RD	HAMPTON	198805025	IRSP/LL	8	CLOSED
MARSTON SCHOOL	4 MARSTON WAY	HAMPTON	199005015	LUST	8	CLOSED
LITTLE RED WAGON	57 LAFAYETTE ROAD	NORTH HAMPTON	199006020	UIC	8	CLOSED
NORTH HAMPTON IRVING	73 LAFAYETTE RD	NORTH HAMPTON	199101036	HOLDTANK	2	REGISTRATION
NORTH HAMPTON IRVING	73 LAFAYETTE RD	NORTH HAMPTON	199101036	LUST	7	FULLER
HAMPTON WATER WORKS	7 MILL RD	NORTH HAMPTON	199207029	SPILL/RLS	8	CLOSED
OAKS OF HAMPTON/PACHECO PROPERTY	BETWEEN HIGH & WINNACUNNET ST	HAMPTON	199306014	HAZWASTE	8	CLOSED
FRANK FITZGERALD INC	17 BARBOUR RD	HAMPTON	199309039	LUST	8	CLOSED
FRANK FITZGERALD INC	17 BARBOUR RD	HAMPTON	199309039	UIC	8	CLOSED
VERIZON (FMR NEW ENGLAND TELEPHONE)	169 WINNACUNNET RD	HAMPTON	199309044	LUST	8	CLOSED
VERIZON (FMR NEW ENGLAND TELEPHONE)	169 WINNACUNNET RD	HAMPTON	199309044	IRSP/LL	8	CLOSED
GOLDEN HEN CONVENIENCE STORE	775 LAFAYETTE ROAD	HAMPTON	199309049	SITEEVAL	8	CLOSED
GETTY STATION 55260	22 TUCK RD	HAMPTON	199309051	LUST	7	SLAYTON
GETTY STATION 55260	22 TUCK RD	HAMPTON	199309051	UIC	8	CLOSED
GETTY STATION 55241	747 LAFAYETTE RD	HAMPTON	199503042	LUST	8	CLOSED
GETTY STATION 55241	747 LAFAYETTE RD	HAMPTON	199503042	UIC	2	REGISTRATION
GETTY STATION 55241	747 LAFAYETTE RD	HAMPTON	199503042	LUST	8	CLOSED
NORTH HAMPTON MOBIL	70 LAFAYETTE RD	NORTH HAMPTON	199506026	MOST	8	CLOSED
NORTH HAMPTON MOBIL	70 LAFAYETTE RD	NORTH HAMPTON	199506026	LUST	8	CLOSED
NORTH HAMPTON MOBIL	70 LAFAYETTE RD	NORTH HAMPTON	199506026	HAZWASTE	8	CLOSED
NORTH HAMPTON MOBIL	70 LAFAYETTE RD	NORTH HAMPTON	199506026	LUST	2	SLAYTON
FITTS PHOTO & HOBBY	69 LAFAYETTE ROAD	NORTH HAMPTON	199708015	UIC	8	CLOSED
XTRA MART	685 LAFAYETTE RD	HAMPTON	199910028	LUST	8	CLOSED
MY STYLIST INC	29 LAFAYETTE ROAD	NORTH HAMPTON	200001034	UIC	3	REGISTRATION
EVE JAECKEL RESIDENCE	8 PINE RD	NORTH HAMPTON	200003033	OPUF	8	CLOSED
MARK SICARD	7 LITTLE RIVER ROAD	HAMPTON	200004035	OPUF	8	CLOSED
JIFFY LUBE 3021	27 LAFAYETTE RD	NORTH HAMPTON	200203007	SEPTIC	8	CLOSED
BLAKE MITSUBISHI	25 LAFAYETTE RD	NORTH HAMPTON	200203051	HOLDTANK	2	REGISTRATION
BLAKE MITSUBISHI	25 LAFAYETTE RD	NORTH HAMPTON	200203051	HOLDTANK	2	REGISTRATION
DONNA COLLYER	10 BLAKE LN	HAMPTON	200204030	OPUF	8	CLOSED
AQUARION WATER CO WELL #9	MILL ROAD	HAMPTON	200302045	UIC	2	REGISTRATION
HUNTER RESIDENCE	167 HIGH STREET	HAMPTON	200306050	SPILL/RLS	8	CLOSED
FANNING RESIDENCE	11 NAVES ROAD	HAMPTON	200412037	OPUF	8	CLOSED
MATTHEWS RESIDENCE	8 TOBEY ST	HAMPTON	200710061	OPUF	8	CLOSED
MARTILLE PROPERTY	4 HIGGINS LANE	HAMPTON	200910079	OPUF	8	CLOSED
GRENIER (SHERR) PROPERTY	11 PHILBROOK TER	HAMPTON	201009003	OPUF	8	CLOSED
CARRIGG PROPERTY	173 ATLANTIC AVE	NORTH HAMPTON	201207027	OPUF	8	CLOSED
HAMPTON ROD AND GUN CLUB	189 ATLANTIC AVENUE	NORTH HAMPTON	201310001			
AQUARION WATER CO WELL #9	MILL ROAD	HAMPTON	200302045	UIC	2	REGISTRATION
AQUARION WATER CO WELL #9	MILL ROAD	HAMPTON	200302045	UIC	2	REGISTRATION
HESS 29202-LUCIER HOLDINGS	639 LAFAYETTE RD	HAMPTON	198805025	IRSP/LL	8	CLOSED

RCRA Hazardous Waste Generators

SITE NAME	ADDRESS	TOWN	RCRA ID	GENERATOR TYPE	STATUS
NORTH HAMPTON SERVICE CENTER	25 LAFAYETTE RD	NORTH HAMPTON	NHD986466779	RCRA REGULATED	DECLASSIFIED
GETTY STATION 55241	747 LAFAYETTE RD	HAMPTON	NHD500023346	RCRA REGULATED	INACTIVE
FAIRPOINT COMMUNICATIONS	169 WINNACUNNET RD	HAMPTON	NHD980523542	RCRA REGULATED	INACTIVE
ATLANTIC NEWS SUNDAY ADV INC	893 LAFAYETTE RD	HAMPTON	NHD982769176	RCRA REGULATED	INACTIVE
HOUGHTON JAMES	204 MILL RD	HAMPTON	NHDS10124670	STATE REGULATED	INACTIVE
GUS S INTL BICYCLE SHOP INC	55 LAFAYETTE RD	NORTH HAMPTON	NHDS10122641	STATE REGULATED	INACTIVE
FITTS PHOTO & HOBBY	69 LAFAYETTE RD	NORTH HAMPTON	NHD986472397	RCRA REGULATED	DECLASSIFIED
SKYCRAFT CORP	RTE 1	NORTH HAMPTON	NHD986473379	RCRA REGULATED	DECLASSIFIED
DONS MOBIL - ALLIANCE ENERGY LLC SITE 06385	70 LAFAYETTE RD	NORTH HAMPTON	NHD986484269	RCRA REGULATED	INACTIVE
BOB HENDRY AUTO	74 LAFAYETTE RD	NORTH HAMPTON	NHDS10050578	STATE REGULATED	ACTIVE
ROCKINGHAM AIRCRAFT ENT INC	HAMPTON AIRFIELD	NORTH HAMPTON	NHD982750606	RCRA REGULATED	INACTIVE
FIRST STUDENT INC 12508	25 LAFAYETTE RD	NORTH HAMPTON	NHDS00023627	RCRA REGULATED	ACTIVE
MY STYLIST	29 LAFAYETTE RD	NORTH HAMPTON	NHDS00014485	RCRA REGULATED	INACTIVE
LYMAN MCCREA AUTOMOTIVE INC	775 LAFAYETTE RD	HAMPTON	NHDS00020946	RCRA REGULATED	ACTIVE
ADVENTURE MOTOR SPORTS	9 ANNS LN	HAMPTON	NHDS10000706	RCRA REGULATED	INACTIVE
AUTO WHOLESALERS OF NORTH HAMPTON	57 LAFAYETTE RD	NORTH HAMPTON	NHDS10161292	RCRA REGULATED	ACTIVE
HOME DEPOT 3405	35 LAFAYETTE RD	NORTH HAMPTON	NHDS10175615	RCRA REGULATED	ACTIVE
ITS ABOUT TIME	43 LAFAYETTE RD	NORTH HAMPTON	NHDS10131592	STATE REGULATED	INACTIVE
RITE AID 3282	69 LAFAYETTE RD	NORTH HAMPTON	NHDS10011760	RCRA REGULATED	DECLASSIFIED
NORTH HAMPTON MAINWAY	73 LAFAYETTE RD	NORTH HAMPTON	NHDS00021415	RCRA REGULATED	INACTIVE
HAMPTON WATER WORKS	LITTLE RIVER RD	NORTH HAMPTON	NHDS00014642	RCRA REGULATED	DECLASSIFIED
WALLINGFORD CALVIN DMD	150 WINNACUNNET RD	HAMPTON	NHDS10176522	RCRA REGULATED	DECLASSIFIED
SEACOAST HARLEY DAVIDSON	17 LAFAYETTE RD	NORTH HAMPTON	NHDS10180276	RCRA REGULATED	INACTIVE
JIFFY LUBE 3021	27 LAFAYETTE RD	NORTH HAMPTON	NHDS10184120	RCRA REGULATED	ACTIVE

Underground Storage Tanks

FACILITY NAME	ADDRESS	TOWN	SITE NUMBER	FACILITY TYPE	NUMBER OF TANKS
HAMPTON ACADEMY JR HIGH SCHOOL	29 ACADEMY AVE	HAMPTON	198604126	LOCAL GOVERNMENT	
HAMPTON AIRFIELD	9A LAFAYETTE RD	NORTH HAMPTON	198605449	AVIATION	4
HAMPTON AIRFIELD	9A LAFAYETTE RD	NORTH HAMPTON	198605449	AVIATION	3
HAMPTON AIRFIELD	9A LAFAYETTE RD	NORTH HAMPTON	198605449	AVIATION	
G M S EXCAVATING	157 LITTLE RIVER ROAD	HAMPTON	198611007	COMMERCIAL	
MARSTON SCHOOL	4 MARSTON WAY	HAMPTON	199005015	LOCAL GOVERNMENT	
NORTH HAMPTON IRVING	73 LAFAYETTE RD	NORTH HAMPTON	199101036	GAS STATION	11A
NORTH HAMPTON IRVING	73 LAFAYETTE RD	NORTH HAMPTON	199101036	GAS STATION	10
NORTH HAMPTON IRVING	73 LAFAYETTE RD	NORTH HAMPTON	199101036	GAS STATION	11B
NORTH HAMPTON IRVING	73 LAFAYETTE RD	NORTH HAMPTON	199101036	GAS STATION	
FRANK FITZGERALD INC	17 BARBOUR RD	HAMPTON	199309039	COMMERCIAL	
VERIZON (FMR NEW ENGLAND TELEPHONE)	169 WINNACUNNET RD	HAMPTON	199309044	UTILITIES	
GETTY STATION 55260	22 TUCK RD	HAMPTON	199309051	GAS STATION	
GETTY STATION 55241	747 LAFAYETTE RD	HAMPTON	199503042	GAS STATION	
NORTH HAMPTON MOBIL	70 LAFAYETTE RD	NORTH HAMPTON	199506026	GAS STATION	6B
NORTH HAMPTON MOBIL	70 LAFAYETTE RD	NORTH HAMPTON	199506026	GAS STATION	6A
NORTH HAMPTON MOBIL	70 LAFAYETTE RD	NORTH HAMPTON	199506026	GAS STATION	
NORTH HAMPTON ELEMENTARY SCHOOL	201 ATLANTIC AVE	NORTH HAMPTON	199609043	LOCAL GOVERNMENT	3
NORTH HAMPTON ELEMENTARY SCHOOL	201 ATLANTIC AVE	NORTH HAMPTON	199609043	LOCAL GOVERNMENT	
XTRA MART	685 LAFAYETTE RD	HAMPTON	199910028	GAS STATION	
XTRA MART	685 LAFAYETTE RD	HAMPTON	199910028	GAS STATION	8B
XTRA MART	685 LAFAYETTE RD	HAMPTON	199910028	GAS STATION	8A
XTRA MART	685 LAFAYETTE RD	HAMPTON	199910028	GAS STATION	7



Legend
- Well Location
- Well Location Buffer
- Aboveground Storage Tank Facility
- Automobile Salvage Yard Facility
- Local Potential Contamination Sources Inventory
- RCRA Hazardous Waste Generator Points
- RCRA Hazardous Waste Generators Area
- Source Water Hazard Inventory Points
- Source Water Hazard Inventory Area
- Underground Storage Tank Facility

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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1,100 Feet

Date: 12/13/2018

Water User Inventory Map

This map shows the New Hampshire Department of Environmental Services (NHDES) geospatial data which is critical to groundwater withdrawal permitting. The tables below list data sites that intersect the buffer of the proposed new well location. A table will be blank if there is no data within the buffer.

Private Water Wells

WRB ID	STREET NUMBER	ROAD	TOWN	TYPE	USE	TOTAL DEPTH	YIELD
105.0003	117	LITTLE RIVER RD	HAMPTON	1	1	160	10
105.0013	6	MOHAWK ST	HAMPTON	1	1	120	10
105.0020		WOODLAND RD	HAMPTON	1	1	100	15
105.0037		CURTIS RD	HAMPTON	1	1	165	30
105.0044		LITTLE RIVER RD	HAMPTON	1	1	360	4
105.0048			HAMPTON	2	8	44.7	0.8
105.0054	189	WOODLAND RD	HAMPTON	1	1	140	8
105.0075	17	BARBOUR RD	HAMPTON	2	8	9.5	0
105.0081		NORTH SHORE RD	HAMPTON	1	1	205	20
105.0097		RTE 101C	HAMPTON	1	0	300	20
105.0109		ACADEMY AVE	HAMPTON	1	6	125	30
105.0112	11	BEAR PATH	HAMPTON	1	1	160	50
105.0117	812	LAFAYETTE RD	HAMPTON	1	6	100	75
105.0120	384	WINNACUNNET RD	HAMPTON	1	1	220	50
105.0127	3	HILDA DR	HAMPTON	1	1	325	4
105.0129	238	WOODLAND RD	HAMPTON	1	1	480	2
105.0137	59	EDGEWOOD DR	HAMPTON	1	1	120	30
105.0146		HOMESTEAD CIR	HAMPTON	1	1	240	15
180.0025	28	CEDAR RD	NORTH HAMPTON	1	1	305	1
180.0073	244	ATLANTIC AVE	NORTH HAMPTON	1	1	820	15
180.0078	39	CEDAR RD	NORTH HAMPTON	1	1	362	2
180.0085	OFF	MILL RD	NORTH HAMPTON	1	8	423	85
180.0086	OFF	MILL RD	NORTH HAMPTON	1	8	363	50
180.0087	OFF	MILL RD	NORTH HAMPTON	1	9	203	15
180.0092	3	FERN RD	NORTH HAMPTON	1	1	320	12
180.0145	25A	CEDAR RD	NORTH HAMPTON	1	1	385	12
105.0076	592	REAR LAFAYETTE RD	HAMPTON	2	8	15.5	0
105.0176	34	MUNSEY DR	HAMPTON	1	1	500	3
180.0152	8	MILL PL	NORTH HAMPTON	1	1	185	10
105.0178		BELMONT CIR	HAMPTON	1	1	500	10
180.0156	16	MILL PL	NORTH HAMPTON	1	1	305	15
180.0157	15	MILL PL	NORTH HAMPTON	1	1	145	50
105.0184		NORTH SHORE RD	HAMPTON	1	1	260	18
180.0173	201	ATLANTIC AVE	NORTH HAMPTON	1	6	240	50
180.0188	20	MILL RD	NORTH HAMPTON	1		560	6
180.0177		MILL RD	NORTH HAMPTON	2	3	40	225
105.0185		MOHAWK ST	HAMPTON	1	1	240	10
180.0185		ATLANTIC AVE	NORTH HAMPTON	1	1	220	40
180.0023	202	ATLANTIC AVE	NORTH HAMPTON	1	1	142	6
105.0002		MOHAWK ST	HAMPTON	1	1	240	25
105.0019	154	WOODLAND RD	HAMPTON	1	1	100	25
105.0191	8	PAWNEE ST	HAMPTON	1	1	205	15
180.0198	16	ROCKRIMMON RD	NORTH HAMPTON	1	1	420	22
180.0199	25	LAFAYETTE RD	NORTH HAMPTON	1	4	723	20
105.0268	11	HUNTER DR	HAMPTON	1	6	140	40
105.0193	157	LITTLE RIVER RD	HAMPTON	1	1	220	50
105.0194	16	FIELDING LN	HAMPTON	1	1	240	50
105.0203	31	WINDMILL LN	HAMPTON	1	6	380	20
105.0204	38	EDGEWOOD DR	HAMPTON	1	6	180	30
105.0205	6 &8	HEMLOCK ST	HAMPTON	1	1	235	50

National Pollutant Discharge Elimination System (NPDES)

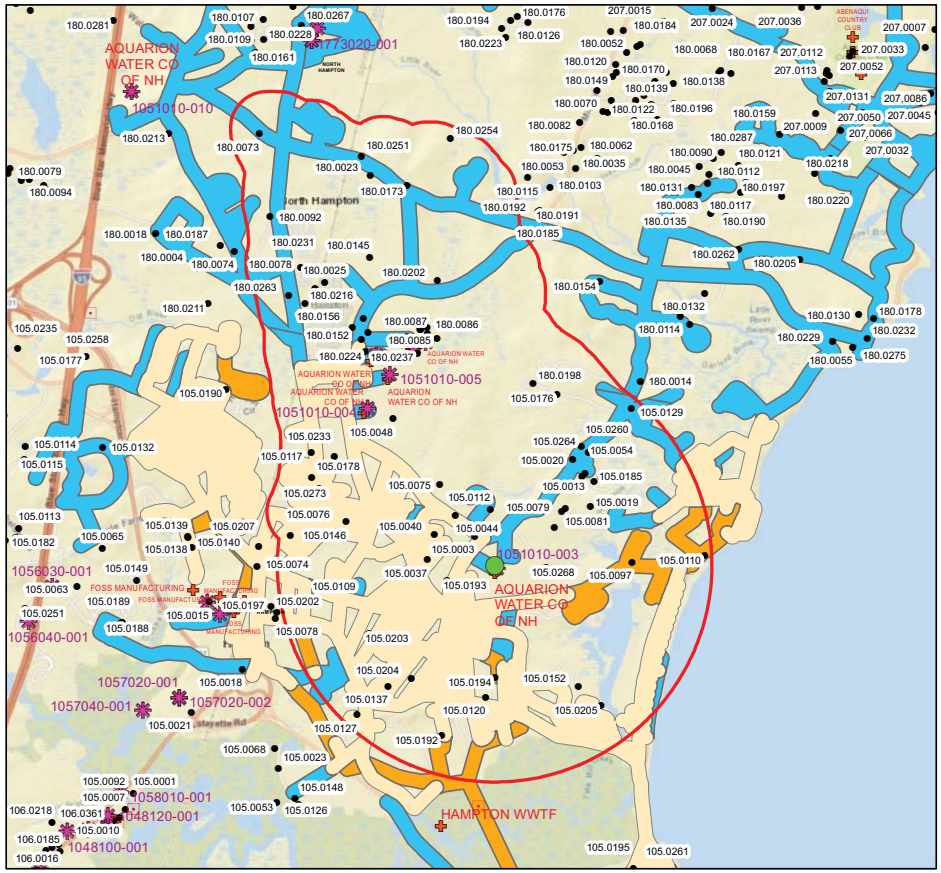
FACILITY	ADDRESS	TOWN	ID	TYPE	CATEGORY	STREAM	STATUS

Public Water Supply Sources

NAME	TOWN	PWSID	SYSTEM TYPE	SYSTEM ACTIVITY	SOURCE ACTIVITY	SOURCE TYPE
AQUARION WATER/NH	HAMPTON	1051010-015	C	A	A	G
AQUARION WATER/NH	HAMPTON	1051010-017	C	A	A	G
AQUARION WATER/NH	HAMPTON	1051010-016	C	A	A	G
AQUARION WATER/NH	HAMPTON	1051010-003	C	A	A	G
AQUARION WATER/NH	HAMPTON	1051010-005	C	A	A	G
AQUARION WATER/NH	HAMPTON	1051010-004	C	A	A	G
AQUARION WATER/NH	HAMPTON	1051010-006	C	A	A	G

Registered Water Users

FACILITY NAME	ADDRESS	TOWN	TYPE	ACTION	SOURCE/DESTINATION NAME
AQUARION WATER CO OF NH	WINNICUT ROAD	NORTH HAMPTON	WS	WL	WHITE'S FIELD WELL #6
AQUARION WATER CO OF NH	WINNICUT ROAD	NORTH HAMPTON	WS	WL	MARSTON SPRINGS WELL #8
AQUARION WATER CO OF NH	WINNICUT ROAD	NORTH HAMPTON	WS	WL	SCAMMON WELL #9
AQUARION WATER CO OF NH	WINNICUT ROAD	NORTH HAMPTON	WS	WL	SICARD WELL #11
AQUARION WATER CO OF NH	WINNICUT ROAD	NORTH HAMPTON	WS	WL	MILL ROAD BRW #20
AQUARION WATER CO OF NH	WINNICUT ROAD	NORTH HAMPTON	WS	WL	MILL ROAD BRW #21
AQUARION WATER CO OF NH	WINNICUT ROAD	NORTH HAMPTON	WS	WL	WELL #8A
AQUARION WATER CO OF NH	WINNICUT ROAD	NORTH HAMPTON	WS	WL	RYDER'S WELL #7



Legend

- Proposed New Well Location
- Proposed New Well Location Buffer
- NPDES Discharge
- Private Water Wells
- Public Water Supply Sources
- Registered Water Users
- Town Boundaries

Water and Sewer Service Areas

- Water & Sewer Service Area
- Sewer Service Area
- Water Service Area

N

3,600 Feet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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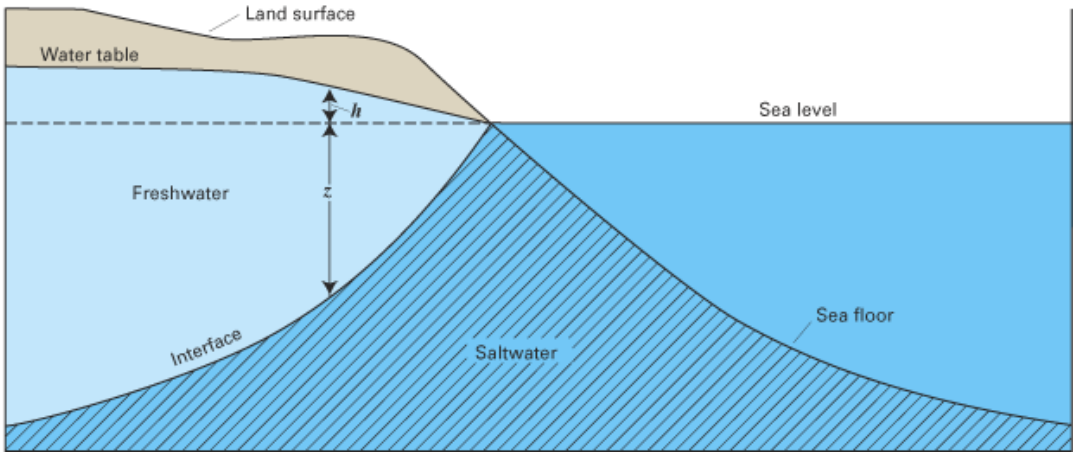
Date: 12/19/2018

Appendix M

Application of the Ghyben-Herzberg Principle to Determine the Estimated Depth of the Freshwater / Saltwater Interface at Wells Monitored During the Long-Term Pumping Test of Aquarion Well 22

Application of the Ghyben Herzberg Principle
to Determine the Estimated Depth to Freshwater/Saltwater Interface
at Wells Monitored During the Long-Term Pumping Test of Aquarion Well 22

The hydrogeology which occurs in the subsurface in coastal areas is complex. In general, freshwater grades into saltwater. This gradation is marked by an increase in the concentration of dissolved solids such as sodium and chloride. This mixing zone may be thin or very wide. In coastal areas where there are tidal fluctuations, this zone can be wide. The freshwater/saltwater interface may coincide with the coastline or be located off-shore. If off-shore, then there will likely be mixing of freshwater with saltwater because of the upward discharge of the freshwater into the saltwater body. The freshwater/saltwater interface, whether sharp or transitional, can be near vertical or slope landward (see figure below).



Pictoral depiction of the Ghyben-Herzberg Principle

Many studies have been performed by the U.S.Geological Survey (USGS) and other researchers for coastal areas and islands throughout the world. At nearby Cape Cod, the USGS indicates that along the coastal fringes of Cape Cod, saltwater occurs beneath freshwater. The exact locations of these boundaries are not well known. In fact, for the Lower Part of Cape Cod, Burns et al. (1975) indicate that there are only two sites where the position of the freshwater/saltwater interface has been determined. One of these investigations was in the Town of Orleans on Pleasant Bay. In 1998 (GEOSPHERE Report for the Town of Orleans, 1998), a well was drilled to the freshwater/saltwater interface. The interface was intersected at a depth of approximately 285 feet below ground surface. The interface was a fairly sharp transition zone of just a few feet. The drilling location for this well location was on a peninsula that jutted out into Pleasant Bay. The bay is saltwater and tidally influenced. The interface was determined to surface approximately ½ mile offshore in the Atlantic Ocean.

Previous studies have found that, in unconfined coastal aquifers, the depth to which freshwater extends below sea level is, in general, 40 times the height of the groundwater table above sea level. This is best stated in the following equation, which is termed the Ghyben-Herzberg Principle (Fetter, 1988):

$$Z = d_w / (d_s - d_w) \times h$$

where:

z is depth of freshwater below sea level

d_w is the density of freshwater

d_s is the density of saltwater

h is the thickness of the freshwater zone above sea level

The density of freshwater is 1.000 gram per cubic centimeter and the density of saltwater is 1.025 grams per cubic centimeter. Therefore, the above equation reduces to:

$$Z = 40h$$

This means that the depth to the freshwater/saltwater interface is equal to 40 times the elevation of the non-pumping groundwater table above mean sea level.

Although the Ghyben-Herzberg Principle will allow calculation of the depth to the freshwater/saltwater interface, groundwater movement may affect the actual depth and orientation. The flow of groundwater toward the ocean affects the position of the interface. According to Driscoll (1986), when the head (i.e., pressure) created by the flow of groundwater equals that of the ocean (i.e., groundwater does not flow into the ocean), the Ghyben-Herzberg Principle is valid. However, when the head created by the flow of groundwater exceeds that of the ocean (i.e., groundwater flows into the ocean), the freshwater/saltwater interface is lower (i.e., at a greater depth) than calculated.

The groundwater elevation data for the wells that were monitored for the Well 22 pumping test have been used to solve the Ghyben-Herzberg formula. These results are shown in the **Table** below. The calculations indicate that the depth to the freshwater/saltwater interface is at approximately 1,086 feet below sea level at Well 22. During the pumping test, the pumping level at shut down at Well 22 was approximately 137 feet below sea level. Projected out to 180 days of continuous pumping, the pumping level would be 152 feet below sea level. Even at the pumping rate (850 gpm) and pumping levels, there is calculated to be hundreds of feet of freshwater below the well. Similar depths to the interface have been calculated for most of the wells monitored for the pumping test (See **Table**). We have applied the calculations to both the sand and gravel and bedrock wells as noted on the **Table**. The well at 81 Landing Road, which is located adjacent to the salt marsh, shows a depth to the interface of 293.6 feet. Of interest, this well did not show any drawdown as a result of the pumping of Well 22. In addition, no private wells showed any danger of being impacted by saltwater, either through the daily salinity monitoring, or through the calculation of the depth to the freshwater/saltwater interface described herein.

REFERENCES

Burns, A.W., Frimpter, M.H., and Willey, R. E. Evaluation of Data Availability and Examples of Modeling for Ground Water Management on Cape Cod, Massachusetts. U.S. Geological Survey Water Resources Investigations 1675, 1975.

Fetter, C. W., Applied Hydrology, Second Edition, Macmillan Publishing Company, 592 pages, 1988,

Groundwater and Wells, 2nd Edition, Fletcher, Driscoll, Johnson Division, St. Paul, MN, 1,089 pages, 1986.

Estimated Depth to Freshwater / Saltwater Interface Calculations

Aquarion Well 22 Long Term Pumping Test

Aquarion Water Company of New Hampshire - Hampton, NH

Monitoring Point ID	Well Type	Well Use	TOC Elev. (ft. AVD)	Ground Elevation (ft. AVD)	Static Depth to Water 6/20/2018 10:00am (ft. btoc)	"h" Static Groundwater Elevation (ft. AVD)	Depth to Water at Shut Down 7/17/2018 11:01am (ft. btoc)	Groundwater Elevation at Shut Down (ft. AVD)	Maximum Drawdown at Shut Down (ft.)	Drawdown Effect due to Pumping?	"z" = 40*h Depth of Freshwater Below Sea Level (Static) (ft.)
Well 22	BR	PWS	39.60	37.40	12.44	27.16	176.77	-137.17	164.33	Yes	1086
Well 21	BR	PWS	62.17	60.17	46.50	15.67	45.90	16.27	R* (0.60)	No	627
Well 20	BR	PWS	58.83	56.83	159.40	-100.57	157.60	-98.77	R* (1.80)	No	(-) Unk.
RW #4 (Ambient Well)	BR	MW	63.95	62.39	3.06	60.89	4.88	59.07	1.82	No	2436
195 Woodland Road	BR	GEO	45.53	43.57	12.73	32.80	25.75	19.78	13.02	Yes	1312
31 Windmill Lane	BR	IRR	56.04	54.89	20.42	35.62	48.03	8.01	27.61	Yes	1425
82 Woodland Road	BR	IRR	52.83	52.46	13.98	38.85	30.97	21.86	16.99	Yes	1554
117 Little River Road	BR	Not Used	66.29	66.29	17.28	49.01	29.42	36.87	12.14	Yes	1960
206 Woodland Road	BR	GEO/DW	38.63	37.18	6.32	32.31	23.53	15.1	17.21	Yes	1292
321 Winnacunnet Road	SG	IRR	56.24	56.24	23.91	32.33	24.52	31.72	0.61	No	1293
59 Edgewood Drive	BR	IRR	37.09	36.14	17.6	19.49	19.01	18.08	1.41	No	780
53 Winnacunnet Road	BR	IRR	33.36	32.04	0.09	33.27	0.43	32.93	0.34	No	1331
23 Esker Drive	SG	IRR	16.95	16.95	6.8	10.15	7.36	9.59	0.56	No	406
12 Springhead Lane	BR	DW	34.71	33.88	10.4	24.31	22.03	12.68	11.63	Yes	972
110 Mill Road	BR	DW	61.51	61.51	17.54	43.97	18.32	43.19	0.78	No	1759
81 Landing Road	BR	Not Used	8.33	7.01	0.99	7.34	1.58	6.75	0.59	No	294
78 Little River Road	SG	Not Used	69.94	67.69	12.28	57.66	13.78	56.16	1.5	No	2306
8 Springhead Lane	BR	DW	40.09	37.42	7.86	32.23	23.22	16.87	15.36	Yes	1289
10 Springhead Lane	BR	DW	37.32	35.27	9.71	27.61	27.19	10.13	17.48	Yes	1104
11 Bear Path	BR	IRR	57.71	55.61	20.4	37.31	31.83	25.88	11.43	Yes	1492
83 Little River Road	BR	DW	73.45	72.48	24.48	48.97	26.41	47.04	1.93	No	1959
38 Edgewood Drive	BR	IRR	34.51	34.51	15.07	19.44	16.61	17.9	1.54	No	778
7 Springhead Lane	BR	DW	39.57	38.00	14.08	25.49	24.22	15.35	10.14	Yes	1020

Notes:

Elevation survey of Well 22 conducted by James Verra & Associates, Inc. July 18, 2018

Static Water Level Height for all wells was collected using pressure transducers

Ground elevation values for all other monitoring points acquired through LiDAR extraction using datasets from NH GRANIT. Vertical datum: North American Vertical Datum 1988 (NAVD1988)

R* = Water level rose during the course of the pumping phase by the value shown ( )

AVD	=	Above Vertical Datum	PWS	=	Public Water Supply
btoc	=	Below top of casing	MW	=	Monitoring Well
TOC	=	Top of casing	GEO	=	Geothermal Well
BR	=	Bedrock Well	IRR	=	Irrigation Well
SG	=	Sand and Gravel Well	DW	=	Domestic Water (Drinking/Irrigation)
NR	=	No response to pumping			

Attachment

See CD ROM (or) Separate Files

containing:

- SCADA Tables (Appendix E)
- Tabulated Water Level Data (Appendix F)