FINAL REPORT

PRELIMINARY EVALUATION OF THE FEASIBILITY TO ARTIFICIALLY RECHARGE THE AQUIFER AT THE MVD-4 AND MVD-5 WELL FIELD

MERRIMACK VILLAGE DISTRICT - MERRIMACK, NEW HAMPSHIRE

February 2019

Presented to:
Mr. Ron Miner, Jr.
Merrimack Village District

EMERY & GARRETT GROUNDWATER INVESTIGATIONS, A DIVISION OF GZA
56 Main Street | P.O. Box 1578 | Meredith, New Hampshire 03253

New England Mid-Atlantic South Atlantic

Emery & Garrett Groundwater Investigations,
A Division of GZA
56 Main Street • P.O. Box 1578
Meredith, New Hampshire 03253
(603) 279-4425 www.eggi.com Fax (603) 279-8717

February 21, 2019

Mr. Ron Miner, Jr.
Merrimack Village District
2 Greens Pond Road
Merrimack, NH 03054

Dear Mr. Miner,

Please find enclosed a copy of Emery & Garrett Groundwater Investigations (EGGI), report entitled, “Final Report, Preliminary Evaluation of the Feasibility to Artificially Recharge the Aquifer at the MVD-4 and MVD-5 Well Field, located in Merrimack, New Hampshire.

Based upon the results of this investigation, we believe that the use of Artificial Recharge is a very favorable means to enhance groundwater production, lessen treatment costs, and improve water quality at the Well Field.

I hope you find the information contained herein responsive to your needs. If you have any questions, please do not hesitate to contact either one of us.

Sincerely,

Daniel J. Tinkham, P.G.
Senior Consultant

James M. Emery, P.G.
Principal

DANIEL J. TINKHAM No. 380

JAMES M. EMERY No. 117

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Emery & Garrett Groundwater Investigations,
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P.O. Box 1578 · 56 Main Street
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(603) 279-4425 (office) www.eggi.com (603) 279-8717 (fax)

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I. INTRODUCTION

Production Wells MVD-4 and MVD-5 are high-yielding sand and gravel wells owned and operated by the Merrimack Village District (MVD) and comprise the MVD-4/5 Well Field. They are located in the northeastern section of Merrimack, New Hampshire, adjacent to the Merrimack River, north of the Souhegan River, and east of Route 3 (Figure 1). Emery & Garrett Groundwater Investigations (EGGI), a Division of GZA, has evaluated the feasibility of utilizing local surface water sources to artificially recharge the Aquifer tapped by this well field, thereby increasing its overall withdrawal capacity.

As part of an investigation conducted in 2003, EGGI performed a long-term pumping test on both wells at a combined pumping rate of 876 gallons per minute (gpm) (1.26 million gallons per day (gpd)) (EGGI 2003). Results of the pumping test were used to define the Wellhead Protection Area (WHPA) and showed that natural recharge to this Aquifer cannot sustain long term pumping rates greater than 420 gpm (600,000 gpd) (Figure 2). Therefore, the MVD-4/5 Well Field would benefit from the addition of Artificial Recharge (AR), derived from a surface water source, to supplement natural groundwater recharge. The overall sustainable yield of the Aquifer could potentially be increased by applying Artificial Recharge to make up some (or all) of the difference between what the wells can pump (1.26 million gpd) and what the Aquifer can yield from natural recharge (600,000 gpd).[1]

In March 2016, elevated levels of per- and polyfluoroalkyl substances (PFAS) were discovered in the groundwater produced by Wells MVD-4 and MVD-5. Both wells were subsequently taken off-line, removing a significant portion of MVD's total supply capacity.[2] Currently, design work is underway to construct a carbon treatment system to remove PFAS from the water produced from this well field. Additional recharge added to the Aquifer would serve to dilute existing concentrations of PFAS and likely decrease the unit cost for treatment of the water. Due to the urgency of providing treatment to Wells MVD-4 and MVD-5, this

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[1] Recharge that is available form annual precipitation.

[2] Estimated at approximately 16% of total available yield capacity.

artificial recharge investigation was conducted coincident with the preliminary design of the treatment plant.

This report contains the documentation and final results of our investigation and concludes that Artificial Recharge can be an important means of supplementing MVD's available groundwater supply capacity.

II. EVALUATION OF THE AQUIFER AT THE MVD-4/5 WELL FIELD

A. Design of Temporary Recharge Basins

1. Hydrogeologic Review and Siting of Potential Recharge Basins

EGGI reviewed published data and those collected during previous investigations to select areas that are likely to be hydrogeologically favorable for the infiltration of surface water into the subsurface via artificial recharge. Existing wells, distribution lines, and proposed locations for water treatment facilities restrict the available area within the site footprint. EGGI coordinated with the MVD and its engineers, Underwood Engineers of Concord, New Hampshire, to determine the areas on the property that are available for the installation and maintenance of artificial recharge basins.

Once the available space was considered and the hydrogeologic conceptual model updated with available data, ten test pit locations were identified in two primary areas: 1) in the abandoned sand & gravel pit south of MVD-5 (Test Pits TP-1, TP-1A, TP-1B, and TP-1C); and 2) on the terrace west of Production Well MVD-5 (Test Pits TP-2, TP-3, TP-3A, TP-3B, TP-4, and TP-5 (Figure 3). A backhoe was used to install the test pits, generally reaching a total depth of approximately six feet below grade. A Professional Geologist was on site to log each Test Pit and collect representative samples from selected intervals (Table I).

Test Pit TP-1 and subsequent adjacent pits (TP-1A through TP-1C) all encountered shallow groundwater or wet soils at depths ranging from approximately four feet to seven feet below grade. Of course, under normal pumping conditions, the groundwater table in this area would be depressed from its natural non-pumping condition. Test Pits TP-1 and TP-1C penetrated clean, well-sorted sandy material below a silty top layer. TP-1A and 1B encountered very poorly-sorted material with silt layers that are not favorable for AR.

The near-surface stratigraphy was similar in each of the test pits installed on the terrace above Wells MVD-4 & MVD-5. Generally, the logs indicate a fine to medium sand extending from the base of an organic soil layer to approximately 2.5 feet. Below 2.5 feet, the test pits encountered a medium to very coarse sand with some gravel (pebbles to cobbles).

The favorability of sediments for the installation of a recharge basin(s) was assessed by EGGI, particularly noting the grain-size distribution and degree of sorting of the intercepted material. This geologic assessment was further complemented with the in-situ testing of the near-surface sediment by conducting percolation tests (Perc tests) in the test pits.

2. Percolation Tests in Near-Surface Sediments

Percolation tests were conducted in TP-1, TP-2, TP-3, TP-4, and TP-5 (Figure 3 and Appendix A). Most of the Perc testing was completed at a depth of four feet below grade to avoid the need for shoring of the test pit walls to ensure the safety of the on-site geologist. Upon completion of the Perc testing, test pits were then deepened for continued sediment logging.

The Perc tests were conducted by pushing a bottomless 5-gallon bucket into the sand at the bottom of each pit to the one-gallon mark. Next, the buckets were filled with water and the cumulative time for each of three successive gallons of water to infiltrate into the subsurface was recorded (Table I). These data provide the basis for estimating infiltration rates below a future artificial recharge basin.

The ability of the subsurface material to accept water was estimated by calculating the Perc rate (infiltration rate) of the third gallon that infiltrated into the subsurface. During the infiltration of the first two gallons of water, the unsaturated soil beneath the Perc test is “wetting”, therefore the rate of infiltration during the third gallon is considered more representative of conditions beneath an infiltration basin. Test Pit TP-1, where water infiltrated at a rate of 4.9 gpm per square foot, provided the fastest Perc rate of the five tests. The slowest Perc rate was 1.1 gpm per square foot, measured in Test Pit TP-3. These Perc rates are considered by EGGI to be very favorable.

3. Evaluation of Deeper Sediment Percolation Rates

Once the Perc testing was complete, three test boring locations, MER45-AR1, MER45-AR2, and MER45-AR3, were identified in the areas of the test pits to evaluate the deeper subsurface materials (Figure 3 and Appendix B). Test Borings MER45-AR1 and MER45-AR2 are located on the terrace west of MVD-5 and MER45-AR3 is within the former sand & gravel pit located south of MVD-5.

The three test borings were installed to depths of 73, 62, and 40 feet, respectively. Test Boring MER45-AR1 was the only one to intercept competent bedrock, but all three wells intercepted coarse-grained aquifer deposits both above and below the water table (Appendix A). During the installation of the test borings, a modified version of a percolation test was applied to test the relative permeability of the unsaturated material between the bottom of the recently-installed test pits and the saturated aquifer deposits. Artificial Recharge can only be feasible if the unsaturated zone allows the migration of artificially recharged water vertically downward so that it can recharge the underlying aquifer.

The modified percolation tests were conducted in Test Borings MER45-AR1 and MER45-AR2, at depths of 10 feet and 20 feet below grade in each boring. The testing consisted of advancing the four-inch-diameter steel casing, per the normal drilling process, and cleaning out the steel casing to the prescribed depth. A 1.25-inch-diameter drive point well was then attached to the well drilling rods and pushed or pounded into the gravel formation below the drilling depth. This allowed the drive point screen to be exposed to relatively undisturbed Aquifer formation material. An automated water level recorder was then installed in the well screen and water was added to the drill rods, thus creating a “falling head” permeability test (or slug test). The rate at which the water in the drill rods was forced into the Aquifer formation material is a function of the permeability of that formation. The results of the permeability testing are expressed as hydraulic conductivity with the units of feet/day:

Test Boring	Interval (feet below ground surface)	Hydraulic Conductivity (feet/day)
MER45-AR1	10 to 12	21.5
MER45-AR1	20 to 22	6.5
MER45-AR2	10 to 12	11.0
MER45-AR2	20 to 22	1.5

The values of hydraulic conductivity calculated during all four testing intervals fall into a range typical of clean fine to medium sands (Appendix B). It is likely that these conductivity results are biased towards lower readings than what are the actual conductivity of the Aquifer formation materials due to remnant silt that was present in the wash water inside each boring. This is inherent with any in-situ testing conducted during drilling. However, the results of the borehole permeability testing do suggest that the unsaturated formation is composed of very favorable material for the infiltration and migration of artificially-recharged water.

Permanent 3-inch-diameter, PVC monitoring wells were installed in each of the three borings. Subsequent to the installation of the three monitoring wells, each well was developed using a combination of surge blocks and pumping to evacuate finer-grained material from the well and surrounding formation. Short-term pumping tests conducted on all three wells (MER45-AR1, MER45-AR2, and MER45-AR3) results in specific capacity values of 135, 45, and 82 gallons per minute per foot of pumping-induced drawdown (gpm/ft), respectively. All of these values are very high for three-inch-diameter wells and are indicative of the highly transmissive aquifer deposits. Therefore, the deep subsurface in all three areas tested are considered very favorable for the infiltration and migration of groundwater beneath artificial recharge basins.

4. Recommended Infiltration Basin Design

The average Perc rate calculated during the permeability testing conducted in the shallow test pits was 2.9 gallons per minute per square foot, ranging from 1.1 to 4.9 gpm/ft^2. MVD would benefit greatly by having the ability to artificially recharge up to 700 gpm (just over one million gallons per day) into the MVD-4/5 Well Field. Assuming the lowest Perc rate of 1.1 gpm/ft^2, it would take an infiltration basin with a bottom area of 636 ft^2 (roughly a square basin of about 25 feet on each side) to allow that degree of infiltration. However, given seasonal variations in water temperature (which effects viscosity of the water), siltation of the basins, and some degree of biofouling, a safety margin of at least five should be built into the basin design. Therefore, a more realistic basin size to accomplish the infiltration of 700 gpm would be 3,200 ft^2 (a square of 56 feet on each side).

Provided the site layout constraints at the MVD-4/5 Well Field, EGGI recommends that two rectangular basins be designed on the terrace west of MVD-5 (Figure 4). Each of those basins could be constructed in the area just west of test Wells MER45-AR1 and MER45-AR2 and be approximately 35 feet wide and 100 feet long (3,500 ft^2). That would allow either basin to be capable of infiltrating the desired volume of AR water. In addition, Wells MER45-AR1 and MER45-AR2 can be used as monitoring wells between the infiltration basins and MVD-5.

We would also strongly recommend that a third basin be installed in the former sand & gravel pit south of MVD-5 (Figure 4). This will provide redundancy for the other two and allow more flexibility for the use of AR and allows routine maintenance of the basins. The third basin should have roughly the same total area (3,500 square feet), but the configuration can be modified to better fit the layout of the site.

B. Geochemical Investigation of Aquifer

The geochemistry of the Aquifer tapped by Production Wells MVD-4 and MVD-5 was investigated through three primary sampling programs: 1) Long-term water quality testing performed by MVD, 2) A leaching test performed on solid samples collected from unsaturated Aquifer formation materials, and 3) Groundwater samples collected from each of the three new monitoring wells: MER45-AR1, MER45-AR2, and MER45-AR3.

1. Long-Term Records for Production Wells MVD-4 and MVD-5

The MVD has been collecting groundwater samples from Production Well MVD-4 and MVD-5 almost every quarter since 1992, providing a long-term record of transient changes to groundwater within the contributing area of the Well Field (these data are being prepared for submission to MVD in a different report). In general, the chemistry records reflect long-term stability and no systematic decline in any of the nine parameters that are regularly analyzed (turbidity, copper, lead, iron, manganese, sodium, chloride, nitrate, and pH). The only long-term trend of moderate concern is a subtle increase in sodium and chloride over the years from continued deicing practices in the area.

Likewise, the chemistry records from MVD-5 indicate similar chemical stability over the period of record and the same subtle increase in sodium chloride levels over the years. Recent years have shown salt levels in MVD-5 that are nearing the Secondary Drinking Water Level for chloride (250 mg/l). Sodium concentrations are significantly above levels that are a concern for people on sodium-restricted diets (20 mg/l).

2. Leaching Test

The leaching test included the collection of solid soil samples from the base of Test Pits TP-1 and TP-3. These solid formation samples are considered representative of the near surface, unsaturated materials overlying the water table. In addition, a raw unfiltered surface water sample was collected from the Merrimack River on the same day. Once those samples were collected, the leaching test consisted of mixing the Merrimack River sample with the solid samples (ratio of 20:1, water to solid) and tumbling them together for a period of 48 hours. Once the tumbling was completed, the resulting effluent from each sample was filtered with a 0.45-

micron filter to extract the sample. Further, an aqueous “tumble blank” was created by tumbling only the surface water collected from the Merrimack River for 48 hours and then drawing off a filtered (0.45-micron) sample.

Each of those four samples (raw Merrimack River, Tumble Blank, and two effluents) were tested for eight different parameters at Eastern Analytical, Inc., of Concord, New Hampshire (Table II and III, and Appendix C):

- Dissolved Organic Carbon (DOC)
- Total UVA at 254 nm (A measure of the absorbance of ultra-violet light at a wavelength of 254 nanometers; an indicator of carbon content)
- True Color
- pH
- Arsenic
- Calcium
- Iron
- Manganese
- PFAS (aqueous)

The two solid samples which were collected from Test Pits TP-1and TP-3 were also analyzed for the presence of PFAS (Table III and Appendix C). Finally, a groundwater sample was collected from Monitoring Well MER45-AR2 on August 9, 2019, to test for the presence of PFAS.

The results of the leaching test can be summarized as follows:

- The raw Merrimack River water exhibited elevated color (20-25 color units or cu), iron, and manganese. The Tumbler Blank (Merrimack River water tumbled for 48 hours and then filtered) lost much of its color (5-10 cu), all of its manganese, and a significant amount of its iron.
- The dissolved organic carbon (DOC) increased slightly in the Tumbler Blank compared to raw Merrimack River water, but the UVA was reduced by nearly half.
- When the Tumbler Blank is compared to the effluent from the tumbled solid samples, there is a notable decrease in DOC, UVA, and color, all suggesting the solid formation material was helping to remove the natural organic compounds present in the Merrimack River water.
- Both effluent samples were absent for iron, but manganese, which was not present in the Tumbler Blank was apparently mobilized into solution. The calcium in the effluent sample from TP-3 had decreased slightly from 5.5 to 4.7 mg/l, suggesting some calcium may be coming out of solution and attaching to the sediment.
- Finally, arsenic, which was not detected in the raw Merrimack River water, the Tumbler Blank, or the effluent from TP-3, was present in the effluent from TP-1. However, the arsenic was detected at a very low level of 0.001 mg/l, which is equal to the laboratory method detection limit.

With regard to PFAS (Table III):

- Raw Merrimack River water contained very low concentrations of seven different PFAS compounds; the only regulated PFAS, PFOA and PFOS, were identified at concentrations of 3.31 and 1.44 nanograms per liter (ng/l or parts per trillion), for a combined total of 4.75 ng/l.
- The Tumbler Blank had no PFAS detections, which suggests that the low level PFAS in the River water was adsorbed onto suspended solids that would have been filtered out of the Tumbler Blank sample.
- Analysis of the solid formation material from Test Pit TP-1 shows all PFAS were absent; the solids from Test Pit TP-3 show barely detectable concentrations of two PFAS: PFHpA and PFOA.
- The effluent from the tumbled solid sample collected from TP-1 did show the low-level presence of four PFAS which necessarily came from the River water. In some cases, PFAS levels were slightly higher in the effluent than the raw River water. Since no PFAS were detected in the solids from TP-1, the increased concentrations are anticipated to be the result of laboratory errors in the analysis.

3. Groundwater Sampling

All three of the newly-installed monitoring wells were sampled after development of the well screens for a full suite of drinking water parameters (Table IV and Appendix D). Samples were submitted to National Testing Laboratories of Cleveland, Ohio. All the samples for analysis of metals were field filtered such that the results reflect dissolved metal concentrations.

The results of those samples show that the groundwater samples all have excellent groundwater quality, with no man-made or natural contaminants elevated above Primary Maximum Contaminant Levels (PMCL, or those levels in drinking water based on potential health effects). However, there is troubling evidence of elevated sodium chloride resulting from deicing products being applied in the contributing recharge area to Wells MVD-4 and MVD-5. Chloride levels in Wells MER45-AR1, MER45-AR2, and MER45-AR3 were measured at 370, 520, and 270 mg/l, respectively, all of which exceed the Secondary Maximum Contaminant Level (SMCL) for chloride. SMCL's are based on aesthetic characteristics, such as taste or odor, and are not based on potential health effects. The related sodium levels are high enough to be of concern for people on restricted sodium diets. The Artificial Recharge of River water, which is very low in sodium and chloride, will serve to lower the total sodium chloride concentrations by diluting existing concentrations. However, it is also recommended that the MVD takes steps to reduce the introduction of sodium and chloride into this Aquifer.

The groundwater sample collected from Monitoring Well MER45-AR2 (the only groundwater sample taken) contained six different PFAS compounds at levels between 5.26 ng/l (PFBA) and 38.9 ng/l (PFOA).

III. Evaluate Potential to use Water from Baboosic Brook and/or the Merrimack River for Artificial Recharge

In order to evaluate the feasibility of withdrawing water from local surface water bodies for infiltration into potential recharge basins, EGGI investigated three surface water bodies: Baboosic Brook, Souhegan River, and Merrimack River. Baboosic Brook is by far the smallest of the three watersheds, draining 49.11 square miles in portions of Merrimack and Bedford. However, it is attractive because of its elevation above the Well Field (reducing the need for pumping) and relative proximity (Figure 1). The confluence of the Souhegan and Merrimack Rivers is approximately 4,300 feet south of the Well Field. However, at this point the Souhegan River water is essentially the same as the Merrimack River, so it was eliminated as a potential source early in the process. The Merrimack River is a major regional drainage (3,184 square miles) for all of central New Hampshire and is located adjacent to the MVD-4/5 Well Field. Specific tasks performed include:

- Field inspections of Baboosic Brook (three locations), the Souhegan River (one location, and the Merrimack River (two locations) (Figure 1).
- Surface water samples were collected from both Baboosic Brook and the Merrimack River.
- Reconnaissance-level inspections of potential pipeline routes were completed.
- A search for historical water chemistry data from surface water bodies was attempted but was generally unsuccessful. The data that is available was of limited use for this investigation.

Field inspection of Baboosic Brook revealed that the source water is very tannic after its circuitous, low-gradient journey through the north end of Merrimack. The elevated color could be a significant concern from a natural filtration standpoint, if it was to be used to artificially recharge the aquifer. A sample of the surface water did not reveal any natural or man-made contaminants, but the chloride (51 mg/l) reflects abundant stormwater runoff from the suburban watershed (Appendix E). Of greatest concern is the relatively small size of the watershed (49.11 square miles). The summertime Q80 flow (flow that is exceeded 80% of the time) in Baboosic Brook is only 4.47 cubic feet per second (cfs) (2,000 gallons per minute or gpm). Therefore, under low flow conditions any withdrawal for AR could be a significant portion of the total stream flow. Therefore, withdrawals of water would likely be subject to limitations. Furthermore, construction of any pipeline from Baboosic Brook to the Well Field will involve multiple property owners, and road crossings which will significantly complicate this process.

The Merrimack River watershed upstream of the Well Field encompasses 3,184 square miles (65 times larger than the Baboosic Brook watershed). The Q80 flow of the Merrimack River during summer months is 960 cfs (430,000 gpm or approximately 620 times the proposed withdrawal of 700 gpm). Therefore, the size of the Merrimack River watershed is much more amenable for obtaining the water needed for year-round AR. The surface water sample collected from the River did not reveal any natural or man-made contaminants (Appendix E).[3] Water withdrawals from the River will require a pump station and pipeline capable of conveying the water approximately 45 to 50 vertical feet to reach the upper AR basins west of MVD-5.

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[3] Except very low background levels of PFOA and PFAS.

Two different potential pipeline routes were considered from the Merrimack River to the Well Field. The shortest of these potential routes (Route Merrimack 1 on Figure 1) is approximately 1,380 feet long and follows existing woods roads much of the way. This route also requires crossing an active railroad track (Pan Am Railways of North Billerica, Massachusetts) and utilities along that right-of-way. Horizontal drilling of the pipeline would be necessary to penetrate sufficiently below those obstacles. However, the only way to avoid the railroad track/utilities crossing would be to extend the length of the pipeline to over 2,800 feet to take advantage of an existing drainageway that exists beneath the railroad tracks (Route Merrimack 2 on Figure 1). Even that route would likely require some kind of permission/permitting from Pan Am Railways). It is EGGI's opinion that the most direct and most cost-effective route for the potential pipeline is Route Merrimack 1 as shown on Figure 1.[4]

IV. EVALUATION OF PERMITTING REQUIREMENTS

Development of an Artificial Recharge program for the MVD-4 and MVD-5 Well Field will require the successful approval of a number of permits, including:

- Surface Water Withdrawal: Two primary types of permitting will be required to remove water from the Lower Merrimack River: 1) those necessary for installation of the intake structure and pipeline, and 2) the actual water withdrawal. This reach of the River is a "Designated River" according to the New Hampshire Department of Environmental Services (NHDES) and it will be subject to the requirements of the Shoreline Water Quality Protection Act. Disturbance of the river bank for installation of the intake structure will trigger a wetlands permit, which will require completion of a "401 Water Quality Certificate" through the NHDES Watershed Management and Wetlands Bureaus. This could impact both the construction of an intake structure in the River and the actual withdrawal of the water.
- Groundwater Discharge Permit: An application will need to be submitted to and approved by the NHDES for the infiltration of surface water into the subsurface. This permit application process will include a detailed testing plan to provide a "Proof of Concept" for removal of the surface water-related organisms (e.g., bacteria). This testing would include the benchmark testing of aquifer materials and a large-scale pumping test utilizing temporary infiltration basins and the existing Production Wells.
- Large Groundwater Withdrawal Permit is <u>NOT</u> required: Because existing Production Wells MVD-4 and MVD-5 were put online prior to the current NHDES Large Groundwater Withdrawal Regulations, so they are exempt from the need for a permit, even if the wells remove a volume greater than historical withdrawals.
- Crossing of the active railroad tracks owned and operated by Pan Am Railways will require permission from Pan Am and coordination with the railway requirements and procedures.

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[4] Pipeline Route Merrimack 1 will stay on MVD Property on the west side of the railroad tracks but will need to cross beneath the railroad tracks operated by Pam Am Railways and then run across a private parcel (Longa Parcel; Tax Map 005D-2, Lot 000009) where the intake structure will be located.

V. CONCLUSIONS/RECOMMENDATIONS

This preliminary investigation has shown that it is technically feasible and favorable to use Artificial Recharge to provide supplemental groundwater recharge to the Aquifer supplying groundwater to the Merrimack Village District Wells MVD-4 and MVD-5. The Merrimack River provides a very reliable source of surface water near the site, even under low flow conditions. The surficial deposits near the surface and deep within the Aquifer are composed of sand and gravel which would allow adequate infiltration of the surface water and deep migration of the groundwater towards the existing Production Wells while providing substantial natural filtration. Therefore, all the natural elements are in place for the use of Artificial Recharge basins to enhance infiltration of the surface water into the underlying Aquifer. In addition, the pumping capacity of Well MVD-5 is much greater than what the natural recharge can supply, so existing infrastructure can be better utilized to withdraw additional groundwater with few improvements.

In summary, the advantages of using Artificial Recharge at Wells MVD-4 and MVD-5 include the following:

1. It will enhance the overall yield of Wells MVD-4 and MVD-5 by as much as 660,000 gpd.
2. The addition of surface water from the Merrimack River will serve to dilute the continuously increasing concentrations of sodium and chloride in the Aquifer. Sodium and chloride are very expensive to remove from water (use of reverse osmosis) and the use of Artificial Recharge could be a reasonably inexpensive means to reduce these sodium and chloride levels.
3. The use of AR should reduce the concentration of PFAS compounds found in the water pumped from Wells MVD-4 and MVD-5 that had been identified during earlier studies of this Well Field. The reduction in PFAS compounds should also increase the length of time the carbon filters will last.
4. The MVD will be able to use the existing infrastructure (pump house) and pumping treatment facility to reduce the cost per gallon of water produced at this site.

A number of permits and/or permission will need to be approved for this AR project. This will include permits for: a) the installation of an intake structure in the Merrimack River; b) surface water withdrawals from the River; c) a pipeline crossing of the existing railroad tracks; and d) introduction of the surface water into the Aquifer via the AR basins. However, the substantial benefits of utilizing AR to supplement the available recharge to the existing Production Wells justify obtaining those permits/permissions.

EGGI recommends completion of the following work tasks so that increased groundwater withdrawals from this Well Field can be realized:

- Perform a small-scale pilot test of a temporary infiltration basin. Water from the MVD system could be used for the pilot test, if the temporary withdrawal and transport of surface water is too cumbersome and expensive.
- Perform a benchtop-scale filtration tests to ensure that surface water from the River is compatible with the Aquifer materials and that the Aquifer materials can provide the required filtration of the surface water. Due to the difficulty of disposing groundwater

pumped from the Production Wells with elevated PFAS levels and the difficulty of temporarily withdrawing/transporting the surface water across the railroad, it may be best that this benchtop testing be performed off-site. The Town of Merrimack's wastewater treatment plant, located adjacent to the Merrimack River, might be an excellent option for use as a testing location.

- Collect groundwater samples from representative monitoring wells around the Well Field to determine the current concentration and distribution of PFAS and sodium chloride contamination. This will help to further quantify the full benefit of diluting existing groundwater resources beneath the site.

VI. LIMITATIONS

EGGI has collected and evaluated the available technical data according to professionally accepted scientific standards. The recommendations provided herein represent EGGI's professional opinion based upon the hydrogeologic data collected and do not constitute a warranty written or implied.

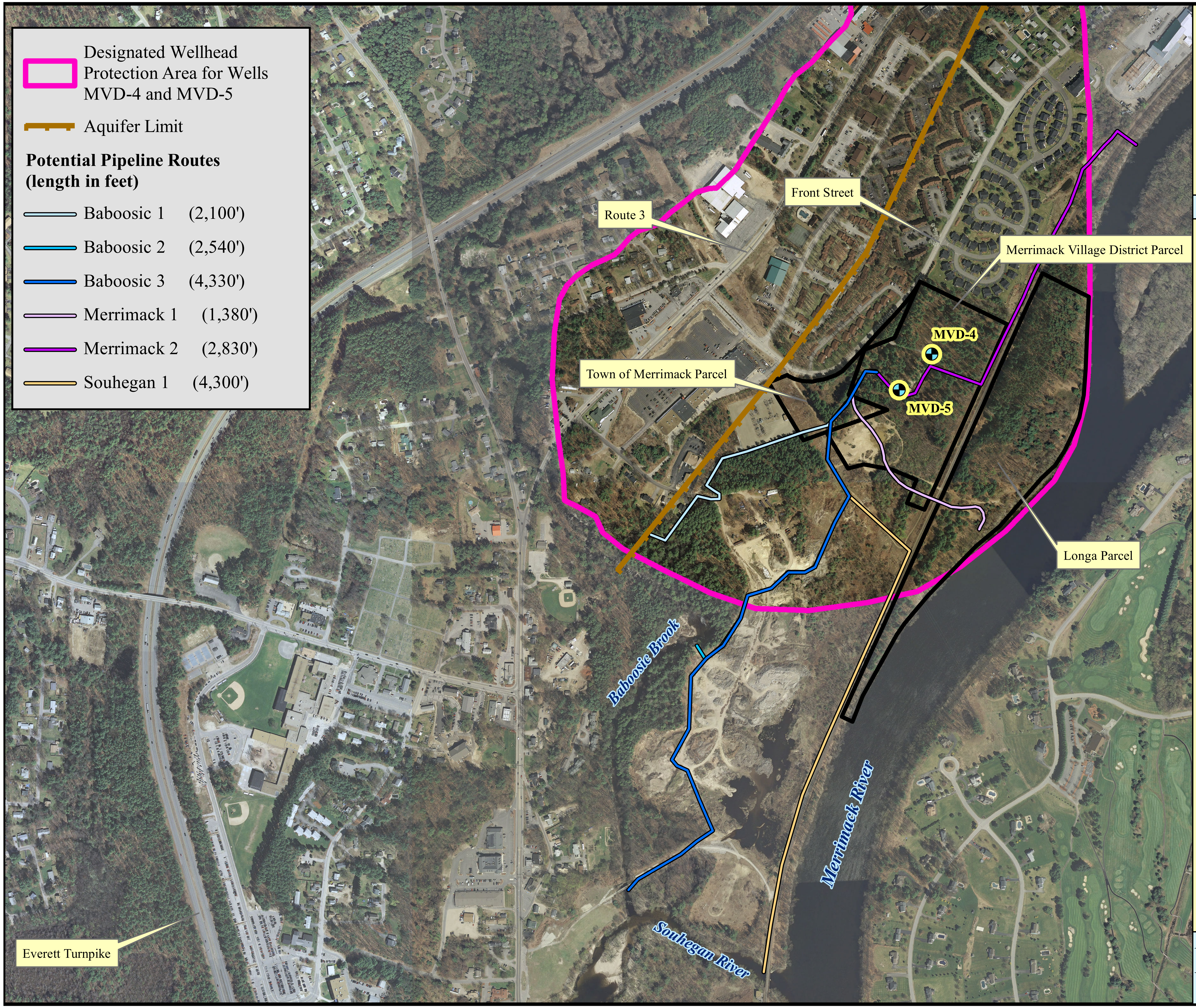
VII. REFERENCE

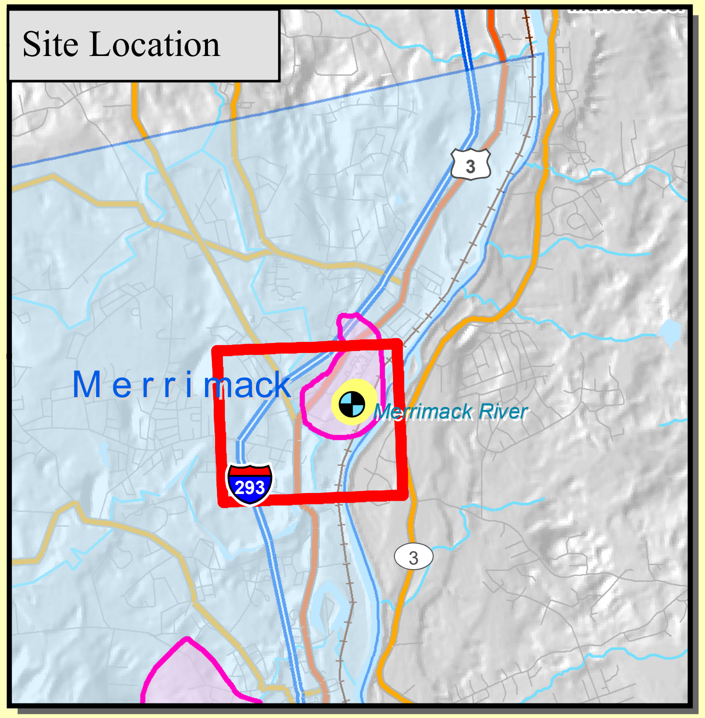
Emery & Garrett Groundwater, Inc. (EGGI), 2003, Establishment of the Source Water Protection Area, Merrimack Village District Wells MVD-4 and MVD-5, Merrimack, New Hampshire. Submitted to Merrimack Village District in December 2003.

FIGURES

FIGURE 1

Potential Pipeline Routes for Artificial Recharge near Wells MVD-4 and MVD-5 Merrimack, New Hampshire





Red box shows the extent of the main view.

1 inch = 8,000 feet
1:96,000

Legend

● MVD-4 *MVD Production Well*

▭ Parcels

N

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

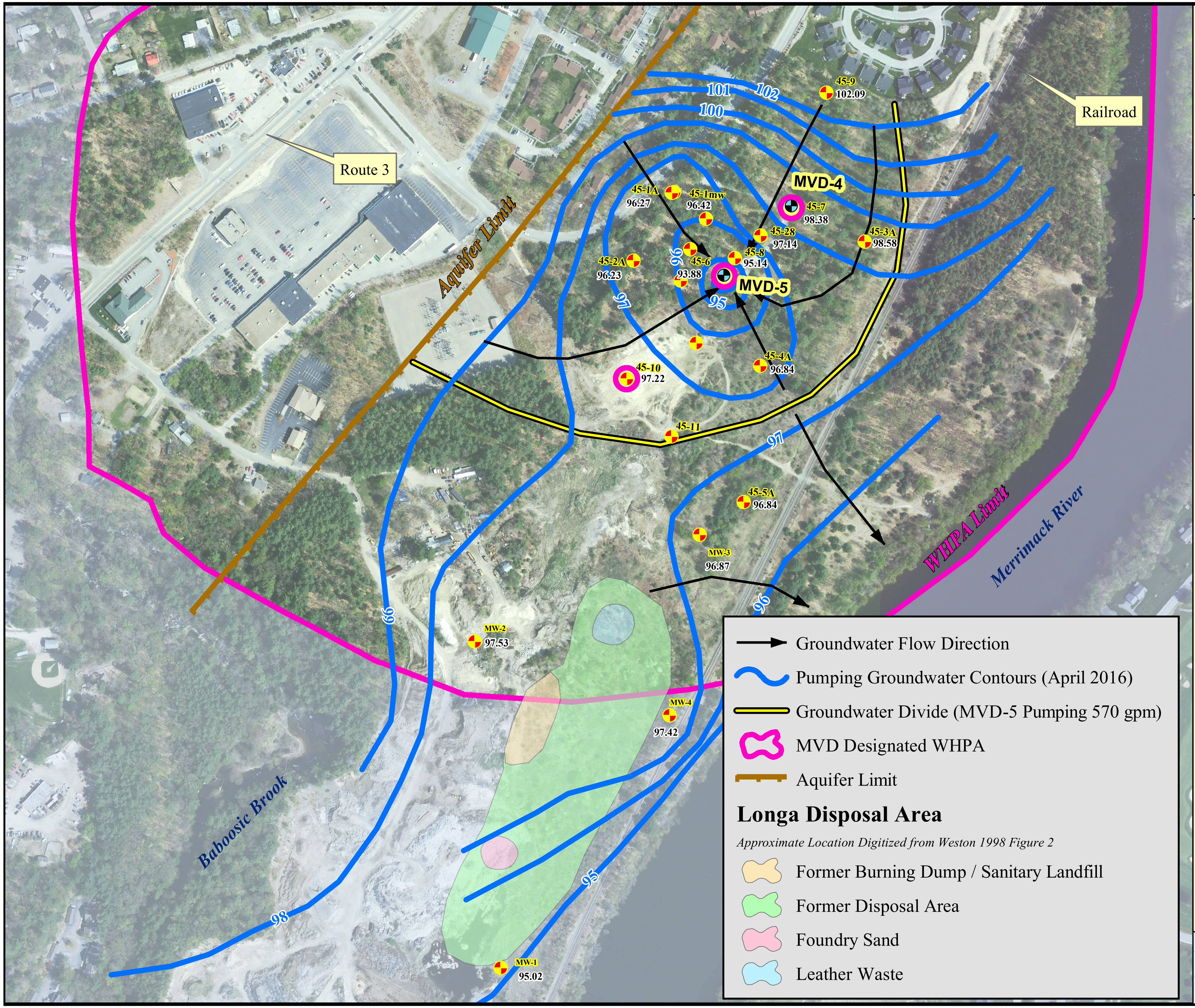
Emery & Garrett Groundwater Investigations, A Division of GZA

FIGURE 1

O:\nh\MERRIMAC\MVD-45AR\GIS\MER-45AR_Fig1_Pipelines.mxd (last modified:2/21/2019)

FIGURE 2

Groundwater Contours During
Pumping Interval 4/12/16
MVD-4 and MVD-5
Merrimack, New Hampshire

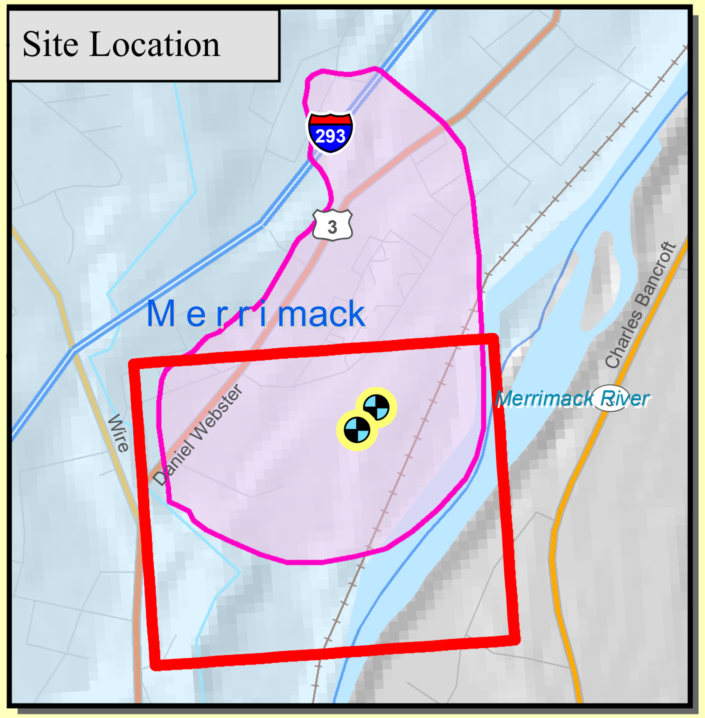


- Groundwater Flow Direction
- Pumping Groundwater Contours (April 2016)
- Groundwater Divide (MVD-5 Pumping 570 gpm)
- MVD Designated WHPA
- Aquifer Limit

Longa Disposal Area

Approximate Location Digitized from Weston 1998 Figure 2

- 🟧 Former Burning Dump / Sanitary Landfill
- 🟩 Former Disposal Area
- 🟥 Foundry Sand
- 🟦 Leather Waste



Red box shows the extent of the main view.

1 inch = 2,000 feet
1:24,000

Legend

MVD-4 *MVD Production Well*

45-28 *Monitoring Well Site*

Well site monitored with an automatic datalogger.

N

Scale is 1:3,600
1 inch = 300 feet

0 37.5 75 150 Meters
0 150 300 600 Feet

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FIGURE 2

O:\nh\MERRIMAC\MVD-45AR\GIS\MER-45AR_Fig2_GWcontours_Pumping.mxd (last modified:2/21/2019)

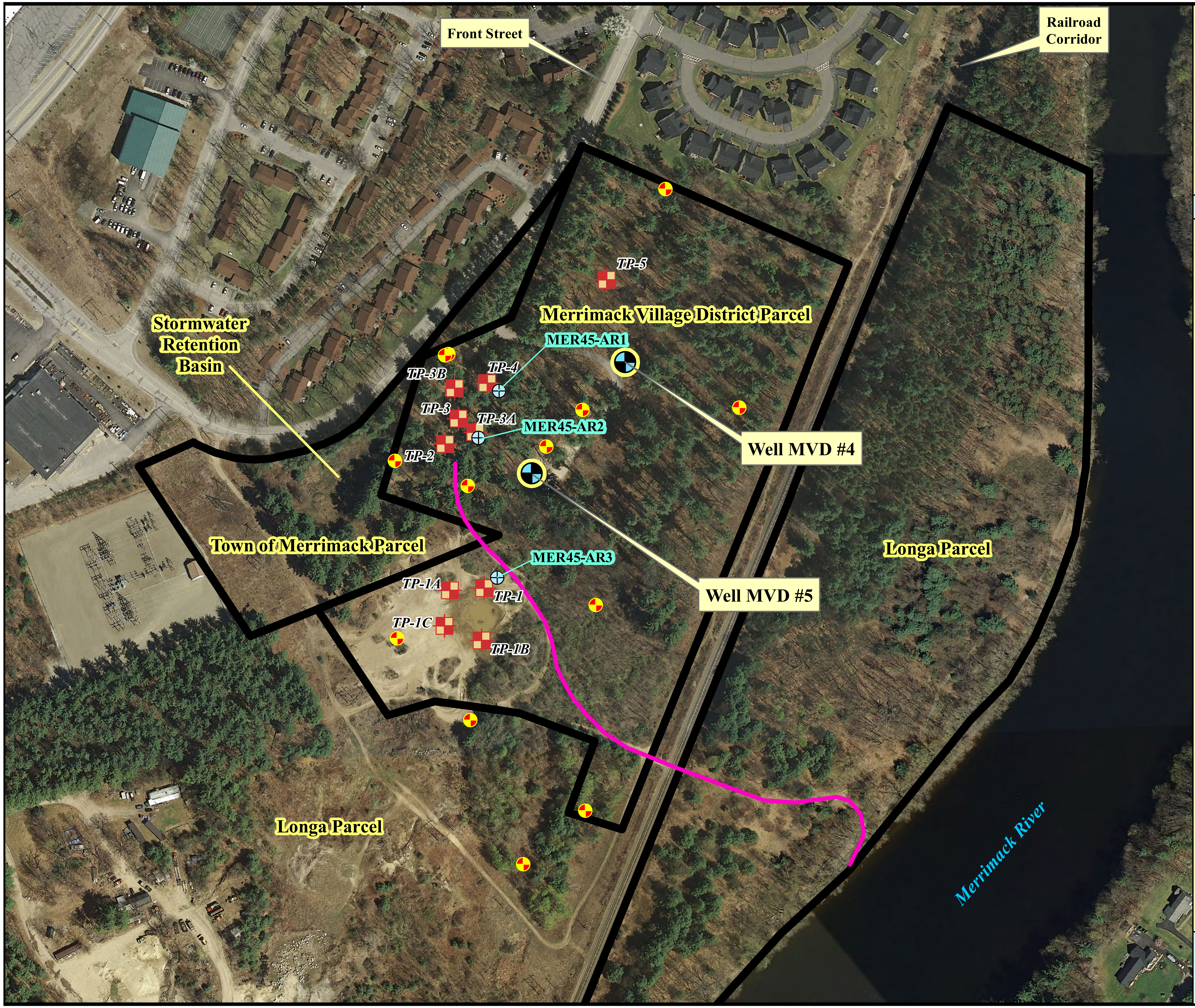

FIGURE 3

Test Pits, Monitoring Wells, and Potential Pipeline Locations for Potential Artificial Recharge Wells MVD-4 and MVD-5 Merrimack, New Hampshire

Legend

◐	MVD-4 *MVD Production Well*
━	Proposed Raw Water Pipeline Route Merrimack 1
MER45-AR1 ⊕	Monitoring Well Installed for Artificial Recharge Investigation
▨	Test Pit Location
●	Existing Monitoring Well
▭	Merrimack Tax Parcels

N

Scale is 1:2,400

1 inch = 200 feet

0 25 50 100 Meters

0 100 200 400 Feet

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FIGURE 3

O:\nh\MERRIMAC\MVD-45AR\GIS\MER-45AR_Fig3_Test_Pits.mxd (last modified:2/21/2019)

FIGURE 4

Potential Artificial Recharge Basin Locations near Wells MVD-4 and MVD-5 Merrimack, New Hampshire

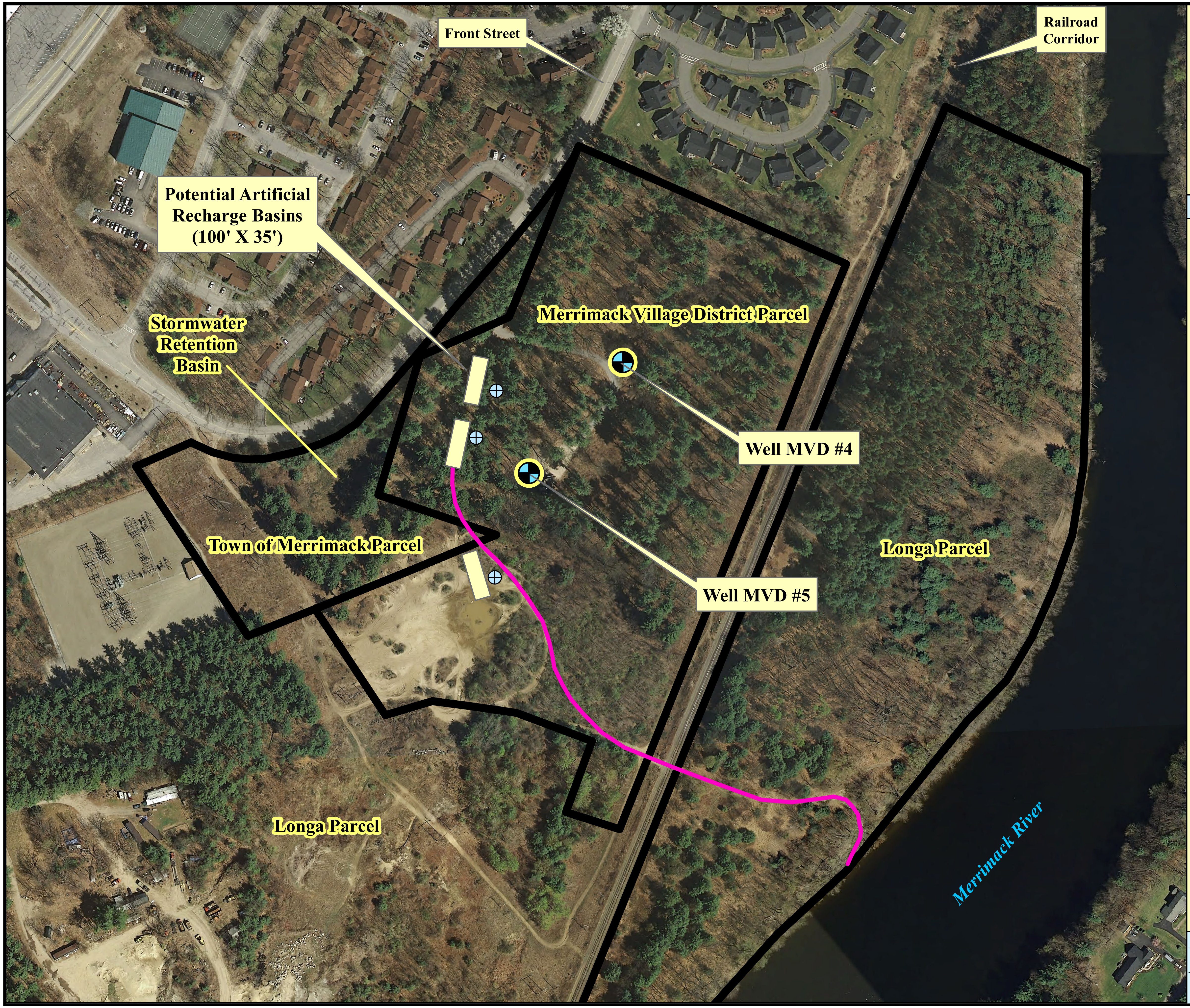

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FIGURE 4

O:\nh\MERRIMAC\MVD-45AR\GIS\MER-45AR_Fig4_Basin_Locations.mxd (last modified:2/21/2019)

TABLES

TABLE I
Geologic Descriptions of Test Pits - June 7, 2018
Artificial Recharge Evaluation
Merrimack Village District MVD-4 and MVD-5 Well Field
Merrimack, New Hampshire

Test Pit	Interval	Description	Perc Test Gallons	Cumulative Perc Time* Minutes:Seconds/Gallon	Perc Rate During Third Gallon Infiltrated (GPM)	Perc Rate Per Square Foot (GPM/FT^2)
Test Pit TP-1	0 to 1.25'	Silty sand with some pebbles and cobbles.	1	00:08.6		
	1.25 to 6'	Layers of tan, well-sorted, medium to coarse sand; groundwater intercepted.	2	00:24.9		
			3	00:47.6	2.6	4.9
Test Pit TP-1A	0 to 1'	Tan, silty sand.				
	1 to 3'	Tan, medium to coarse sand with rusty layers and thin gay, silty layers.				
	3 to 4.5'	Very poorly-sorted, fine to very coarse sand, some pebbles, some silt, little cobbles; groundwater intercepted.				
Test Pit TP-1B	0 to 6'	Interlayered, tan to rusty fine to coarse sand with gray to rusty silty layers, trace cobbles.				
		Sand is generally silty except for occasional coarse layers.				
Test Pit TP-1C	0 to 0.5'	Silty fine to coarse sand.				
	0.5 to 2.5'	Tan to rusty, poorly-sorted fine to very coarse sand, some pebbles, little cobbles.				
	2.5 to 6'	Gray, well-sorted sand, some pebbles, little cobbles.				
Test Pit TP-2	0 to 0.7'	Brown, organic-rich soil.	1	00:28.7		
	0.7 to 2.5'	Tan, well-sorted, fine to medium sand, trace silt.	2	01:00.0		
	2.5 to 4'	Tan to gray, medium to very coarse sand, little granules.	3	01:41.0	1.5	2.7
Test Pit TP-3	0 to 0.5'	Dark brown, organic-rich soil.	1	00:48.0		
	0.5 to 2'	Tan, fine to medium sand, trace silt.	2	02:00.0		
	2 to 6.5'	Tan to gray, moderately-sorted, medium to very coarse sand, trace pebbles.	3	03:42.0	0.6	1.1
Test Pit TP-3A	0 to 0.7'	Organic-rich soil.				
	0.7 to 3.5'	Tan, fine to medium sand, trace silt.				
	3.5 to 6'	Medium to very coarse sand, some pebbles.				
Test Pit TP-3B	0 to 0.9'	Organic-rich soil.				
	0.9 to 2.5'	Tan, fine to medium sand, trace pebbles.				
	2.5 to 4'	Tan, medium to very coarse sand, some pebbles.				
Test Pit TP-4	0 to 0.5'	Organic-rich soil.	1	00:27.0		
	0.5 to 1.5'	Tan, fine to medium sand.	2	00:58.0		
	1.5 to 6'	Coarse to very coarse sand, some gravel.	3	01:47.0	1.2	2.3
Test Pit TP-5	0 to 0.5'	Organic-rich soil.	1	00:15.0		
	0.5 to 2'	Tan, fine to medium sand, trace pebbles.	2	00:35.0		
	2 to 4'	Tan to gray, fine to very coarse sand, trace pebbles.	3	01:07.0	1.9	3.5
	4 to 5.5'	Coarse to very coarse sand, trace gravel.				

* Perc Time = The time required for subsequent gallons of water to flow vertically out of an open-ended five-gallon bucket into the formation.
Four gallons of water are added to the bucket and the time is recorded for each of the first three gallons to infiltrate through a known area.

TABLE II

Results of Laboratory Analyses of Water Quality Samples Leaching Tests near the MVD-4/5 Well Field Merrimack Village District, Merrimack, New Hampshire

Sample Name	**Dissolved Organic Carbon** (mg/l)	**Total UVA at 254 nm** cm-1	**ColorTrue** PtCo	**pH**	**Arsenic** (mg/l)	**Calcium** (mg/l)	**Iron** (mg/l)	**Manganese** (mg/l)
MCL:				***6.5-8.5***	***0.01***		***0.3***	***0.05***
Effluent TP-1	2.8	0.060	<5	7.02	0.001	5.6	<0.05	0.029
Effluent TP-2	1.8	0.013	<5	6.77	<0.001	4.7	<0.05	**0.093**
Tumble Blank	3.2	0.077	5-10	6.99	<0.001	5.5	0.15	<0.005
Raw Merrimack River	3.0	0.130	20-25	6.93	<0.001	5.7	0.83	0.041

MCL = Maximum Contaminant Levels

Values in **bold** exceed Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) and may require treatment.

ND = not detected

TABLE III

Results of Sampling for Per- and Polyfluorinated Alkyl Substances (PFAS)
Sample Locations near the MVD-4/5 Well Field
Merrimack Village District, Merrimack, New Hampshire

Analyte	**Raw Merrimack River**	**Tumble Blank**	**Effluent TP-1**	**Solid TP-1**	**Effluent TP-3**	**Solid TP-3**	**Monitoring Well MER45-AR2**
PFBA	1.31	ND	1.28	ND	3.38	ND	5.26
PFPeA	1.61	ND	2.07	ND	6.79	ND	9.44
PFBS	1.88	ND	ND	ND	ND	ND	10.6
PFHxA	ND	ND	ND	ND	ND	ND	13.5
PFHpA	1.16	ND	2.61	ND	10.7	0.370	8.56
PFHxS	2.70	ND	ND	ND	1.44	ND	ND
6:2 FTS	ND	ND	ND	ND	ND	ND	NT
PFOA	3.31	ND	1.50	ND	48.6	0.616	38.9
PFHpS	ND	ND	ND	ND	ND	ND	NT
PFNA	ND	ND	ND	ND	ND	ND	ND
PFOSA	ND	ND	ND	ND	ND	ND	NT
PFOS	1.44	ND	ND	ND	ND	ND	ND
PFDA	ND	ND	ND	ND	ND	ND	ND
8:2 FTS	ND	ND	ND	ND	ND	ND	NT
MeFOSAA	ND	ND	ND	ND	ND	ND	ND
EtFOSAA	ND	ND	ND	ND	ND	ND	ND
PFUnA	ND	ND	ND	ND	ND	ND	ND
PFDS	ND	ND	ND	ND	ND	ND	NT
PFDoA	ND	ND	ND	ND	ND	ND	ND
MeFOSA	ND	ND	ND	ND	ND	ND	NT
PFTrDA	ND	ND	ND	ND	ND	ND	ND
PFTeDA	ND	ND	ND	ND	ND	ND	ND
EtFOSA	ND	ND	ND	ND	ND	ND	NT
PFHxDA	ND	ND	ND	ND	0.390	ND	NT
MeFOSE	ND	ND	ND	ND	ND	ND	NT
EtFOSE	ND	ND	ND	ND	ND	ND	NT

NT = not tested

ND = not detected

TABLE IV

Results of Laboratory Analyses of Water Quality Samples
Test Wells near the MVD-4 and MVD-5 Well Field
Merrimack Village District, Merrimack, New Hampshire

Well Name	**Iron** (mg/l)	**Manganese** (mg/l)	**pH**	**Alkalinity** (mg/l)	**Chloride** (mg/l)	**Sodium*** (mg/l)	**Turbidity** (ntu)	**Hardness** (mg/l)	**Total Dissolved Solids** (mg/l)	**Sulfate** (mg/l)	**Nitrate** (mg/l)	**VOCs** (mg/l)	**Pesticides Herbicides PCBs** (mg/l)
MCL:	***0.30***	***0.05***	***6.5-8.5***		***250***		***1***		***500***	***250***	***10***		
AR1	ND	0.014	**5.8**	22	**370**	181	ND	110	**640**	12	1.5	ND	ND
AR2	ND	0.016	**5.8**	ND	**520**	263	ND	120	**860**	14	1.5	ND	ND
AR3	ND	ND	**6.0**	22	**270**	125	ND	100	480	11	1.7	ND	ND

MCL = Maximum Contaminant Levels

Values in **bold** exceed Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) and may require treatment.

ND = not detected

*Recommended level for people on a low sodium diet is 20 mg/l.

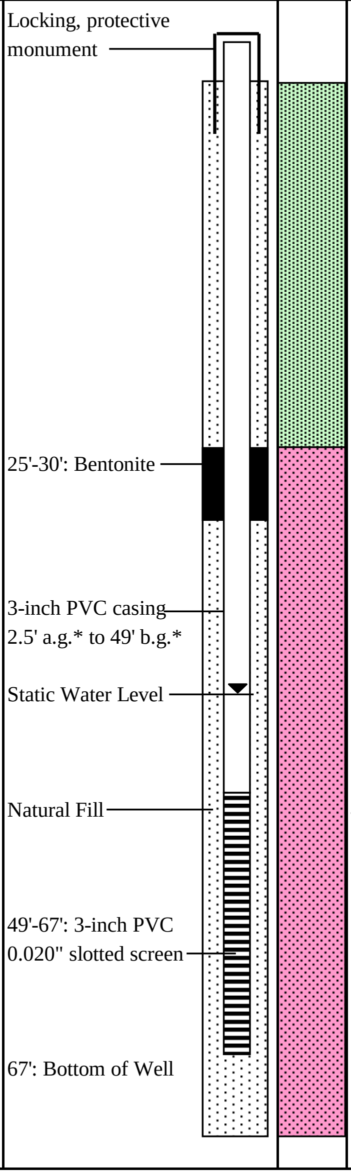
APPENDIX A

HYDROGEOLOGIC LOGS

HYDROGEOLOGIC LOG FOR MONITORING WELL MER45-AR1
Merrimack Village District, Production Wells MVD-4 and MVD-5
Merrimack, New Hampshire

Project: MVD-4 / MVD-5 Artificial Recharge
Driller: Northern Test Boring
Geologist: Dan Tinkham
Date Drilled: July 2, 2018
Drill Method: 4-inch Casing - Drive and Wash

Total Depth of Well: 55.5'
Depth to Bedrock: 73'
Static Water Level: 42.13' below top of casing (8/9/18)
Screen Interval (Slot Size): 49'-67' (0.020" slotted)



DEPTH (feet)	SAMPLE DESCRIPTION	**Penetration Blows (Recovery)
+2		
0		
2		
4	**0' - 25': Brown, well- to moderately-sorted, fine sand to granules.**	
6		
8		
10		
12		
14		
16		
18	20'-22': Split-spoon; Gray-brown, moderately-sorted, fine sand to granules.	7-7-11-14
20		(9 inches)
22		
24		
26	**25'- 73': Brown, poorly-sorted, fine to very coarse sand with**	
28	**variable granules, pebbles to cobbles.**	
30	30'-32': Split-spoon; Brown, poorly-sorted, medium sand to granules,	9-10-11-13
32	trace pebbles.	(7 inches)
34		
36		
38		
40		
42	40'-42': Split-spoon; Rusty-brown, moderately-sorted, fine to very	13-12-12-17
44	coarse sand, trace silt, trace pebbles.	(10 inches)
46		
48		
50	**48' - 57.5': Brown, well-sorted, loose, fine sand, trace silt.**	
52	50'-52': Split-spoon; Rusty brown to brown, poorly-sorted, fine sand	16-20-18-20
54	to granules, trace silt, trace pebbles.	(11 inches)
56		
58		
60	60'-62': Split-spoon; Brown, moderately-sorted, fine sand to granules,	15-17-17-16
62	trace pebbles.	(12 inches)
64		
66		
68		
70		
72		
74	**73': Refusal on bedrock.**	

*a.g. - Above Ground Surface; b.g. - Below Ground Surface

** Penetration blows with a 140 pound hammer falling 30 inches (per 6-inches over a 2 foot interval).

GEOLOGIC LOG LEGEND FOR TEST WELL MER45-AR1

🟩 Generally, well-sorted, medium to coarse sands, varying amounts of gravel (see log for details).

🟥 Generally, poorly-sorted (well-graded), fine to coarse sands with pebbles to cobbles (see log).

PERCENTAGES USED IN SAMPLE DESCRIPTIONS

Trace = 0-10%   Little = 10-20%

HYDROGEOLOGIC LOG FOR MONITORING WELL MER45-AR2
Merrimack Village District, Production Wells MVD-4 and MVD-5
Merrimack, New Hampshire

Project: **MVD-4 / MVD-5 Artificial Recharge**

Total Depth of Well: 62'

Driller: Northern Test Boring

Depth to Till: 73'

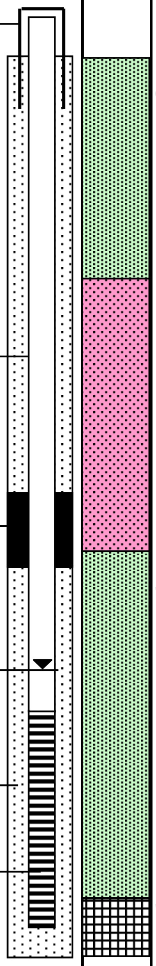
Geologist: Dan Tinkham

Static Water Level: 44.70' below top of casing (8/9/18)

Date Drilled: July 3, 2018

Screen Interval (Slot Size): 45'-60' (0.020" slotted)

Drill Method: 4-inch Casing - Drive and Wash



DEPTH (feet)	WELL CONSTRUCTION	DRILL LOG	SAMPLE DESCRIPTION	**Penetration Blows (Recovery)
	Locking, protective			
+2	monument			
0				
2		🟩	**0' - 15': Brown, well-sorted, beds of fine to coarse sand**	
4		🟩	**with variable pebbles.**	
6		🟩		
8		🟩		
10		🟩		
12		🟩		
14		🟩		
16		🟥	**15'- 34': Brown-gray, poorly-sorted, fine sand to pebbles.**	
18		🟥		
20	3-inch PVC casing	🟥	20'-22': Split-spoon; Rusty-brown, poorly-sorted, fine sand to pebbles,	9-11-15-10
22	2.5' a.g.* to 45' b.g.*	🟥	trace silt.	(9 inches)
24		🟥		
26		🟥		
28		🟥		
30		🟥	30'-32': Split-spoon; Brown-gray, poorly-sorted, compact, fine sand to	33-32-31-26
32	30'-35': Bentonite	🟥	pebbles (some weathered).	(10 inches)
34		🟥		
36		🟩	**34' - 58': Brown-gray, well-sorted, beds of fine sand, to granules.**	
38		🟩		
40		🟩		
42	Static Water Level	🟩	40'-42': Split-spoon; 6" of Brown, well-sorted, medium to coarse sand;	31-20-17-19
44		🟩	4" as 30' to 32'.	(10 inches)
46		🟩		
48		🟩		
50	Natural Fill	🟩		
52		🟩	50'-52': Split-spoon; Brown-gray, well-sorted, medium to very coarse sand;	18-18-16-18
54	45'-60': 3-inch PVC	🟩	One 2" bed had little granules.	(10 inches)
56	0.020" slotted screen	🟩		
58		▦	**58' - 62': Brown to Gray, poorly-sorted, silt to pebbles.**	
60		▦	60'-62': Split-spoon; Brown to gray, poorly-sorted, medium sand to pebbles,	31-30-27
62	60': Bottom of Well	▦	trace fine sand to silt.	(14 inches)
64			**62': Bottom of Boring in Till.**	
66				
68				
70				
72				
74				

*a.g. - Above Ground Surface; b.g. - Below Ground Surface

** Penetration blows with a 140 pound hammer falling 30 inches (per 6-inches over a 2 foot interval).

GEOLOGIC LOG LEGEND FOR TEST WELL MER45-AR2

- 🟩 Generally, well-sorted, medium to coarse sands, varying amounts of gravel (see log for details).
- 🟥 Generally, poorly-sorted (well-graded), fine to coarse sands with pebbles to cobbles (see log).
- ▦ Till - dense, tight, silty sand with layers and/or lenses of clay (see log for details).

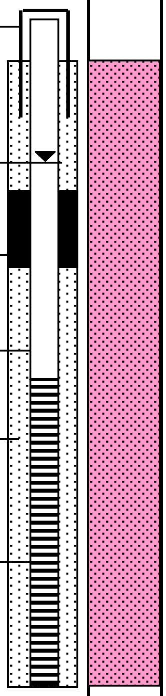
PERCENTAGES USED IN SAMPLE DESCRIPTIONS

Trace = 0-10%   Little = 10-20%

HYDROGEOLOGIC LOG FOR MONITORING WELL MER45-AR3
Merrimack Village District, Production Wells MVD-4 and MVD-5
Merrimack, New Hampshire

Project: **MVD-4 / MVD-5 Artificial Recharge**
Driller: Northern Test Boring
Geologist: Dan Tinkham
Date Drilled: July 3, 2018
Drill Method: 4-inch Casing - Drive and Wash

Total Depth of Well: 40'
Depth to Till: Not Intercepted
Static Water Level: 8.06' below top of casing (8/9/18)
Screen Interval (Slot Size): 20'-40' (0.020" slotted)



DEPTH (feet)	**WELL CONSTRUCTION**	**SAMPLE DESCRIPTION**	****Penetration Blows (Recovery)**
+2	Locking, protective monument		
0			
2		**0' - 40': Brown, poorly-sorted, fine sand to pebbles, trace to little silt.**	
4			
6	Static Water Level		
8			
10		10'-12': Split-spoon; 8" of Brown, well-sorted, coarse to very coarse, trace granules. 2" Brown, poorly-sorted, fine sand to pebbles.	5-6-3-3 (10 inches)
12	8'-13': Bentonite		
14			
16			
18	3-inch PVC casing		
20	2.5' a.g.* to 20' b.g.*	20'-22': Split-spoon; Brown, poorly-sorted, medium sand to pebbles.	6-7-11-8 (8 inches)
22			
24	Natural Fill		
26			
28			
30	20'-40': 3-inch PVC 0.020" slotted screen		
32			
34			
36			
38			
40	40': Bottom of Well	**40': Bottom of Boring.**	
42			
44			

*a.g. - Above Ground Surface; b.g. - Below Ground Surface

** Penetration blows with a 140 pound hammer falling 30 inches (per 6-inches over a 2 foot interval).

GEOLOGIC LOG LEGEND FOR TEST WELL MER45-AR3

▨ Generally, poorly-sorted (well-graded), fine to coarse sands with pebbles to cobbles (see log).

PERCENTAGES USED IN SAMPLE DESCRIPTIONS

Trace = 0-10%   Little = 10-20%
Some = 20-35%   And = 35-50%

APPENDIX B

PERCOLATION TEST ANALYSES

Emery & Garrett Groundwater Investigations,
A Division of GZA

Slug Test Analysis Report

Project: Merrimack MVD-4/5 Artificial Recharge

Number:

Client: Merrimack Village District

Location: Merrimack, New Hampshire

Slug Test: Slug Test AR-1 10 Feet

Test Well: MER45-AR1-10

Test Conducted by: djt

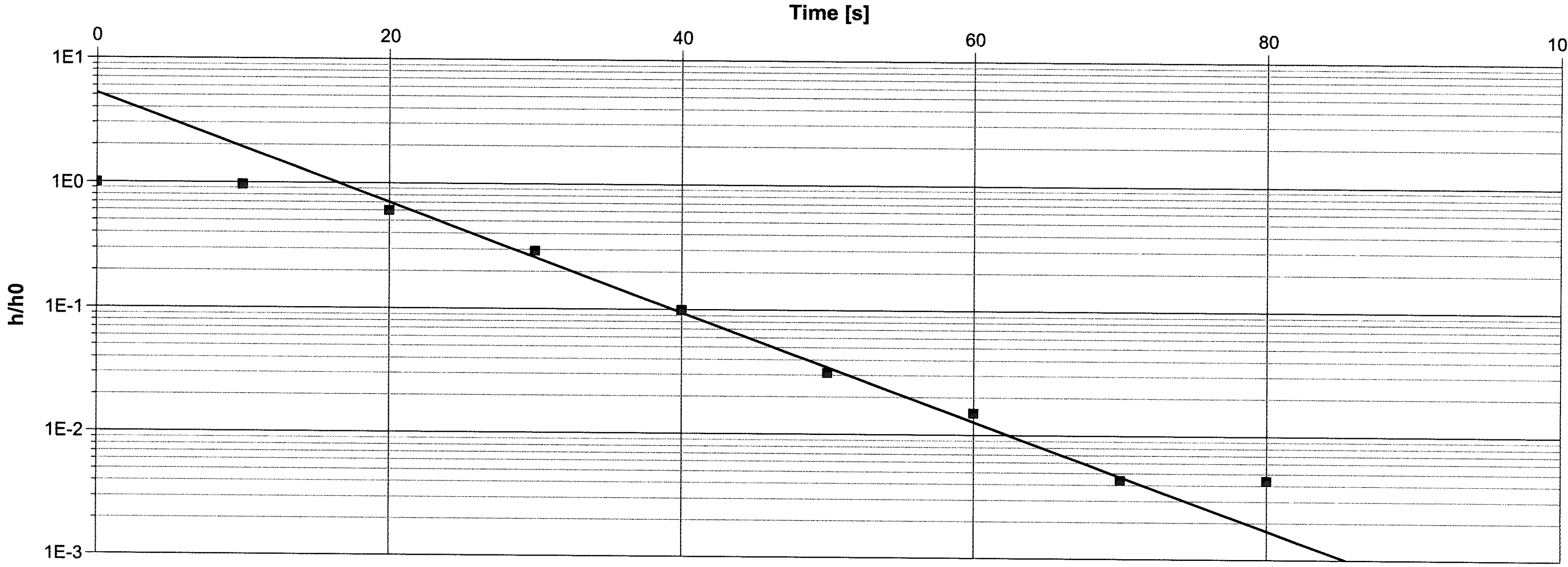
Test Date: 7/2/2018

Analysis Performed by: djt

MER-AR1 10 Feet

Analysis Date: 1/21/2019

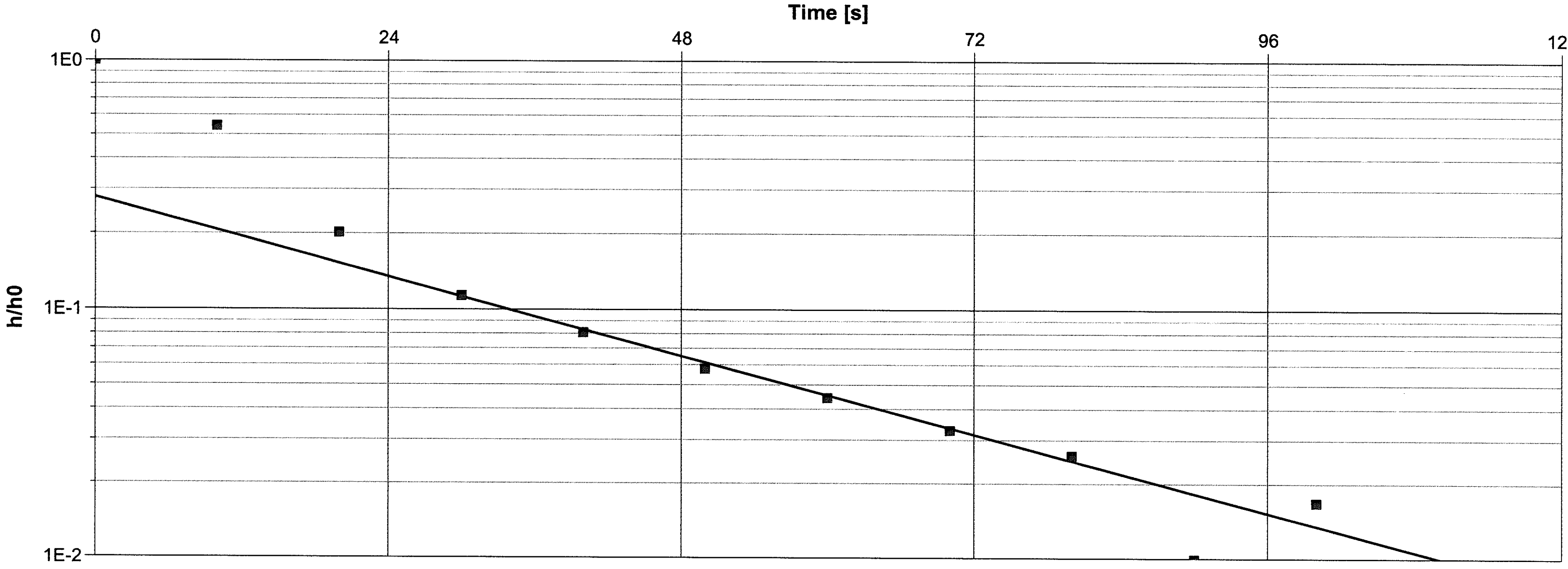
Aquifer Thickness: 30.00 ft



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [ft/d]	
MER45-AR1-10	21.50	

Emery & Garrett Groundwater Investigations, ***A Division of GZA***	**Slug Test Analysis Report**	
	Project: Merrimack MVD-4/5 Artificial Recharge	
	Number:	
	Client: Merrimack Village District	
Location: Merrimack, New Hampshire	Slug Test: Slug Test AR-1 20 Feet	Test Well: MER45-AR1-20
Test Conducted by: djt		Test Date: 7/2/2018
Analysis Performed by: djt	MER-AR1 20 Feet	Analysis Date: 1/21/2019
Aquifer Thickness: 30.00 ft		

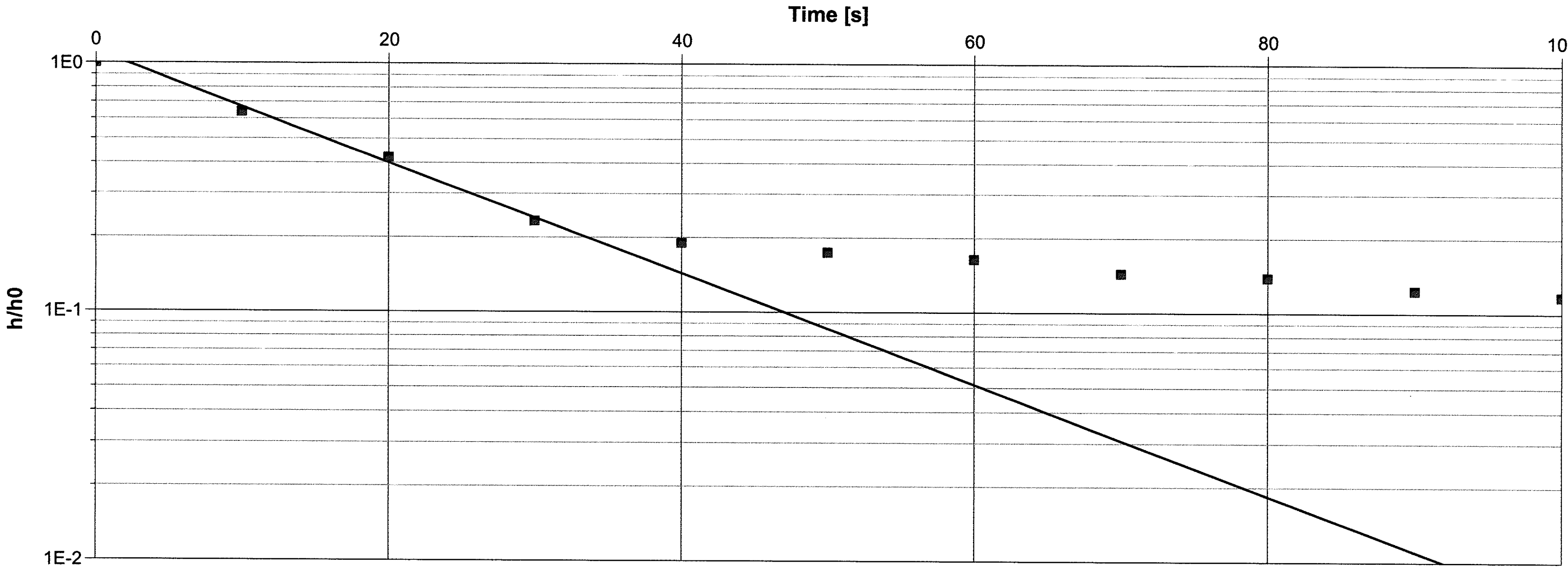


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [ft/d]
MER45-AR1-20	6.50

Emery & Garrett Groundwater Investigations, A Division of GZA	**Slug Test Analysis Report** Project: Merrimack MVD-4/5 Artificial Recharge Number: Client: Merrimack Village District

Location: Merrimack, New Hampshire	Slug Test: Slug Test AR-2 10 Feet	Test Well: MER45-AR2-10
Test Conducted by: djt		Test Date: 7/2/2018
Analysis Performed by: djt	MER-AR2 10 Feet	Analysis Date: 1/21/2019
Aquifer Thickness: 30.00 ft		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [ft/d]
MER45-AR2-10	11.00

Emery & Garrett Groundwater Investigations,
A Division of GZA

Slug Test Analysis Report

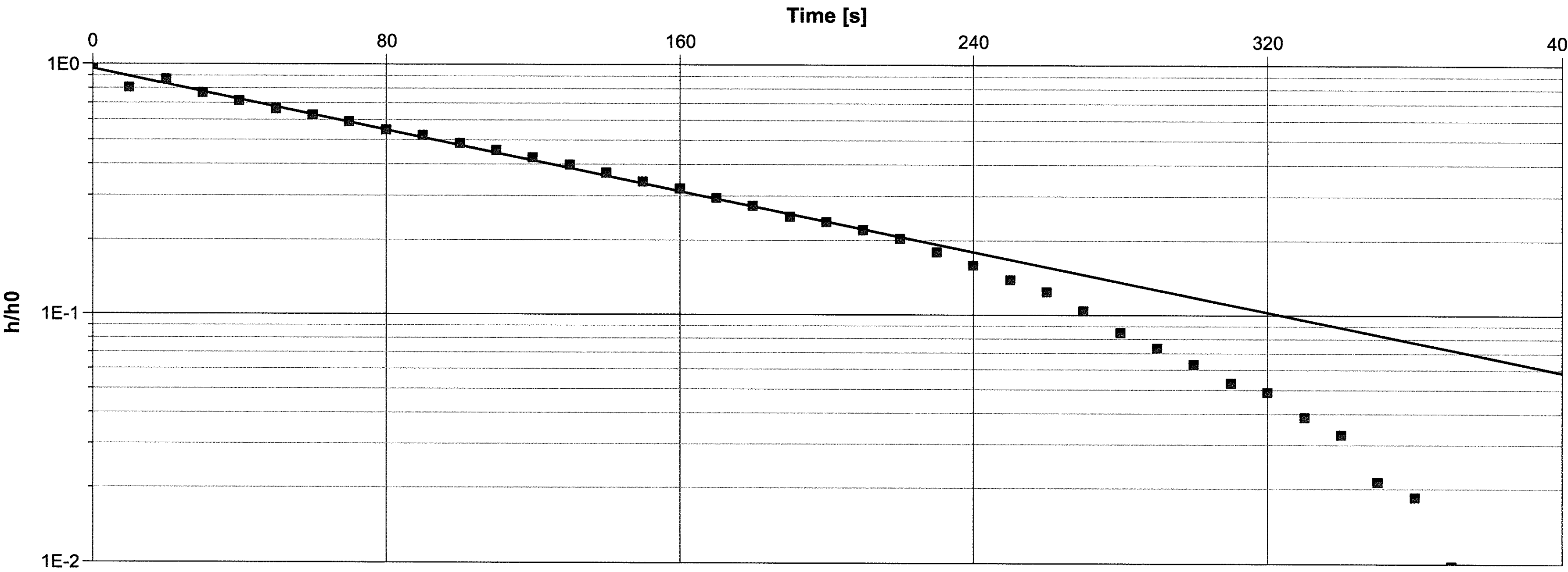
Project: Merrimack MVD-4/5 Artificial Recharge

Number:

Client: Merrimack Village District

Location: Merrimack, New Hampshire	Slug Test: Slug Test AR-2 20 Feet	Test Well: MER45-AR2-20
Test Conducted by: djt		Test Date: 7/2/2018
Analysis Performed by: djt	MER-AR2 20 Feet	Analysis Date: 1/21/2019

Aquifer Thickness: 30.00 ft



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [ft/d]
MER45-AR2-20	1.50

APPENDIX C

LEACHING TESTS

TUMBLE SAMPLES

Eastern Analytical, Inc.
professional laboratory and drilling services

ACCREDITED IN ACCORDANCE WITH nelac

Daniel Tinkham
Emery & Garrett Groundwater Investigations, LLC
56 Main Street
Meredith , NH 03253

Subject: Laboratory Report

Eastern Analytical, Inc. ID:	182869
Client Identification:	MER 4/5 AR | MER
Date Received:	6/7/2018

Dear Mr. Tinkham :

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

7·31·18
Date

38
# of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **182869**

Client: **Emery & Garrett Groundwater Investigations, LLC (NH)**

Client Designation: **MER 4/5 AR | MER**

Temperature upon receipt (°C): 2.1

Acceptable temperature range (°C): 0-6

Received on ice or cold packs (Yes/No): Y

Lab ID	**Sample ID**	**Date Received**	**Date Sampled**	**Sample Matrix**	**% Dry Weight**	**Exceptions/Comments** (other than thermal preservation)
182869.01	TP-1	6/7/18	6/7/18	soil		Adheres to Sample Acceptance Policy
182869.02	TP-3	6/7/18	6/7/18	soil		Adheres to Sample Acceptance Policy
182869.03	Merrimack River	6/7/18	6/7/18	aqueous		Adheres to Sample Acceptance Policy
182869.04	PFAS Tumble Blank	6/7/18		aqueous		Adheres to Sample Acceptance Policy
182869.05	Blank	6/7/18	6/7/18	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#: **182869**

Client: **Emery & Garrett Groundwater Investigations, LLC (NH)**

Client Designation: **MER 4/5 AR | MER**

Sample ID:	TP-1	TP-3	Blank					
Lab Sample ID:	182869.01	182869.02	182869.05					
Matrix:	soil	soil	aqueous					
Date Sampled:	6/7/18	6/7/18	6/7/18	**Analytical Matrix**	**Units**	**Date of Analysis**	**Method**	**Analyst**
Date Received:	6/7/18	6/7/18	6/7/18					
Dissolved Organic Carbon	**2.8**	**1.8**	**3.2**	SWLPsolid	mg/L	6/14/18	5310C-00	LO
Total UVA at 254 nm	**0.060**	**0.013**	**0.077**	SWLPsolid	cm-1	6/13/18	5910B-94	ATA
ColorTrue	< 5	< 5	**5-10**	SWLPsolid	PtCo	6/13/18	110.2	AMB
pH	**7.02**	**6.77**	**6.99**	SWLPsolid	SU	6/13/18	4500H+B	KL

Sample ID:	Merrimack River					
Lab Sample ID:	182869.03					
Matrix:	aqueous					
Date Sampled:	6/7/18	**Analytical Matrix**	**Units**	**Date of Analysis**	**Method**	**Analyst**
Date Received:	6/7/18					
Dissolved Organic Carbon	**3.0**	AqDis	mg/L	6/14/18	5310C-00	LO
Total UVA at 254 nm	**0.13**	AqTot	cm-1	6/8/18	5910B-94	ATA
ColorTrue	**20-25**	AqTot	PtCo	6/8/18	110.2	AMB
pH	**6.93**	AqTot	SU	6/7/18	4500H+B	KL

TP-1 & TP-3 SWLPsolid: Per client request, samples were tumbled for 48 hours in river water (Merrimack River) provided by the client. After tumble, samples were filtered through 0.45 um filters. A 1:20 ratio of solid to river water was used for the tumble.

Sample "Blank" is the Merrimack River sample that has been tumbled for 48 hours and then filtered through a 0.45 um filter.

LABORATORY REPORT

EAI ID#: **182869**

Client: **Emery & Garrett Groundwater Investigations, LLC (NH)**
Client Designation: **MER 4/5 AR | MER**

Sample ID:	TP-1	TP-3	Blank	**Analytical Matrix**	**Units**	**Date of Analysis**	**Method**	**Analyst**
Lab Sample ID:	182869.01	182869.02	182869.05					
Matrix:	soil	soil	aqueous					
Date Sampled:	6/7/18	6/7/18	6/7/18					
Date Received:	6/7/18	6/7/18	6/7/18					
Arsenic	**0.001**	< 0.001	< 0.001	SWLPsolid	mg/L	6/13/18	6020	DS
Calcium	**5.6**	**4.7**	**5.5**	SWLPsolid	mg/L	6/13/18	6020	DS
Iron	< 0.05	< 0.05	**0.15**	SWLPsolid	mg/L	6/13/18	6020	DS
Manganese	**0.029**	**0.093**	< 0.005	SWLPsolid	mg/L	6/13/18	6020	DS

Sample ID:	Merrimack River	**Analytical Matrix**	**Units**	**Date of Analysis**	**Method**	**Analyst**
Lab Sample ID:	182869.03					
Matrix:	aqueous					
Date Sampled:	6/7/18					
Date Received:	6/7/18					
Arsenic	< 0.001	AqTot	mg/L	6/13/18	200.8	DS
Calcium	**5.7**	AqTot	mg/L	6/13/18	200.8	DS
Iron	**0.83**	AqTot	mg/L	6/13/18	200.8	DS
Manganese	**0.041**	AqTot	mg/L	6/13/18	200.8	DS

TP-1 & TP-3 SWLPsolid: Per client request, samples were tumbled for 48 hours in river water (Merrimack River) provided by the client. After tumble, samples were filtered through 0.45 um filters. A 1:20 ratio of solid to river water was used for the tumble.

Sample "Blank" is the Merrimack River sample that has been tumbled for 48 hours and then filtered through a 0.45 um filter.

Vista
Analytical Laboratory

July 30, 2018

Vista Work Order No. 1801266

Ms. Jennifer Laramie
Eastern Analytical, Inc.
25 Chennell Drive
Concord, NH 03301

Dear Ms. Laramie,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on June 14, 2018. This sample set was analyzed on a standard turn-around time, under your Project Name '182869 NH 3191'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 1801266
Case Narrative

Sample Condition on Receipt:

Four aqueous samples and two soil samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

PFAS Isotope Dilution Method

As directed, the aqueous extracts of samples "TP-1" and "TP-3" were filtered prior to extraction.

Sample "Merrimack River" contained particulate and was centrifuged prior to extraction.

The samples were extracted and analyzed for a selected list of PFAS using the PFAS Isotope Dilution Method. This method is listed on Vista's NELAP certificate as Modifed EPA Method 537. The results for PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Results for all other analytes include the linear isomers only.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above the Reporting Limit. The OPR recoveries were within the method acceptance criteria.

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

VAL-PFAS

The samples were extracted and analyzed for a selected list of PFAS using VAL Method PFAS. The results for PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Results for all other analytes include the linear isomers only.

Holding Times

The samples were extracted and analyzed within the hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the Reporting Limit (RL). The OPR recoveries were within the method acceptance criteria.

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
1801266-02	PFAS Tumble Blank	PFAS Isotope Dilution Method	d3-MeFOSA	H	9.70
1801266-03	TP-1	PFAS Isotope Dilution Method	d3-MeFOSA	H	5.90
1801266-03	TP-1	PFAS Isotope Dilution Method	d5-EtFOSA	H	6.70
1801266-04	TP-1	VAL - PFAS	d3-MeFOSA	H	5.40
1801266-04	TP-1	VAL - PFAS	d5-EtFOSA	H	4.30
1801266-05	TP-3	PFAS Isotope Dilution Method	d3-MeFOSA	H	4.30
1801266-05	TP-3	PFAS Isotope Dilution Method	d5-EtFOSA	H	5.30
B8F0149-BLK1	B8F0149-BLK1	PFAS Isotope Dilution Method	d3-MeFOSA	H	4.70
B8F0149-BLK1	B8F0149-BLK1	PFAS Isotope Dilution Method	d5-EtFOSA	H	5.50
B8F0149-BS1	B8F0149-BS1	PFAS Isotope Dilution Method	d3-MeFOSA	H	6.60
B8F0149-BS1	B8F0149-BS1	PFAS Isotope Dilution Method	d5-EtFOSA	H	8.10
B8F0179-BLK1	B8F0179-BLK1	VAL - PFAS	d3-MeFOSAA	H	29.1
B8F0179-BLK1	B8F0179-BLK1	VAL - PFAS	d5-EtFOSAA	H	30.7
B8F0179-BLK1	B8F0179-BLK1	VAL - PFAS	13C2-PFUnA	H	42.3
B8F0179-BLK1	B8F0179-BLK1	VAL - PFAS	d3-MeFOSA	H	6.40
B8F0179-BLK1	B8F0179-BLK1	VAL - PFAS	d5-EtFOSA	H	5.90

H = Recovery was outside laboratory acceptance criteria.

TABLE OF CONTENTS

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1801266-01	Merrimack River	07-Jun-18 15:20	14-Jun-18 10:18	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1801266-02	PFAS Tumble Blank	07-Jun-18 00:00	14-Jun-18 10:18	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1801266-03	TP-1	07-Jun-18 09:15	14-Jun-18 10:18	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1801266-04	TP-1	07-Jun-18 09:15	14-Jun-18 10:18	HDPE Jar, 6 oz HDPE Jar, 6 oz
1801266-05	TP-3	07-Jun-18 12:45	14-Jun-18 10:18	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1801266-06	TP-3	07-Jun-18 12:45	14-Jun-18 10:18	HDPE Jar, 6 oz HDPE Jar, 6 oz
1801266-07	Blank	07-Jun-18 00:00	14-Jun-18 10:18	HDPE Bottle, 125 mL HDPE Bottle, 125 mL

ANALYTICAL RESULTS

Vista Analytical Laboratory

Sample ID: Method Blank **PFAS Isotope Dilution Method**

Client Data
Name: Eastern Analytical, Inc. Matrix: Aqueous
Project: 182869 NH 3191

Laboratory Data
Lab Sample: B8F0149-BLK1 Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	MDL	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	0.729	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFPeA	2706-90-3	ND	1.28	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFBS	375-73-5	ND	1.79	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFHxA	307-24-4	ND	2.18	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFHpA	375-85-9	ND	0.591	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFHxS	355-46-4	ND	0.947	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
6:2 FTS	27619-97-2	ND	2.00	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFOA	335-67-1	ND	0.651	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFHpS	375-92-8	ND	0.937	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFNA	375-95-1	ND	0.810	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFOSA	754-91-6	ND	1.77	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFOS	1763-23-1	0.901	0.807	4.00	J	B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFDA	335-76-2	ND	1.49	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
8:2 FTS	39108-34-4	ND	2.06	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
MeFOSAA	2355-31-9	ND	1.65	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
EtFOSAA	2991-50-6	ND	1.37	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFUnA	2058-94-8	ND	1.05	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFDS	335-77-3	ND	1.23	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFDoA	307-55-1	ND	0.792	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
MeFOSA	31506-32-8	ND	3.83	20.0		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFTrDA	72629-94-8	ND	0.494	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFTeDA	376-06-7	ND	0.755	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
EtFOSA	4151-50-2	ND	5.11	20.0		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
PFHxDA	67905-19-5	ND	0.294	4.00		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
MeFOSE	24448-09-7	ND	6.07	20.0		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
EtFOSE	1691-99-2	ND	9.44	20.0		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	103	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C3-PFPeA	IS	98.4	60 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C3-PFBS	IS	127	60 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C2-PFHxA	IS	103	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C4-PFHpA	IS	112	60 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
18O2-PFHxS	IS	95.1	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C2-6:2 FTS	IS	122	40 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C2-PFOA	IS	105	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C5-PFNA	IS	93.5	50 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C8-PFOSA	IS	33.5	20 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C8-PFOS	IS	99.1	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1

Sample ID: Method Blank

PFAS Isotope Dilution Method

Client Data

Name: Eastern Analytical, Inc.

Project: 182869 NH 3191

Matrix: Aqueous

Laboratory Data

Lab Sample: B8F0149-BLK1

Column: BEH C18

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFDA	IS	76.0	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C2-8:2 FTS	IS	127	40 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
d3-MeFOSAA	IS	85.1	50 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
d5-EtFOSAA	IS	91.5	50 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C2-PFUnA	IS	76.9	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C2-PFDoA	IS	72.9	30 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
d3-MeFOSA	IS	4.70	10 - 130	H	B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C2-PFTeDA	IS	109	20 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
d5-EtFOSA	IS	5.50	10 - 150	H	B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
13C2-PFHxDA	IS	119	20 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
d7-MeFOSE	IS	30.3	10 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1
d9-EtFOSE	IS	29.7	10 - 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 10:09	1

MDL - Method Detection Limit

RL - Reporting limit

Results reported to MDL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: OPR **PFAS Isotope Dilution Method**

Client Data

Name: Eastern Analytical, Inc.
Project: 182869 NH 3191
Matrix: Aqueous

Laboratory Data

Lab Sample: B8F0149-BS1
Column: BEH C18

Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	83.0	80.0	104	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFPeA	2706-90-3	82.5	80.0	103	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFBS	375-73-5	80.2	80.0	100	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFHxA	307-24-4	87.7	80.0	110	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFHpA	375-85-9	79.2	80.0	99.0	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFHxS	355-46-4	86.5	80.0	108	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
6:2 FTS	27619-97-2	80.4	80.0	100	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFOA	335-67-1	85.5	80.0	107	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFHpS	375-92-8	83.5	80.0	104	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFNA	375-95-1	82.7	80.0	103	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFOSA	754-91-6	73.9	80.0	92.4	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFOS	1763-23-1	84.7	80.0	106	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFDA	335-76-2	79.9	80.0	99.9	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
8:2 FTS	39108-34-4	96.4	80.0	120	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
MeFOSAA	2355-31-9	84.5	80.0	106	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
EtFOSAA	2991-50-6	84.0	80.0	105	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFUnA	2058-94-8	79.7	80.0	99.6	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFDS	335-77-3	94.3	80.0	118	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFDoA	307-55-1	74.6	80.0	93.2	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
MeFOSA	31506-32-8	445	400	111	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFTrDA	72629-94-8	88.0	80.0	110	60 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFTeDA	376-06-7	77.7	80.0	97.2	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
EtFOSA	4151-50-2	501	400	125	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
PFHxDA	67905-19-5	83.2	80.0	104	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
MeFOSE	24448-09-7	470	400	117	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
EtFOSE	1691-99-2	476	400	119	70 - 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1

Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	102	60- 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C3-PFPeA	IS	98.8	60- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C3-PFBS	IS	125	60- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C2-PFHxA	IS	93.5	70- 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C4-PFHpA	IS	106	60- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
18O2-PFHxS	IS	95.6	60- 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C2-6:2 FTS	IS	109	40- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C2-PFOA	IS	95.5	60- 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1

Sample ID: OPR

PFAS Isotope Dilution Method

Client Data

Name:	Eastern Analytical, Inc.	Matrix:	Aqueous
Project:	182869 NH 3191		

Laboratory Data

Lab Sample:	B8F0149-BS1	Column:	BEH C18

Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C5-PFNA	IS	92.0	50- 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C8-PFOSA	IS	33.7	20- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C8-PFOS	IS	108	60- 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C2-PFDA	IS	77.9	60- 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C2-8:2 FTS	IS	119	40- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
d3-MeFOSAA	IS	79.7	50- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
d5-EtFOSAA	IS	82.1	50- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C2-PFUnA	IS	75.7	60- 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C2-PFDoA	IS	73.3	30- 130		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
d3-MeFOSA	IS	6.60	10- 130	H	B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C2-PFTeDA	IS	104	20- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
d5-EtFOSA	IS	8.10	10- 150	H	B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
13C2-PFHxDA	IS	110	20- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
d7-MeFOSE	IS	28.6	10- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1
d9-EtFOSE	IS	28.7	10- 150		B8F0149	21-Jun-18	0.125 L	08-Jul-18 09:58	1

Sample ID: Merrimack River

PFAS Isotope Dilution Method

Client Data

Name:	Eastern Analytical, Inc.	Matrix:	Aqueous
Project:	182869 NH 3191	Date Collected:	07-Jun-18 15:20

Laboratory Data

Lab Sample:	1801266-01	Column:	BEH C18
Date Received:	14-Jun-18 10:18		

Analyte	CAS Number	Conc. (ng/L)	MDL	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	1.31	0.761	4.18	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFPeA	2706-90-3	1.61	1.34	4.18	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFBS	375-73-5	1.88	1.87	4.18	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFHxA	307-24-4	ND	2.28	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFHpA	375-85-9	1.16	0.617	4.18	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFHxS	355-46-4	2.70	0.989	4.18	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
6:2 FTS	27619-97-2	ND	2.09	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFOA	335-67-1	3.31	0.680	4.18	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFHpS	375-92-8	ND	0.978	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFNA	375-95-1	ND	0.846	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFOSA	754-91-6	ND	1.85	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFOS	1763-23-1	1.44	0.842	4.18	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFDA	335-76-2	ND	1.56	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
8:2 FTS	39108-34-4	ND	2.15	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
MeFOSAA	2355-31-9	ND	1.72	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
EtFOSAA	2991-50-6	ND	1.43	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFUnA	2058-94-8	ND	1.10	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFDS	335-77-3	ND	1.28	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFDoA	307-55-1	ND	0.827	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
MeFOSA	31506-32-8	ND	4.00	20.9		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFTrDA	72629-94-8	ND	0.516	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFTeDA	376-06-7	ND	0.788	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
EtFOSA	4151-50-2	ND	5.33	20.9		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
PFHxDA	67905-19-5	ND	0.307	4.18		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
MeFOSE	24448-09-7	ND	6.34	20.9		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
EtFOSE	1691-99-2	ND	9.85	20.9		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	102	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C3-PFPeA	IS	97.7	60 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C3-PFBS	IS	116	60 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C2-PFHxA	IS	95.7	70 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C4-PFHpA	IS	105	60 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
18O2-PFHxS	IS	102	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C2-6:2 FTS	IS	123	40 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C2-PFOA	IS	98.3	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C5-PFNA	IS	92.1	50 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C8-PFOSA	IS	64.9	20 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C8-PFOS	IS	104	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1

Vista Analytical Laboratory

Sample ID: Merrimack River **PFAS Isotope Dilution Method**

Client Data

Name: Eastern Analytical, Inc.
Project: 182869 NH 3191
Matrix: Aqueous
Date Collected: 07-Jun-18 15:20

Laboratory Data

Lab Sample: 1801266-01
Date Received: 14-Jun-18 10:18
Column: BEH C18

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFDA	IS	94.4	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C2-8:2 FTS	IS	114	40 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
d3-MeFOSAA	IS	103	50 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
d5-EtFOSAA	IS	108	50 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C2-PFUnA	IS	83.3	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C2-PFDoA	IS	91.1	30 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
d3-MeFOSA	IS	11.3	10 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C2-PFTeDA	IS	122	20 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
d5-EtFOSA	IS	12.5	10 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
13C2-PFHxDA	IS	114	20 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
d7-MeFOSE	IS	64.5	10 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1
d9-EtFOSE	IS	64.9	10 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:19	1

MDL - Method Detection Limit

RL - Reporting limit

Results reported to MDL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Vista Analytical Laboratory

Sample ID: PFAS Tumble Blank

PFAS Isotope Dilution Method

Client Data

Name: Eastern Analytical, Inc.
Project: 182869 NH 3191
Matrix: Aqueous
Date Collected: 07-Jun-18 00:00

Laboratory Data

Lab Sample: 1801266-02
Date Received: 14-Jun-18 10:18
Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	MDL	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	0.760	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFPeA	2706-90-3	ND	1.33	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFBS	375-73-5	ND	1.87	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFHxA	307-24-4	ND	2.27	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFHpA	375-85-9	ND	0.616	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFHxS	355-46-4	ND	0.987	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
6:2 FTS	27619-97-2	ND	2.08	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFOA	335-67-1	ND	0.678	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFHpS	375-92-8	ND	0.976	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFNA	375-95-1	ND	0.844	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFOSA	754-91-6	ND	1.84	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFOS	1763-23-1	ND	0.841	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFDA	335-76-2	ND	1.55	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
8:2 FTS	39108-34-4	ND	2.15	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
MeFOSAA	2355-31-9	ND	1.72	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
EtFOSAA	2991-50-6	ND	1.43	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFUnA	2058-94-8	ND	1.09	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFDS	335-77-3	ND	1.28	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFDoA	307-55-1	ND	0.825	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
MeFOSA	31506-32-8	ND	3.99	20.8		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFTrDA	72629-94-8	ND	0.515	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFTeDA	376-06-7	ND	0.787	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
EtFOSA	4151-50-2	ND	5.32	20.8		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
PFHxDA	67905-19-5	ND	0.306	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
MeFOSE	24448-09-7	ND	6.33	20.8		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
EtFOSE	1691-99-2	ND	9.84	20.8		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	100	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C3-PFPeA	IS	91.8	60 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C3-PFBS	IS	113	60 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C2-PFHxA	IS	97.3	70 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C4-PFHpA	IS	106	60 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
18O2-PFHxS	IS	101	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C2-6:2 FTS	IS	93.9	40 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C2-PFOA	IS	89.1	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C5-PFNA	IS	81.5	50 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C8-PFOSA	IS	46.0	20 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C8-PFOS	IS	102	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1

Sample ID: PFAS Tumble Blank

PFAS Isotope Dilution Method

Client Data

Name:	Eastern Analytical, Inc.	Matrix:	Aqueous
Project:	182869 NH 3191	Date Collected:	07-Jun-18 00:00

Laboratory Data

Lab Sample:	1801266-02	Column:	BEH C18
Date Received:	14-Jun-18 10:18		

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFDA	IS	79.5	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C2-8:2 FTS	IS	111	40 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
d3-MeFOSAA	IS	103	50 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
d5-EtFOSAA	IS	95.1	50 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C2-PFUnA	IS	76.2	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C2-PFDoA	IS	77.8	30 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
d3-MeFOSA	IS	9.70	10 - 130	H	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C2-PFTeDA	IS	84.6	20 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
d5-EtFOSA	IS	11.3	10 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
13C2-PFHxDA	IS	98.7	20 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
d7-MeFOSE	IS	37.7	10 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1
d9-EtFOSE	IS	37.1	10 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:30	1

MDL - Method Detection Limit

RL - Reporting limit

Results reported to MDL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: TP-1

PFAS Isotope Dilution Method

Client Data

Name: Eastern Analytical, Inc.
Project: 182869 NH 3191

Matrix: Aqueous
Date Collected: 07-Jun-18 09:15

Laboratory Data

Lab Sample: 1801266-03
Date Received: 14-Jun-18 10:18

Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	MDL	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	1.28	0.773	4.24	J	B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFPeA	2706-90-3	2.07	1.36	4.24	J	B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFBS	375-73-5	ND	1.90	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFHxA	307-24-4	ND	2.31	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFHpA	375-85-9	2.61	0.626	4.24	J	B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFHxS	355-46-4	ND	1.00	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
6:2 FTS	27619-97-2	ND	2.12	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFOA	335-67-1	1.50	0.690	4.24	J	B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFHpS	375-92-8	ND	0.993	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFNA	375-95-1	ND	0.858	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFOSA	754-91-6	ND	1.88	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFOS	1763-23-1	ND	0.855	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFDA	335-76-2	ND	1.58	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
8:2 FTS	39108-34-4	ND	2.18	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
MeFOSAA	2355-31-9	ND	1.75	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
EtFOSAA	2991-50-6	ND	1.45	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFUnA	2058-94-8	ND	1.11	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFDS	335-77-3	ND	1.30	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFDoA	307-55-1	ND	0.839	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
MeFOSA	31506-32-8	ND	4.06	21.2		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFTrDA	72629-94-8	ND	0.523	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFTeDA	376-06-7	ND	0.800	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
EtFOSA	4151-50-2	ND	5.41	21.2		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
PFHxDA	67905-19-5	ND	0.312	4.24		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
MeFOSE	24448-09-7	ND	6.43	21.2		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
EtFOSE	1691-99-2	ND	10.0	21.2		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	100	60 - 130		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C3-PFPeA	IS	90.6	60 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C3-PFBS	IS	135	60 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C2-PFHxA	IS	94.4	70 - 130		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C4-PFHpA	IS	104	60 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
18O2-PFHxS	IS	103	60 - 130		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C2-6:2 FTS	IS	129	40 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C2-PFOA	IS	95.0	60 - 130		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C5-PFNA	IS	89.9	50 - 130		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C8-PFOSA	IS	46.0	20 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C8-PFOS	IS	94.3	60 - 130		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1

Sample ID: TP-1

PFAS Isotope Dilution Method

Client Data

Name:	Eastern Analytical, Inc.	Matrix:	Aqueous
Project:	182869 NH 3191	Date Collected:	07-Jun-18 09:15

Laboratory Data

Lab Sample:	1801266-03	Column:	BEH C18
Date Received:	14-Jun-18 10:18		

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFDA	IS	80.6	60 - 130		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C2-8:2 FTS	IS	149	40 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
d3-MeFOSAA	IS	110	50 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
d5-EtFOSAA	IS	119	50 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C2-PFUnA	IS	87.5	60 - 130		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C2-PFDoA	IS	91.8	30 - 130		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
d3-MeFOSA	IS	5.90	10 - 130	H	B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C2-PFTeDA	IS	117	20 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
d5-EtFOSA	IS	6.70	10 - 150	H	B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
13C2-PFHxDA	IS	142	20 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
d7-MeFOSE	IS	53.7	10 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1
d9-EtFOSE	IS	48.3	10 - 150		B8F0149	21-Jun-18	0.118 L	08-Jul-18 10:40	1

MDL - Method Detection Limit

RL - Reporting limit

Results reported to MDL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: TP-3

PFAS Isotope Dilution Method

Client Data

Name: Eastern Analytical, Inc.
Project: 182869 NH 3191

Matrix: Aqueous
Date Collected: 07-Jun-18 12:45

Laboratory Data

Lab Sample: 1801266-05
Date Received: 14-Jun-18 10:18

Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	MDL	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	3.38	0.760	4.17	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFPeA	2706-90-3	6.79	1.33	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFBS	375-73-5	ND	1.87	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFHxA	307-24-4	ND	2.27	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFHpA	375-85-9	10.7	0.616	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFHxS	355-46-4	1.44	0.987	4.17	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
6:2 FTS	27619-97-2	ND	2.09	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFOA	335-67-1	48.6	0.679	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFHpS	375-92-8	ND	0.977	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFNA	375-95-1	ND	0.845	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFOSA	754-91-6	ND	1.85	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFOS	1763-23-1	ND	0.841	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFDA	335-76-2	ND	1.55	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
8:2 FTS	39108-34-4	ND	2.15	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
MeFOSAA	2355-31-9	ND	1.72	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
EtFOSAA	2991-50-6	ND	1.43	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFUnA	2058-94-8	ND	1.09	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFDS	335-77-3	ND	1.28	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFDoA	307-55-1	ND	0.826	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
MeFOSA	31506-32-8	ND	3.99	20.9		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFTrDA	72629-94-8	ND	0.515	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFTeDA	376-06-7	ND	0.787	4.17		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
EtFOSA	4151-50-2	ND	5.33	20.9		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
PFHxDA	67905-19-5	0.390	0.307	4.17	J	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
MeFOSE	24448-09-7	ND	6.33	20.9		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
EtFOSE	1691-99-2	ND	9.84	20.9		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	103	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C3-PFPeA	IS	95.2	60 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C3-PFBS	IS	133	60 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C2-PFHxA	IS	98.4	70 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C4-PFHpA	IS	111	60 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
18O2-PFHxS	IS	99.8	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C2-6:2 FTS	IS	132	40 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C2-PFOA	IS	102	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C5-PFNA	IS	97.8	50 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C8-PFOSA	IS	37.8	20 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C8-PFOS	IS	93.7	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1

Sample ID: TP-3 **PFAS Isotope Dilution Method**

Client Data
Name: Eastern Analytical, Inc.
Project: 182869 NH 3191
Matrix: Aqueous
Date Collected: 07-Jun-18 12:45

Laboratory Data
Lab Sample: 1801266-05
Date Received: 14-Jun-18 10:18
Column: BEH C18

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFDA	IS	92.6	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C2-8:2 FTS	IS	136	40 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
d3-MeFOSAA	IS	104	50 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
d5-EtFOSAA	IS	108	50 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C2-PFUnA	IS	83.1	60 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C2-PFDoA	IS	84.1	30 - 130		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
d3-MeFOSA	IS	4.30	10 - 130	H	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C2-PFTeDA	IS	111	20 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
d5-EtFOSA	IS	5.30	10 - 150	H	B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
13C2-PFHxDA	IS	130	20 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
d7-MeFOSE	IS	46.1	10 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1
d9-EtFOSE	IS	47.0	10 - 150		B8F0149	21-Jun-18	0.120 L	08-Jul-18 10:51	1

MDL - Method Detection Limit
RL - Reporting limit
Results reported to MDL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: Method Blank

VAL - PFAS

Client Data				**Laboratory Data**			
Name:	Eastern Analytical, Inc.	Matrix:	Solid	Lab Sample:	B8F0179-BLK1	Column:	BEH C18
Project:	182869 NH 3191						

Analyte	CAS Number	Conc. (ng/g)	MDL	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	0.140	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFPeA	2706-90-3	ND	0.202	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFBS	375-73-5	ND	0.363	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFHxA	307-24-4	ND	0.203	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFHpA	375-85-9	ND	0.205	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFHxS	355-46-4	ND	0.310	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
6:2 FTS	27619-97-2	ND	0.229	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFOA	335-67-1	ND	0.236	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFHpS	375-92-8	ND	0.170	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFNA	375-95-1	ND	0.178	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFOSA	754-91-6	ND	0.227	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFOS	1763-23-1	ND	0.845	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFDA	335-76-2	ND	0.256	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
8:2 FTS	39108-34-4	ND	0.285	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
MeFOSAA	2355-31-9	ND	0.302	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
EtFOSAA	2991-50-6	ND	0.321	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFUnA	2058-94-8	ND	0.354	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFDS	335-77-3	ND	0.201	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFDoA	307-55-1	ND	0.276	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
MeFOSA	31506-32-8	ND	0.943	10.0		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFTrDA	72629-94-8	ND	0.122	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFTeDA	376-06-7	ND	0.198	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
EtFOSA	4151-50-2	ND	1.34	10.0		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
PFHxDA	67905-19-5	ND	0.0349	2.00		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
MeFOSE	24448-09-7	ND	1.95	10.0		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
EtFOSE	1691-99-2	ND	1.01	10.0		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	82.9	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C3-PFPeA	IS	80.6	60 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C3-PFBS	IS	85.0	60 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C2-PFHxA	IS	82.8	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C4-PFHpA	IS	84.6	60 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
18O2-PFHxS	IS	73.8	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C2-6:2 FTS	IS	76.8	40 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C2-PFOA	IS	81.5	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C5-PFNA	IS	74.7	50 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C8-PFOSA	IS	37.4	20 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C8-PFOS	IS	86.2	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1

Vista Analytical Laboratory

Sample ID: Method Blank

VAL - PFAS

Client Data				**Laboratory Data**			
Name:	Eastern Analytical, Inc.	Matrix:	Solid	Lab Sample:	B8F0179-BLK1	Column:	BEH C18
Project:	182869 NH 3191						

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFDA	IS	60.9	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C2-8:2 FTS	IS	72.3	40 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
d3-MeFOSAA	IS	29.1	50 - 150	H	B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
d5-EtFOSAA	IS	30.7	50 - 150	H	B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C2-PFUnA	IS	42.3	60 - 130	H	B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C2-PFDoA	IS	33.6	30 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
d3-MeFOSA	IS	6.40	10 - 130	H	B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C2-PFTeDA	IS	63.8	20 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
d5-EtFOSA	IS	5.90	10 - 150	H	B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
13C2-PFHxDA	IS	77.1	20 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
d7-MeFOSE	IS	19.1	10 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1
d9-EtFOSE	IS	21.0	10 - 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:18	1

MDL - Method Detection Limit

RL - Reporting limit

The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to MDL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: OPR **VAL - PFAS**

Client Data

Name: Eastern Analytical, Inc.
Project: 182869 NH 3191
Matrix: Solid

Laboratory Data

Lab Sample: B8F0179-BS1
Column: BEH C18

Analyte	CAS Number	Amt Found (ng/g)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	10.8	10.0	108	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFPeA	2706-90-3	10.7	10.0	107	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFBS	375-73-5	11.0	10.0	110	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFHxA	307-24-4	10.7	10.0	107	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFHpA	375-85-9	10.8	10.0	108	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFHxS	355-46-4	11.3	10.0	113	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
6:2 FTS	27619-97-2	11.5	10.0	115	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFOA	335-67-1	11.4	10.0	114	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFHpS	375-92-8	10.2	10.0	102	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFNA	375-95-1	9.56	10.0	95.6	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFOSA	754-91-6	11.9	10.0	119	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFOS	1763-23-1	12.2	10.0	122	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFDA	335-76-2	11.2	10.0	112	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
8:2 FTS	39108-34-4	10.1	10.0	101	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
MeFOSAA	2355-31-9	9.76	10.0	97.6	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
EtFOSAA	2991-50-6	10.3	10.0	103	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFUnA	2058-94-8	9.62	10.0	96.2	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFDS	335-77-3	10.7	10.0	107	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFDoA	307-55-1	10.8	10.0	108	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
MeFOSA	31506-32-8	60.1	50.0	120	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFTrDA	72629-94-8	11.2	10.0	112	60 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFTeDA	376-06-7	11.8	10.0	118	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
EtFOSA	4151-50-2	53.2	50.0	106	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
PFHxDA	67905-19-5	10.2	10.0	102	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
MeFOSE	24448-09-7	63.2	50.0	126	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
EtFOSE	1691-99-2	59.0	50.0	118	70 - 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1

Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	79.5	60- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C3-PFPeA	IS	81.3	60- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C3-PFBS	IS	75.8	60- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C2-PFHxA	IS	86.2	70- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C4-PFHpA	IS	86.9	60- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
18O2-PFHxS	IS	75.4	60- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C2-6:2 FTS	IS	92.6	40- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C2-PFOA	IS	87.0	60- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1

Sample ID: OPR

VAL - PFAS

Client Data

Name: Eastern Analytical, Inc.
Project: 182869 NH 3191
Matrix: Solid

Laboratory Data

Lab Sample: B8F0179-BS1
Column: BEH C18

Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C5-PFNA	IS	79.1	50- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C8-PFOSA	IS	51.4	20- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C8-PFOS	IS	77.7	60- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C2-PFDA	IS	67.3	60- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C2-8:2 FTS	IS	67.9	40- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
d3-MeFOSAA	IS	52.5	50- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
d5-EtFOSAA	IS	52.4	50- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C2-PFUnA	IS	68.4	60- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C2-PFDoA	IS	69.3	30- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
d3-MeFOSA	IS	10.9	10- 130		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C2-PFTeDA	IS	72.3	20- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
d5-EtFOSA	IS	10.1	10- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
13C2-PFHxDA	IS	75.8	20- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
d7-MeFOSE	IS	44.5	10- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1
d9-EtFOSE	IS	43.2	10- 150		B8F0179	22-Jun-18	1.00 g	04-Jul-18 19:08	1

Sample ID: TP-1 VAL - PFAS

Client Data

Name: Eastern Analytical, Inc.
Project: 182869 NH 3191
Matrix: Soil
Date Collected: 07-Jun-18 09:15

Laboratory Data

Lab Sample: 1801266-04
Date Received: 14-Jun-18 10:18
% Solids: 91.3
Column: BEH C18

Analyte	CAS Number	Conc. (ng/g)	MDL	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	0.130	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFPeA	2706-90-3	ND	0.187	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFBS	375-73-5	ND	0.337	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFHxA	307-24-4	ND	0.188	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFHpA	375-85-9	ND	0.190	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFHxS	355-46-4	ND	0.288	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
6:2 FTS	27619-97-2	ND	0.213	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFOA	335-67-1	ND	0.219	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFHpS	375-92-8	ND	0.158	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFNA	375-95-1	ND	0.165	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFOSA	754-91-6	ND	0.211	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFOS	1763-23-1	ND	0.784	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFDA	335-76-2	ND	0.238	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
8:2 FTS	39108-34-4	ND	0.264	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
MeFOSAA	2355-31-9	ND	0.280	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
EtFOSAA	2991-50-6	ND	0.298	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFUnA	2058-94-8	ND	0.329	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFDS	335-77-3	ND	0.187	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFDoA	307-55-1	ND	0.256	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
MeFOSA	31506-32-8	ND	0.875	9.28		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFTrDA	72629-94-8	ND	0.113	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFTeDA	376-06-7	ND	0.184	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
EtFOSA	4151-50-2	ND	1.24	9.28		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
PFHxDA	67905-19-5	ND	0.0324	1.86		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
MeFOSE	24448-09-7	ND	1.81	9.28		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
EtFOSE	1691-99-2	ND	0.937	9.28		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	86.2	60 - 130		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C3-PFPeA	IS	86.6	60 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C3-PFBS	IS	85.8	60 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C2-PFHxA	IS	89.5	70 - 130		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C4-PFHpA	IS	85.7	60 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
18O2-PFHxS	IS	85.2	60 - 130		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C2-6:2 FTS	IS	83.6	40 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C2-PFOA	IS	81.8	60 - 130		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C5-PFNA	IS	70.7	50 - 130		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C8-PFOSA	IS	46.7	20 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C8-PFOS	IS	84.1	60 - 130		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1

Sample ID: TP-1 **VAL - PFAS**

Client Data				**Laboratory Data**			
Name:	Eastern Analytical, Inc.	Matrix:	Soil	Lab Sample:	1801266-04	Column:	BEH C18
Project:	182869 NH 3191	Date Collected:	07-Jun-18 09:15	Date Received:	14-Jun-18 10:18		
				% Solids:	91.3		

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFDA	IS	68.8	60 - 130		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C2-8:2 FTS	IS	89.0	40 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
d3-MeFOSAA	IS	50.4	50 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
d5-EtFOSAA	IS	52.3	50 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C2-PFUnA	IS	64.5	60 - 130		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C2-PFDoA	IS	68.8	30 - 130		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
d3-MeFOSA	IS	5.40	10 - 130	H	B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C2-PFTeDA	IS	74.7	20 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
d5-EtFOSA	IS	4.30	10 - 150	H	B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
13C2-PFHxDA	IS	71.0	20 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
d7-MeFOSE	IS	35.9	10 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1
d9-EtFOSE	IS	36.1	10 - 150		B8F0179	22-Jun-18	1.18 g	04-Jul-18 19:29	1

MDL - Method Detection Limit

RL - Reporting limit

The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to MDL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: TP-3

VAL - PFAS

Client Data				**Laboratory Data**			
Name:	Eastern Analytical, Inc.	Matrix:	Soil	Lab Sample:	1801266-06	Column:	BEH C18
Project:	182869 NH 3191	Date Collected:	07-Jun-18 12:45	Date Received:	14-Jun-18 10:18		
				% Solids:	83.0		

Analyte	CAS Number	Conc. (ng/g)	MDL	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	0.135	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFPeA	2706-90-3	ND	0.195	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFBS	375-73-5	ND	0.350	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFHxA	307-24-4	ND	0.196	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFHpA	375-85-9	0.370	0.198	1.93	J	B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFHxS	355-46-4	ND	0.299	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
6:2 FTS	27619-97-2	ND	0.221	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFOA	335-67-1	0.616	0.227	1.93	J	B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFHpS	375-92-8	ND	0.164	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFNA	375-95-1	ND	0.172	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFOSA	754-91-6	ND	0.219	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFOS	1763-23-1	ND	0.814	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFDA	335-76-2	ND	0.247	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
8:2 FTS	39108-34-4	ND	0.275	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
MeFOSAA	2355-31-9	ND	0.291	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
EtFOSAA	2991-50-6	ND	0.309	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFUnA	2058-94-8	ND	0.341	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFDS	335-77-3	ND	0.194	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFDoA	307-55-1	ND	0.266	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
MeFOSA	31506-32-8	ND	0.909	9.64		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFTrDA	72629-94-8	ND	0.118	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFTeDA	376-06-7	ND	0.191	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
EtFOSA	4151-50-2	ND	1.29	9.64		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
PFHxDA	67905-19-5	ND	0.0336	1.93		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
MeFOSE	24448-09-7	ND	1.88	9.64		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
EtFOSE	1691-99-2	ND	0.973	9.64		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	90.1	60 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C3-PFPeA	IS	89.2	60 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C3-PFBS	IS	89.2	60 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C2-PFHxA	IS	88.7	70 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C4-PFHpA	IS	89.8	60 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
18O2-PFHxS	IS	92.6	60 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C2-6:2 FTS	IS	97.8	40 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C2-PFOA	IS	77.5	60 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C5-PFNA	IS	73.3	50 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C8-PFOSA	IS	55.3	20 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C8-PFOS	IS	80.8	60 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1

Sample ID: TP-3 **VAL - PFAS**

Client Data				**Laboratory Data**			
Name:	Eastern Analytical, Inc.	Matrix:	Soil	Lab Sample:	1801266-06	Column:	BEH C18
Project:	182869 NH 3191	Date Collected:	07-Jun-18 12:45	Date Received:	14-Jun-18 10:18		
				% Solids:	83.0		

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFDA	IS	68.4	60 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C2-8:2 FTS	IS	76.7	40 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
d3-MeFOSAA	IS	62.7	50 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
d5-EtFOSAA	IS	61.9	50 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C2-PFUnA	IS	71.7	60 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C2-PFDoA	IS	67.9	30 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
d3-MeFOSA	IS	14.6	10 - 130		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C2-PFTeDA	IS	73.5	20 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
d5-EtFOSA	IS	14.4	10 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
13C2-PFHxDA	IS	86.0	20 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
d7-MeFOSE	IS	41.1	10 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1
d9-EtFOSE	IS	44.9	10 - 150		B8F0179	22-Jun-18	1.25 g	04-Jul-18 19:39	1

MDL - Method Detection Limit

RL - Reporting limit

The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to MDL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank**
Conc.	**Concentration**
D	**Dilution**
DL	**Detection limit**
E	**The associated compound concentration exceeded the calibration range of the instrument**
H	**Recovery and/or RPD was outside laboratory acceptance limits**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ**
LOD	**Limits of Detection**
LOQ	**Limits of Quantitation**
M	**Estimated Maximum Possible Concentration (CA Region 2 projects only)**
NA	**Not applicable**
ND	**Not Detected**
Q	**Ion ratio outside of 70-130% of Standard Ratio. (DOD PFAS projects only)**
TEQ	**Toxic Equivalency**
U	**Not Detected (specific projects only)**
*****	**See Cover Letter**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	17-015-0
	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1322288
New Hampshire Environmental Accreditation Program	207717
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	014
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	9077
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

CHAIN-OF-CUSTODY RECORD

Eastern Analytical, Inc. 32
professional laboratory and drilling services

1801266 **EAI ID# 182869** Page 1

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes 1.3°C
Merrimack River	6/7/2018 15:20	aqueous	Subcontract - Perfluorinated Compounds EPA Method 537	
PFAS Tumble Blank		aqueous	Subcontract - Perfluorinated Compounds EPA Method 537	
TP-1	6/7/2018 09:15	soil	Subcontract - Perfluorinated Compounds EPA Method 537 - Tumble extract provided	
TP-1	6/7/2018 09:15	soil	Subcontract - Perfluorinated Compounds EPA Method 537	

EAI ID# 182869 **Project State: NH**

Project ID: 3191

Company Vista Analytical Laboratory
Address 1104 Windfield Way
Address El Dorado Hills, CA 95762
Account #
Phone # (916) 673-1520

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.

TP-1, TP-3, PFAS Tumble Blank and Blank tumbled for 48 hours in river water provided by client. PFAS samples to be filtered with 0.7 um filter at the sub lab. TP-1 & TP -3 will also be analyzed for total PFAS in soil. PFAS 26 compound list needed. PFAS tumble blank tumbled with PFAS-free water & **extracted and held based on** results.

PO #: 48215 **EAI ID# 182869**

If RUSH charges will be applied, please call prior to analyzing.

Samples Collected by: ____________

Relinquished by	Date/Time	Received by
	6/13/18 15:30	VPS
VPS	6/14/18 1109	
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

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CHAIN-OF-CUSTODY RECORD

Eastern Analytical, Inc.
professional laboratory and drilling services

1801266 **EAI ID# 182869** Page 2

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
TP-3	6/7/2018 12:45	soil	Subcontract - Perfluorinated Compounds EPA Method 537	- Tumble extract provided
TP-3	6/7/2018 12:45	soil	Subcontract - Perfluorinated Compounds EPA Method 537	

EAI ID# 182869 **Project State: NH**

Project ID: 3191

Company Vista Analytical Laboratory
Address 1104 Windfield Way
Address El Dorado Hills, CA 95762
Account #
Phone # (916) 673-1520

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.

☒ TP-1, TP-3, PFAS Tumble Blank and Blank tumbled for 48 hours in river water provided by client. PFAS samples to be filtered with 0.7 um filter at the sub lab. TP-1 & TP -3 will also be analyzed for total PFAS in soil. PFAS 26 compound list needed. PFAS tumble blank tumbled with PFAS-free water & extracted and held based on results.

PO #: 48215 **EAI ID# 182869**

If RUSH charges will be applied, please call prior to analyzing.

Samples Collected by: ________

6/13/18 15:30 VPS

Relinquished by	Date/Time	Received by
VPS	6/14/18 1110	
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

Vista Analytical Laboratory

Sample Log-in Checklist

Vista Work Order #: 1801266 **TAT** 14 Std KE 06/14/18

Samples Arrival:	**Date/Time** 06/14/18 1018	**Initials:** SR	**Location:** WR-2 **Shelf/Rack:** N/A
Logged In:	**Date/Time** 06/14/18 1423	**Initials:** KE	**Location:** WR-2 **Shelf/Rack:** B6

Delivered By:	FedEx	[✓ UPS]	On Trac	GSO	DHL	Hand Delivered	Other
Preservation:	[✓ Ice]	Blue Ice		Dry Ice		None	

Temp °C: 1.6 (uncorrected)	**Time:** 1106	**Thermometer ID:** IR-3
Temp °C: 1.3 (corrected)	**Probe used:** Yes☐ No☒	

	YES	NO	NA
Adequate Sample Volume Received?	KE		
Holding Time Acceptable?	SR		
Shipping Container(s) Intact?	SR		
Shipping Custody Seals Intact?			SR
Shipping Documentation Present?	SR		
Airbill Trk # 1Z X46 599 01 9529 1888	SR		
Sample Container Intact?	KE		
Sample Custody Seals Intact?			KE
Chain of Custody / Sample Documentation Present?	SR		
COC Anomaly/Sample Acceptance Form completed?	KE		~~KE~~

KE 06/14/18 ADDITIONAL SAMPLE REQUIRES ANOMALY FORM

If Chlorinated or Drinking Water Samples, Acceptable Preservation?						KE
Preservation Documented:	$Na_2S_2O_3$	Trizma	None	Yes	No	[✓ NA]
Shipping Container	Vista	[✓ Client]	Retain	Return	Dispose	

Comments:

INVENTORY:

COC: MERRIMACK RIVER
PFAS TUMBLE BLANK
TP-1
TP-1
TP-3
TP-3

SAMPLE ID: MERRIMACK x 2 (125mL)
PFAS TUMBLE BLANK x2 (125mL)
TP-1 x 2 (125ml)
TP-1 x 2 (6oz)
TP-3 x 2 (125ml)
TP-3 x 2 (6oz)
*TRIP BLANK x 2 (125)ml

* NOT LISTED ON COC.

Chain of Custody Anomaly/Sample Acceptance Form

Vista
Analytical Laboratory

Client: Eastern Analytical, Inc.
Contact: Jennifer Laramie
Email: JenniferL@eailabs.com
Phone: (603) 410-3881

Workorder Number: 1801266
Date Received: 14-Jun-18 10:18
Documented by/date: K. Elric 06/14/18

Please review the following information and complete the Client Authorization section. To comply with NELAC regulations, we must receive authorization before proceeding with sample analysis.

Thank you,

Martha Maier
mmaier@vista-analytical.com
916-673-1520

The following information or item is needed to proceed with analysis:

- ☐ Complete Chain-of-Custody
- ☐ Test Method Requested
- ☐ Analyte List Requested
- ☒ Other: **See Comments**
- ☐ Preservative
- ☐ Sample Identification
- ☐ Sample Collection Date and/or Time
- ☐ Collector's Name
- ☐ Sample Type
- ☐ Sample Location

The following anomalies were noted. Authorization is needed to proceed with analysis.

☐ Temperature outside < 6°C Range Samples Affected: ______________________

Temperature ________°C Ice Present? Yes No Melted

- ☐ Sample ID Discrepancy
- ☐ Sample Holding Time Missed
- ☐ Custody Seals Broken
- ☐ Insufficient Sample Size
- ☐ Sample Container(s) Broken
- ☐ Incorrect Container Type

Comments:
Received 7 samples, COC lists 6 samples.
Sample not listed on COC:
Eastern ID# 182869.05 Blank

Client Authorization

Proceed with Analysis: YES [✓ NO] Signature and Date 6/25/18

Client Comments/Instructions Per Jenn Laramie, do not analyze extra blank received w/ sample.

Page 1 of 3 JW 6/8/18

182869

CHAIN-OF-CUSTODY RECORD

BOLD FIELDS REQUIRED. PLEASE CIRCLE REQUESTED ANALYSIS.

				VOC				SVOC					TCLP	METALS		INORGANICS								MICRO		OTHER				
SAMPLE I.D.	**SAMPLING DATE/TIME** *IF COMPOSITE, INDICATE BOTH START & FINISH DATE/TIME	**MATRIX (SEE BELOW)**	**GRAB/*COMPOSITE**	524.2 524.2 BTEX 524.2 MTBE ONLY	8260B 624 VTICs 1, 4 DIOXANE	8021B BTEX HALOS	8015B GRO MAVPH	8270D 625 SVTICs EDB DBCP ABN A BN PAH	TPH8100 L1 L2	8015B DRO MAEPH	PEST 608 PCB 608 PEST 8081A PCB 8082	OIL & GREASE 1664 TPH 1664	TCLP 1311 ABN METALS VOC PEST HERB	DISSOLVED METALS (LIST BELOW)	TOTAL METALS (LIST BELOW)	TS TSS TDS SPEC. CON.	Br Cl F SO_4 NO_2 NO_3 NO_3NO_2	BOD CBOD T. ALK.	TKN NH_3 T. PHOS. O. PHOS.	pH T. RES. CHLORINE	COD PHENOLS TOC DOC	TOTAL CYANIDE TOTAL SULFIDE	REACTIVE CYANIDE REACTIVE SULFIDE FLASHPOINT IGNITABILITY	TOTAL COLIFORM E. COLI FECAL COLIFORM	ENTEROCOCCI HETEROTROPHIC PLATE COUNT	See attached	Quote	101467	# OF CONTAINERS	**NOTES** MeOH VIAL #
TP-1	9:15 6-7-18	S																											3	
TP-3	1245 ↓	S																											3	
Merrimack River	15:20 ↓	SW																												

MATRIX: A-AIR; S-SOIL; GW-GROUND WATER; SW-SURFACE WATER; DW-DRINKING WATER; WW-WASTE WATER

PRESERVATIVE: H-HCL; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH

PROJECT MANAGER: J-Martz (Daniel Tinkham) *PM

COMPANY: EGG

ADDRESS: 56 main st

CITY: Meredith STATE: NH ZIP: 03253

PHONE: EXT.:

FAX:

E-MAIL:

SITE NAME: MER 4/5 AR

PROJECT #: MER

STATE: [✓ NH] MA ME VT OTHER:

REGULATORY PROGRAM: NPDES: RGP POTW STORMWATER OR GWP, OIL FUND, BROWNFIELD OR OTHER:

QUOTE #: PO #:

DATE NEEDED:

QA/QC REPORTING LEVEL
A B C
OR
PRESUMPTIVE CERTAINTY

REPORTING OPTIONS
PRELIMS: YES OR NO

ELECTRONIC OPTIONS
E-MAIL PDF EQUIS EXCEL

TEMP. 2.1 °C
ICE? [✓ YES] NO

SAMPLER(S): J-Martz

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
	6-7-18	1639	

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:

PA 6/12/18

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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)

Eastern Analytical, Inc.

CHAIN-OF-CUSTODY RECORD

182869

EGGNH

2 of 3

Sample IDs	**Date/Time** *Composites need start and stop dates/times*	**Matrix**	**Parameters and Sample Notes**	**# of containers**
TP-1 *		soil Grab or Comp	SolTotDry/PFCsSubVAL SPLPsolidmod/PFCsSubVAL/DOC/TUVA/pH/ColorTrue/ICPMets.As.Ca.Fe.Mn	☐
☐ **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 ☐
TP-3 *		soil Grab or Comp	SolTotDry/PFCsSubVAL SPLPsolidmod/PFCsSubVAL/DOC/TUVA/pH/ColorTrue/ICPMets.As.Ca.Fe.Mn	☐
☐ **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 ☐
Merrimack River *		aqueous Grab or Comp	AqTot/TUVA/pH/ColorTrue/ICPMets.As.Ca.Fe.Mn/PFCsSubVAL AqDis/DOC	☐
☐ **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 ☐
PFAS Tumble Blank *		soil Grab or Comp	SPLPsolid/PFCsSubVAL	☐
☐ **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 ☐

* Samples Analyzed

* Blank Sample - Analysis same as .01 and .02

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 MER 4/5 AR | MER

State NH
Client (Pro Mgr) Daniel Tinkham
Customer Emery & Garrett Groundwater
Address 56 Main Street
City Meredith NH 03253
Phone 279-4425 **Fax** 279-8717

Email: djtinkham@eggi.com
Direct 279-4425

PA- 6/12/18

Results Needed by: Preferred date ___________
Notes:

TP-1 & TP-3 are to be tumbled for 48 hours in river water provided by client. After tumble, samples will be filtered with 0.45 um filter and analyzed for DOC,TUVA, pH, ColorTrue, As.Ca.Fe.Mn. PFAS samples will be filtered with 0.7 um filter at the sub lab. TP-1 & TP-3 will also be analyzed for total PFAS in soil. PFAS will be analyzed for 26 compound list. PFAS tumble blank will be tumbled with river water and PFAS-free water and extracted and held based on results.

QC deliverables
☒ A ☐ A+ ☐ B ☐ B+ ☐ C ☐ MA M

ReportingOptions

- ☒ HC
- ☒ EDD PDF
- ☒ EDD email
- ☒ PDF prelim, NO FAX
- ☒ e-mail Login Confirmation
- ☐ NO FAX
- ☐ Partial FAX
- ☐ PDF Invoice
- ☐ EQUIS

PO# verbal
Quote#: 1014671
Temp 2.1 **°C**
Ice Y☑ N☐

Samples Collected by:___________

Relinquished by	**Date/Time**	**Received by**
	6/7/18 16:38	
Relinquished by	**Date/Time**	**Received by**

Eastern Analytical, Inc. www.easternanalytical.com | 800.287.0525 | customerservice@easternanalytical.com

182869

3 of 3

Eastern Analytical, Inc.

Quotation 1014671

Quotation Date: 7/5/2017

PA
4/12/18

Project ID: PFAS Leachability Project
Revised 6/5/2018 JLL

EAI Project ID:

Jeffrey Marts
Emery & Garrett Groundwater Investigations, LLC
56 Main Street
Meredith, NH 03253

Dear Mr. Marts:

Thank you for the opportunity to provide this quotation.

Qty.	Description
2	SPLP (1312) Prep (modified - tumble water & specs
3	DOC (Aqueous)
3	UV Absorption
3	pH
3	Color (True)
3	Filter Fee (Inorganic), *0.45 µm filter*
3	Subcontract - PFCs/PFAS EPA Method 537 - 26 Cmpd
2	Subcontract - PFAS Filter Fee
1	Overnight Shipping to Subcontract Lab (est. 15 lbs -
3	Metals Aqueous Prep
3	Calcium
3	Iron
3	Manganese
3	Arsenic
2	Subcontract - PFCs/PFAS EPA Method 537 - 26 Cmpd
0	Subcontract - PFAS Centrifuging (if necessary)

AR2 PFAS
MONITORING WELL MER 45-AR2

Eastern Analytical, Inc.
professional laboratory and drilling services

Daniel Tinkham
Emery & Garrett Groundwater Investigations,
56 Main Street
Meredith , NH 03253

ACCREDITED IN ACCORDANCE WITH nelac

Subject: Laboratory Report

Eastern Analytical, Inc. ID: 185312
Client Identification: MER-45
Date Received: 8/9/2018

Dear Mr. Tinkham :

Enclosed please find the report of analysis for the above identified project. As discussed, analyses were subcontracted and are listed as follows:

Analysis:	Subcontract - Perfluorinated Compounds EPA Method 537 Vista
Subcontractor Lab:	Vista Analytical Laboratory

A complete copy of the report is attached. This report may not be reproduced except in full, without the written approval of the laboratory.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw
Lorraine Olashaw, Lab Director

9.7.18
Date

14
# of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **185312**

Client: **Emery & Garrett Groundwater Investigations, LLC (NH)**

Client Designation: **MER-45**

Temperature upon receipt (°C): 1.7

Acceptable temperature range (°C): 0-6

Received on ice or cold packs (Yes/No): Y

Lab ID	**Sample ID**	**Date Received**	**Date Sampled**	**Sample Matrix**	**% Dry Weight**	**Exceptions/Comments** (other than thermal preservation)
185312.01	MER-45-AR2	8/9/18	8/9/18	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

Vista
Analytical Laboratory

September 05, 2018

Vista Work Order No. 1802440

Ms. Jennifer Laramie
Eastern Analytical, Inc.
25 Chennell Drive
Concord, NH 03301

Dear Ms. Laramie,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on August 14, 2018 under your Project Name '185312 NH'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 1802440
Case Narrative

Sample Condition on Receipt:

One aqueous sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:

PFAS Isotope Dilution Method

The sample was extracted and analyzed for a selected list of PFAS using Modified EPA Method 537. The results for PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Results for all other analytes include the linear isomers only.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above the Reporting Limit. The OPR recoveries were within the method acceptance criteria.

The recoveries of all internal standards in the QC and field samples were within the acceptance criteria.

Table of Contents

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1802440-01	MER-45-AR2	09-Aug-18 10:05	14-Aug-18 10:47	HDPE Bottle, 125 mL
				HDPE Bottle, 125 mL

ANALYTICAL RESULTS

Vista Analytical Laboratory

Sample ID: Method Blank

PFAS Isotope Dilution Method

Client Data

Name: Eastern Analytical, Inc.
Project: 185312 NH
Matrix: Aqueous

Laboratory Data

Lab Sample: B8H0116-BLK1
Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFPeA	2706-90-3	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFBS	375-73-5	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFHxA	307-24-4	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFHpA	375-85-9	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFHxS	355-46-4	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFOA	335-67-1	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFNA	375-95-1	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFOS	1763-23-1	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFDA	335-76-2	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
MeFOSAA	2355-31-9	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
EtFOSAA	2991-50-6	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFUnA	2058-94-8	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFDoA	307-55-1	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFTrDA	72629-94-8	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
PFTeDA	376-06-7	ND	4.00		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	93.2	60 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C3-PFPeA	IS	90.5	60 - 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C3-PFBS	IS	94.2	60 - 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C2-PFHxA	IS	87.1	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C4-PFHpA	IS	90.9	60 - 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
18O2-PFHxS	IS	82.2	60 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C2-PFOA	IS	89.6	60 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C5-PFNA	IS	77.1	50 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C8-PFOS	IS	84.7	60 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C2-PFDA	IS	69.5	60 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
d3-MeFOSAA	IS	58.9	50 - 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
d5-EtFOSAA	IS	59.4	50 - 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C2-PFUnA	IS	61.0	60 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C2-PFDoA	IS	61.7	30 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1
13C2-PFTeDA	IS	65.9	20 - 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 10:07	1

RL - Reporting limit

Results reported to RL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: OPR

PFAS Isotope Dilution Method

Client Data

Name: Eastern Analytical, Inc.
Project: 185312 NH
Matrix: Aqueous

Laboratory Data

Lab Sample: B8H0116-BS1
Column: BEH C18

Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	40.7	40.0	102	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFPeA	2706-90-3	41.7	40.0	104	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFBS	375-73-5	44.0	40.0	110	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFHxA	307-24-4	43.1	40.0	108	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFHpA	375-85-9	41.7	40.0	104	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFHxS	355-46-4	44.4	40.0	111	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFOA	335-67-1	43.6	40.0	109	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFNA	375-95-1	34.2	40.0	85.5	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFOS	1763-23-1	42.9	40.0	107	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFDA	335-76-2	40.8	40.0	102	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
MeFOSAA	2355-31-9	42.4	40.0	106	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
EtFOSAA	2991-50-6	43.2	40.0	108	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFUnA	2058-94-8	41.1	40.0	103	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFDoA	307-55-1	40.5	40.0	101	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFTrDA	72629-94-8	45.2	40.0	113	60 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
PFTeDA	376-06-7	38.7	40.0	96.7	70 - 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1

Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	89.7	60- 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C3-PFPeA	IS	90.9	60- 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C3-PFBS	IS	89.2	60- 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C2-PFHxA	IS	88.6	70- 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C4-PFHpA	IS	88.4	60- 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
18O2-PFHxS	IS	84.1	60- 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C2-PFOA	IS	85.5	60- 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C5-PFNA	IS	74.5	50- 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C8-PFOS	IS	87.2	60- 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C2-PFDA	IS	67.2	60- 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
d3-MeFOSAA	IS	53.5	50- 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
d5-EtFOSAA	IS	56.6	50- 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C2-PFUnA	IS	65.5	60- 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C2-PFDoA	IS	58.9	30- 130		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1
13C2-PFTeDA	IS	77.8	20- 150		B8H0116	16-Aug-18	0.250 L	23-Aug-18 09:56	1

Sample ID: MER-45-AR2

PFAS Isotope Dilution Method

Client Data

Name:	Eastern Analytical, Inc.	Matrix:	Aqueous
Project:	185312 NH	Date Collected:	09-Aug-18 10:05

Laboratory Data

Lab Sample:	1802440-01	Column:	BEH C18
Date Received:	14-Aug-18 10:47		

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	5.26	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFPeA	2706-90-3	9.44	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFBS	375-73-5	10.6	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFHxA	307-24-4	13.5	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFHpA	375-85-9	8.56	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFHxS	355-46-4	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFOA	335-67-1	38.9	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFNA	375-95-1	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFOS	1763-23-1	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFDA	335-76-2	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
MeFOSAA	2355-31-9	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
EtFOSAA	2991-50-6	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFUnA	2058-94-8	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFDoA	307-55-1	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFTrDA	72629-94-8	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
PFTeDA	376-06-7	ND	4.10		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	92.3	60 - 130		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C3-PFPeA	IS	92.8	60 - 150		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C3-PFBS	IS	107	60 - 150		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C2-PFHxA	IS	90.4	70 - 130		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C4-PFHpA	IS	89.7	60 - 150		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
18O2-PFHxS	IS	90.0	60 - 130		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C2-PFOA	IS	84.8	60 - 130		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C5-PFNA	IS	78.3	50 - 130		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C8-PFOS	IS	96.4	60 - 130		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C2-PFDA	IS	68.5	60 - 130		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
d3-MeFOSAA	IS	75.2	50 - 150		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
d5-EtFOSAA	IS	79.7	50 - 150		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C2-PFUnA	IS	70.1	60 - 130		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C2-PFDoA	IS	71.5	30 - 130		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1
13C2-PFTeDA	IS	79.9	20 - 150		B8H0116	16-Aug-18	0.122 L	23-Aug-18 11:10	1

RL - Reporting limit

Results reported to RL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank**
Conc.	**Concentration**
D	**Dilution**
DL	**Detection limit**
E	**The associated compound concentration exceeded the calibration range of the instrument**
H	**Recovery and/or RPD was outside laboratory acceptance limits**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ**
LOD	**Limits of Detection**
LOQ	**Limits of Quantitation**
M	**Estimated Maximum Possible Concentration (CA Region 2 projects only)**
NA	**Not applicable**
ND	**Not Detected**
Q	**Ion ratio outside of 70-130% of Standard Ratio. (DOD PFAS projects only)**
TEQ	**Toxic Equivalency**
U	**Not Detected (specific projects only)**
*	**See Cover Letter**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	17-015-0
	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1322288
New Hampshire Environmental Accreditation Program	207717
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	014
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	9077
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

CHAIN-OF-CUSTODY RECORD

Eastern Analytical, Inc. 2
professional laboratory and drilling services

1802440 0.6°C **EAI ID# 185312** Page 1

Sample ID	Date Sampled	Matrix	aParameters	Sample Notes
MER-45-AR2	8/9/2018 10:05	aqueous	Subcontract - Perfluorinated Compounds EPA Method 537	

EAI ID# 185312 **Project State: NH**
Project ID:

Company Vista Analytical Laboratory
Address 1104 Windfield Way
Address El Dorado Hills, CA 95762
Account #
Phone # (916) 673-1520

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.
PFAs 16 compound list

PO #:48573 **EAI ID# 185312**

Data Deliverable (circle)
Excel NH EMD EQuIS ME EGAD

Call prior to analyzing, if RUSH charges will be applied.

Samples Collected by:
8/13/18 1500 UPS

Relinquished by	Date/Time	Received by
UPS	08/14/18 1059	
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

Vista
Analytical Laboratory

Sample Log-in Checklist

Vista Work Order #: 1802440 **TAT** 8td

Samples Arrival:	**Date/Time** 08/14/18 1047	**Initials:** ✓BLB	**Location:** WR-2 **Shelf/Rack:** NA
Logged In:	**Date/Time** 08/14/18 1246	**Initials:** BLB	**Location:** WR-2 **Shelf/Rack:** F5

Delivered By:	FedEx	[✓ UPS]	On Trac	GSO	DHL	Hand Delivered	Other
Preservation:	[✓ Ice]		Blue Ice		Dry Ice		None

Temp °C: 0.7 (uncorrected)
Temp °C: 0.6 (corrected)
Time: 1057
Probe used: Yes☐ No☑
Thermometer ID: IR-4

		YES	NO	NA
Adequate Sample Volume Received?		✓BLB		
Holding Time Acceptable?		WJS		
Shipping Container(s) Intact?		✓BLB		
Shipping Custody Seals Intact?				✓BLB
Shipping Documentation Present?		✓BLB		
Airbill	Trk # 1ZX46 599 019822 4338	✓BLB		
Sample Container Intact?		✓BLB		
Sample Custody Seals Intact?				✓BLB
Chain of Custody / Sample Documentation Present?		✓BLB		
COC Anomaly/Sample Acceptance Form completed?			WJS	WJS

If Chlorinated or Drinking Water Samples, Acceptable Preservation?						WJS
Preservation Documented:	$Na_2S_2O_3$	Trizma	[✓ None]	[✓ Yes]	No	NA
Shipping Container	Vista	[✓ Client]	Retain	[✓ Return]		Dispose

Comments:

ID.: LR – SLC *Rev No.: 0* *Rev Date: 05/18/2017* *Page: 1 of 1*

Page 1 of 1

CHAIN-OF-CUSTODY RECORD

185312

14

BOLD FIELDS REQUIRED. PLEASE CIRCLE REQUESTED ANALYSIS.

				VOC				SVOC					TCLP	METALS		INORGANICS								MICRO		OTHER				
SAMPLE I.D.	**SAMPLING DATE / TIME** *IF COMPOSITE, INDICATE BOTH START & FINISH DATE / TIME	**MATRIX (SEE BELOW)**	**GRAB/*COMPOSITE**	524.2 524.2 BTEX 524.2 MTBE ONLY	8260 624 VTICs 1, 4 DIOXANE	8021 BTEX HALOS	8015 GRO MAVPH	8270 625 SVTICs EDB DBCP ABN A BN PAH	TPH8100 L1 L2	8015 DRO MAEPH	PEST 608 PCB 608 PEST 8081 PCB 8082	OIL & GREASE 1664 TPH 1664	TCLP 1311 ABN METALS VOC PEST HERB	DISSOLVED METALS (LIST BELOW)	TOTAL METALS (LIST BELOW)	TS TSS TDS SPEC. CON.	Br Cl F SO_4 NO_2 NO_3 NO_3NO_2	BOD CBOD T. ALK.	TKN NH_3 T. PHOS. O. PHOS.	pH T. RES. CHLORINE	COD PHENOLS TOC DOC	TOTAL CYANIDE TOTAL SULFIDE	REACTIVE CYANIDE REACTIVE SULFIDE FLASHPOINT IGNITABILITY	TOTAL COLIFORM E. COLI FECAL COLIFORM	ENTEROCOCCI HETEROTROPHIC PLATE COUNT	PFAS 16 compounds			# OF CONTAINERS	**NOTES** MeOH VIAL #
MER-45-AR2	8/9/18 ~~[illegible]~~ 1005		G																							X			2	

MATRIX: A-AIR; S-SOIL; GW-GROUND WATER; SW-SURFACE WATER; DW-DRINKING WATER; WW-WASTE WATER

PRESERVATIVE: H-HCL; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH

PROJECT MANAGER: Dan Tinkham

COMPANY: Emery + Garrett Groundwater

ADDRESS: 56 Main St

CITY: Meredith STATE: NH ZIP: 03253

PHONE: 603-279-4425 EXT.:

FAX:

E-MAIL: eggi@eggi.com

SITE NAME: MER-45

PROJECT #:

STATE: [✓ NH] MA ME VT OTHER:

REGULATORY PROGRAM: NPDES: RGP POTW STORMWATER OR GWP, OIL FUND, BROWNFIELD OR OTHER:

QUOTE #: PO #:

DATE NEEDED:

QA/QC REPORTING LEVEL
A B C
OR
MA MCP

REPORTING OPTIONS
PRELIMS: YES OR NO

ELECTRONIC OPTIONS
E-MAIL PDF EQUIS EXCEL

TEMP. 1.7 °C

ICE? [✓ YES] NO

SAMPLER(S): Ryan Allen

RELINQUISHED BY: DATE: 8/9/18 TIME: 1545 RECEIVED BY:

RELINQUISHED BY: DATE: TIME: RECEIVED BY:

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)

PFAS 16 compound list

Vista Labs

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)

APPENDIX D

WATER QUALITY RESULTS FROM TEST WELLS

Informational Water Quality Report

Watercheck w/PO

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

Client:

Ordered By:

Emery & Garrett Groundwater Investigations, LLC
56 Main Street
Meredith, NH 03253
ATTN: Emery & Garrett Groundwater Inc.

Sample Number: 887711

Location:	MER-45-AR1
Type of Water:	Well Water
Collection Date and Time:	8/9/2018 12:15 PM
Received Date and Time:	8/10/2018 10:05 AM
Date Completed:	8/28/2018

Metals filtered
0.5 hr test

Definition and Legend

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

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

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
		Microbiologicals				
	Total Coliform by P/A	No bacteria sample was submitted.				
		Inorganic Analytes - Metals				
✓	Aluminum	ND	mg/L	0.2	EPA Secondary	0.1
✓	Arsenic	ND	mg/L	0.010	EPA Primary	0.005
✓	Barium	ND	mg/L	2	EPA Primary	0.30
✓	Cadmium	ND	mg/L	0.005	EPA Primary	0.002
●	Calcium	36.4	mg/L	--		2.0
✓	Chromium	ND	mg/L	0.1	EPA Primary	0.010
✓	Copper	ND	mg/L	1.3	EPA Action Level	0.004
✓	Iron	ND	mg/L	0.3	EPA Secondary	0.020
✓	Lead	ND	mg/L	0.015	EPA Action Level	0.002
●	Lithium	0.005	mg/L	--		0.001
●	Magnesium	5.29	mg/L	--		0.10
●	Manganese	0.014	mg/L	0.05	EPA Secondary	0.004
✓	Mercury	ND	mg/L	0.002	EPA Primary	0.001
✓	Nickel	ND	mg/L	--		0.020
●	Potassium	4.2	mg/L	--		1.0
✓	Selenium	ND	mg/L	0.05	EPA Primary	0.020
●	Silica	16.4	mg/L	--		0.1
✓	Silver	ND	mg/L	0.100	EPA Secondary	0.002
●	Sodium	181	mg/L	--		1
●	Strontium	0.348	mg/L	--		0.001
✓	Uranium	ND	mg/L	0.030	EPA Primary	0.001
●	Zinc	0.076	mg/L	5	EPA Secondary	0.004
		Physical Factors				
●	Alkalinity (Total as CaCO3)	22	mg/L	--		20
▲	Hardness	110	mg/L	100	NTL Internal	10

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
⚠	pH	5.8	pH Units	6.5 to 8.5	EPA Secondary	
⚠	Total Dissolved Solids	640	mg/L	500	EPA Secondary	20
✓	Turbidity	ND	NTU	1.0	EPA Action Level	0.1
	Inorganic Analytes - Other					
✓	Bromide	ND	mg/L	--		0.5
⚠	Chloride	370.0	mg/L	250	EPA Secondary	5.0
✓	Fluoride	ND	mg/L	4.0	EPA Primary	0.5
●	Nitrate as N	1.5	mg/L	10	EPA Primary	0.5
✓	Nitrite as N	ND	mg/L	1	EPA Primary	0.5
✓	Ortho Phosphate	ND	mg/L	--		2.0
●	Sulfate	12.0	mg/L	250	EPA Secondary	5.0
	Organic Analytes - Trihalomethanes					
✓	Bromodichloromethane	ND	mg/L	--		0.002
✓	Bromoform	ND	mg/L	--		0.004
✓	Chloroform	ND	mg/L	--		0.002
✓	Dibromochloromethane	ND	mg/L	--		0.004
✓	Total THMs	ND	mg/L	0.080	EPA Primary	0.002
	Organic Analytes - Volatiles					
✓	1,1,1,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,1-Trichloroethane	ND	mg/L	0.2	EPA Primary	0.001
✓	1,1,2,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,2-Trichloroethane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,1-Dichloroethane	ND	mg/L	--		0.002
✓	1,1-Dichloroethene	ND	mg/L	0.007	EPA Primary	0.001
✓	1,1-Dichloropropene	ND	mg/L	--		0.002
✓	1,2,3-Trichlorobenzene	ND	mg/L	--		0.002
✓	1,2,3-Trichloropropane	ND	mg/L	--		0.002
✓	1,2,4-Trichlorobenzene	ND	mg/L	0.07	EPA Primary	0.002

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	1,2-Dichlorobenzene	ND	mg/L	0.6	EPA Primary	0.001
✓	1,2-Dichloroethane	ND	mg/L	0.005	EPA Primary	0.001
✓	1,2-Dichloropropane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,3-Dichlorobenzene	ND	mg/L	--		0.001
✓	1,3-Dichloropropane	ND	mg/L	--		0.002
✓	1,4-Dichlorobenzene	ND	mg/L	0.075	EPA Primary	0.001
✓	2,2-Dichloropropane	ND	mg/L	--		0.002
✓	2-Chlorotoluene	ND	mg/L	--		0.001
✓	4-Chlorotoluene	ND	mg/L	--		0.001
✓	Acetone	ND	mg/L	--		0.01
✓	Benzene	ND	mg/L	0.005	EPA Primary	0.001
✓	Bromobenzene	ND	mg/L	--		0.002
✓	Bromomethane	ND	mg/L	--		0.002
✓	Carbon Tetrachloride	ND	mg/L	0.005	EPA Primary	0.001
✓	Chlorobenzene	ND	mg/L	0.1	EPA Primary	0.001
✓	Chloroethane	ND	mg/L	--		0.002
✓	Chloromethane	ND	mg/L	--		0.002
✓	cis-1,2-Dichloroethene	ND	mg/L	0.07	EPA Primary	0.002
✓	cis-1,3-Dichloropropene	ND	mg/L	--		0.002
✓	DBCP	ND	mg/L	--		0.001
✓	Dibromomethane	ND	mg/L	--		0.002
✓	Dichlorodifluoromethane	ND	mg/L	--		0.002
✓	Dichloromethane	ND	mg/L	0.005	EPA Primary	0.002
✓	EDB	ND	mg/L	--		0.001
✓	Ethylbenzene	ND	mg/L	0.7	EPA Primary	0.001
✓	Methyl Tert Butyl Ether	ND	mg/L	--		0.004
✓	Methyl-Ethyl Ketone	ND	mg/L	--		0.01
✓	Styrene	ND	mg/L	0.1	EPA Primary	0.001

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

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	Toxaphene	ND	mg/L	0.003	EPA Primary	0.001
✓	Trifluralin	ND	mg/L	--		0.002

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

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

National Testing Laboratories, Ltd.

NATIONAL TESTING LABORATORIES, LTD

Informational Water Quality Report

Watercheck w/PO

National Testing Laboratories, Ltd.
Quality Water Analysis

6571 Wilson Mills Rd
Cleveland, Ohio 44143
1-800-458-3330

Client:

Ordered By:

Emery & Garrett Groundwater Investigations, LLC
56 Main Street
Meredith, NH 03253
ATTN: Emery & Garrett Groundwater Inc.

Sample Number:	887712
Location:	MER-45-AR2
Type of Water:	Well Water
Collection Date and Time:	8/9/2018 10:05 AM
Received Date and Time:	8/10/2018 10:05 AM
Date Completed:	8/28/2018

Metals Filtered
0.5 hr ptest

Definition and Legend

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

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

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
			Microbiologicals			
	Total Coliform by P/A	No bacteria sample was submitted.				
			Inorganic Analytes - Metals			
✓	Aluminum	ND	mg/L	0.2	EPA Secondary	0.1
✓	Arsenic	ND	mg/L	0.010	EPA Primary	0.005
✓	Barium	ND	mg/L	2	EPA Primary	0.30
✓	Cadmium	ND	mg/L	0.005	EPA Primary	0.002
●	Calcium	40.1	mg/L	--		2.0
✓	Chromium	ND	mg/L	0.1	EPA Primary	0.010
✓	Copper	ND	mg/L	1.3	EPA Action Level	0.004
✓	Iron	ND	mg/L	0.3	EPA Secondary	0.020
✓	Lead	ND	mg/L	0.015	EPA Action Level	0.002
●	Lithium	0.004	mg/L	--		0.001
●	Magnesium	4.67	mg/L	--		0.10
●	Manganese	0.016	mg/L	0.05	EPA Secondary	0.004
✓	Mercury	ND	mg/L	0.002	EPA Primary	0.001
✓	Nickel	ND	mg/L	--		0.020
●	Potassium	5.2	mg/L	--		1.0
✓	Selenium	ND	mg/L	0.05	EPA Primary	0.020
●	Silica	11.9	mg/L	--		0.1
✓	Silver	ND	mg/L	0.100	EPA Secondary	0.002
●	Sodium	263	mg/L	--		1
●	Strontium	0.470	mg/L	--		0.001
✓	Uranium	ND	mg/L	0.030	EPA Primary	0.001
●	Zinc	0.118	mg/L	5	EPA Secondary	0.004
			Physical Factors			
✓	Alkalinity (Total as CaCO3)	ND	mg/L	--		20
▲	Hardness	120	mg/L	100	NTL Internal	10

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
▲	pH	5.8	pH Units	6.5 to 8.5	EPA Secondary	
▲	Total Dissolved Solids	860	mg/L	500	EPA Secondary	20
✓	Turbidity	ND	NTU	1.0	EPA Action Level	0.1
Inorganic Analytes - Other						
●	Bromide	0.9	mg/L	--		0.5
▲	Chloride	520.0	mg/L	250	EPA Secondary	5.0
✓	Fluoride	ND	mg/L	4.0	EPA Primary	0.5
●	Nitrate as N	1.5	mg/L	10	EPA Primary	0.5
✓	Nitrite as N	ND	mg/L	1	EPA Primary	0.5
✓	Ortho Phosphate	ND	mg/L	--		2.0
●	Sulfate	14.0	mg/L	250	EPA Secondary	5.0
Organic Analytes - Trihalomethanes						
✓	Bromodichloromethane	ND	mg/L	--		0.002
✓	Bromoform	ND	mg/L	--		0.004
✓	Chloroform	ND	mg/L	--		0.002
✓	Dibromochloromethane	ND	mg/L	--		0.004
✓	Total THMs	ND	mg/L	0.080	EPA Primary	0.002
Organic Analytes - Volatiles						
✓	1,1,1,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,1-Trichloroethane	ND	mg/L	0.2	EPA Primary	0.001
✓	1,1,2,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,2-Trichloroethane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,1-Dichloroethane	ND	mg/L	--		0.002
✓	1,1-Dichloroethene	ND	mg/L	0.007	EPA Primary	0.001
✓	1,1-Dichloropropene	ND	mg/L	--		0.002
✓	1,2,3-Trichlorobenzene	ND	mg/L	--		0.002
✓	1,2,3-Trichloropropane	ND	mg/L	--		0.002
✓	1,2,4-Trichlorobenzene	ND	mg/L	0.07	EPA Primary	0.002

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	1,2-Dichlorobenzene	ND	mg/L	0.6	EPA Primary	0.001
✓	1,2-Dichloroethane	ND	mg/L	0.005	EPA Primary	0.001
✓	1,2-Dichloropropane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,3-Dichlorobenzene	ND	mg/L	--		0.001
✓	1,3-Dichloropropane	ND	mg/L	--		0.002
✓	1,4-Dichlorobenzene	ND	mg/L	0.075	EPA Primary	0.001
✓	2,2-Dichloropropane	ND	mg/L	--		0.002
✓	2-Chlorotoluene	ND	mg/L	--		0.001
✓	4-Chlorotoluene	ND	mg/L	--		0.001
✓	Acetone	ND	mg/L	--		0.01
✓	Benzene	ND	mg/L	0.005	EPA Primary	0.001
✓	Bromobenzene	ND	mg/L	--		0.002
✓	Bromomethane	ND	mg/L	--		0.002
✓	Carbon Tetrachloride	ND	mg/L	0.005	EPA Primary	0.001
✓	Chlorobenzene	ND	mg/L	0.1	EPA Primary	0.001
✓	Chloroethane	ND	mg/L	--		0.002
✓	Chloromethane	ND	mg/L	--		0.002
✓	cis-1,2-Dichloroethene	ND	mg/L	0.07	EPA Primary	0.002
✓	cis-1,3-Dichloropropene	ND	mg/L	--		0.002
✓	DBCP	ND	mg/L	--		0.001
✓	Dibromomethane	ND	mg/L	--		0.002
✓	Dichlorodifluoromethane	ND	mg/L	--		0.002
✓	Dichloromethane	ND	mg/L	0.005	EPA Primary	0.002
✓	EDB	ND	mg/L	--		0.001
✓	Ethylbenzene	ND	mg/L	0.7	EPA Primary	0.001
✓	Methyl Tert Butyl Ether	ND	mg/L	--		0.004
✓	Methyl-Ethyl Ketone	ND	mg/L	--		0.01
✓	Styrene	ND	mg/L	0.1	EPA Primary	0.001

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

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	Toxaphene	ND	mg/L	0.003	EPA Primary	0.001
✓	Trifluralin	ND	mg/L	--		0.002

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

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National Testing Laboratories, Ltd.

NATIONAL TESTING LABORATORIES, LTD

Informational Water Quality Report

Watercheck w/PO

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

Client:

Ordered By:

Emery & Garrett Groundwater Investigations, LLC
56 Main Street
Meredith, NH 03253
ATTN: Emery & Garrett Groundwater Inc.

Sample Number:	887710
Location:	MER-45-AR3
Type of Water:	Well Water
Collection Date and Time:	8/9/2018 2:20 PM
Received Date and Time:	8/10/2018 10:05 AM
Date Completed:	8/28/2018

Metals Filtered
0.5hr ptest

Definition and Legend

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

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

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
			Microbiologicals			
	Total Coliform by P/A	No bacteria sample was submitted.				
			Inorganic Analytes - Metals			
✓	Aluminum	ND	mg/L	0.2	EPA Secondary	0.1
✓	Arsenic	ND	mg/L	0.010	EPA Primary	0.005
✓	Barium	ND	mg/L	2	EPA Primary	0.30
✓	Cadmium	ND	mg/L	0.005	EPA Primary	0.002
●	Calcium	31.4	mg/L	--		2.0
✓	Chromium	ND	mg/L	0.1	EPA Primary	0.010
✓	Copper	ND	mg/L	1.3	EPA Action Level	0.004
✓	Iron	ND	mg/L	0.3	EPA Secondary	0.020
✓	Lead	ND	mg/L	0.015	EPA Action Level	0.002
●	Lithium	0.006	mg/L	--		0.001
●	Magnesium	5.89	mg/L	--		0.10
✓	Manganese	ND	mg/L	0.05	EPA Secondary	0.004
✓	Mercury	ND	mg/L	0.002	EPA Primary	0.001
✓	Nickel	ND	mg/L	--		0.020
●	Potassium	3.4	mg/L	--		1.0
✓	Selenium	ND	mg/L	0.05	EPA Primary	0.020
●	Silica	17.5	mg/L	--		0.1
✓	Silver	ND	mg/L	0.100	EPA Secondary	0.002
●	Sodium	125	mg/L	--		1
●	Strontium	0.302	mg/L	--		0.001
✓	Uranium	ND	mg/L	0.030	EPA Primary	0.001
●	Zinc	0.058	mg/L	5	EPA Secondary	0.004
			Physical Factors			
●	Alkalinity (Total as CaCO3)	22	mg/L	--		20
●	Hardness	100	mg/L	100	NTL Internal	10

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
▲	pH	6.0	pH Units	6.5 to 8.5	EPA Secondary	
●	Total Dissolved Solids	480	mg/L	500	EPA Secondary	20
✓	Turbidity	ND	NTU	1.0	EPA Action Level	0.1
			Inorganic Analytes - Other			
✓	Bromide	ND	mg/L	--		0.5
▲	Chloride	270.0	mg/L	250	EPA Secondary	5.0
✓	Fluoride	ND	mg/L	4.0	EPA Primary	0.5
●	Nitrate as N	1.7	mg/L	10	EPA Primary	0.5
✓	Nitrite as N	ND	mg/L	1	EPA Primary	0.5
✓	Ortho Phosphate	ND	mg/L	--		2.0
●	Sulfate	11.0	mg/L	250	EPA Secondary	5.0
			Organic Analytes - Trihalomethanes			
✓	Bromodichloromethane	ND	mg/L	--		0.002
✓	Bromoform	ND	mg/L	--		0.004
✓	Chloroform	ND	mg/L	--		0.002
✓	Dibromochloromethane	ND	mg/L	--		0.004
✓	Total THMs	ND	mg/L	0.080	EPA Primary	0.002
			Organic Analytes - Volatiles			
✓	1,1,1,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,1-Trichloroethane	ND	mg/L	0.2	EPA Primary	0.001
✓	1,1,2,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,2-Trichloroethane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,1-Dichloroethane	ND	mg/L	--		0.002
✓	1,1-Dichloroethene	ND	mg/L	0.007	EPA Primary	0.001
✓	1,1-Dichloropropene	ND	mg/L	--		0.002
✓	1,2,3-Trichlorobenzene	ND	mg/L	--		0.002
✓	1,2,3-Trichloropropane	ND	mg/L	--		0.002
✓	1,2,4-Trichlorobenzene	ND	mg/L	0.07	EPA Primary	0.002

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	1,2-Dichlorobenzene	ND	mg/L	0.6	EPA Primary	0.001
✓	1,2-Dichloroethane	ND	mg/L	0.005	EPA Primary	0.001
✓	1,2-Dichloropropane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,3-Dichlorobenzene	ND	mg/L	--		0.001
✓	1,3-Dichloropropane	ND	mg/L	--		0.002
✓	1,4-Dichlorobenzene	ND	mg/L	0.075	EPA Primary	0.001
✓	2,2-Dichloropropane	ND	mg/L	--		0.002
✓	2-Chlorotoluene	ND	mg/L	--		0.001
✓	4-Chlorotoluene	ND	mg/L	--		0.001
✓	Acetone	ND	mg/L	--		0.01
✓	Benzene	ND	mg/L	0.005	EPA Primary	0.001
✓	Bromobenzene	ND	mg/L	--		0.002
✓	Bromomethane	ND	mg/L	--		0.002
✓	Carbon Tetrachloride	ND	mg/L	0.005	EPA Primary	0.001
✓	Chlorobenzene	ND	mg/L	0.1	EPA Primary	0.001
✓	Chloroethane	ND	mg/L	--		0.002
✓	Chloromethane	ND	mg/L	--		0.002
✓	cis-1,2-Dichloroethene	ND	mg/L	0.07	EPA Primary	0.002
✓	cis-1,3-Dichloropropene	ND	mg/L	--		0.002
✓	DBCP	ND	mg/L	--		0.001
✓	Dibromomethane	ND	mg/L	--		0.002
✓	Dichlorodifluoromethane	ND	mg/L	--		0.002
✓	Dichloromethane	ND	mg/L	0.005	EPA Primary	0.002
✓	EDB	ND	mg/L	--		0.001
✓	Ethylbenzene	ND	mg/L	0.7	EPA Primary	0.001
✓	Methyl Tert Butyl Ether	ND	mg/L	--		0.004
✓	Methyl-Ethyl Ketone	ND	mg/L	--		0.01
✓	Styrene	ND	mg/L	0.1	EPA Primary	0.001

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

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	Toxaphene	ND	mg/L	0.003	EPA Primary	0.001
✓	Trifluralin	ND	mg/L	--		0.002

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

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

National Testing Laboratories, Ltd.

NATIONAL TESTING LABORATORIES, LTD

APPENDIX E

WATER QUALITY RESULTS FROM SURFACE WATER

Informational Water Quality Report

Watercheck w/PO

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

Client:

MVD- 4&5 AR

Ordered By:

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

Sample Number:	884662
Location:	Merrimack River
Type of Water:	Other
Collection Date and Time:	5/7/2018 1:30 PM
Received Date and Time:	5/10/2018 11:50 AM
Date Completed:	5/18/2018

Metals Not Filtered
High Flow

Definition and Legend

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

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

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
				Microbiologicals		
	Total Coliform by P/A	No bacteria sample was submitted.				
				Inorganic Analytes - Metals		
▲	Aluminum	0.3	mg/L	0.2	EPA Secondary	0.1
✓	Arsenic	ND	mg/L	0.010	EPA Primary	0.005
✓	Barium	ND	mg/L	2	EPA Primary	0.30
✓	Cadmium	ND	mg/L	0.005	EPA Primary	0.002
●	Calcium	2.8	mg/L	--		2.0
✓	Chromium	ND	mg/L	0.1	EPA Primary	0.010
✓	Copper	ND	mg/L	1.3	EPA Action Level	0.004
▲	Iron	0.521	mg/L	0.3	EPA Secondary	0.020
✓	Lead	ND	mg/L	0.015	EPA Action Level	0.002
●	Lithium	0.001	mg/L	--		0.001
●	Magnesium	0.57	mg/L	--		0.10
▲	Manganese	0.089	mg/L	0.05	EPA Secondary	0.004
✓	Mercury	ND	mg/L	0.002	EPA Primary	0.001
✓	Nickel	ND	mg/L	--		0.020
✓	Potassium	ND	mg/L	--		1.0
✓	Selenium	ND	mg/L	0.05	EPA Primary	0.020
●	Silica	5.1	mg/L	--		0.1
✓	Silver	ND	mg/L	0.100	EPA Secondary	0.002
●	Sodium	9	mg/L	--		1
●	Strontium	0.022	mg/L	--		0.001
✓	Uranium	ND	mg/L	0.030	EPA Primary	0.001
●	Zinc	0.006	mg/L	5	EPA Secondary	0.004
				Physical Factors		
✓	Alkalinity (Total as CaCO3)	ND	mg/L	--		20
✓	Hardness	ND	mg/L	100	NTL Internal	10

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
▲	pH	6.3	pH Units	6.5 to 8.5	EPA Secondary	
●	Total Dissolved Solids	30	mg/L	500	EPA Secondary	20
▲	Turbidity	1.5	NTU	1.0	EPA Action Level	0.1
Inorganic Analytes - Other						
✓	Bromide	ND	mg/L	--		0.5
●	Chloride	12.0	mg/L	250	EPA Secondary	5.0
✓	Fluoride	ND	mg/L	4.0	EPA Primary	0.5
✓	Nitrate as N	ND	mg/L	10	EPA Primary	0.5
✓	Nitrite as N	ND	mg/L	1	EPA Primary	0.5
✓	Ortho Phosphate	ND	mg/L	--		2.0
✓	Sulfate	ND	mg/L	250	EPA Secondary	5.0
Organic Analytes - Trihalomethanes						
✓	Bromodichloromethane	ND	mg/L	--		0.002
✓	Bromoform	ND	mg/L	--		0.004
✓	Chloroform	ND	mg/L	--		0.002
✓	Dibromochloromethane	ND	mg/L	--		0.004
✓	Total THMs	ND	mg/L	0.080	EPA Primary	0.002
Organic Analytes - Volatiles						
✓	1,1,1,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,1-Trichloroethane	ND	mg/L	0.2	EPA Primary	0.001
✓	1,1,2,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,2-Trichloroethane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,1-Dichloroethane	ND	mg/L	--		0.002
✓	1,1-Dichloroethene	ND	mg/L	0.007	EPA Primary	0.001
✓	1,1-Dichloropropene	ND	mg/L	--		0.002
✓	1,2,3-Trichlorobenzene	ND	mg/L	--		0.002
✓	1,2,3-Trichloropropane	ND	mg/L	--		0.002
✓	1,2,4-Trichlorobenzene	ND	mg/L	0.07	EPA Primary	0.002

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	1,2-Dichlorobenzene	ND	mg/L	0.6	EPA Primary	0.001
✓	1,2-Dichloroethane	ND	mg/L	0.005	EPA Primary	0.001
✓	1,2-Dichloropropane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,3-Dichlorobenzene	ND	mg/L	--		0.001
✓	1,3-Dichloropropane	ND	mg/L	--		0.002
✓	1,4-Dichlorobenzene	ND	mg/L	0.075	EPA Primary	0.001
✓	2,2-Dichloropropane	ND	mg/L	--		0.002
✓	2-Chlorotoluene	ND	mg/L	--		0.001
✓	4-Chlorotoluene	ND	mg/L	--		0.001
✓	Acetone	ND	mg/L	--		0.01
✓	Benzene	ND	mg/L	0.005	EPA Primary	0.001
✓	Bromobenzene	ND	mg/L	--		0.002
✓	Bromomethane	ND	mg/L	--		0.002
✓	Carbon Tetrachloride	ND	mg/L	0.005	EPA Primary	0.001
✓	Chlorobenzene	ND	mg/L	0.1	EPA Primary	0.001
✓	Chloroethane	ND	mg/L	--		0.002
✓	Chloromethane	ND	mg/L	--		0.002
✓	cis-1,2-Dichloroethene	ND	mg/L	0.07	EPA Primary	0.002
✓	cis-1,3-Dichloropropene	ND	mg/L	--		0.002
✓	DBCP	ND	mg/L	--		0.001
✓	Dibromomethane	ND	mg/L	--		0.002
✓	Dichlorodifluoromethane	ND	mg/L	--		0.002
✓	Dichloromethane	ND	mg/L	0.005	EPA Primary	0.002
✓	EDB	ND	mg/L	--		0.001
✓	Ethylbenzene	ND	mg/L	0.7	EPA Primary	0.001
✓	Methyl Tert Butyl Ether	ND	mg/L	--		0.004
✓	Methyl-Ethyl Ketone	ND	mg/L	--		0.01
✓	Styrene	ND	mg/L	0.1	EPA Primary	0.001

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

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	Toxaphene	ND	mg/L	0.003	EPA Primary	0.001
✓	Trifluralin	ND	mg/L	--		0.002

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

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National Testing Laboratories, Ltd.

NATIONAL TESTING LABORATORIES, LTD

Informational Water Quality Report

Watercheck w/PO

Client:
MVD- 4&5 AR

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

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

Sample Number:	884663
Location:	Baboosic Brook
Type of Water:	Other
Collection Date and Time:	5/7/2018 3:00 PM
Received Date and Time:	5/10/2018 11:50 AM
Date Completed:	5/18/2018

Metals Not Filtered
High Flow

Definition and Legend

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

Primary Standards:	Are expressed as the maximum contaminant level (MCL) which is the highest level of contaminant that is allowed in drinking water. MCLs are enforceable standards.
Secondary standards:	Are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor,or color) in drinking water. Individual states may choose to adopt them as enforceable standards.
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mg/L (ppm):	Unless otherwise indicated, results and standards are expressed as an amount in milligrams per liter or parts per million.
Minimum Detection Level (MDL):	The lowest level that the laboratory can detect a contaminant.
ND:	The contaminant was not detected above the minimum detection level.
NA:	The contaminant was not analyzed.
✓	The contaminant was not detected in the sample above the minimum detection level.
●	The contaminant was detected at or above the minimum detection level, but not above the referenced standard.
▲	The contaminant was detected above the standard, which is not an EPA enforceable MCL.
✚	The contaminant was detected above the EPA enforceable MCL.
✖	These results may be invalid.

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
Microbiologicals						
	Total Coliform by P/A	No bacteria sample was submitted.				
Inorganic Analytes - Metals						
✓	Aluminum	ND	mg/L	0.2	EPA Secondary	0.1
✓	Arsenic	ND	mg/L	0.010	EPA Primary	0.005
✓	Barium	ND	mg/L	2	EPA Primary	0.30
✓	Cadmium	ND	mg/L	0.005	EPA Primary	0.002
●	Calcium	8.3	mg/L	--		2.0
✓	Chromium	ND	mg/L	0.1	EPA Primary	0.010
✓	Copper	ND	mg/L	1.3	EPA Action Level	0.004
▲	Iron	0.801	mg/L	0.3	EPA Secondary	0.020
✓	Lead	ND	mg/L	0.015	EPA Action Level	0.002
✓	Lithium	ND	mg/L	--		0.001
●	Magnesium	1.80	mg/L	--		0.10
▲	Manganese	0.121	mg/L	0.05	EPA Secondary	0.004
✓	Mercury	ND	mg/L	0.002	EPA Primary	0.001
✓	Nickel	ND	mg/L	--		0.020
●	Potassium	1.5	mg/L	--		1.0
✓	Selenium	ND	mg/L	0.05	EPA Primary	0.020
●	Silica	3.3	mg/L	--		0.1
✓	Silver	ND	mg/L	0.100	EPA Secondary	0.002
●	Sodium	32	mg/L	--		1
●	Strontium	0.082	mg/L	--		0.001
✓	Uranium	ND	mg/L	0.030	EPA Primary	0.001
✓	Zinc	ND	mg/L	5	EPA Secondary	0.004
Physical Factors						
✓	Alkalinity (Total as CaCO3)	ND	mg/L	--		20
●	Hardness	28	mg/L	100	NTL Internal	10

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	pH	7.6	pH Units	6.5 to 8.5	EPA Secondary	
●	Total Dissolved Solids	99	mg/L	500	EPA Secondary	20
●	Turbidity	0.7	NTU	1.0	EPA Action Level	0.1
Inorganic Analytes - Other						
✓	Bromide	ND	mg/L	--		0.5
●	Chloride	51.0	mg/L	250	EPA Secondary	5.0
✓	Fluoride	ND	mg/L	4.0	EPA Primary	0.5
✓	Nitrate as N	ND	mg/L	10	EPA Primary	0.5
✓	Nitrite as N	ND	mg/L	1	EPA Primary	0.5
✓	Ortho Phosphate	ND	mg/L	--		2.0
✓	Sulfate	ND	mg/L	250	EPA Secondary	5.0
Organic Analytes - Trihalomethanes						
✓	Bromodichloromethane	ND	mg/L	--		0.002
✓	Bromoform	ND	mg/L	--		0.004
✓	Chloroform	ND	mg/L	--		0.002
✓	Dibromochloromethane	ND	mg/L	--		0.004
✓	Total THMs	ND	mg/L	0.080	EPA Primary	0.002
Organic Analytes - Volatiles						
✓	1,1,1,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,1-Trichloroethane	ND	mg/L	0.2	EPA Primary	0.001
✓	1,1,2,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,2-Trichloroethane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,1-Dichloroethane	ND	mg/L	--		0.002
✓	1,1-Dichloroethene	ND	mg/L	0.007	EPA Primary	0.001
✓	1,1-Dichloropropene	ND	mg/L	--		0.002
✓	1,2,3-Trichlorobenzene	ND	mg/L	--		0.002
✓	1,2,3-Trichloropropane	ND	mg/L	--		0.002
✓	1,2,4-Trichlorobenzene	ND	mg/L	0.07	EPA Primary	0.002

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	1,2-Dichlorobenzene	ND	mg/L	0.6	EPA Primary	0.001
✓	1,2-Dichloroethane	ND	mg/L	0.005	EPA Primary	0.001
✓	1,2-Dichloropropane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,3-Dichlorobenzene	ND	mg/L	--		0.001
✓	1,3-Dichloropropane	ND	mg/L	--		0.002
✓	1,4-Dichlorobenzene	ND	mg/L	0.075	EPA Primary	0.001
✓	2,2-Dichloropropane	ND	mg/L	--		0.002
✓	2-Chlorotoluene	ND	mg/L	--		0.001
✓	4-Chlorotoluene	ND	mg/L	--		0.001
✓	Acetone	ND	mg/L	--		0.01
✓	Benzene	ND	mg/L	0.005	EPA Primary	0.001
✓	Bromobenzene	ND	mg/L	--		0.002
✓	Bromomethane	ND	mg/L	--		0.002
✓	Carbon Tetrachloride	ND	mg/L	0.005	EPA Primary	0.001
✓	Chlorobenzene	ND	mg/L	0.1	EPA Primary	0.001
✓	Chloroethane	ND	mg/L	--		0.002
✓	Chloromethane	ND	mg/L	--		0.002
✓	cis-1,2-Dichloroethene	ND	mg/L	0.07	EPA Primary	0.002
✓	cis-1,3-Dichloropropene	ND	mg/L	--		0.002
✓	DBCP	ND	mg/L	--		0.001
✓	Dibromomethane	ND	mg/L	--		0.002
✓	Dichlorodifluoromethane	ND	mg/L	--		0.002
✓	Dichloromethane	ND	mg/L	0.005	EPA Primary	0.002
✓	EDB	ND	mg/L	--		0.001
✓	Ethylbenzene	ND	mg/L	0.7	EPA Primary	0.001
✓	Methyl Tert Butyl Ether	ND	mg/L	--		0.004
✓	Methyl-Ethyl Ketone	ND	mg/L	--		0.01
✓	Styrene	ND	mg/L	0.1	EPA Primary	0.001

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

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	Toxaphene	ND	mg/L	0.003	EPA Primary	0.001
✓	Trifluralin	ND	mg/L	--		0.002

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

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National Testing Laboratories, Ltd.

NATIONAL TESTING LABORATORIES, LTD

EMERY & GARRETT GROUNDWATER INVESTIGATIONS, A DIVISION OF GZA
56 Main Street | P.O. Box 1578 | Meredith, New Hampshire 03253
www.eggi.com