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August 14, 2020

Mr. Matthew Hubicki
Project Manager, Remedial Bureau C
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-7014 ***Via E-mail:*** matthew.hubicki@dec.ny.gov

Re: Draft Supplemental Work Plan
Bottled Water Provision and Point of Entry Treatment System (POET SYSTEM) Installation; Hudson Valley Regional Airport
18 Griffith Way, Town of Wappinger, Dutchess County, New York
NYSDEC Site # 314129

Dear Matt:

This Bottled Water Provision and Point of Entry Treatment (POET) Installation Work Plan (Work Plan) has been developed at the request of the New York State Department of Environmental Conservation (NYSDEC) as a result of sampling of an off-site private water supply well that had per- and polyfluoroalkyl substances (PFAS) levels exceeding the USEPA's drinking water advisory of 70 parts per trillion (ppt) at an off-site private water supply well in the vicinity of the Hudson Valley Region Airport (HVRA). Bottled water has been provided to that private water supply since May of 2020. This Work Plan is intended to conform with the requirements outlined in the Consent Order, dated March 28, 2018.

The Consent Order defines two (2) corrective actions if an exceedance of the 70 ppt advisory level is documented. The first corrective action is to provide bottled water to the affected location. The second corrective action is to install a POET SYSTEM.

This Work Plan documents the County's commitment to provide bottled water and a POET system at residential and other non-public water supply well locations in areas adjacent to the southeast corner of HVRA where PFAS impacts have been documented.

Work Plan

Bottled Water

Bottled water is to be provided to all private residences or businesses that exceed the USEPA's health advisory level of 70 ppt for total PFAS compounds in drinking water. The bottled water shall be provided as soon as practical once an exceedance is documented. The New York State Department of Health has proposed a drinking water Maximum Contaminant Level (MCL) of 10 ppt for PFOA and 10 ppt for PFOS. If the proposed MCL is adopted, the Department will request the County begin offering bottled water to, and POET installation at, those affected properties above 10 ppt for PFOA or PFOS in the manner described in this work plan. If the proposed MCL is adopted, the County will renegotiate the Consent Order with the Department.

Point of Entry Treatment System (POET system)

If an exceedance of the USEPA's 70 ppt health advisory level is documented and bottled water is provided, a POET system shall be installed to treat all water entering the building from the current water supply source. The POET system provides treated water to all water fixtures (sinks, baths/showers, toilets, ice makers, outside hose connections, etc.) of the structure.

The treatment of PFAS with use of Granular Activated Carbon (GAC) is well understood and demonstrated to be successful at reducing the level of PFAS to acceptable limits.

The County shall select a water treatment contractor for the installation of each POET system. In general, the POET system shall include the following or equivalent equipment:

- Pre-filter (Dual Gradient 50 -5 micron)
- Lead GAC Canister (e.g., 2 ft^3 Calgon Cullar F600AW)
- Lag GAC Canister (e.g., 2 ft^3 Calgon Cullar F600AW)
- Post-Filter (Dual Gradient 50 -5 micron)
- UV Lamp (e.g., VIQUA S8Q-PA)
- Flow Meter (total gallons)
- Influent, Midpoint and Effluent Water Sampling Ports

Attached to this Work Plan is an operations manual for the provision of Bottled Water Supply and installation of POET system in Private Water Supply Systems. The manual includes a schematic of a typical POET system installation. The plumbing piping and

fittings are typically cross-linked polyethylene (PEX) and will be installed to properly fit together with the existing plumbing.

The POET system will be tested at start up and routinely during use by the County's installation contractor. At system startup, water samples will be collected for PFAS analysis from the water sampling point located prior to the Lead GAC canister and from the effluent water sampling point after the Lag GAC canister. A visual assessment of the UV unit will be completed to ensure proper operation. The total gallons of water treated will be recorded with a flow meter.

Following the installation of the POET system, a quality control inspection of the system will be completed by the installer to ensure the system components have been installed adequately and are properly functioning. The initial sampling/monitoring of each POET system is generally completed several days after installation to allow for at least 200 gallons of water to be treated by the POET system. The treated water from the POET system will not be deemed ready for consumption until the analytical results for the initial system sample have been received and the effluent sample indicates PFAS concentrations are not detected above the method detection limit (MDL). The NYSDEC and NYSDOH will be provided with the initial POET system sample results and with notification that the water is safe to consume by the POET system users.

Scheduled maintenance of the POET system is as follows:

Pre and Post Filter Replacement:	Every 4 months
Ultraviolet Lamp Replacement:	Every 12 months
Ultraviolet Quartz Sleeve Cleaning:	Every 12 to 24 months
GAC Canister Replacement:	As needed depending on periodic analytical monitoring

Non-scheduled POET system maintenance by the installer is completed on an as-needed basis. All equipment components and parts are to be maintained according to the manufacturer's specifications.

A POET SYSTEM will be removed once the analytical results for the influent sampling port sample demonstrates PFAS concentrations below the advisory level pursuant to the Consent Order, and influent water concentrations have remained below the Regulatory Standard over a subsequent monitoring period of eight (8) quarterly sampling rounds in accordance with the Long-Term Monitoring (LTM) plan.

Decommissioning of the POET will not be performed with prior authorization by and notification to the NYSDEC, NYSDOH and Dutchess County Department of Health.

Upon achieving the criteria for the removal of a POET system, the County, through its contractor, will remove all POET system components, and restore the water system to its pre-POET system installation condition. The property owner will be given the opportunity to keep the system components after they have been permanently disconnected and removed. If the property would like to reconnect the system after the system has been disconnected, it will be the owners' responsibility to have a licensed water treatment specialist complete the work as well as be responsible for the POET system operation and maintenance.

The results of each monitoring event for the POET system will be provided to NYSDEC in accordance with the Consent Order sample reporting and consistent with the data and report submissions provided to date. The results for all POET system sampling events, dating back to the initial set of NYSDEC results from the water supply wells, will be provided in a master Excel spreadsheet to NYSDEC on an annual basis.

The County will implement this process upon approval by the NYSDEC. Please do not hesitate to call me at (845) 594-1788 or email me at j.mciver@ctmale.com with questions or comments.

Sincerely
C.T. MALE ASSOCIATES

James D. McIver, Jr., P.G.
Managing Geologist and Regional Office Manager

Att: OPERATION, MONITORING & MAINTENANCE MANUAL, Bottled Water and Point of Entry System (POET); Private Water Supply Systems

ec: Robert Balkind, P.E., Dutchess County Department of Public Works
James Fedorchak, Esq. Dutchess County Attorney
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Rosaura Andújar-McNeil, P.E., C.T. Male

August 2020

OPERATION, MONITORING & MAINTENANCE MANUAL
Bottled Water and Point of Entry System (POET) Private Water Supply Systems

Prepared for:

COUNTY OF DUTCHESS
1626 Dutchess Turnpike
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Prepared by:

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BOTTLED WATER AND POET OM&M MANUAL
HUDSON VALLEY REGIONAL AIRPORT

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General

This Bottled Water Provision and Point of Entry Treatment (POET) Operation, Monitoring and Maintenance (OM&M) Manual has been developed at the request of the New York State Department of Environmental Conservation (NYSDEC) to address per- and polyfluoroalkyl substances (PFAS) levels exceeding the USEPA's drinking water advisory of 70 parts per trillion (ppt) at an off-site private water supply well in the vicinity of the Hudson Valley Region Airport (HVRA). It is intended to conform with the requirements outlined in the Consent Order, dated March 28, 2018. The New York State Department of Health has proposed a drinking water Maximum Contaminant Level (MCL) of 10 ppt for PFOA and 10 ppt for PFOS. If the proposed MCL is adopted, the Department will request the County begin offering bottled water to, and POET installation at, those affected properties above 10 ppt for PFOA or PFOS in the manner described in this work plan. If the proposed MCL is adopted, the County will renegotiate the Consent Order with the Department.

The Consent Order defines two (2) corrective actions if an exceedance of the 70 ppt advisory level is documented. The first corrective action is to provide bottled water to the affected location as soon as practical. The second corrective action is to install a point of entry treatment system (POET system). For the purpose of this plan, are collectively referred to as Corrective Actions (CA).

The intent of this document is to provide the requirements for the installation, operation, monitoring and maintenance of POET systems installed at residential and other non-public water supply well locations within the areas adjacent to the southeast corner of the HVRA where PFAS impacts have been documented. This manual does not pertain to Public Water Systems or Non-Transient Water Systems.

Bottled water is to be provided to all private residences or businesses that exceed the 70 ppt drinking water guidance value. The bottled water shall be provided as soon as practical.

The POET SYSTEM are installed to treat all water entering the building from the current water supply source. In this manner, the POET provides treated water to all water

fixtures (sinks, baths/showers, toilets, ice makers, outside hose connections, etc.) of the structure.

The treatment of PFAS with use of Granular Activated Carbon (GAC) is well understood and demonstrated to be successful at reducing the level of PFAS to acceptable limits.

1.2 Project Background

Perfluorooctanoic acid (PFOA) is a member of the class of substances referred to as PFAS. PFAS have been produced and used in commercial products and industrial processes for over 60 years. Known commercial uses of PFAS include: water-, soil-, and stain-resistant coatings for clothing, leather, upholstery, and carpets; oil-resistant coatings for food contact paper; aviation hydraulic fluids; fire-fighting foams; paints, adhesives, waxes, polishes, and other products. Known industrial uses of PFAS include: surfactants, emulsifiers, wetting agents, flash inhibitors, additives, non-stick coatings on cookware, membranes for waterproof/ breathable clothing, electrical wire casing, fire and chemical resistant tubing, and plumbing thread seal tape.

NYSDEC informed Dutchess County, by letter dated September 15, 2017, that NYSDEC had classified the HVRA Site as a "P-site" based on the detection of perfluorinated compounds in a water supply well located on the Site and in nearby supply wells. The water samples were collected by the New York State Department of Health (NYSDOH).

2.0 PURPOSE & ORGANIZATION OF MANUAL

2.1 Organizational Structure

For this project, the NYSDEC and NYSDOH are responsible for overall project oversight and management. The County of Dutchess shall contract with entities to provide the POET installations. C.T. Male is responsible for the sampling and analysis of each installed POET as further discussed herein. Analytical results related to the ongoing operation of each POET will be provided to the County, NYSDEC and NYSDOH as they become available to C.T. Male. In turn, the County shall issue the results to each property owner that has received a POET system.

2.2 O&M Contractor

The County shall select a water treatment contractor for the installation, scheduled inspection, and all scheduled and non-scheduled maintenance of each POET system.

2.3 Treatment System Overview

The POET systems components shall include the following or equivalent:

- Pre-filter (Dual Gradient 50 -5 micron)
- Lead GAC Canister (2 ft^3 Calgon Cullar F600AW)
- Lag GAC Canister (2 ft^3 Calgon Cullar F600AW)
- Post-Filter (Dual Gradient 50 -5 micron)
- UV Lamp (VIQUA S8Q-PA)
- Flow Meter (total gallons)
- Influent, Midpoint and Effluent Water Sampling Ports

A schematic drawing of a typical POET system installation is presented in Appendix A. The plumbing piping and fittings used are composed of cross-linked polyethylene (PEX) Products and are typically three-quarter inch (3/4") diameter. All plumbing fittings shall be NSF approved.

3.0 OPERATION

3.1 Operational Overview

The POET system operates through pressurized flow from the water supply well pump and pressure tank system within the structure. Electrical service for the UV unit is taken from the electrical service (115V) within the building.

Well water from the water supply well/pressure tank first flows through a polypropylene pre-sediment filter. It is then plumbed to the Lead and Lag GAC canisters. GAC treated water then flows through a post- polypropylene sediment filter and a totalizing mechanical flow meter, to record the total gallons of water before passing through the UV unit. Lastly, the water passes through a flow controller to assure sufficient disinfection by the UV unit.

3.2 POET System Startup

Prior to installing a POET, a site visit will be performed to review the existing water system and area required for the equipment installation. In most instances the POET is installed within the basement of the building, but this may not always be possible depending on the set up of the existing water supply systems. During the pre-installation site visit, an un-treated water sample from the source will be collected and analyzed for Hardness, Iron, Manganese, Hydrogen Sulfide, Alkalinity, Total Dissolved Solids and pH. This data is retained for future reference and evaluation.

At system startup, water samples will be collected for PFAS analysis from the water sampling point located prior to the Lead GAC canister and from the effluent water sampling point after the Lag GAC canister. A visual assessment of the UV unit will be completed to ensure it is properly operating. The total gallons of water treated will be recorded by the flow meter.

3.3 Laboratory Analyses

The influent, midpoint and effluent samples from the POET SYSTEM will be analyzed for the 21 compounds required by the Department's PFAS Sampling Guidance, Appendix G – PFAS Analyte List. The compounds are listed as follows:

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perflouralkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetrasdecanoic acid	PFTA/PFTeDA	376-06-7
Fluoinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluoroctanesulfonamides	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

3.4 System Shutdown & Removal

The POET SYSTEM are designed to operate continuously and to treat the supply water whenever there is water use within the building. Other than the UV unit which requires electrical power, the POET SYSTEM components rely on water pressure and flow to

operate. The only time the POET system will not treat water is during a power outage (i.e. as the water well pump will not be in operation).

POET system which will remain in service will continue to be maintained in accordance with Section 4.0 of this OM&M plan until they can be removed as further described below.

A POET system will be removed once the analytical results for the influent sampling port sample demonstrates PFAS concentrations below the advisory level pursuant to the Consent Order, and influent water concentrations have remained below the Regulatory Standard over a subsequent monitoring period of eight (8) quarters in accordance with the Long Term Monitoring (LTM) Plan.

Upon achieving the criteria for the removal of a POET system, the County, through its contractor, will remove all system components that were installed, and restore the water system to its pre-POET installation condition. The property owner will be given the opportunity to keep the system components after they have been permanently disconnected and removed. If the property would like to reconnect the system after the system has been disconnected, it will be the owners' responsibility to have a licensed water treatment specialist complete the work as well as be responsible for the POET system operation and maintenance.

If the removal criteria for a POET system is achieved and the POET system is removed, the related well will be classified as a Long-Term Monitoring well and sampled in accordance with the approved LTM Plan.

If the POET system will be left in place; operation, maintenance and monitoring of this POET system will become the responsibility of the property owner if the water quality testing indicates that the guidance value has been met for four (4) quarterly consecutive sampling events. Before POET system operation, monitoring and maintenance responsibilities are transferred to a property owner under this section, the County will have its POET system maintenance contractor perform one (1) last maintenance on the POET system. If the Lead and Lag GAC vessels have not been replaced within the last 12 months, both the Lead and Lag GAC vessels will be replaced with new vessels.

4.0 INSPECTION AND MAINTENANCE REQUIREMENTS

4.1 Scheduled Inspection and Maintenance

Following the installation of each POET system, a quality control inspection of the system will be completed by the installer to ensure the system components have been adequately installed and are properly functioning. The initial sampling/monitoring of each POET system is generally completed several days after installation to allow for at least 200 gallons of the water to be treated by the POET system. The treated water from the POET system will not be deemed ready for consumption until the analytical results for the initial system sample have been received and the effluent sample indicates PFAS concentrations are not detected above the method detection limit (MDL). The NYSDEC and NYSDOH will be provide with the initial POET system sample results and with notification that the water is safe to consume by the POET system recipients.

Scheduled maintenance of each POET system is as follows:

Pre and Post Filter Replacement:	Every 4 months
Ultraviolet Lamp Replacement:	Every 12 months
Ultraviolet Quartz Sleeve Cleaning:	Every 12 to 24 months
GAC Canister Replacement:	As needed depending on periodic analytical monitoring (see Section 4.2)

Non-scheduled POET system maintenance by the installer is completed on an as-needed basis. All equipment components and parts are to be maintained according to the manufacturer's specifications.

4.2 GAC Change Out

Following the collection and analysis of the initial effluent water sample from a POET system subsequent samples will be collected from the midpoint sample port, between the Lead and Lag GAC canisters. Sampling at the midpoint ensures that if the Lead GAC

media in the Lead canister has been saturated with PFAS it can be scheduled for change out.

The change out of the GAC canisters will be initiated when the PFOA concentration in the water sample collected from the midpoint sample port exceed 2 ppt. As soon as practicable after receiving the laboratory report indicating an exceedance of the MDL for PFOA at the midpoint sampling port, a water sample will be collected from the effluent sampling port to document the concentration of regulated PFAS are below the applicable MCL. The GAC canisters will then be scheduled for immediate change out as follows:

- Remove the Lead GAC canister.
- Remove the Lag GAC canister and place it in the Lead GAC position.
- Install the replacement GAC canister in the Lag position.
- Spent GAC media will be temporarily stored in 55-gallon drums at the airport prior to shipment to a treatment contractor. GAC media will be accumulated and stored undercover at the airport until approximately two to four drums of media is accumulated. Pick-up of the bulked media will be scheduled accordingly when two to four drums of spent media is accumulated.
- Upon return of the Lead GAC canister, the GAC media will be evaluated and recorded for indications of biofilm accumulation, and mineral encrustation to determine if "channeling" is occurring within the GAC canister beds. Channeling can reduce the GAC life cycle and is important in determining when a GAC canister should be replaced as discussed in Section 4.4.

4.3 UV Change Out

The UV lamp will be replaced with a new unit or serviced on a 12-month basis.

Depending on the visual condition of the UV quartz sleeve at the time the UV lamp is replaced, it will either be replaced or cleaned by the installer or maintenance personnel. The frequency for cleaning the UV quartz sleeve is dependent upon the hardness of the well water. The installer will maintain a written record of the water hardness for each POET SYSTEM from the time of installation, and during each UV system inspection until the POET SYSTEM is permanently removed or it is no longer the responsibility of the County. The following establishes the general timeframe for the cleaning of the UV quartz sleeve.

- 0 - 8 gpg (grams per gallon): Every 12 months
- 9 – 14 gpg: Every 6 months
- 15+ gpg: Every 4 months

4.4 Filter Change Out

The pre- and post-polypropylene sediment cartridge filters will be replaced by the installer every four (4) months. The frequency of filter changes may be modified over time as location specific historical data is developed for each POET SYSTEM.

4.5 System Data Records

The County will direct its water treatment contractor to keep records of work and modifications made to the POET SYSTEM as outlined in this POET SYSTEM OM&M Manual. The contractor will also be directed to provide these records to NYSDEC and NYSDOH, and to provide the records of an individual property owner to that property owner within one (1) week of a request for such records.

5.0 ONGOING MONITORING AND REPORTING

The sampling activities conducted as part of this POET SYSTEM OM&M Manual will be performed in accordance with the following supporting documents:

- Field Sampling Plan (FSP) dated December 2018, which presents the standard field sampling and data gathering procedures to be followed during implementation of the field activities.
- Quality Assurance Project Plan (QAPP), dated December 2018 or as subsequently updated, which provides project-specific organization details, objectives, data acquisition, data assessment, oversight, data review procedures, and analytical parameters. Protocols for sample collection, handling, storage, chain-of-custody (COC), laboratory and/or field analyses, data evaluation and validation, and reporting are also addressed.
- Project-Specific Health & Safety Plan (HASP) dated December 2018, which addresses the potential health and safety hazards that may be encountered while performing the work. The Health and Safety Plan has been amended to include

methodologies and precautions to protect field staff and the public during the COVID-19 pandemic.

5.1 Sample Collection and Analysis

As indicated in Section 3.2, initial system water samples are collected prior to the Lead GAC Canister (influent) and after the Lag GAC canister and analyzed by the laboratory of record for PFAS.

Sampling of all POET SYSTEM will be conducted quarterly for the first year of operation. After the completion of the initial system sampling for PFAS (as presented in Section 3.2), the follow-up sampling of the influent and midpoint samples from the POET SYSTEM will be performed on the following frequency based on the POET SYSTEM influent PFOA concentration:

Influent PFOA Concentration ≥ 1,000 ppt: **Every 3 months**

Influent PFOA Concentration ≥200 ppt to <1000 ppt: **Every 6 months**

Influent PFOA Concentration <200 ppt: **Every 12 months**

After a year of system monitoring, inclusive of the initial and first follow-up monitoring event, the above sampling frequency will be reevaluated to determine if it should be modified*. For example: if breakthrough of the Lead GAC canister for a POET system with an influent sample PFOA concentration greater than 1,000 ppt does not occur within the initial year of operation sampling, the sampling frequency may be extended an additional three (3) or six (6) months.

Regardless of whether there has been breakthrough of the Lead GAC canister after two (2) years of operation, the Lead and Lag GAC canisters will be replaced.

Any proposed change in sampling frequency will be formally submitted to NYSDEC for review and approval before making any sampling frequency changes.

5.2 System Sampling

Sampling of the POET SYSTEM (influent, midpoint or effluent) are normally collected mid- to late-morning and up until the mid-afternoon, during which time the water has

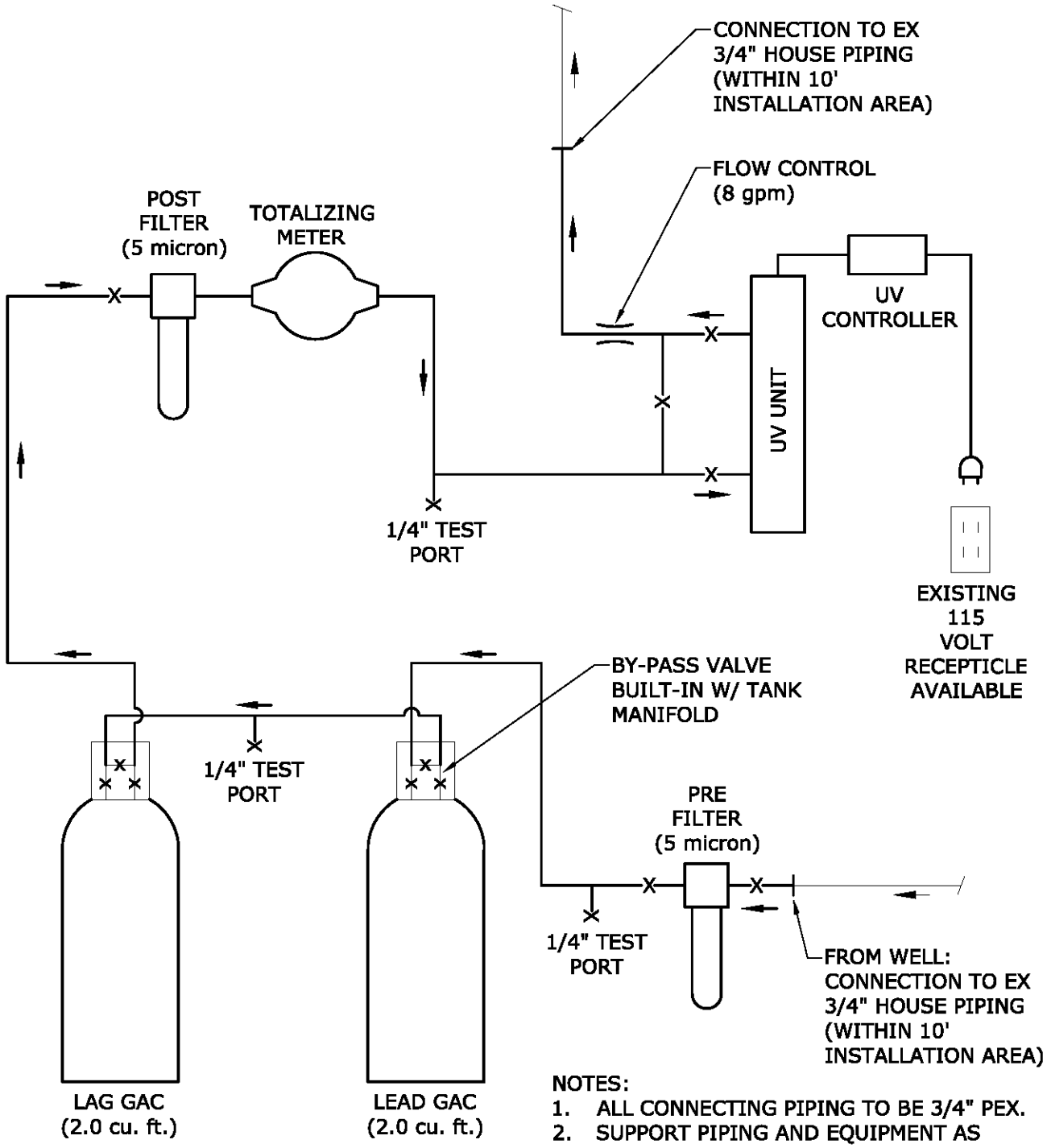
been running and treated for bathing, cooking, washing, flushing, etc. Regardless, the water will be run to waste at an outside tap location for approximately 10 minutes prior to the collection of the system samples.

5.3 Periodic Reporting

The results of each monitoring event for each POET SYSTEM will be provided to NYSDEC in accordance with the Consent Order sample reporting and consistent with the data and report submissions provided to date. The results for all POET SYSTEM sampling events, dating back to the initial set of NYSDEC results from the water supply wells, will be provided in a master Excel spreadsheet to NYSDEC on an annual basis.

APPENDIX A
POET SYSTEM INSTALLATION SCHEMATIC

NONE :XREFS



NOTES:
1. ALL CONNECTING PIPING TO BE 3/4" PEX.
2. SUPPORT PIPING AND EQUIPMENT AS NECESSARY.

Date	RECORD OF WORK	Appr.

SCHEMATIC
TYPICAL GAC POET SYSTEM
VARIOUS RESIDENTIAL / COMMERCIAL LOCATIONS

Drafter: DLP	Checker: DPR
Appr. by: DPR	Proj. No.

C.T. MALE ASSOCIATES
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SCALE: NONE | DATE: MAR 15, 2016

CAD DWG. FILE NAME: K:\Projects\166131\Civil\schematic.dwg