



March 4, 2020

Bureau of Waste Site Cleanup
Southeast Regional Office
Massachusetts Department of Environmental Protection
C/o Angela Gallagher
Site Remediation Section
20 Riverside Drive
Lakeville, MA 02347

RE: Immediate Response Action Status and Remedial Monitoring Report #36
Barnstable County Fire Training Academy Facility
155 South Flint Rock Road
Hyannis, Massachusetts
DEP Release Tracking No. 4-26179
Project Number #6206

Dear Ms. Gallagher:

BETA Group, Inc. (BETA) has prepared this Immediate Response Action (IRA) Status and Remedial Monitoring Report (RMR) for the Disposal Site referenced as the Barnstable Country Fire Training Academy (the BCFTA or facility) located at 155 South Flint Rock Road in Hyannis, MA (the Site) on the behalf of Barnstable County. This report was completed in accordance with Massachusetts Contingency Plan (MCP) - 310 CMR 40.0000.

This is the 36th monthly IRA RMR Status report. It documents the IRA/RMR activities being conducted to address a release of PFOS/PFOA to groundwater, soils, surface water, and sediments located at the Site. A potential Imminent Hazard (IH) condition and Condition of Substantial Release Migration were previously identified at the Site. This letter report specifically addresses the status of the Site groundwater pumping and treatment system (GWPTS) during the monthly reporting period from November 1 to November 30, 2019.

The completed BWSC105 Immediate Response Action (IRA) Transmittal Form and attached BWSC105A and BWSC105B IRA Remedial Monitoring Report Forms are being submitted to the MassDEP electronically via the eDEP system. This letter is being submitted to the Massachusetts Department of Environmental Protection (MassDEP) as an attachment to those forms. Copies of these forms prior to electronic signature are included as Attachment A.

REMEDIAL MONITORING REPORT – NOVEMBER 2019

During the November 2019 reporting period, the primary treatment system (GWTS #1) was operable for approximately 29 days. There were two scheduled shutdowns during this reporting period, lasting a total of approximately one day. The first partial day shutdown occurred on November 7, 2019 while the operation and maintenance contractor for the Site, Groundwater Treatment & Technology (GWTT) changed/replaced a 3-inch propeller-type flow meter, which was not providing reliable flow data, to a 2-inch pulse-turbine type flow meter/totalizer on the effluent piping. On November 11, 2019, a second, temporary groundwater treatment system was put into service. On November 11, 2019 the original GWTS was shut down for short period of time to split the influent flow at the force mains and start up a temporary GWTS. For the purposes of this and future IRA and RMR reports, the original GWTS will be referred as GWTS #1 and the newly installed temporary system will be referred to as GWTS #2. Details of the installation and startup of GWTS #2 are provided in a subsequent section of this report. On November 12, 2019, BETA collected performance samples from the GWTS #1, which was in operation at the time of sample collection, and the first start-up sequence samples from the newly activated GWTS #2.

Health Advisories and Regulatory Standards Used for Comparison

During the initial two years of the GWPTS operation (July 2016 through June 2018), the USEPA revised Health Advisory (HA) of 0.070 µg/L for two PFAS chemicals, Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS), was used for comparison to the analytical results of GWPTS performance samples. The HA (revised downward to 0.070 µg/L in July 2016) applied to each compound individually or for the total concentration of the two. Subsequently, MassDEP adopted the USEPA HA. The USEPA considers its HA to still be in effect (as of March 2020). However, for MCP purposes it has been superseded by MassDEP guidelines and regulatory actions.

On June 11, 2018, MassDEP's Office of Research and Standards (ORS) issued an updated ORS Guideline/HA that applied to the individual concentrations or the total summed of five PFAS chemicals: PFOS, PFOA, Perfluorononanoic Acid (PFNA), Perfluorohexanesulfonic Acid (PFHxS), and Perfluoroheptanoic Acid (PFHpA). From June 11, 2018 until December 2019, individual concentrations of any of these five compounds or the total concentrations of all were compared to the MassDEP ORS HA of 0.070 µg/L.

On April 19, 2019, MassDEP released the Public Comment Draft of proposed revisions to the MCP, which included proposed Method 1 groundwater risk standards for the five PFAS compounds, plus an additional PFAS compound, Perfluorodecanoic Acid (PFDA). A Method 1 GW-1 risk standard of 0.020 µg/L was proposed for the individual concentrations of any of these six compounds or the total concentrations of all six. From May 2019 through the current reporting period, tabulated treatment system analytical results have been compared to all six PFAS compounds of concern for informational purposes.

In December 2019, MassDEP published final MCP Method 1 risk standards for PFAS with an effective date of December 27, 2019.

The final MCP PFAS risk standards for groundwater include the 6 PFAS compounds of concern listed above and a 0.020 µg/L GW-1 numerical risk standard. As of the date of filing of this report, these MCP risk standards are in effect and are included in Table 1.

However, the results for this reporting period (November 2019) apply to the time period when the revised PFAS risk standards were in draft only. Therefore, the total PFAS concentrations reported and discussed for comparison purposes in this report are based on the sum of the five PFAS included in the June 2018 ORS HA and the HA of 0.070 µg/l. Results in all future status reports will be compared to the finalized MCP GW-1 risk standards for six PFAS compounds (0.020 µg/l).

GWTS # 1 Monitoring Results

As noted samples from GWTS #1 were collected on November 12, 2019 from the Influent (PRW-4), Midpoint and Effluent ports and were submitted to Bureau Veritas Laboratories (formerly Maxxam Analytics) of Mississauga, Ontario (Bureau Veritas) for the laboratory analysis of Total PFAs via USEPA Method 537 M.

The total sum of the five PFAS concentrations in the Influent sample, 4.597 µg/L, is approximately 7% higher than the October 2019 Influent results, but similar to the historical concentrations detected in the groundwater at PRW-4 (the recovery well). PFAS concentrations in the treatment system Influent/PRW-4 well since approximately January 2019 have been highly variable. Refer to Figure 1; this figure depicts the total summed concentrations of PFOA and PFOS compounds documented in the GWTS Influent/PRW-4 discharge and the system Midpoint from July 2015 to the current November 2019 sampling event. Due to the presentation of only PFOS and PFOA data in the status reports for the early years of system operation, the concentrations of the other three to four PFAS compounds of concern are not included in the sums depicted on Figure 1. However, since tracking of those began with the June 2018 reporting period, the concentrations of those compounds have been relatively small compared to PFOS concentrations – see Table 1A.

Due to busier than normal conditions at the laboratory, the November 2019 monthly sampling results were not received until December 10, 2019, approximately four weeks after the sampling date. In the November 2019 GWTS #1 system Midpoint performance sample, PFAS concentrations, specifically the PFOS compound, was detected above the laboratory reporting limits and above the EPA/MassDEP HA (in effect at that time.) However, none of the 23-laboratory available PFAS compounds were detected above method detection limits (MDLs) in the November 2019 Effluent sample; laboratory reportable detection limits (RDLs) were sufficiently low to allow comparison to the applicable EPA/MassDEP HA standards. Bureau Veritas reports the results for 23 PFAS compounds, including six (6) PFAS precursors. Refer to the attached laboratory report in Appendix B. As a precaution to avoid significant breakthrough in the effluent stream, the County contacted Calgon Corp. to schedule a carbon changeout for GWTS #1 after the results were received.

GWTS #1 Operational Details

As noted above, during the November 2019 reporting period, the primary treatment system (GWTS #1) was operable for approximately 29 days.

There were two scheduled shutdowns during this reporting period, lasting a total of approximately one day, the first on November 7, 2019 and the second on the 11th. As noted in previous reporting submittals, operational problems were observed with the system related to flow metering and the estimation of flow rates into and through the system. A propeller-style flow meter/totalizer was installed on the GWPTS Effluent line during the July 2019 reporting period. However, during the September 2019 reporting period it became apparent that the flow rate and totalizer readings may not be reliable due to low accuracy of that meter at discharge flow rates below 40 gpm.

On November 7, 2019, the propeller-style flow meter/totalizer was replaced with a pulse/turbine style flow totalizer to allow for more accurate flow volume recording at all flow rates. The meter is a standard totalizer installed on the effluent line of GWTS #1 reporting total gallons treated by GWTS #1. Instantaneous flow rate through GWTS #1 can be estimated using the stopwatch method. The installation of the new flow totalizer has resulted in reliable values for total flow through GWTS #1 from November 7, 2019 onward; these are reported appropriately on Table 2A.

For the November 2019 reporting period, the overall (average) system flow rate and gallons of groundwater treated were approximated for the first seven (7) days of the period, based on the only available information. Following the replacement of effluent flow meter/totalizer, the effluent flow net totalizer readings were reported for the system by the O&M contractor. Additionally, following the removal of the accumulated iron-oxide sediment in the EQ tank (in October 2019), the sight glass was cleared of obstructions and approximate influent flow rates were reported for the system by the O&M contractor. On this basis, approximately 0.56 million gallons of groundwater were estimated to be treated during the November 2019 reporting period, for an average effluent flow rate of 21.6 gpm. The average of the observed instantaneous Influent flow rates was is 30.1 gpm, indicating that the recovery well was not operating continuously. Based on 0.56 million gallons treated, approximately 0.022 kilograms of PFAS were estimated to have been removed from the plume area during this reporting period. Refer to the attached Table 2A for a summary of the GWPTS performance details. Although influent flow rates were not reported from September to October as a result of the iron sediment accumulation in the sight glass (of the EQ tank), BETA observed a significant decrease in the November 2019 average influent flow rates compared to the influent flow rates from August 2019; this decrease is most likely a result of iron accumulation in the force main and recovery well (PRW-4). In response, the County contracted Desmond Drilling to descale /purge the iron-oxide precipitate build-up in December 2019.

Expansion and Startup of Groundwater Treatment Capacity Using Temporary Unit

GWTS #2 Specifications, Installation and Start-up Information

This section describes the installation and startup of GWTS #2. As mentioned in the final IRA Plan Modification, dated December 2019, as part of IRA Status Report No. 27 for February 2019, the feasibility of expanding groundwater pumping and treatment was evaluated. The evaluation indicated that a short-term expansion of groundwater recovery via a new temporary well pumping to a temporary (rental) treatment unit was feasible.

Later status reports and May 31, 2019 correspondence to MassDEP indicated the intention of the County to proceed with expanding treatment capacity as rapidly as feasible by procuring (via a rental contract) and installing a temporary treatment system. MassDEP concurred with adding additional temporary treatment capacity. Therefore, in order to increase the efficacy of groundwater recovery and treatment for the Site, the County, assisted by BETA, solicited competitive quotes and procured a temporary conventional treatment system housed in a shipping container through a rental contract with GWTT of Millbury, MA. The treatment system is described below. The system was delivered to the FTA in late October 2019 and connected to influent piping and new gravity discharge piping in November 2019. Final steps to energize and start-up the system, designated as GWTS #2 for Site reporting purposes, and divert groundwater to it were completed on November 11, 2019. Previously, municipal water had been used to hydrate the GAC and test the system.

The municipal water present in GWTS #2 was initially pumped through the system and to discharge on November 11, 2019. Actual groundwater flow through the temporary system was estimated to begin on November 12, 2019. A standard start-up process with increased frequency of monitoring was executed.

Currently, groundwater from recovery well, PRW-4 is conveyed through two, 2-inch ID parallel force mains to the treatment building on the FTA property. Prior to November 11, 2019, both force mains discharged through the top hatch of the equalization tank of the permanent treatment system, GWTS #1. As of November 11, 2019, one force main continues to discharge to the GWTS #1 equalization tank. The second force main has been connected via hose and hard piping to the temporary treatment system, GWTS #2. Valves and hard piping remain in place to allow flow from the second force main to be diverted to either GWTS #2 or GWTS #1, as was the case prior to November 11, 2019. Hose connections also allow interchangeability between force mains and treatment systems. It should also be noted that as of November 22, 2019, when the O&M contractor personnel estimate the influent flow rate to the systems, they do so by switching the flow from both force mains to the GWTS #1 equalization tank and recording the time for the tank to fill approximately 6 inches.

The rental treatment system GWTS #2 is housed in a heated, weather-tight temporary structure, i.e., a former shipping container. The system is designed to treat PFAS-impacted groundwater at a target flow rate of approximately 30 gpm. The temporary groundwater treatment system includes the following components:

- a. 1000-gallon, equalization/iron precipitation tank
- b. Integrated, automatically controlled transfer pump
- c. conventional bag filter filtration (5 μ m) to collect precipitated iron
- d. two granular activated carbon (GAC) adsorption vessels in series, each with approximately 40 cubic feet (1,300 pounds) of virgin, coal based GAC
- e. Flow totalizer and additional instruments, as required
- f. Integrated control panel and new electrical service
- g. Ancillary equipment including sampling ports, heaters, and lighting.

The Process & Instrumentation Diagram and the Equipment Layout plan for GWTS #2 were included in Appendix C of the final IRA Plan Modification dated December 2019. A new gravity discharge line, consisting of a 4-inch PVC pipe, has been installed below grade to one of the existing north basins for recharge. The approximate route of the new drain is shown on Figure 2B, Site Plan Detail (of the final IRA Plan Modification dated December 2019).

GWTS #2 Operational Details

System GWTS #2 was operable for all or part of approximately 19 days during the November 2019 reporting period. There were three minor scheduled shutdowns during the month of November 2019 for appropriately calculating the influent flow rate from GWTS #1.

For the November 2019 reporting period, the overall (average) system flow rate and gallons of groundwater treated from GWTS #2 were based on the effluent net totalizer readings reported for the system by the O&M contractor. On this basis, approximately 0.23 million gallons of groundwater were shown to have flowed through GWTS #2 during the November 2019 reporting period, at an approximate average (effluent) flow rate of 8.5 gpm. The average effluent flow rate was significantly lower than expected, as GWTS #2 is designed for a treatment rate of approximately 30 gpm, and its average flow rate was actually significantly lower than that observed through GWTS #1. Frequent system shutdowns that most likely were occurring during the reporting period may have lessened the time of operation and total net gallons pumped through system GWTS #2. Conditions affecting shutdowns include the temporary, relatively close settings of the float switches in the EQ tank of GWTS #2, which control the operation of the transfer pump at GWTS #2, necessitated by a build-up of iron sludge (since removed.) In addition, short but frequent shutdowns of GWTS #2 were conducted to measure the influent flow rate of PRW-4 into the GWTS #1 EQ tank. That process, described above, reduces the total flow into the GWTS#2 EQ tank, and, therefore the volume of groundwater processed through that system. However, the overall reason of the lower average effluent flow rate is unknown at this time and is under evaluation. On the basis that 0.23 million gallons were treated, approximately 0.004 kilograms of PFAS were estimated to have been removed from the plume area during this reporting period by GWTS #2. Refer to the attached Table 2B for a summary of the GWTS #2 performance details.

GWTS #2 System Monitoring Results

On November 12, 15, and 19, 2019, BETA collected performance samples from GWTS #2 system per system post-startup requirements and the system was in operation at the time of sample collection. Samples collected from the Influent (PRW-4), Midpoint and Effluent ports were submitted to Bureau Veritas Laboratories (formerly Maxxam Analytics) of Mississauga, Ontario (Bureau Veritas for the laboratory analysis of Total PFAs via USEPA Method 537 M. The Influent sample from November 12, 2019 represents the groundwater quality entering both GWTS on that date. Influent samples were not collected on November 15 and November 19, 2019 due to the emphasis on monitoring the removal of PFAS by the new treatment system. The summary analytical results for the GWTS #2 performance samples are shown on Table 1B (with the exception of the Influent sample results shown on Table 1A).

Refer to the attached Table 1B, for a summary of the GWTS #2 PFAS analytical data post system-startup for the November 2019 reporting period. Individual concentrations of PFOS, PFOA, PFNA, PFHxS, and PFHpA from the three post-system startup GW&TS performance sample collections are included on Table 1B. As previously discussed, the tabulated treatment system analytical results from GWTS #2 are compared to all six PFAS compounds of concern for informational purposes. The laboratory report/certificate of analysis is included as Attachment B.

The total sum of the five PFAS concentrations in the Influent sample, is 4.597 µg/L, as the source of the influent for GWTS #2 is recovery well PRW-4, same as GWTS #1. The two, 2-inch force mains were diverted, each to a treatment system to optimize treatment of the impacted groundwater while flow rates from the newly installed submersible pump at recovery well PRW-4 are high.

During the day 7 post-system startup sampling – November 19, 2019 monitoring event, PFAS concentrations, specifically the PFOS compound, were detected in both the Midpoint and Effluent sample above the laboratory reporting limits, but below the EPA/MassDEP HA. In the opinion of BETA, it is very unlikely that breakthrough occurred in the GWTS #2 GAC in within seven days after system start-up with new, virgin GAC. However, upon receipt of the results, re-sampling was scheduled; BETA collected an Effluent sample from GWTS #2 on December 17, 2019 and submitted the sample to Bureau Veritas for expedited analysis. The analytical results from the December 17, 2019 monitoring event reported all 23 PFAS compounds below laboratory reporting limits and below the EPA/MassDEP HA. It is unknown why there was apparent breakthrough observed in the November 19, 2019 system sample. Due to the amount of time that had lapsed between sampling on November 19, 2019 and the receipt of these sampling results, the re-sampling of GWTS #2 on December 17, 2019 was used to also collect the monthly performance samples (for the December 2019 reporting period) from GWTS #2 and GWTS #1; as such data from the Influent and Midpoint samples collected from GWTS #2 are included on Table 1B.

No PFAS concentrations were reported above the applicable EPA/MassDEP HA standards (in effect at that time) in the three November 2019 GWTS #2 Midpoint and Effluent samples; laboratory reportable detection limits (RDLs) were sufficiently low to allow comparison to the applicable EPA/MassDEP HA standards. Bureau Veritas reports the results for 23 PFAS compounds, including six (6) PFAS precursors. Refer to Table 2B and the attached laboratory report in Appendix B.

GROUNDWATER TREATMENT PUMPING AND TREATMENT SUMMARY

During the November 2019 reporting period, the current groundwater pump and treatment system was expanded on November 11, 2019 by connecting the second force main via hose and hard piping to a temporary treatment system, identified as GWTS #2. The overall (average) system flow rate and gallons of groundwater treated were approximated, based on available information, primarily the Effluent flow totalizer readings reported for both systems by the O&M contractor. For the period of November 1 through November 30, 2019, both systems treated an approximate combined 0.8 million gallons of groundwater from the downgradient recovery well PRW-4 at an average effluent flow rate of 19.1 gpm.

Based on the combined 0.8 million gallons of groundwater treated, approximately 0.02 kilograms of PFAS are estimated to have been removed from the plume area during this reporting period. These calculations, however, were obtained from the November 7, 2019 to November 29, 2019 effluent totalizer readings as collected from the operation and maintenance contractor for the Site. As previously mentioned, Effluent flow rate readings from the totalizer at GWTS #1 were not providing reliable flow data until the replacement of the totalizer on the Effluent line on November 7, 2019 and GWTS #2 was not in operation until November 11, 2019. Refer to the attached tables, Table 1B and Table 2B for a summary of the GWPTS performance details from both systems.

Ongoing IRA Activities

Sampling results, system performance, and additional assessment work related to the ongoing response actions, such as system improvement and enhancement details, will be presented in the next IRA Status and RMR Report, for the December 2019 reporting period.

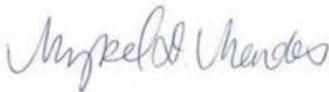
Public Involvement Activities

A copy of the municipal notification to the Town Manager and other officials is included as Attachment C.

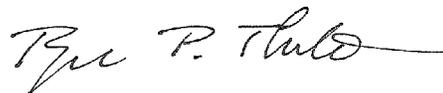
The Site has been designated a Public Involvement Plan Site under the MCP. The Draft Public Involvement Plan (PIP) was presented at a public meeting held at the Barnstable Town Hall on May 2, 2019. Following the end of the comment period, the PIP was finalized. The final PIP was filed with MassDEP on June 30, 2019. A copy of this report is available to the public through the repositories located in the Finalize PIP.

Sincerely,

BETA Group, Inc.



Mykel Mendes
Environmental Engineer



Roger Thibault, P.E., LSP
Senior Environmental Engineer

Copy: Jack Yunits, Barnstable County Administrator
Steve Tebo, Assistant County Administrator

Attachments:

TABLES:

Table 1A – Summary of Groundwater Pump and Treatment System PFAS Analytical Data – GWTS #1
Table 1B - Summary of Groundwater Pump and Treatment System PFAS Analytical Data – GWTS #2
Table 2A - Summary of Groundwater Pump and Treatment System Operating and Maintenance Data-
GWTS #1
Table 2B- Summary of Groundwater Pump and Treatment System Operating and Maintenance Data-
GWTS #2

FIGURES:

Figure 1 - BCFRTA GWPTS Influent and Midpoint PFOS Concentrations from 2015-2019

APPENDICES:

- A: BWSC 105, 105A, 105B Forms
- B: Laboratory Reports
- C: Municipal Notification Letter to Town Manager

TABLES

Table 1A - Summary of Groundwater Pump and Treatment System Total PFAS Analytical Data - GWTS #1
 Barnstable Country Fire and Rescue Training Academy
 155 Flint Rock Road, Barnstable, MA
 RTN 4-26179

SAMPLE ID	INFLUENT (PRW-1)						MIDPOINT						EFFLUENT					
	PFOS (ng/L)	PFOA (ng/L)	PFNA (ng/L)	PFHxS (ng/L)	PFHpA (ng/L)	PFDA (ng/L)	PFOS (ng/L)	PFOA (ng/L)	PFNA (ng/L)	PFHxS (ng/L)	PFHpA (ng/L)	PFDA (ng/L)	PFOS (ng/L)	PFOA (ng/L)	PFNA (ng/L)	PFHxS (ng/L)	PFHpA (ng/L)	PFDA (ng/L)
USDEP Method 537.2	70 ng/L						70 ng/L						70 ng/L					
MassDEP ORS Guideline ²	70 ng/L						70 ng/L						70 ng/L					
MCP Method 1 GW-1 Standard ³	20 ng/L						20 ng/L						20 ng/L					
SAMPLE DATE																		
4/7/2015	760	60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7/7/2015	5600	460	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/4/2015	5900	550	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/30/2015	17000	840	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/15/2015	9900	560	--	--	--	--	BRL (-9.4)	BRL (-5.3)	--	--	--	9.4	BRL (-5.8)	--	--	--	--	--
11/12/2015	9000	BRL (-2000)	--	--	--	--	BRL (-3.3)	--	--	--	--	--	--	--	--	--	--	--
1/6/2016	7600	260	--	--	--	--	120	75	--	--	--	--	--	--	--	--	--	--
1/21/2016	5200	160	--	--	--	--	270	16	--	--	--	--	--	--	--	--	--	--
2/3/2016	3500	140	--	--	--	--	540	26	--	--	--	--	--	--	--	--	--	--
2/17/2016	4500	140	--	--	--	--	520	24	--	--	--	--	--	--	--	--	--	--
3/8/2016	3700	140	--	--	--	--	420	19	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
3/23/2016	5000	150	--	--	--	--	650	39	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
4/14/2016	4800	140	--	--	--	--	610	26	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
4/28/2016	6300	BRL (-200)	--	--	--	--	--	--	--	--	--	--	BRL (-2.0)	BRL (-2.0)	--	--	--	--
5/12/2016	6800	BRL (-200)	--	--	--	--	--	--	--	--	--	--	BRL (-2.0)	BRL (-2.0)	--	--	--	--
5/25/2016	6900	BRL (-210)	--	--	--	--	--	--	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
6/16/2016	7800	160	--	--	--	--	--	--	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
7/6/2016	7600	270	--	--	--	--	--	--	--	--	--	10	BRL (-5.3)	--	--	--	--	--
8/11/2016	13000	160	--	--	--	--	1600	54	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
Carbon change conducted after sample collection on 08/17/16.																		
8/18/2016	9500	210	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
9/8/2016	9500	190	--	--	--	--	8.5	5.3	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
10/6/2016	17000	250	--	--	--	--	110	8.3	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
10/20/2016	7200	130	--	--	--	--	1000	BRL (-5.3)	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
11/3/2016	7900	110	--	--	--	--	650	BRL (-5.3)	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
11/17/2016	5400	99	--	--	--	--	1200	NA	--	--	--	17	NA	--	--	--	--	--
12/1/2016	5300	100	--	--	--	--	400	14	--	--	--	--	--	--	--	--	--	--
12/14/2016	5700	95	--	--	--	--	82	BRL (-5.3)	--	--	--	8.1	BRL (-5.3)	--	--	--	--	--
1/4/2017	4900	95	--	--	--	--	360	15	--	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--
2/16/2017	2900	88	--	--	--	--	1000	39	--	--	--	25	BRL (-5.3)	--	--	--	--	--
3/1/2017	3700	120	--	--	--	--	1400	47	--	--	--	150	6.5	--	--	--	--	--
3/23/2017	3800	87	--	--	--	--	2000	71	--	--	--	160	9.5	--	--	--	--	--
5/3/2017	2400	86	--	--	--	--	--	--	--	--	--	BRL (-2.6)	BRL (-4.6)	--	--	--	--	--
Carbon change conducted on 04/13/17.																		
4/19/2017	3200	110	--	--	--	--	160	BRL (-4.6)	--	--	--	BRL (-2.6)	BRL (-4.6)	--	--	--	--	--
5/18/2017	3000	110	--	--	--	--	570	32	--	--	--	BRL (-2.6)	BRL (-4.6)	--	--	--	--	--
6/1/2017	3200	110	--	--	--	--	730	33	--	--	--	4.1	BRL (-4.6)	--	--	--	--	--
6/27/2017	2600	99	--	--	--	--	--	--	--	--	--	210	15	--	--	--	--	--
7/18/2017	3500	97	--	--	--	--	2300	72	--	--	--	49	25	--	--	--	--	--
Carbon change conducted on 8/09/17																		
8/16/2017	3000	110	--	--	--	--	BRL (-2.3)	BRL (-4.1)	--	--	--	BRL (-2.3)	BRL (-4.1)	--	--	--	--	--
8/28/2017	2900	100	--	--	--	--	27	BRL (-2.0)	--	--	--	--	--	--	--	--	--	--
10/2/2017	3200	85	--	--	--	--	510	25	--	--	--	BRL (-2.6)	BRL (-4.6)	--	--	--	--	--
10/12/2017	4500	110	--	--	--	--	960	29	--	--	--	BRL (-2.6)	BRL (-4.6)	--	--	--	--	--
11/9/2017	2400	77	--	--	--	--	1500	39	--	--	--	BRL (-6.0)	BRL (-3.3)	--	--	--	--	--
11/20/2017	2000	64	--	--	--	--	520	15	--	--	--	BRL (-6.0)	BRL (-3.3)	--	--	--	--	--
12/7/2017	1600	64	--	--	--	--	780	34	--	--	--	BRL (-3.3)	BRL (-5.3)	--	--	--	--	--
2/5/2018	2100	27	--	--	--	--	390	13	--	--	--	BRL (-6.0)	BRL (-3.3)	--	--	--	--	--
2/14/2018	2100	30	--	--	--	--	850	27	--	--	--	11	BRL (-3.3)	--	--	--	--	--
System shutdown on 2/14/18 due to transfer pump failure; system restart on 4/9/18.																		
4/9/2018	2,600	79	--	--	--	--	990	25	--	--	--	BRL (-2.0)	BRL (-2.0)	--	--	--	--	--
4/13/2018	3100	62	--	--	--	--	1500	35	--	--	--	30	BRL (-3.3)	--	--	--	--	--
5/9/2018	1800	73	--	--	--	--	490	26	--	--	--	BRL (-6.0)	BRL (-3.3)	--	--	--	--	--
System shutdown on 5/9/18 after sampling collection due to carbon breakthrough and influent pump alarm fail.																		
Carbon change conducted on 06/05/18; system restarted on 06/07/18.																		
6/14/2018	2800	120	79	540	110	--	200	9.4	BRL (-8.7)	38	11	--	BRL (-6.0)	BRL (-3.3)	BRL (-8.7)	BRL (-5.6)	BRL (-7.4)	--
7/13/2018	2400	100	73	600	90	--	1100	44	27	24	35	--	BRL (-2.0)	BRL (-2.0)	BRL (-2.0)	BRL (-2.0)	BRL (-2.0)	--
8/7/2018	2900	95	73	460	86	--	630	31	22	130	34	--	27	5.3	BRL (-8.7)	9.1	BRL (-7.4)	--
9/27/2018	4300	69	50	360	190	--	3600	69	49	330	65	--	81	BRL (-3.3)	BRL (-8.7)	14	BRL (-7.4)	--
Carbon change conducted on 09/28/18; system restarted on 09/29/18.																		
10/30/2018	3800	65	46	320	71	--	100	6	8.7	16	78	--	BRL (-6.0)	BRL (-3.3)	BRL (-8.7)	BRL (-5.6)	BRL (-7.4)	--
11/16/2018	2900	62	50	290	77	--	460	24	19	94	26	--	BRL (-6.0)	BRL (-3.3)	BRL (-8.7)	BRL (-5.6)	BRL (-7.4)	--
12/14/2018	1900	62	49	300	70	--	1200	40	30	180	45	--	BRL (-6.0)	BRL (-3.3)	BRL (-8.7)	BRL (-5.6)	BRL (-7.4)	--
1/10/2019	2400	84	68	410	96	--	2200	71	54	360	82	--	21	BRL (-3.3)	BRL (-8.7)	BRL (-5.6)	BRL (-7.4)	--
Carbon change conducted on 2/4/19; system restarted on 2/5/19.																		
2/15/2019	4600	130	120	550	110	--	560	14	14	62	14	--	BRL (-6.0)	BRL (-3.3)	BRL (-8.7)	BRL (-6.2)	BRL (-7.4)	--
3/11/2019	5600	120	120	520	98	--	63	BRL (-3.3)	BRL (-4.9)	BRL (-5.6)	BRL (-7.1)	--	BRL (-6.0)	BRL (-3.3)	BRL (-4.9)	BRL (-5.6)	BRL (-7.1)	--
Iron sediments pumped out of influent tank and associated piping.																		
4/9/2019	6600	140	180	580	99	--	400	7.4	9.9	31	BRL (-7.1)	--	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	--
5/21/2019	2500	83	59	290	100	8.6	3400	72	69	260	7.8	12	BRL (-1.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)
Carbon change conducted on 06/13/19; system restarted on 06/14/19.																		
6/27/2019	8400	86	120	340	68	26	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)
7/29/2019	9500	78	100	290	72	16	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)
8/22/2019	8300	64	100	260	63	20	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)
9/26/2019	4900	65	82	220	64	21	64	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)
10/30/2019	3800	63	85	230	72	19	51	BRL (-7.4)	BRL (-4.9)	5.9	BRL (-7.1)	BRL (-4.1)	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)
11/12/2019	4200	53	85	200	59	15	120	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)	BRL (-5.2)	BRL (-7.4)	BRL (-4.9)	BRL (-5.2)	BRL (-7.1)	BRL (-4.1)

Notes:

- Concentrations presented in ng/L - nanograms per Liter - parts per trillion
- Prior to June 11, 2018, the USEPA established the EPA Health Advisory for two PFAS chemicals, PFOA and PFOS, which was 70 ng/L. Subsequently, MassDEP's Office of Research and Standards (ORS) expanded on this Health Advisory and created the ORS Guideline that applied to the total sum of five PFAS chemicals, PFOS, PFOA, PFNA, PFHxS, and PFHpA, effective June 11, 2018.
- On December 13, 2019, MassDEP published the newly established clean up standards for PFAS in soil and groundwater. These standards were effective as of December 27, 2019 and apply to the total sum of six PFAS chemicals, PFOS, PFOA, PFNA, PFHxS, PFHpA, and PFDA. The new standard is 20 ng/L or parts per trillion (ppt). Concentrations of the six PFAS compounds presented in the table were not compared to the new MassDEP standards until the January 2020 monthly system sample collection, which is after the effective date of December 27, 2019.
- Concentrations of the three additional PFAS chemicals, PFNA, PFHxS, and PFHpA were not presented prior to 06.11.18. The USEPA Health Advisory only applies to the PFOS and PFOA compounds. Concentrations of PFNA, PFHxS, and PFHpA were not presented/tabulated until after the MassDEP ORS Guideline was in effect on 06.11.18.
- Concentrations of the PFAS compound, PFDA, were not presented prior to the May 2019 sampling period. On April 19, 2019, MassDEP presented a draft of proposed risk standards for PFAS that included a sixth PFAS compound, PFDA.
- BRL - Below Laboratory Reporting Limits; reporting limit shown in parentheses.
- Concentrations in bold exceed applicable MassDEP ORS Guideline and/or the MCP Method 1 GW-1 groundwater risk standard.
- PFOS - Perfluorooctanesulfonic acid
- PFOA - Perfluorooctanoic Acid
- PFNA - Perfluorononanoic Acid
- PFHxS - Perfluorohexanesulfonic Acid
- PFHpA - Perfluor

Table 1B - Summary of Groundwater Pump and Treatment System Total PFAS Analytical Data -GWTS #2
 Barnstable Country Fire and Rescue Training Academy
 155 Flint Rock Road, Barnstable, MA
 RTN 4-26179

SAMPLE ID	INFLUENT (PRW-4)						MIDPOINT						EFFLUENT					
	PFOS (ng/L)	PFOA (ng/L)	PFNA (ng/L)	PFHxS (ng/L)	PFHpA (ng/L)	PFDA (ng/L)	PFOS (ng/L)	PFOA (ng/L)	PFNA (ng/L)	PFHxS (ng/L)	PFHpA (ng/L)	PFDA (ng/L)	PFOS (ng/L)	PFOA (ng/L)	PFNA (ng/L)	PFHxS (ng/L)	PFHpA (ng/L)	PFDA (ng/L)
USEPA Method 537.2																		
MassDEP ORS Guideline*	70 ng/L						70 ng/L						70 ng/L					
MCP Method T GW-1 Standard ¹³	20 ng/L						20 ng/L						20 ng/L					
SAMPLE DATE																		
System Startup on 11/11/19.																		
11/12/2019	4200	53	85	200	59	15	BRL (<5.2)	BRL (<7.4)	BRL (<4.9)	BRL (<5.2)	BRL (<7.1)	BRL (<4.1)	BRL (<5.2)	BRL (<7.4)	BRL (<4.9)	BRL (<5.2)	BRL (<7.1)	BRL (<4.1)
11/15/2019	--	--	--	--	--	--	BRL (<5.2)	BRL (<7.4)	BRL (<4.9)	BRL (<5.2)	BRL (<7.1)	BRL (<4.1)	BRL (<5.2)	BRL (<7.4)	BRL (<4.9)	BRL (<5.2)	BRL (<7.1)	BRL (<4.1)
11/19/2019	--	--	--	--	--	--	BRL (<5.2)	44	BRL (<4.9)	BRL (<5.2)	BRL (<7.1)	BRL (<4.1)	BRL (<5.2)	42	BRL (<4.9)	BRL (<5.2)	BRL (<7.1)	BRL (<4.1)
12/17/2019 ¹⁶	1500	43	51	180	54	10	BRL (<5.2)	BRL (<7.4)	BRL (<4.9)	BRL (<5.2)	BRL (<7.1)	BRL (<4.1)	BRL (<5.2)	BRL (<7.4)	BRL (<4.9)	BRL (<5.2)	BRL (<7.1)	BRL (<4.1)

- Notes:
- Concentrations presented in ng/L - nanograms per Liter - parts per trillion
 - MassDEP's Office of Research and Standards (ORS) expanded upon the USEPA's Health Advisory and created the ORS Guideline that applies to the total summed of five PFAS chemicals, PFOS, PFOA, PFNA, PFHxS, and PFHpA, effective June 11, 2018.
 - Concentrations of the PFAS compound, PFDA, are presented based on the April 19, 2019, MassDEP draft of new/proposed groundwater standards for PFAS that includes a sixth, PFAS compound, PFDA. However the concentration of PFDA is not included in total PFAS removal calculations.
 - BRL - Below Laboratory Reporting Limits: reporting limit shown in parentheses.
 - Concentrations in bold exceed applicable MassDEP ORS Guideline
 - PFOS - Perfluorooctanesulfonic acid
 - PFOA - Perfluorooctanoic Acid
 - PFNA - Perfluorononanoic Acid
 - PFHxS - Perfluorohexanesulfonic Acid
 - PFHpA - Perfluoroheptanoic Acid
 - PFDA - Perfluorodecanoic Acid
 - : Concentration data not available and/or sample was not collected on that date.
 - Per MCP Regulations, the system was sampled one day, three days, and seven (7) days following the initial week of startup (11/11/19).
 - On December 13, 2019, MassDEP published the newly established clean up standards for PFAS in soil and groundwater. These standards were effective as of December 27, 2019 and apply to the total sum of six PFAS chemicals, PFOS, PFOA, PFNA, PFHxS, PFHpA, and PFDA. Concentrations of the six PFAS compounds presented in the table were not compared to the new MassDEP standards until the January 2020 monthly system sample collection.
 - The December monthly sample was collected from the system's effluent stream on 12/17/2019 following the receipt of the laboratory results from the 11/19/2019 sampling event on 12/16/2019.
- The effluent was resampled again to ensure significant breakthrough was not occurring from the secondary carbon vessel.

Table 2A- Summary of Groundwater Pump and Treatment System Operating and Maintenance Data - GWTS #1
 Barnstable Country Fire and Rescue Training Academy
 155 Flint Rock Road, Barnstable, MA
 RTN 4-26179

Date	Operator	System Operating on Arrival	Influent Bag Filter Differential Pressure (psi) 4		Pre-Filter Changeout Differential Pressure (psi)		Post-Filter Changeout Differential Pressure (psi)		6" Influent Tank Fill Rate (min)	Estimated Influent Flow Rate (GPM)2	Days System Operating	Effluent				Estimated Total PFAs Removal (kg)3	System Operating on Departure	System Sampled	Comments		
			Pre	Post	Gauge: P1	Gauge: P2	Gauge: P1	Gauge: P2				Effluent Flow Rate (GPM)2	Totalizer (Gal)	Total Gallons Treated	Average Effluent Flow Rate (GPM)3						
4/9/2018	CE	No	75	NA	NA	NA	75	NA			0	--	--	--	--		Yes	Yes	Conducted system pressure checks after restart.		
4/10/2018	CE	Yes	94	74	NA	NA	77	74	2.07	59.3	1	--	--	--	--	0.001	Yes	No	Changed 3 bag filters (5 µm) and conducted system pressure checks.		
4/11/2018	CE	Yes	76	NA	NA	NA	76	NA	2.78	44.0	2	--	--	--	--	0.001	Yes	No	PRW-4 well pump is operating at high level, high level float is not triggering pump to shut off. CS turned off PRW-4 manually at 1243 and restarted at 14:32. Carbon vessels were backwashed individually from 1313 to 1427.		
4/12/2018	CE	Yes	NA	NA	NA	NA	75	75	2.78	44.0	3	--	--	--	--	0.002	Yes	No	Transfer pump is drawing down influent/holding tank faster than PRW-4 well is filling tank. No bag filter changes.		
4/13/2018	CE	Yes	88	74	NA	NA	75	74	2.80	43.8	4	--	--	--	--	0.003	Yes	Yes	Changed 3 bag filters (5 µm) and conducted system pressure checks.		
4/16/2018	CE	Yes	86	74	NA	NA	74	74	2.83	43.2	7	--	--	--	--	0.005	Yes	No	Pressure differential at 8 psi, no bags change. PRW-4 well high level float not triggering pump to shut off. Changed 3 bag filters (5 µm) and conducted system pressure checks.		
4/19/2018	CE	Yes	83		NA	NA	75		NA	NA	10	--	--	--	--	NA	Yes	No	Transfer pump is maintaining drawdown and flow through system ahead of the PRW-4 well pump, no bag changes.		
4/20/2018	CE	Yes	89	75	NA	NA	75	75	3.07	39.9	11	--	--	--	--	0.007	Yes	No	Changed 3 bag filters (5 µm) and conducted system pressure checks.		
4/23/2018	CE	Yes	92	76	NA	NA	77	76	3.18	38.5	14	--	--	--	--	0.009	Yes	No	High level float not triggering PRW-4 to shut down. Sean (B&B Electric) on site to inspect high float electrical issues. PRW-4 shut off at 13:40 to inspect control panel. PRW-4 restarted at 14:55. Transfer pump maintaining flow ahead of PRW-4 well pump. Both carbon vessels backwashed. Changed 3 bag filters (5 µm).		
4/24/2018	CE	Yes	74	NA	NA	NA	76		3.18	38.5	15	--	--	--	--	0.009	Yes	No	No bag change, conducted system pressure checks.		
4/25/2018	CE	Yes	79	NA	NA	NA	75		3.30	37.1	16	--	--	--	--	0.009	Yes	No	Pressure differential of 4 psi, no bag filter change, transfer pump is maintaining flow ahead of the PRW-4 well pump.		
4/26/2018	CE	Yes	83	NA	NA	NA	76		3.37	36.4	17	--	--	--	--	0.010	Yes	No	Pressure differential of 7 psi, no bag filter change, transfer pump is maintaining flow ahead of the PRW-4 well pump. While both the system transfer pump and PRW-4 well pump are on and operating, treatment takes 28 seconds to draw down 1 inch in influent tank (-17.5 gallons)		
4/27/2018	CE	Yes	84	73	NA	NA	75	75	3.42	35.8	18	--	--	--	--	0.010	Yes	No	Changed 3 bag filters (5 µm) and conducted system pressure checks.		
4/30/2018	CE	Yes	87	73	NA	NA	75	75	3.53	34.7	21.00	--	--	--	--	0.012	Yes	No	Changed 3 bag filters (5 µm) and conducted system pressure checks.		
Totals for April 2018									Average Flow Rate (gpm)		41.3					21.00			0.014		
5/1/2018	CS	Yes	83		NA	NA	75		3.83	32.0	0.00	--	--	--	--	0.0000	Yes	No	Adjusted /increased VFD of transfer pump from 35 psi to 40 psi to maintain drawdown ahead of PRW-4 well pump. No bag change. 1" drawdown - 1.41		
5/2/2018	CS	Yes	94	75	NA	NA	80	75	3.63	33.7	1.00	--	--	--	--	0.0006	Yes	No	Changed 3 bag filters (5 µm) and conducted system pressure checks. Conducted a backwash on both carbon vessels, PRW-4 well pump would not shut off, float switch relay stuck in on position, PRW-4 shutoff at 0733 and restarted at 08:26 with float switch working properly. Adjusted transfer pump rate back to 35 psi.		
5/4/2018	JES	Yes	110	73	NA	NA	73	75	3.65	33.6	3.00	--	--	--	--	0.0017	Yes	No	Changed 3 bag filters (10 µm) and conducted system pressure checks.		
5/7/2018	JES	Yes	110	73	NA	NA	74	74	3.7	33.1	6.00	--	--	--	--	0.0034	Yes	No	Changed 3 bag filters (5 µm) and conducted system pressure checks.		
Totals for May 2018									Average Flow Rate (gpm)		33.1					8.00			0.004		
6/5/2018	CE/MM	No	--	--	NR	NR	NR	NR	--	--	0	--	--	--	--	0	--	--	Carbon Change out- filled vessels with water and let to sit for -24 hours, changed 3 bag filters (5 µm)		
6/6/2018	CE	Yes	--	--	NR	NR	NR	NR	3.45	35.5	1	--	--	--	--	0.001	No	No	Pump floats not operating correctly, low float turns pump off and when low float is in water again, transfer pump starts. System remained off.		
6/7/2018	CE	Yes	62	52	NR	NR	NR	NR	3.18	38.5	2	--	--	--	--	0.001	Yes	No	Electrician on site in morning to correct float error- system operating normally.		
6/11/2018	CE	Yes	56	61	NR	NR	NR	NR	3.63	33.7	6	--	--	--	--	0.003	Yes	No	No bag change, conducted system pressure checks.		
6/12/2018	CE	Yes	56	63	NR	NR	NR	NR	3.68	33.3	7	--	--	--	--	0.004	Yes	No	No bag change, conducted system pressure checks.		
6/13/2018	CE	Yes	58	54	NR	NR	NR	NR	3.46	35.4	8	--	--	--	--	0.005	Yes	No	Changed 3 bag filters.		
6/13/2018	MM	Yes	--	--	NR	NR	NR	NR	--	--	8	--	--	--	--	--	--	Yes	Did not collect system data, only collected samples from Influent, Midpoint, and Effluent sample ports/locations.		
6/16/2018	CE	Yes	77	60	NR	NR	NR	NR	--	--	11	--	--	--	--	--	--	No	Changed 3 bag filters.		
6/19/2018	CE	Yes	92	65	NR	NR	NR	NR	--	--	14	--	--	--	--	--	No	No	Changed 3 bag filters and repaired holding basket for bags. Recovery well was not running, went out to the well and checked power, turned power to well on/off and did not hear contact relay pull in. System remained off until electrical issue in recovery well is fixed. Fixed at 15:45		
6/20/2018	CE	Yes	72	60	NR	NR	NR	NR	3.73	32.8	15	--	--	--	--	0.008	Yes	No	No bag change, conducted system pressure checks.		
6/21/2018	CE	Yes	79	60	NR	NR	NR	NR	--	--	16	--	--	--	--	--	--		No bag change, conducted system pressure checks. Worked by phone with Bob Simmonds on Control panel for transfer pump, pump will not change speed.		
6/22/2018	CE	Yes	87	67	NR	NR	NR	NR	3.72	32.9	17	--	--	--	--	0.009	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
6/25/2018	CE	Yes	81	68	NR	NR	NR	NR	3.77	32.5	20	--	--	--	--	0.011	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
6/27/2018	CE	Yes	79	68	NR	NR	NR	NR	3.73	32.8	22	--	--	--	--	0.012	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
6/29/2018	CE	Yes	78	68	NR	NR	NR	NR	3.68	33.3	24	--	--	--	--	0.014	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
Totals for June 2018									Average Flow Rate (gpm)		33.9					24			0.013		
7/2/2018	CE	Yes	83	69	NR	NR	NR	NR	3.95	31.0	2	--	--	--	--	0.001	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
7/5/2018	CE	No	--	--	NR	NR	NR	NR	--	--	5	--	--	--	--	--	No	No	No power supplied to the recovery well.		
7/6/2018	CE	Yes	86	69	NR	NR	NR	NR	3.87	31.7	5	--	--	--	--	0.003	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
7/9/2018	CE	Yes	89	72	NR	NR	NR	NR	3.77	32.5	8	--	--	--	--	0.004	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
7/11/2018	CE	Yes	88	72	NR	NR	NR	NR	3.85	31.8	10	--	--	--	--	0.005	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
7/13/2018	CE	Yes	89	72	NR	NR	NR	NR	4.08	30.0	12	--	--	--	--	0.006	Yes	Yes	Changed 3 bag filters, conducted system pressure checks.		
7/16/2018	CE	Yes	98	70	NR	NR	NR	NR	3.97	30.9	15	--	--	--	--	0.007	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
7/18/2018	CE	No	--	--	NR	NR	NR	NR	--	--	--	--	--	--	--	--	No	No	No power supplied to the recovery well. Contact relay at recovery well pump out.		
7/19/2018	CE	Yes	94	72	NR	NR	NR	NR	4.03	30.4	17	--	--	--	--	0.008	Yes	No	Electrician replaced the contact relay, recovery well operating again. Changed 3 bag filters and collected system pressure checks.		
7/20/2018	CE	Yes	81	72	NR	NR	NR	NR	--	--	--	--	--	--	--	--	Yes	No	Changed 3 bag filters, conducted system pressure checks. Backwashed carbon vessels.		
7/23/2018	CE	Yes	84	72	NR	NR	NR	NR	4.47	27.4	21	--	--	--	--	0.009	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
7/25/2018	CE	Yes	84	72	NR	NR	NR	NR	--	--	--	--	--	--	--	--	Yes	No	Collected system pressure checks.		
7/26/2018	CE	Yes	80	72	NR	NR	NR	NR	--	--	--	--	--	--	--	--	Yes	No	Collected system pressure checks.		
7/27/2018	CE	Yes	88	72	NR	NR	NR	NR	4.8	25.5	25	--	--	--	--	0.010	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
7/30/2018	CE	Yes	91	71	NR	NR	NR	NR	4.95	24.7	28	--	--	--	--	0.011	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
Totals for July 2018									Average Flow Rate (gpm)		29.6					28			0.015		
8/2/2018	CE	Yes	89	70	NR	NR	NR	NR	5.17	23.7	2	--	--	--	--	0.001	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
8/6/2018	CE	Yes	94	72	NR	NR	NR	NR	5.22	23.5	6	--	--	--	--	0.003	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
8/10/2018	CE	Yes	98	72	NR	NR	NR	NR	4.32	28.4	10	--	--	--	--	0.006	Yes	No	Changed 3 bag filters, conducted system pressure checks. System was sampled on August 7, 2018.		
8/14/2018	CE	Yes	82	69	NR	NR	NR	NR	4.8	25.5	14	--	--	--	--	0.007	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
8/17/2018	CE	Yes	81	64	NR	NR	NR	NR	5.0	24.5	17	--	--	--	--	0.008	Yes	No	Changed 3 bag filters, conducted system pressure checks. Backwashed carbon vessels.		
8/21/2018	CE	No	78	68	NR	NR	NR	NR	5.2	23.6	20	--	--	--	--	0.009	Yes	No	Recovery well down, due to contactor burnout/failure. System restarted at 14:45.		
8/24/2018	CE	Yes	77	68	NR	NR	NR	NR	5.32	23.0	23	--	--	--	--	0.010	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
8/28/2018	CE	Yes	89	69	NR	NR	NR	NR	6.03	20.3	27	--	--	--	--	0.011	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
Totals for August 2018									Average Flow Rate (gpm)		24.1					30			0.014		

Table 2A- Summary of Groundwater Pump and Treatment System Operating and Maintenance Data - GWTS #1
 Barnstable Country Fire and Rescue Training Academy
 155 Flint Rock Road, Barnstable, MA
 RTN 4-26179

Date	Operator	System Operating on Arrival	Influent Bag Filter Differential Pressure (psi) ⁶		Pre-Filter Changeout Differential Pressure (psi)		Post-Filter Changeout Differential Pressure (psi)		6" Influent Tank Fill Rate (min)	Estimated Influent Flow Rate (GPM) ²	Days System Operating	Effluent				Estimated Total PFAS Removal (kg) ¹	System Operating on Departure	System Sampled	Comments		
			Pre	Post	Gauge: P1	Gauge: P2	Gauge: P1	Gauge: P2				Effluent Flow Rate (GPM) ²	Totalizer (Gal)	Total Gallons Treated	Average Effluent Flow Rate (GPM) ³						
9/4/2018	CE	Yes	89	67	NR	NR	NR	NR	5.87	20.9	4	--	--	--	--	0.002	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
9/7/2018	CE	Yes	82	70	NR	NR	NR	NR	6.52	18.8	7	--	--	--	--	0.004	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
9/11/2018	CE	Yes	88	70	NR	NR	NR	NR	7.03	17.4	11	--	--	--	--	0.005	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
9/14/2018	CE	Yes	86	70	NR	NR	NR	NR	7.18	17.1	14	--	--	--	--	0.006	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
9/18/2018	CE	Yes	91	74	NR	NR	NR	NR	8.02	15.3	18	--	--	--	--	0.007	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
9/21/2018	CE	No	74	70	NR	NR	NR	NR	--	--	--	--	--	--	--	--	No	No	Recovery well down.		
9/24/2018	CE	Yes	94	70	NR	NR	NR	NR	8.03	15.3	23	--	--	--	--	0.010	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
9/28/2018	CE	Yes	--	--	NR	NR	NR	NR	--	--	--	--	--	--	--	--	--	--	Carbon Change out- filled vessels with water and let to sit for ~24 hours, changed 3 bag filters (5 um), system sampled on 09/27/18.		
Totals for September 2018									Average Flow Rate (gpm)		17.4	28					0.010				
10/1/2018	CE	No	78	57	NR	NR	NR	NR	5.83	21.0	1	--	--	--	--	0.000	Yes	No	System restarted after scheduled shutdown for carbon exchange. Changed 3 bag filters, conducted system pressure checks.		
10/5/2018	CE	Yes	65	55	NR	NR	NR	NR	6.35	19.3	5	--	--	--	--	0.002	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
10/10/2018	CE	Yes	56	57	NR	NR	NR	NR	6.95	17.6	10	--	--	--	--	0.003	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
10/12/2018	CE	Yes	60	55	NR	NR	NR	NR	--	--	12	--	--	--	--	--	Yes	No	No bag change necessary.		
10/15/2018	CE	Yes	70	60	NR	NR	NR	NR	6.9	17.8	15	--	--	--	--	0.005	Yes	No	Changed 3 bag filters, conducted system pressure checks. Repaired filter basket.		
10/19/2018	CE	Yes	71	60	NR	NR	NR	NR	7.12	17.2	19	--	--	--	--	0.006	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
10/23/2018	CE	Yes	76	63	NR	NR	NR	NR	7.73	15.8	23	--	--	--	--	0.007	Yes	No	Changed 3 bag filters, conducted system pressure checks. Repaired holding basket in filter vessel.		
10/26/2018	CE	Yes	72	64	NR	NR	NR	NR	8.83	13.9	26	--	--	--	--	0.007	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
10/30/2018	CE	Yes	80	65	NR	NR	NR	NR	7.52	16.3	30	--	--	--	--	0.009	Yes	Yes	Changed 3 bag filters, conducted system pressure checks. Repaired bag holder (basket) in filter vessel.		
Totals for October 2018									Average Flow Rate (gpm)		17.4	31					0.011				
11/2/2018	CE	Yes	71	62	NR	NR	NR	NR	7.86	15.6	2	--	--	--	--	0.001	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
11/6/2018	CE	Yes	71	62	NR	NR	NR	NR	--	--	6	--	--	--	--	--	No	No	Changed 3 bag filters, conducted system pressure checks. Backwashed both carbon vessels. System shutdown at 10:00 for force main descaling and flush.		
11/8/2018	CE	Yes	65	45	NR	NR	NR	NR	5.25	23.3	6	--	--	--	--	0.004	Yes	No	Changed 3 bag filters, conducted system pressure checks. System restarted at 12:40 following the completion of the force main descaling.		
11/9/2018	CE	Yes	55	44	NR	NR	NR	NR	5.2	23.6	7	--	--	--	--	0.004	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
11/12/2018	CE	Yes	51	47	NR	NR	NR	NR	5.03	24.4	10	--	--	--	--	0.007	Yes	No	Conducted system pressure checks.		
11/13/2018	CE	Yes	52	47	NR	NR	NR	NR	4.88	25.1	11	--	--	--	--	0.007	Yes	No	Conducted system pressure checks.		
11/14/2018	CE	Yes	54	47	NR	NR	NR	NR	4.92	24.9	12	--	--	--	--	0.008	Yes	No	Conducted system pressure checks.		
11/15/2018	CE	Yes	55	47	NR	NR	NR	NR	--	--	13	--	--	--	--	--	Yes	No	Conducted system pressure checks.		
11/16/2018	CE	Yes	54	50	NR	NR	NR	NR	4.63	26.5	14	--	--	--	--	0.010	Yes	Yes	Changed 3 bag filters, conducted system pressure checks.		
11/21/2018	CE	Yes	63	53	NR	NR	NR	NR	5.08	24.1	19	--	--	--	--	0.012	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
11/27/2018	CE	Yes	69	55	NR	NR	NR	NR	5.75	21.3	25	--	--	--	--	0.014	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
11/30/2018	CE	Yes	77	58	NR	NR	NR	NR	5.95	20.9	28	--	--	--	--	0.016	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
Totals for November 2018									Average Flow Rate (gpm)		23.0	28					0.012				
12/3/2018	CE	Yes	63	62	NR	NR	NR	NR	5.33	23.0	3	--	--	--	--	0.001	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
12/7/2018	CE	Yes	83	67	NR	NR	NR	NR	5.58	22.0	7	--	--	--	--	0.002	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
12/11/2018	CE	Yes	75	65	NR	NR	NR	NR	5.8	21.1	11	--	--	--	--	0.003	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
12/14/2018	CE	Yes	70	63	NR	NR	NR	NR	5.4	22.7	14	--	--	--	--	0.004	Yes	Yes	Changed 3 bag filters, conducted system pressure checks.		
12/18/2018	CE	Yes	70	65	NR	NR	NR	NR	6.72	18.2	18	--	--	--	--	0.004	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
12/21/2018	CE	Yes	70	67	NR	NR	NR	NR	6.7	18.3	21	--	--	--	--	0.005	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
12/26/2018	CE	Yes	78	71	NR	NR	NR	NR	7.38	16.6	26	--	--	--	--	0.006	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
12/28/2018	CE	Yes	82	70	NR	NR	NR	NR	7.35	16.7	28	--	--	--	--	0.006	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
12/31/2018	CE	Yes	82	71	NR	NR	NR	NR	7.38	16.6	31	--	--	--	--	0.007	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
Totals for December 2018									Average Flow Rate (gpm)		19.5	31					0.008				
1/4/2019	RPT	Yes	72	72	NR	NR	NR	NR	6.5	18.8	4	--	--	--	--	0.001	Yes	No	Changed 3 bag filters, conducted system pressure checks, observed hole in pre-filter basket.		
1/7/2019	PCB	Yes	80	71	NR	NR	NR	NR	6.2	19.8	7	--	--	--	--	0.002	Yes	No	Change 3 bag filters, conducted system pressure checks.		
1/10/2019	RPT	Yes	75	70	NR	NR	NR	NR	7.03	17.4	10	--	--	--	--	0.003	Yes	No	Conducted system pressure checks.		
1/11/2019	MDM	Yes	79	71	NR	NR	NR	NR	7.62	16.1	11	--	--	--	--	0.003	Yes	Yes	Change 3 bag filters, conducted system pressure checks.		
1/14/2019	PCB	Yes	76	71	NR	NR	NR	NR	--	--	14	--	--	--	--	--	Yes	No	Conducted system pressure checks.		
1/15/2019	PCB	Yes	80	71	NR	NR	NR	NR	--	--	15	--	--	--	--	--	Yes	No	Change 3 bag filters, conducted system pressure checks.		
1/18/2019	PCB	Yes	76	71	NR	NR	NR	NR	8.65	14.2	18	--	--	--	--	0.004	Yes	No	Change 3 bag filters, conducted system pressure checks.		
1/21/2019	SCT	Yes	80	71	NR	NR	NR	NR	8.15	15.0	21	--	--	--	--	0.005	Yes	No	Change 3 bag filters, conducted system pressure checks.		
1/24/2019	SCT	Yes	85	69	NR	NR	NR	NR	9.1	13.5	24	--	--	--	--	0.005	Yes	No	Change 3 bag filters, conducted system pressure checks.		
1/27/2019	SCT	Yes	85	68	NR	NR	NR	NR	8.25	14.8	27	--	--	--	--	0.007	Yes	No	Change 3 bag filters, conducted system pressure checks.		
1/30/2019	PCB	Yes	86	71	NR	NR	NR	NR	9	13.6	30	--	--	--	--	0.007	Yes	No	Change 3 bag filters, conducted system pressure checks.		
1/31/2019	PCB	Yes	83	71	NR	NR	NR	NR	--	--	31	--	--	--	--	--	Yes	No	Change 3 bag filters, conducted system pressure checks.		
Totals for January 2019									Average Flow Rate (gpm)		14.5	31					0.008				
2/4/2019	RPT	Yes	--	--	NR	NR	NR	NR	--	--	--	--	--	--	--	--	--	No	Carbon Change out- filled vessels with water and let to sit for ~24 hours, changed 3 bag filters (5 um).		
2/5/2019	RPT	No	52	35	NR	NR	NR	NR	7.33	16.7	4	222.7	--	--	--	0.002	Yes	No	System restarted after scheduled shutdown for carbon exchange. Changed bag filters and conducted system pressure checks.		
2/11/2019	PCB	Yes	83	45	NR	NR	NR	NR	11.58	10.6	10	--	--	--	--	--	Yes	No	Changed 3 bag filters, conducted system pressure checks.		
2/13/2019	ST	Yes	55	43	NR	NR	NR	NR	8.12	15.1	12	--	--	--	--	--	Yes	No	Changed 3 bag filters, conducted system checks.		
2/15/2019	MDM	Yes	--	--	NR	NR	NR	NR	7.5	16.3	14	131.7	--	--	--	0.007	Yes	Yes	Sampled system and collected system pressure checks.		
2/22/2019	ST	Yes	--	--	NR	NR	NR	NR	10.75	11.4	21	43.75	--	--	--	0.007	Yes	No	Changed 3 bag filters, repaired filter basket, adjusted and lowered the speed drive on the transfer/discharge pump.		
2/25/2019	MDM	Yes	25	15	NR	NR	NR	NR	7.5	16.3	23	--	--	--	--	--	Yes	No	System shutdown at 09:33 for the replacement of the submersible pump at PRW-4 and restarted at 14:04.		
Totals for February 2019									Average Flow Rate (gpm)		14.4	26	132.7					0.011			
3/1/2019	ST	Yes	43	40	NR	NR	NR	NR	7.55	16.2	1	76.6	--	--	--	0.001	Yes	No	Conducted system pressure checks.		
3/3/2019	ST	Yes	45	40	NR	NR	NR	NR	--	--	3	--	--	--	--	--	Yes	No	Conducted system pressure checks, changed bag filters, installed/replaced filter baskets with new stainless steel filter baskets.		
3/5/2019	PCB	Yes	46	40	NR	NR	NR	NR	--	--	5	--	--	--	--	--	Yes	No	Conducted system pressure checks.		
3/7/2019	PCB/ST	Yes	50	40	NR	NR	NR	NR	8.16	15.0	7	--	--	--	--	0.004	Yes	No	Conducted system pressure checks and changed bag filters.		
3/9/2019	ST	Yes	44	41	NR	NR	NR	NR	7.75	15.8	9	--	--	--	--	0.005	Yes	No	Changed bag filters.		
3/11/2019	ST	Yes	58	50	NR	NR	NR	NR	7.92	15.5	11	68.1	--	--	--	0.006	Yes	Yes	Changed bag filters.		
3/13/2019	ST	Yes	65	50	NR	NR	NR	NR	4.62	26.5	13	--	--	--	--	--	Yes	No	Noticed low speed on transfer pump, adjusted VFD to increase pump speed to 55 Hz. Changed 3 bag filters twice.		
3/14/2019	ST	Yes	75	50	NR	NR	NR	NR	5.16	23.7	14	70.0	--	--	--	0.012	Yes	No	Conducted system pressure checks and collected samples from EQ tank for analysis at County lab for disposal criteria.		
3/16/2019	PCB	No	62	60	NR	NR	NR	NR	--	--	15	--	--	--	--	--	Yes	No	Pump at PRW-4 shut off upon arrival to system, contact relay failure, possibly due to power surge from thunderstorm. Restarted system after contact relay was replaced.		

Table 2A- Summary of Groundwater Pump and Treatment System Operating and Maintenance Data - GWTS #1
 Barnstable Country Fire and Rescue Training Academy
 155 Flint Rock Road, Barnstable, MA
 RTN 4-26179

Date	Operator ¹	System Operating on Arrival	Influent Bag Filter Differential Pressure (psi) ⁴		Pre-Filter Changeout Differential Pressure (psi)		Post-Filter Changeout Differential Pressure (psi)		6" Influent Tank Fill Rate (min)	Estimated Influent Flow Rate (GPM) ²	Days System Operating	Effluent				Estimated Total PFAs Removal (kg) ³	System Operating on Departure	System Sampled	Comments	
			Pre	Post	Gauge: P1	Gauge: P2	Gauge: P1	Gauge: P2				Effluent Flow Rate (GPM) ²	Totalizer (Gal)	Total Gallons Treated	Average Effluent Flow Rate (GPM) ³					
4/1/2019	ST	Yes	--	--	40	28	40	39	2.25	54.4	1	--	--	--	--	0.002	Yes	No	Conducted system pressure checks and changed bag filters.	
4/3/2019	ST	Yes	--	--	40	39	--	--	--	--	3	--	--	--	--	--	Yes	No	Conducted system pressure checks.	
4/6/2019	ST	Yes	--	--	50	41	50	50	2.23	54.9	6	--	--	--	--	0.014	Yes	No	Conducted system pressure checks and changed bag filters.	
4/9/2019	GWTT	Yes	--	--	40	50	--	--	1.6	76.6	9	18.85	--	--	--	0.029	Yes	Yes	Conducted system pressure checks, backwashed the primary carbon vessel for ~30 minutes; inspected the transfer pump and removed excess iron oxide sedimentation from the inlet piping.	
4/10/2019	ST	Yes	--	--	50	15	23	25	--	--	10	--	--	--	--	--	Yes	No	Conducted system pressure checks and changed bag filters.	
4/11/2019	ST	Yes	--	--	40	35	35	35	--	--	11	--	--	--	--	--	Yes	No	Conducted system pressure checks and changed bag filters.	
4/12/2019	GWTT	Yes	--	--	50	40	44	46	3	40.8	12	--	--	--	--	0.020	Yes	No	Conducted system pressure checks and changed bag filters.	
4/15/2019	GWTT	Yes	--	--	55	45	55	55	4.08	30.0	15	--	--	--	--	0.019	Yes	No	Conducted system pressure checks and changed bag filters.	
4/19/2019	GWTT	Yes	--	--	58	55	35	40	2.5	49.0	19	--	--	--	--	0.039	Yes	No	Conducted system pressure checks and changed bag filters.	
4/23/2019	GWTT	Yes	--	--	48	47	50	55	4.00	30.6	23	33.4	--	--	--	0.029	Yes	No	Conducted system pressure checks and changed bag filters.	
4/26/2019	GWTT	Yes	--	--	58	50	55	60	--	--	26	20.3	--	--	--	--	Yes	No	Conducted system pressure checks and changed bag filters, conducted general housekeeping duties.	
4/30/2019	GWTT	No	--	--	--	--	--	--	--	--	29	--	--	--	--	--	--	Yes	--	System off on arrival due to contact relay failure for transfer pump operation; system restarted at 16:29 after contact relay was replaced.
Totals of April 2019										Average Flow Rate (gpm)	48.1	29	24.2	--	--	0.058	--	--	--	
5/3/2019	GWTT	Yes	--	--	55	35	45	50	2.18	56.2	3	32.93	--	--	--	0.003	Yes	No	Conducted system pressure checks and changed bag filters.	
5/7/2019	GWTT	Yes	--	--	58	38	50	55	2.05	59.8	7	31.57	--	--	--	0.007	Yes	No	Conducted system pressure checks and changed bag filters.	
5/10/2019	GWTT	No	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	System down as a result of failed VFD for transfer pump operation, changed bag filters.
5/17/2019	GWTT	No	--	--	55	38	--	--	--	--	10	--	--	--	--	--	Yes	No	Installed new VFD drive, system shutdown due to power surge from thunderstorm. Electrician added 15 minute- electrical control delay at the control panel in the system shed; creating a 15 minute delay before the pump at PRW-4 powers on at the "high level" float switch.	
5/21/2019	MDM	No	--	--	57	30	57	60	1.83	66.9	14	33.38	--	--	--	0.016	Yes	Yes	Power surge from rogue ground voltage at electrical easement "fried" the electrical delay at control panel in system shed. Electrician bypassed delay to allow system restart at 11:15. Electrician will change coil at PRW-4 panel to lower voltage at later date. Conducted system pressure checks and changed bag filters.	
5/24/2019	GWTT	Yes	--	--	58	35	58	60	2.083	58.8	17	25.36	--	--	--	0.017	Yes	No	Conducted system pressure checks and changed bag filters. Bypass installed to allow 15 minute delay on PRW-4 submersible pump float switch.	
5/28/2019	GWTT	Yes	--	--	56	46	55	60	2.65	46.2	21	52.10	--	--	--	0.016	Yes	No	Conducted system pressure checks and changed bag filters twice. Backwashed both carbon vessels.	
5/31/2019	GWTT	Yes	--	--	58	35	55	60	2.17	56.5	24	36.90	--	--	--	0.022	Yes	No	Conducted system pressure checks and changed bag filters, 3" butterfly valve on INF of LGACS #2 replaced. Installed a 3 inch flow totalizer and meter on	
Totals of May 2019										Average Flow Rate (gpm)	57.4	24	35.4	--	--	0.023	--	--	--	
6/4/2019	GWTT	Yes	--	--	57	48	57	62	2.46	49.8	4	20.2	--	--	--	0.010	Yes	No	Conducted system pressure checks and changed bag filter. Replaced in-kind flow meter previously installed on 5/31/19.	
6/7/2019	GWTT	Yes	--	--	57	45	57	62	2.43	50.4	7	16.2	--	--	--	0.017	Yes	No	Conducted system pressure checks and changed bag filters.	
6/11/2019	GWTT	Yes	--	--	76	78	70	82	2.53	48.4	11	17.3	--	--	--	0.026	Yes	No	Conducted system pressure checks and changed bag filters. System shutdown due to high pressure measurement on the LGAC vessels, (from iron fouling); carbon change to occur on 6/13/19.	
6/13/2019	MDM	No	--	--	--	--	--	--	--	--	11	--	--	--	--	--	No	No	System off for carbon change out.	
6/14/2019	GWTT	No	--	--	--	--	25	28	2.3	53.3	12	167.1	--	--	--	0.032	Yes	No	System restarted at 13:00; adjusted flow rate via VFD to 55 Hz. GWTT recorded Effluent flow rate from drop in site glass to be 44 seconds, immediately after adjusting the VFD.	
6/18/2019	GWTT	Yes	--	--	25	10	11	15	2.23	54.9	16	56.2	--	--	--	0.043	Yes	No	Conducted system checks, changed bag filters, adjusted VFD to 55 GPM.	
6/21/2019	GWTT	Yes	--	--	17	15	17	20	2.12	57.8	19	58.6	--	--	--	0.054	Yes	No	Conducted system checks, changed bag filters, adjusted VFD to 28 Hz.	
6/25/2019	GWTT	Yes	--	--	20	18	20	25	2.3	53.3	23	59.0	--	--	--	0.060	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 28 to 35 Hz.	
6/27/2019	MDM	Yes	--	--	33	21	--	--	3.2	38.3	25	17.5	--	--	--	0.047	Yes	Yes	Conducted system checks, system VFD at 35 Hz; pressure gauges at LGAC 2 are 0 psi.	
6/28/2019	GWTT	Yes	--	--	33	22	30	35	2.4	51.0	26	60.9	--	--	--	0.065	Yes	No	Conducted system checks, changed bag filters, VFD at 35 Hz. Effluent flow rate increased after bag filter changeout.	
Totals of June 2019										Average Flow Rate (gpm)	50.8	27	62.4	--	--	0.068	--	--	--	
7/2/2019	GWTT	Yes	--	--	32	20	30	32	2.52	48.6	2	52.6	20575	--	--	0.005	Yes	No	Conducted system checks, changed bag filters.	
7/5/2019	GWTT	Yes	--	--	25	23	30	35	2.53	242970	5	52.6	242970	222395	--	0.013	Yes	No	Conducted system checks, changed bag filters, VFD at 35 Hz. Effluent flow rate increased after bag filter changeout.	
7/9/2019	GWTT	Yes	--	--	32	25	36	40	2.35	52.1	9	58.6	311680	68710	--	0.026	Yes	No	Conducted system checks, changed bag filters, VFD at 35 Hz. Effluent flow rate increased after bag filter changeout. Primary LGAC vessel requires a	
7/12/2019	GWTT	Yes	--	--	39	35	39	43	2.42	407920	12	55.7	407920	96240	--	0.033	Yes	No	Conducted system checks, changed bag filters, adjusted VFD to 42 Hz.	
7/15/2019	GWTT	Yes	--	--	46	40	35	50	3.00	40.8	15	55.7	587740	179820	--	0.034	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 42 Hz to 40 Hz.	
7/18/2019	GWTT	Yes	--	--	45	28	55	60	2.83	43.3	18	47.48	NR	NR	--	0.043	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 40 Hz to 45 Hz.	
7/23/2019	GWTT	Yes	--	--	56	43	55	61	3.22	38.0	23	25.63	717580	129840	--	0.048	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 40 Hz to 45 Hz.	
7/26/2019	GWTT	Yes	--	--	56	50	56	60	--	--	26	11.93	722700	5120	--	--	Yes	No	Conducted system checks, changed bag filters.	
7/29/2019	GWTT	Yes	--	--	--	--	56	60	2.50	49.0	29	53.3	723360	660	--	0.078	Yes	Yes	Pumped out contents of exterior totes and conducted backwash of system (6,800 gallons removed by Global). Shutdown system for ~2 hours. VFD at 23 Hz on departure.	
Totals of July 2019										Average Flow Rate (gpm)	46.9	31	45.1	--	--	0.079	--	--	--	
8/2/2019	GWTT	Yes	--	--	15	5	18	9	2.68	50.6	2	19.68	723960	0	0.0	0.006	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 23 Hz to 28 Hz.	
8/5/2019	GWTT	Yes	--	--	21	8	16	20	2.50	52.8	5	49.00	726280	2320	0.5	0.014	Yes	No	Conducted system checks, changed bag filters, VFD at 28 Hz.	
8/8/2019	GWTT	Yes	--	--	20	19	22	27	2.23	54.9	8	53.50	729450	3170	0.7	0.024	Yes	No	Conducted system checks, changed bag filters, adjusted VFD to 32 Hz and 31 Hz. Visibility of site glass impaired due to iron fouling, possible obstruction in site glass causing error in flow calculations.	
8/13/2019	GWTT	Yes	--	--	27	23	28	30	2.17	56.5	13	56.45	738390	8940	1.2	0.040	Yes	No	Conducted system checks, changed bag filters, adjusted VFD to 23 Hz. Obstruction in site glass seems apparent, affecting flow rate calculations.	
8/16/2019	GWTT	Yes	--	--	32	26	30	35	1.04	117.8	16	34.83	744020	5630	1.3	0.103	--	--	Conducted system checks, changed bag filters, adjusted VFD from 23 Hz to 28 Hz.	
8/20/2019	GWTT	Yes	--	--	40	27	36	38	NR	NR	20	NR	757990	13970	2.4	--	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 38 Hz to 39 Hz. Could not calculate influent flow rate due to obstruction in site glass	
8/23/2019	GWTT	Yes	--	--	41	29	38	44	--	--	23	50.00	790720	32730	7.6	0.063	Yes	Yes	Conducted system checks, changed bag filters, and adjusted VFD from 39 Hz to 40 Hz. Collected monthly system samples on 8/22/19.	
8/27/2019	GWTT	Yes	--	--	45	35	44	49	--	--	27	50.00	873750	83030	14.4	0.074	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 40 Hz to 42 Hz.	
8/30/2019	GWTT	Yes	--	--	49	37	8	10	--	--	30	49.00	976540	102790	23.8	0.081	Yes	No	Conducted system checks, changed bag filters after backwash of primary vessel.	
Totals of August 2019										Average Flow Rate (gpm)	66.5	31	49.0	252580	6.5	0.113	--	--	--	
9/3/2019	GWTT	Yes	--	--	18	7	10	14	NA	NA	3	NR	1044190	67650	15.7	0.001	Yes	No	Conducted system checks, changed bag filters, "High High Level" Alarm indicated, adjusted VFD, site glass plugged due to iron oxide sludge build up at bottom of EO tank, could not collect influent flow rate.	
9/6/2019	GWTT	Yes	--	--	27	14	22	25	NA	NA	6	NR	NR	NR	NR	--	Yes	No	Conducted system checks, changed bag filters, "High High Level" Alarm indicated, adjusted VFD to 35 Hz from 31 Hz.	
9/10/2019	GWTT	Yes	--	--	35	18	30	35	NA	NA	10	NR	1203690	159500	27.7	0.008	Yes	No	Conducted system checks, changed bag filters, observed approximately 20 in. of sludge in EO Tank, and adjusted VFD to 40 Hz from 38 Hz.	
9/13/2019	GWTT	Yes	--	--	40	25	40	42	NA	NA	13	NR	1311290	107600	24.9	0.009	Yes	No	Conducted system checks, changed bag filters, observed approximately 20 in. of sludge in EO Tank, and adjusted VFD to 40 Hz from 38 Hz.	
9/16/2019	GWTT	Yes	--	--	45	26	44	48	NA	NA	16	NR	1413970	102680	23.8	0.011	Yes	No	Conducted system checks, changed bag filters, and adjusted VFD to 48 Hz.	
9/20/2019	GWTT	Yes	--	--	68	35	12	14	NA	NA	20	NR	1543040	129070	22.4	0.013	Yes	No	Conducted system checks, changed bag filters, backwashed primary GAC vessel, and adjusted VFD to 29 Hz.	
9/23/2019	GWTT	Yes	--	--	24	8	23	27	NA	NA	23	NR	1563850	20810	4.8	0.003	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 29 Hz to 34 Hz.	
9/27/2019	GWTT	Yes	--	--	32	17	42	44	NA	NA	27	NR	1577890	14040	2.4	0.002	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 34 Hz to 42 Hz, system samples collected on 9/26/19.	
Totals of September 2019 ¹⁰										Average Flow Rate (gpm)	NA	30	NR	--	601350	17.4	0.015	--	--	

Table 2A- Summary of Groundwater Pump and Treatment System Operating and Maintenance Data - GWTS #1
 Barnstable Country Fire and Rescue Training Academy
 155 Flint Rock Road, Barnstable, MA
 RTN 4-26179

Date	Operator ¹	System Operating on Arrival	Influent Bag Filter Differential Pressure (psi) ⁴		Pre-Filter Changeout Differential Pressure (psi)		Post-Filter Changeout Differential Pressure (psi)		6" Influent Tank Fill Rate (min)	Estimated Influent Flow Rate (GPM) ²	Days System Operating	Effluent			Estimated Total PFAS Removal (kg) ³	System Operating on Departure	System Sampled	Comments	
			Pre	Post	Gauge: P1	Gauge: P2	Gauge: P1	Gauge: P2				Effluent Flow Rate (GPM) ²	Totalizer (Gal)	Total Gallons Treated					Average Effluent Flow Rate (GPM) ³
10/1/2019	GWTT	Yes	--	--	50	28	18	19	NA	NA	1	NR	1620400	--	--	--	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 42 Hz to 31 Hz. Operator noticed a loud sound on discharge pipes at LGAC #1 as well as a pressure drop across the entire system, system was instantly turned off and restarted after the VFD was adjusted. Operator assumed an obstruction (i.e. iron oxide precipitates) was in LGAC#1 restricting flow and loud sound was the obstruction being dislodged.
10/3/2019	GWTT	Yes	--	--	--	--	--	--	NA	NA	3	NR	1639940	19540	6.8	0.0005	Yes	No	System was shut off at 8:00 during excavation of the effluent discharge piping. The discharge piping was repaired and the system was restarted at 16:00. The bag filters were changed.
10/7/2019	GWTT	Yes	--	--	27	14	22	20	NA	NA	6	NR	1645550	5610	1.3	0.0002	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 31 Hz to 35 Hz.
10/11/2019	GWTT	Yes	--	--	32	30	19	20	NA	NA	10	NR	1683870	38320	6.7	0.0015	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 35 Hz to 32 Hz.
10/15/2019	GWTT	Yes	--	--	29	20	27	30	NA	NA	14	NR	1755270	71400	12.4	0.0040	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 32 Hz to 39 Hz.
10/18/2019	GWTT	Yes	--	--	38	22	30	35	NA	NA	18	NR	1867270	112000	19.4	0.0082	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 39 Hz to 35 Hz.
10/22/2019	GWTT	Yes	--	--	34	13	31	35	NA	NA	21	NR	1946590	79320	18.4	0.0090	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 35 Hz to 43 Hz.
10/25/2019	GWTT	Yes	--	--	44	34	35	42	NA	NA	24	NR	2043780	97190	22.5	0.0126	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 43 Hz to 40 Hz.
10/28/2019	GWTT	Yes	--	--	44	34	35	42	5.38	22.8	27	NR	2123880	80100	18.5	0.0117	Yes	No	Conducted system checks, changed bag filters, Global Cycle on site to vacuum pump out the contents from the EQ tank, bag filter unit, totes containing water from GAC vessel backwashes. The VFD was adjusted from 40 Hz to 24 Hz. Pressure gauge at P5 was replaced. System sampled on 10/30/19.
Totals of October 2019										Average Flow Rate (gpm) ⁷	NA	30	NR	503480	11.7	0.008			
11/1/2019	GWTT	Yes	--	--	15	2	19	19	5.00	24.5	1	53.26	2128040	4160	2.9	--	Yes	No	Conducted system checks, changed bag filters, and adjusted the VFD frequency.
11/4/2019	GWTT	Yes	--	--	26	8	21	17	4.28	28.60	4	45.37	2131870	3830	0.9	--	Yes	No	Conducted system checks, changed bag filters, and the VFD was adjusted from 30 Hz to 29 Hz.
11/7/2019	GWTT	Yes	--	--	25	10	30	27	3.70	33.1	7	44.0	2042122	--	--	--	Yes	No	Conducted system checks, changed bag filters, exchanged 3" flow meter to 2" pulse turbine flow meter/totalizer. Adjusted the VFD from 29 Hz to 34 Hz on departure.
11/11/2019	GWTT	Yes	--	--	32	18	31	35	3.70	33.1	11	NR	2119390	77268	13.4	0.0037	Yes	Yes	Conducted system checks, changed bag filters, VFD left at 34 Hz. Force main influent flow was split: temporary GWTPS expansion system started. System sampled on 11/12/19.
11/15/2019	GWTT	Yes	--	--	32	21	32	36	4.47	27.4	14	NR	2190828	71438	16.5	0.0058	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 34 Hz to 38 Hz on departure.
11/18/2019	GWTT	Yes	--	--	40	30	42	46	4.43	27.6	17	NR	2273202	82374	19.1	0.0081	Yes	No	Conducted system checks, changed bag filters, adjusted VFD from 38 Hz to 39 Hz upon departure.
11/22/2019	GWTT	Yes	--	--	42	27	41	45	3.50	35.0	21	NR	2391315	118113	20.5	0.0108	Yes	No	Conducted system checks, changed bag filters. VFD kept at 39 Hz. Cleared sludged out of bottom of sight glass on EQ tank.
11/25/2019	GWTT	Yes	--	--	43	32	43	46	3.90	31.4	24	NR	2486658	95343	22.1	0.0133	Yes	No	Conducted system checks, changed bag filters. VFD kept at 39 Hz.
11/29/2019	GWTT	Yes	--	--	45	32	44	48	4.10	29.9	28	NR	2601976	115318	20.0	0.0141	Yes	No	Conducted system checks, changed bag filters.
Totals of November 2019										Average Flow Rate (gpm)	30.1	29	NR	559854	21.6	0.016			

- Notes:
- CE - Coastal Engineering, GWTT - Groundwater Treatment Technologies
 - Prior to November 2019, the estimated influent (INF) and effluent (EFF) flow rates are calculated based on the cross-sectional volume per vertical foot of the influent tank and the measured/timed filling (INF) rate or draining (EFF) of the tank. The diameter of the influent tank is approximately 78 inches. The cross-sectional volume of the tank is approximately 33.1 cubic feet per vertical linear foot. Therefore the flow rate calculation factor is approximately 122.5 gallons per 6 inches. Since 11/7/2019 (following the replacement of the effluent totalizer, ONLY INF flow rates (from PRW-4) are calculated based on an approximation.
 - Prior to November 2019 the total mass of PFAS removed is calculated based on the calculated influent flow rate, the number of days the system has been operating, and the average total Influent PFAS concentration for the month. Since November 2019, the total mass of PFAS removed is calculated based on the effluent flow rate.
 - NA or -- Not Applicable.
 - NR - Not Reported
 - As of April 1, 2019, the system's O&M data reporting was changed to include the differential pressure readings from the bag filter unit's pressure gauges before and after the bag filters are changed/replaced, if applicable.
 - The influent flow rate could not reliably be calculated/measured from September to (most of) October due to a blockage in the site glass on the EQ tank from accumulated iron-oxide precipitates in the bottom of the tank. The iron-oxide precipitates were removed from the EQ tank on Oct. 28, 2019.
 - Instantaneous Effluent Flow Rate is recorded as the instantaneous flow rate as calculated or indicated from the totalizer flow meter on the system's effluent discharge piping.
 - The Average effluent flow rate is calculated from the net gallons obtained from the system's effluent totalizer flow meter and days that the system was in operation.
 - Calculated average effluent flow rates and the estimated PFAS removed total for the months of July to October 2019 were calculated based on the reported totalizer readings. However, the totalizer flow meter on the effluent discharge piping may not be accurate at flow rates less than 40 GPM. Therefore the data are shaded to indicate that they are approximations only and for this reason the July through October data are also considered approximates.

Table 2B - Summary of Groundwater Pump and Treatment System Operating and Maintenance Data - System No. 2
 Barnstable Country Fire and Rescue Training Academy
 155 Flint Rock Road, Barnstable, MA
 RTN 4-26179

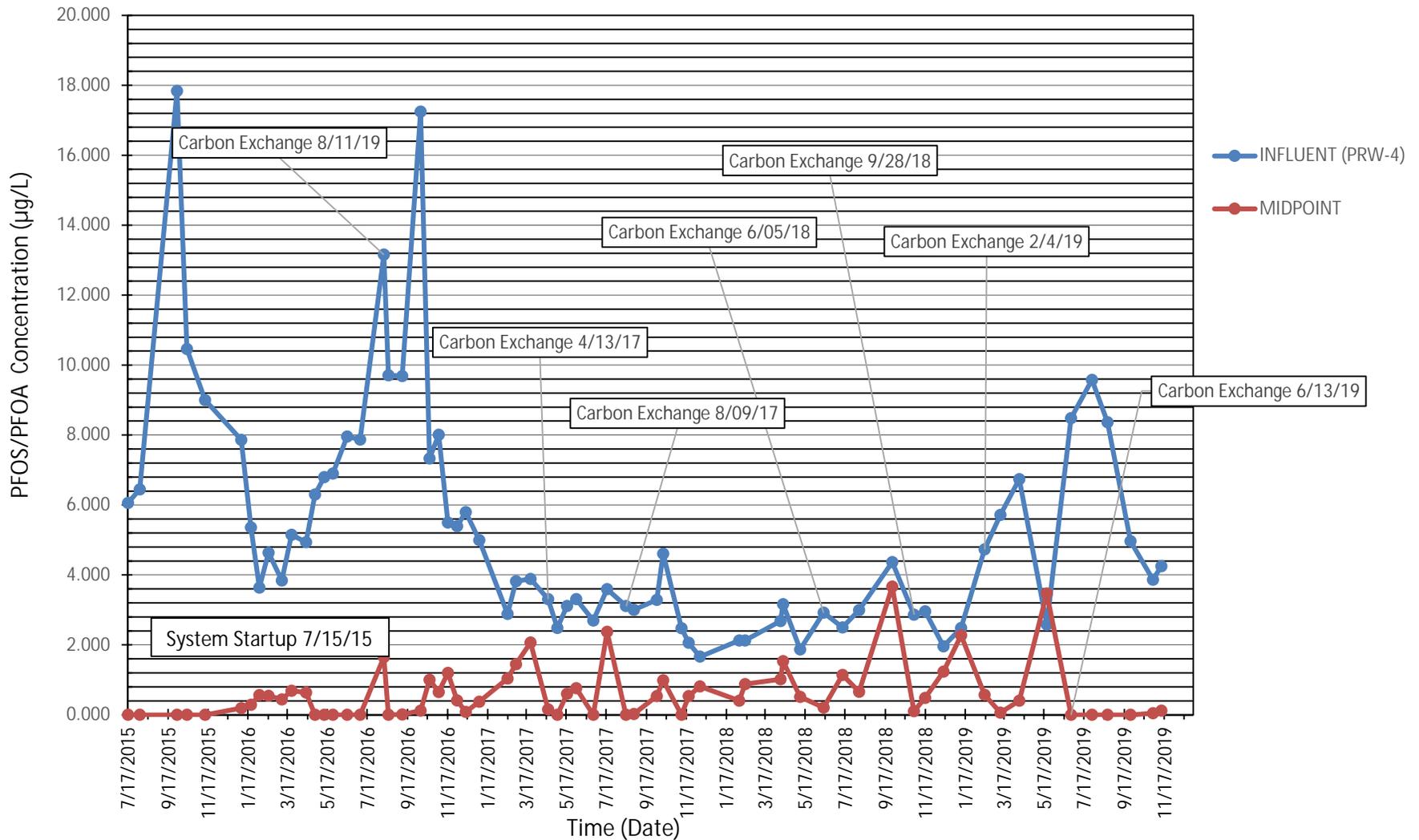
Date	Operator ¹	System Operating on Arrival	Days System Operating	Transfer Pump Pres. (psi)	Pre-Filter Changeout Differential Pressure (psi) ²			Post-Filter Changeout Differential Pressure (psi)		Carbon Vessels. Pre-change out (psi)		Carbon Vessels. Post-change out (psi)		INFLUENT Flow Rate (GPM) ^{3,4}	EFFLUENT				Estimated Total PFAs Removal (kg)	System Operating on Departure	System Sampled	Comments
				Gauge: P1	Gauge: P2	Gauge: P3	Gauge: P2	Gauge: P3	Gauge: P4	Gauge: P5	Gauge: P4	Gauge: P5	Totalizer (Gal)		Instant. Flow Rate (GPM) ⁷	Total Net Gallons Treated ⁵	Average Effluent Flow Rate (GPM) ⁶					
11/11/2019	GWTT	Yes	1	38	0	0	0	0	<2	0	2	2	12.56	416900.0	32.00	0.0	--	0.00032	Yes	No	Influent flow stream from PRW-4 split and started system #2. Conducted system checks, changed bag filters after initial flush.	
11/15/2019	GWTT	Yes	4	40	24	2	5	2	2	2	2	2	34.00	451645.0	34.00	34745.0	8.043	0.0008	Yes	Yes	Conducted system pressure checks and changed the bag filters. System shutdown temporarily to calculate influent flow rate at GWTPS #1. Collected system startup samples on 11/12/19 and 11/15/19.	
11/18/2019	GWTT	Yes	7	--	32	2	6	6	2	2	4	4	44.00	491280.0	33.00	39635.0	9.175	0.0016	Yes	No	Conducted system pressure checks and changed the bag filters. System shutdown temporarily to calculate influent flow rate at GWTPS #1.	
11/22/2019	GWTT	Yes	11	40	31	4	7	7	4	4	6	5	12.50	549022.0	34.00	57742.0	10.025	0.0028	Yes	No	Conducted system pressure checks and changed the bag filters. System shutdown temporarily to calculate influent flow rate at GWTPS #1. Collected system startup samples on 11/19/19.	
11/25/2019	GWTT	Yes	14	40	15	6	7	7	4	5	5	6	12.50	594623.0	33.00	45601.0	10.556	0.0037	Yes	No	Conducted system pressure checks and changed the bag filters.	
11/29/2019	GWTT	Yes	18	40	18	6	8	8	3	3	4	4	NR	649150.0	34.00	54527.0	9.466	0.0043	Yes	No	Conducted system pressure checks and changed the bag filters.	
Totals of November 2019			19										Average Flow Rate (gpm)	23.11		232250	8.49	0.0040				

Notes:

1. GWTT - Groundwater Treatment Technologies
2. Pressure readings before filter bag changeout or if no changeout was done.
3. Influent flow is an estimate of the flow rate from the submersible Well Pump at PRW-4.
4. Flow calculated based on gallons marking on EQ tank. Estimated flow rate = 25 GPM (i.e. flow is calculated based on an in-situ observation of flow into the EQ tank, and 100 gallons of groundwater flows into the EQ tank for a 4 minute duration).
5. Net gallons since previous effluent totalizer reading. (Difference between the current totalizer reading - the last dated totalizer reading).
6. Average flow rate: net gallons divided by time in minutes since last totalizer reading (Net Gallons / (# days * 24 * 60)).
7. Instantaneous flow rate estimated by stopwatch at totalizer meter.

FIGURES

Figure 1 -BCFRTA GWPTS Influent and Midpoint PFAS Concentrations from 2015-2019



Barnstable County Fire & Rescue Training Academy
 155 South Flint Rock Road, Barnstable, MA
 RTN 4-26179



Notes:

1. Concentrations depicted represent the sum of the perfluorooctanesulfonic acid (PFOS) and the perfluorooctanic acid (PFOA) compounds in micrograms per liter (µg/L).
2. Concentration data points at 0 µg/L from Midpoint sample location, indicate a sample was not collected from the Midpoint location on that date or was detected below laboratory reporting limits.

APPENDICES



Immediate Response Action (IRA) Transmittal Form
Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number

4 - 26179

A. SITE LOCATION:

1. Release Name/Location Aid: BARNSTABLE COUNTY FIRE TRAINING ACADEMY

2. Street Address: 155 SOUTH FLINT ROCK ROAD

3. City/Town: BARNSTABLE 4. Zip Code: 026300000

5. Check here if this location is Adequately Regulated, pursuant to 310 CMR 40.0110-0114.

a. CERCLA b. HSWA Corrective Action c. Solid Waste Management

d. RCRA State Program (21C Facilities)

B. THIS FORM IS BEING USED TO: (check all that apply)

1. List Submittal Date of Initial IRA Written Plan (if previously submitted): 9/26/2016

2. Submit an **Initial IRA Plan**.

3. Submit a **Modified IRA Plan** of a previously submitted written IRA Plan.

4. Submit an **Imminent Hazard Evaluation**. (check one)

a. An Imminent Hazard exists in connection with this Release or Threat of Release.

b. An Imminent Hazard does not exist in connection with this Release or Threat of Release.

c. It is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release, and further assessment activities will be undertaken.

d. It is unknown whether an Imminent Hazard exists in connection with this Release or Threat of Release. However, response actions will address those conditions that could pose an Imminent Hazard.

5. Submit a request to **Terminate an Active Remedial System or Response Action(s) Taken to Address an Imminent Hazard**.

6. Submit an **IRA Status Report**

7. Submit a **Remedial Monitoring Report**. (This report can only be submitted through eDEP.)

a. Type of Report: (check one) i. Initial Report ii. Interim Report iii. Final Report

b. Frequency of Submittal: (check all that apply)

i. A Remedial Monitoring Report(s) submitted monthly to address an Imminent Hazard.

ii. A Remedial Monitoring Report(s) submitted monthly to address a Condition of Substantial Release Migration.

iii. A Remedial Monitoring Report(s) submitted every six months, concurrent with an IRA Status Report.

iv. A Remedial Monitoring Report(s) submitted annually, concurrent with an IRA Status Report.

c. Number of Remedial Systems and/or Monitoring Programs: 2

A separate BWSC105A, IRA Remedial Monitoring Report, must be filled out for each Remedial System and/or Monitoring Program addressed by this transmittal form.



Immediate Response Action (IRA) Transmittal Form
Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number

4 - 26179

8. Submit an **IRA Completion Statement**.

a. Check here if future response actions addressing this Release or Threat of Release notification condition will be conducted as part of the Response Actions planned or ongoing at a Site that has already been Tier Classified under a different Release Tracking Number (RTN)

b. Provide Release Tracking Number of Tier Classified Site (Primary RTN): _____

These additional response actions must occur according to the deadlines applicable to the Primary RTN. Use the Primary RTN when making all future submittals for the site unless specifically relating to this Immediate Response Action.

9. Submit a **Revised IRA Completion Statement**.

10. Submit a **Plan for the Application of Remedial Additives** near a sensitive receptor, pursuant to 310 CMR 40.0046(3).

(All sections of this transmittal form must be filled out unless otherwise noted above)

C. RELEASE OR THREAT OF RELEASE CONDITIONS THAT WARRANT IRA:

1. Media Impacted and Receptors Affected: (check all that apply)

- a. Paved Surface
- b. Basement
- c. School
- d. Public Water Supply
- e. Surface Water
- f. Zone 2
- g. Private Well
- h. Residence
- i. Soil
- j. Groundwater
- k. Sediments
- l. Wetland
- m. Storm Drain
- n. Indoor Air
- o. Air
- p. Soil Gas
- q. Sub-Slab Soil Gas
- r. Critical Exposure Pathway
- s. NAPL
- t. Unknown
- r. Others Specify: _____

2. Sources of the Release or TOR: (check all that apply)

- a. Transformer
- b. Fuel Tank
- c. Pipe
- d. OHM Delivery
- e. AST
- f. Drums
- g. Tanker Truck
- h. Hose
- i. Line
- j. UST Describe: _____
- k. Vehicle
- l. Boat/Vessel
- m. Unknown
- n. Other: FIREFIGHTING FOAM

3. Type of Release or TOR: (check all that apply)

- a. Dumping
- b. Fire
- c. AST Removal
- d. Overfill
- e. Rupture
- f. Vehicle Accident
- g. Leak
- h. Spill
- i. Test failure
- j. TOR Only
- k. UST Removal Describe: _____
- l. Unknown
- m. Other: HISTORIC FOAM USE

4. Identify Oils and Hazardous Materials Released: (check all that apply)

- a. Oils
- b. Chlorinated Solvents
- c. Heavy Metals
- d. Others Specify: PFAS

D. DESCRIPTION OF RESPONSE ACTIONS: (check all that apply, for volumes list cumulative amounts)

- 1. Assessment and/or Monitoring Only
- 2. Temporary Covers or Caps
- 3. Deployment of Absorbent or Containment Materials
- 4. Temporary Water Supplies
- 5. Structure Venting System/HVAC Modification System
- 6. Temporary Evacuation or Relocation of Residents
- 7. Product or NAPL Recovery
- 8. Fencing and Sign Posting
- 9. Groundwater Treatment Systems
- 10. Soil Vapor Extraction
- 11. Remedial Additives
- 12. Air Sparging
- 13. Active Exposure Pathway Mitigation System
- 14. Passive Exposure Pathway Mitigation System



Immediate Response Action (IRA) Transmittal Form
Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number

4 - 26179

D. DESCRIPTION OF RESPONSE ACTIONS: (cont.)

15. Excavation of Contaminated Soils.

a. Re-use, Recycling or Treatment i. On Site Estimated volume in cubic yards _____

ii. Off Site Estimated volume in cubic yards _____

ii.a. Receiving Facility: _____ Town: _____ State: _____

ii.b. Receiving Facility: _____ Town: _____ State: _____

iii. Describe: _____

b. Store i. On Site Estimated volume in cubic yards _____

ii. Off Site Estimated volume in cubic yards _____

ii.a. Receiving Facility: _____ Town: _____ State: _____

ii.b. Receiving Facility: _____ Town: _____ State: _____

c. Landfill i. Cover Estimated volume in cubic yards _____

Receiving Facility: _____ Town: _____ State: _____

ii. Disposal Estimated volume in cubic yards 200

Receiving Facility: TAUNTON LANDFILL Town: TAUNTON State: MA

16. Removal of Drums, Tanks, or Containers:

a. Describe Quantity and Amount: _____

b. Receiving Facility: _____ Town: _____ State: _____

c. Receiving Facility: _____ Town: _____ State: _____

17. Removal of Other Contaminated Media:

a. Specify Type and Volume: _____

18. Other Response Actions:

Describe: _____

19. Use of Innovative Technologies:

Describe: _____



Immediate Response Action (IRA) Transmittal Form
Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number

4 - 26179

E. LSP SIGNATURE AND STAMP:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and 309 CMR 4.03(2), and (iii) the provisions of 309 CMR 4.03(3), to the best of my knowledge, information and belief,

> if Section B of this form indicates that an **Immediate Response Action Plan** is being submitted, the response action(s) that is(are) the subject of this submittal (i) has (have) been developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is(are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B of this form indicates that an **Imminent Hazard Evaluation** is being submitted, this Imminent Hazard Evaluation was developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and the assessment activity(ies) undertaken to support this Imminent Hazard Evaluation comply(ies) with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000;

> if Section B of this form indicates that an **Immediate Response Action Status Report** and/or a **Remedial Monitoring Report** is(are) being submitted, the response action(s) that is (are) the subject of this submittal (i) is (are) being implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) comply(ies) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B of this form indicates that an **Immediate Response Action Completion Statement** or a request to **Terminate an Active Remedial System or Response Action(s) Taken to Address an Imminent Hazard** is being submitted, the response action(s) that is(are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is(are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000 and (iii) comply(ies) with the identified provisions of all orders, permits, and approvals identified in this submittal.

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

1. LSP #: 1443

2. First Name: ROGER P 3. Last Name: THIBAUT

4. Telephone: 508-331-2700 5. Ext: _____ 6. Email: _____

7. Signature: _____

8. Date: _____ (mm/dd/yyyy)

9. LSP Stamp:





Immediate Response Action (IRA) Transmittal Form
Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number

4 - 26179

F. PERSON UNDERTAKING IRA:

1. Check all that apply: a. change in contact name b. change of address c. change in the person undertaking response actions
2. Name of Organization: BARNSTABLE COUNTY COMMISSIONERS
3. Contact First Name: JACK 4. Last Name: YUNITS
5. Street: 3195 MAIN ST 6. Title: _____
7. City/Town: BARNSTABLE 8. State: MA 9. Zip Code: 026301105
10. Telephone: 508-375-6643 11. Ext: _____ 12. Email: JYUNITS@BARNSTABLECOUNTY.ORG

G. RELATIONSHIP TO RELEASE OR THREAT OF RELEASE OF PERSON UNDERTAKING IRA:

- Check here to change relationship
1. RP or PRP a. Owner b. Operator c. Generator d. Transporter
 e. Other RP or PRP Specify Relationship: _____
2. Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)
3. Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))
4. Any Other Person Undertaking Response Actions: Specify Relationship: _____

H. REQUIRED ATTACHMENT AND SUBMITTALS:

1. Check here if any Remediation Waste, generated as a result of this IRA, will be stored, treated, managed, recycled or reused at the site following submission of the IRA Completion Statement. If this box is checked, you must submit one of the following plans, along with the appropriate transmittal form.
 a. A Release Abatement Measure (RAM) Plan (BWSC106) b. Phase IV Remedy Implementation Plan (BWSC108)
2. Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by MassDEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.
3. Check here to certify that the Chief Municipal Officer and the Local Board of Health were notified of the implementation of an Immediate Response Action taken to control, prevent, abate or eliminate an Imminent Hazard.
4. Check here to certify that the Chief Municipal Officer and the Local Board of Health were notified of the submittal of a Completion Statement for an Immediate Response Action taken to control, prevent, abate or eliminate an Imminent Hazard.
5. Check here if any non-updatable information provided on this form is incorrect, e.g. Release Address/Location Aid. Send corrections to BWSC.eDEP@state.ma.us.
6. Check here to certify that the LSP Opinion containing the material facts, data, and other information is attached.



Immediate Response Action (IRA) Transmittal Form
Pursuant to 310 CMR 40.0424 - 40.0427 (Subpart D)

Release Tracking Number

4 - 26179

I. CERTIFICATION OF PERSON UNDERTAKING IRA:

1. I, _____, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form; (ii) that, based on my inquiry of the/those individual(s) immediately responsible for obtaining the information, the material information contained herein is, to the best of my knowledge, information and belief, true, accurate and complete; (iii) that, to the best of my knowledge, information and belief, I/the person(s) or entity(ies) on whose behalf this submittal is made satisfy(ies) the criteria in 310 CMR 40.0183(2); (iv) that I/the person(s) or entity(ies) on whose behalf this submittal is made have provided notice in accordance with 310 CMR 40.0183(5); and (v) that I am fully authorized to make this attestation on behalf of the person(s) or entity(ies) legally responsible for this submittal. I/the person(s) or entity(ies) on whose behalf this submittal is made is/are aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

2. By: _____ 3. Title: _____

4. For: BARNSTABLE COUNTY COMMISSIONERS 5. Date: _____ (mm/dd/yyyy)

6. Check here if the address of the person providing certification is different from address recorded in Section F.

7. Street: _____

8. City/Town: _____ 9. State: _____ 10. Zip Code: _____

11. Telephone: _____ 12. Ext: _____ 13. Email: _____

YOU ARE SUBJECT TO AN ANNUAL COMPLIANCE ASSURANCE FEE OF UP TO \$10,000 PER BILLABLE YEAR FOR THIS DISPOSAL SITE. YOU MUST LEGIBLY COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.

Date Stamp (DEP USE ONLY:)



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup
IRA REMEDIAL MONITORING REPORT

BWSC105 -A

Pursuant to 310 CMR 40.0400 (SUBPART D)

Release Tracking Number

Remedial System or Monitoring Program: of

-

A. DESCRIPTION OF ACTIVE OPERATION AND MAINTENANCE ACTIVITY:

1. Type of Active Operation and Maintenance Activity: (check all that apply)

- a. Active Remedial System: (check all that apply)
 - i. NAPL Recovery
 - ii. Soil Vapor Extraction/Bioventing
 - iii. Vapor-phase Carbon Adsorption
 - iv. Groundwater Recovery
 - v. Dual/Multi-phase Extraction
 - vi. Aqueous-phase Carbon Adsorption
 - vii. Air Stripping
 - viii. Sparging/Biosparging
 - ix. Cat/Thermal Oxidation
 - x. Other Describe: _____
- b. Active Exposure Pathway Elimination Measure
 Active Exposure Pathway Mitigation System to address (check one): i. Indoor Air ii. Drinking Water
- c. Application of Remedial Additives: (check all that apply)
 - i. To the Subsurface
 - ii. To Groundwater (Injection)
 - iii. To the Surface
- d. Active Remedial Monitoring Program Without the Application of Remedial Additives: (check all that apply; Sections C, D and E are not required; attach supporting information, data, maps and/or sketches needed by checking Section G5)
 - i. Reactive Wall
 - ii. Natural Attenuation
 - iii. Other Describe: _____

2. Mode of Operation: (check one)

- a. Continuous
- b. Intermittent
- c. Pulsed
- d. One-time Event Only
- e. Other: _____

3. System Effluent/Discharge: (check all that apply)

- a. Sanitary Sewer/POTW
- b. Groundwater Re-infiltration/Re-injection: (check one)
 - i. Downgradient
 - ii. Upgradient
- c. Vapor-phase Discharge to Ambient Air: (check one)
 - i. Off-gas Controls
 - ii. No Off-gas Controls
- d. Drinking Water Supply
- e. Surface Water (including Storm Drains)
- f. Other Describe: _____

B. MONITORING FREQUENCY:

1. Reporting period that is the subject of this submittal: From: 11/1/2019 To: 11/30/2019
 (mm/dd/yyyy) (mm/dd/yyyy)

2. Number of monitoring events during the reporting period: (check one)

- a. System Startup: (if applicable)
 - i. Days 1, 3, 6, and then weekly thereafter, for the first month.
 - ii. Other Describe: _____
- b. Post-system Startup (after first month) or Monitoring Program:
 - i. Monthly
 - ii. Quarterly
 - iii. Annually
 - iv. Other Describe: _____

3. Check here to certify that the number of required monitoring events were conducted during the reporting period.

C. EFFLUENT/DISCHARGE REGULATION: (check one to indicate how the effluent/discharge limits were established)

- 1. NPDES: (check one)
 - a. Remediation General Permit
 - b. Individual Permit
 - c. Emergency Exclusion
 Effective Date of Permit: _____
 (mm/dd/yyyy)

2. MCP Performance Standard MCP Citations(s): _____

3. DEP Approval Letter Date of Letter: 11/18/2016
 (mm/dd/yyyy)

4. Other Describe: _____



IRA REMEDIAL MONITORING REPORT

Pursuant to 310 CMR 40.0400 (SUBPART D)

Remedial System or Monitoring Program: of

Release Tracking Number

-

D. WASTEWATER TREATMENT PLANT OPERATOR: (check one)

1. Required due to Remedial Wastewater Treatment Plant in place for more than 30 days.

a. Name: TJMCGOFF

b. Grade: 4

c. License No: 15570

d. License Exp. Date: 12/31/2019

(mm/dd/yyyy)

2. Not Required

3. Not Applicable

E. STATUS OF ACTIVE REMEDIAL SYSTEM OR ACTIVE REMEDIAL MONITORING PROGRAM DURING REPORTING PERIOD: (check all that apply)

1. The Active Remedial System was functional one or more days during the Reporting Period.

a. Days System was Fully Functional: 30

b. GW Recovered (gals): 559854

c. NAPL Recovered (gals):

d. GW Discharged (gals): 559854

e. Avg. Soil Gas Recovery Rate (scfm):

f. Avg. Sparging Rate (scfm):

2. Remedial Additives: (check all that apply)

a. No Remedial Additives applied during the Reporting Period.

b. Enhanced Bioremediation Additives applied: (total quantity applied at the site for the current reporting period)

i. Nitrogen/Phosphorus:

ii. Peroxides:

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units

iii. Microorganisms:

iv. Other:

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units

c. Chemical oxidation/reduction additives applied: (total quantity applied at the site for the current reporting period)

i. Permanganates:

ii. Peroxides:

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units

iii. Persulfates:

iv. Other:

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units



IRA REMEDIAL MONITORING REPORT

Pursuant to 310 CMR 40.0400 (SUBPART D)

Release Tracking Number

Remedial System or Monitoring Program: 1 of 2

4 - 26179

E. STATUS OF ACTIVE REMEDIAL SYSTEM OR ACTIVE REMEDIAL MONITORING PROGRAM DURING REPORTING PERIOD: (cont.)

d. Other additives applied: (total quantity applied at the site for the current reporting period)

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units

e. Check here if any additional Remedial Additives were applied. Attach list of additional additives and include Name of Additive, Date Applied, Quantity Applied and Units (in gals. or lbs.)

F. SHUTDOWNS OF ACTIVE REMEDIAL SYSTEM OR ACTIVE REMEDIAL MONITORING PROGRAM: (check all that apply)

1. The Active Remedial System had unscheduled shutdowns on one or more occasions during the Reporting Period.

a. Number of Unscheduled Shutdowns: _____ b. Total Number of Days of Unscheduled Shutdowns: _____

c. Reason(s) for Unscheduled Shutdowns: _____

2. The Active Remedial System had scheduled shutdowns on one or more occasions during the Reporting Period.

a. Number of Scheduled Shutdowns: 2 b. Total Number of Days of Scheduled Shutdowns: 1

c. Reason(s) for Scheduled Shutdowns: BACKWASH OF CARBON VESSELS AND START UP OF TEMPORARY SYSTEM EXPANSION

3. The Active Remedial System or Active Remedial Monitoring Program was permanently shutdown/discontinued during the Reporting Period.

a. Date of Final System or Monitoring Program Shutdown: _____
(mm/dd/yyyy)

b. No Further Effluent Discharges.

c. No Further Application of Remedial Additives planned; sufficient monitoring completed to demonstrate compliance with 310 CMR 40.0046.

d. No Further Submittals Planned.

e. Other: Describe: _____

G. SUMMARY STATEMENTS: (check all that apply for the current reporting period)

1. All Active Remedial System checks and effluent analyses required by the approved plan and/or permit were performed when applicable.

2. There were no significant problems or prolonged (>25% of reporting period) unscheduled shutdowns of the Active Remedial System.

3. The Active Remedial System or Active Remedial Monitoring Program operated in conformance with the MCP, and all applicable approval conditions and/or permits.

4. Indicate any Operational Problems or Notes:

5. Check here if additional/supporting Information, data, maps, and/or sketches are attached to the form.



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup
IRA REMEDIAL MONITORING REPORT
MEASUREMENTS

BWSC105 -B

Release Tracking Number

Pursuant to 310 CMR 40.0400 (SUBPART D)

Remedial System or Monitoring Program: of

For each Point of Measurement, related to concentration indicate the highest concentration detected during the reporting period, of each oil, hazardous material and/or remedial additive.

For each Point of Measurement for pressure differentials, indicate the lowest pressure differential detected during the reporting period.

Point of Measurement	Date (mm/dd/yyyy)	Contaminant, Measurement and/or Indicator Parameter	Influent Concentration (where applicable)	Midpoint Concentration (where applicable)	(check one)	Check here, if ND/BDL	Permissible Concentration or Pressure Differential	Units	Within Permissible Limits? (Y/N)
					<input checked="" type="checkbox"/> Discharge <input type="checkbox"/>				
SYSTEM	11/12/2019	PFAS	4.612	0.120	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.070	UG/L	YES

Check here if any additional BWSC105 B, Measurements Form(s), are needed.



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup
IRA REMEDIAL MONITORING REPORT

BWSC105 -A

Pursuant to 310 CMR 40.0400 (SUBPART D)

Release Tracking Number

Remedial System or Monitoring Program: of

-

A. DESCRIPTION OF ACTIVE OPERATION AND MAINTENANCE ACTIVITY:

1. Type of Active Operation and Maintenance Activity: (check all that apply)

- a. Active Remedial System: (check all that apply)
 - i. NAPL Recovery
 - ii. Soil Vapor Extraction/Bioventing
 - iii. Vapor-phase Carbon Adsorption
 - iv. Groundwater Recovery
 - v. Dual/Multi-phase Extraction
 - vi. Aqueous-phase Carbon Adsorption
 - vii. Air Stripping
 - viii. Sparging/Biosparging
 - ix. Cat/Thermal Oxidation
 - x. Other Describe: _____
- b. Active Exposure Pathway Elimination Measure
 Active Exposure Pathway Mitigation System to address (check one): i. Indoor Air ii. Drinking Water
- c. Application of Remedial Additives: (check all that apply)
 - i. To the Subsurface
 - ii. To Groundwater (Injection)
 - iii. To the Surface
- d. Active Remedial Monitoring Program Without the Application of Remedial Additives: (check all that apply; Sections C, D and E are not required; attach supporting information, data, maps and/or sketches needed by checking Section G5)
 - i. Reactive Wall
 - ii. Natural Attenuation
 - iii. Other Describe: _____

2. Mode of Operation: (check one)

- a. Continuous
- b. Intermittent
- c. Pulsed
- d. One-time Event Only
- e. Other: _____

3. System Effluent/Discharge: (check all that apply)

- a. Sanitary Sewer/POTW
- b. Groundwater Re-infiltration/Re-injection: (check one)
 - i. Downgradient
 - ii. Upgradient
- c. Vapor-phase Discharge to Ambient Air: (check one)
 - i. Off-gas Controls
 - ii. No Off-gas Controls
- d. Drinking Water Supply
- e. Surface Water (including Storm Drains)
- f. Other Describe: _____

B. MONITORING FREQUENCY:

1. Reporting period that is the subject of this submittal: From: 11/11/2019 To: 11/30/2019
 (mm/dd/yyyy) (mm/dd/yyyy)

2. Number of monitoring events during the reporting period: (check one)

- a. System Startup: (if applicable)
 - i. Days 1, 3, 6, and then weekly thereafter, for the first month.
 - ii. Other Describe: _____
- b. Post-system Startup (after first month) or Monitoring Program:
 - i. Monthly
 - ii. Quarterly
 - iii. Annually
 - iv. Other Describe: _____

3. Check here to certify that the number of required monitoring events were conducted during the reporting period.

C. EFFLUENT/DISCHARGE REGULATION: (check one to indicate how the effluent/discharge limits were established)

- 1. NPDES: (check one)
 - a. Remediation General Permit
 - b. Individual Permit
 - c. Emergency Exclusion
 Effective Date of Permit: _____
 (mm/dd/yyyy)

2. MCP Performance Standard MCP Citations(s): _____

3. DEP Approval Letter Date of Letter: 5/31/2019
 (mm/dd/yyyy)

4. Other Describe: _____



IRA REMEDIAL MONITORING REPORT

Pursuant to 310 CMR 40.0400 (SUBPART D)

Remedial System or Monitoring Program: 2 of 2

Release Tracking Number

4 - 26179

D. WASTEWATER TREATMENT PLANT OPERATOR: (check one)

1. Required due to Remedial Wastewater Treatment Plant in place for more than 30 days.

a. Name: TJMCGOFF

b. Grade: 4

c. License No: 15570

d. License Exp. Date: 12/31/2019

(mm/dd/yyyy)

2. Not Required

3. Not Applicable

E. STATUS OF ACTIVE REMEDIAL SYSTEM OR ACTIVE REMEDIAL MONITORING PROGRAM DURING REPORTING PERIOD: (check all that apply)

1. The Active Remedial System was functional one or more days during the Reporting Period.

a. Days System was Fully Functional: 19

b. GW Recovered (gals): 232250

c. NAPL Recovered (gals):

d. GW Discharged (gals): 232250

e. Avg. Soil Gas Recovery Rate (scfm):

f. Avg. Sparging Rate (scfm):

2. Remedial Additives: (check all that apply)

a. No Remedial Additives applied during the Reporting Period.

b. Enhanced Bioremediation Additives applied: (total quantity applied at the site for the current reporting period)

i. Nitrogen/Phosphorus:

ii. Peroxides:

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units

iii. Microorganisms:

iv. Other:

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units

c. Chemical oxidation/reduction additives applied: (total quantity applied at the site for the current reporting period)

i. Permanganates:

ii. Peroxides:

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units

iii. Persulfates:

iv. Other:

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units



IRA REMEDIAL MONITORING REPORT

Pursuant to 310 CMR 40.0400 (SUBPART D)

Remedial System or Monitoring Program: of

Release Tracking Number

-

E. STATUS OF ACTIVE REMEDIAL SYSTEM OR ACTIVE REMEDIAL MONITORING PROGRAM DURING REPORTING PERIOD: (cont.)

d. Other additives applied: (total quantity applied at the site for the current reporting period)

Name of Additive	Date	Quantity	Units

Name of Additive	Date	Quantity	Units

e. Check here if any additional Remedial Additives were applied. Attach list of additional additives and include Name of Additive, Date Applied, Quantity Applied and Units (in gals. or lbs.)

F. SHUTDOWNS OF ACTIVE REMEDIAL SYSTEM OR ACTIVE REMEDIAL MONITORING PROGRAM: (check all that apply)

1. The Active Remedial System had unscheduled shutdowns on one or more occasions during the Reporting Period.

a. Number of Unscheduled Shutdowns: _____ b. Total Number of Days of Unscheduled Shutdowns: _____

c. Reason(s) for Unscheduled Shutdowns: _____

2. The Active Remedial System had scheduled shutdowns on one or more occasions during the Reporting Period.

a. Number of Scheduled Shutdowns: _____ b. Total Number of Days of Scheduled Shutdowns: _____

c. Reason(s) for Scheduled Shutdowns: _____

3. The Active Remedial System or Active Remedial Monitoring Program was permanently shutdown/discontinued during the Reporting Period.

a. Date of Final System or Monitoring Program Shutdown: _____
(mm/dd/yyyy)

b. No Further Effluent Discharges.

c. No Further Application of Remedial Additives planned; sufficient monitoring completed to demonstrate compliance with 310 CMR 40.0046.

d. No Further Submittals Planned.

e. Other: Describe: _____

G. SUMMARY STATEMENTS: (check all that apply for the current reporting period)

1. All Active Remedial System checks and effluent analyses required by the approved plan and/or permit were performed when applicable.

2. There were no significant problems or prolonged (>25% of reporting period) unscheduled shutdowns of the Active Remedial System.

3. The Active Remedial System or Active Remedial Monitoring Program operated in conformance with the MCP, and all applicable approval conditions and/or permits.

4. Indicate any Operational Problems or Notes:

5. Check here if additional/supporting Information, data, maps, and/or sketches are attached to the form.



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup
IRA REMEDIAL MONITORING REPORT
MEASUREMENTS

BWSC105 -B

Pursuant to 310 CMR 40.0400 (SUBPART D)

Remedial System or Monitoring Program: of

Release Tracking Number

For each Point of Measurement, related to concentration indicate the highest concentration detected during the reporting period, of each oil, hazardous material and/or remedial additive.

For each Point of Measurement for pressure differentials, indicate the lowest pressure differential detected during the reporting period.

Point of Measurement	Date (mm/dd/yyyy)	Contaminant, Measurement and/or Indicator Parameter	Influent Concentration (where applicable)	Midpoint Concentration (where applicable)	(check one)		Check here, if ND/BDL	Permissible Concentration or Pressure Differential	Units	Within Permissible Limits? (Y/N)
					<input checked="" type="checkbox"/> Discharge	<input type="checkbox"/> GroundWater Concentration Pressure Differential				
SYSTEM	11/12/2019	PFAS	4.612				<input checked="" type="checkbox"/>	0.070	UG/L	YES
SYSTEM	11/15/2019	PFAS	4.612				<input checked="" type="checkbox"/>	0.070	UG/L	YES
SYSTEM	11/19/2019	PFAS	4.612	0.044	0.042		<input type="checkbox"/>	0.070	UG/L	YES
SYSTEM	12/17/2019	PFAS					<input checked="" type="checkbox"/>	0.070	UG/L	YES

Check here if any additional BWSC105 B, Measurements Form(s), are needed.



Your Project #: BARNSTABLE COUNTY
 Site#: BCFRTA
 Site Location: BCFRTA
 Your C.O.C. #: 726342-04-01

Attention: Steven Tebo

Barnstable County
 3195 Main Street
 PO Box 427
 Barnstable, MA
 USA 02630

Report Date: 2019/12/10
 Report #: R5998791
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9W1244

Received: 2019/11/14, 13:44

Sample Matrix: Water
 # Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
PFAS in water by SPE/LCMS (1)	5	2019/11/21	2019/12/07	CAM SOP-00894	EPA 537 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.



Your Project #: BARNSTABLE COUNTY
Site#: BCFRTA
Site Location: BCFRTA
Your C.O.C. #: 726342-04-01

Attention: Steven Tebo

Barnstable County
3195 Main Street
PO Box 427
Barnstable, MA
USA 02630

Report Date: 2019/12/10
Report #: R5998791
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9W1244
Received: 2019/11/14, 13:44

Encryption Key

Patricia Legette
Project Manager
10 Dec 2019 12:48:03

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Patricia Legette, Project Manager
Email: Patricia.Legette@bvlabs.com
Phone# (905)817-5799

=====

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

BV Labs Job #: B9W1244
Report Date: 2019/12/10

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: RT

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LHR003			LHR004		LHR005			
Sampling Date		2019/11/12 21:45			2019/11/12 21:30	2019/11/12 21:30				
COC Number		726342-04-01			726342-04-01	726342-04-01				
	UNITS	INFLUENT	RDL	MDL	SYSTEM 1-MIDPOINT	SYSTEM1-EFF	RDL	MDL	QC Batch	
Perfluorinated Compounds										
Perfluorobutanoic acid	ug/L	0.031	0.020	0.0070	<0.0070	<0.0070	0.020	0.0070	6454988	
Perfluoropentanoic Acid (PFPeA)	ug/L	0.11	0.020	0.0041	0.0045	<0.0041	0.020	0.0041	6454988	
Perfluorohexanoic Acid (PFHxA)	ug/L	0.12	0.020	0.0064	<0.0064	<0.0064	0.020	0.0064	6454988	
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.059	0.020	0.0071	<0.0071	<0.0071	0.020	0.0071	6454988	
Perfluorooctanoic Acid (PFOA)	ug/L	0.053	0.020	0.0074	<0.0074	<0.0074	0.020	0.0074	6454988	
Perfluorononanoic Acid (PFNA)	ug/L	0.085	0.020	0.0049	<0.0049	<0.0049	0.020	0.0049	6454988	
Perfluorodecanoic Acid (PFDA)	ug/L	0.015	0.020	0.0041	<0.0041	<0.0041	0.020	0.0041	6454988	
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.096	0.020	0.0043	<0.0043	<0.0043	0.020	0.0043	6454988	
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.0068	0.020	0.0068	<0.0068	<0.0068	0.020	0.0068	6454988	
Perfluorotridecanoic Acid	ug/L	<0.0069	0.020	0.0069	<0.0069	<0.0069	0.020	0.0069	6454988	
Perfluorotetradecanoic Acid	ug/L	<0.0067	0.020	0.0067	<0.0067	<0.0067	0.020	0.0067	6454988	
Perfluorobutanesulfonic acid	ug/L	0.0073	0.020	0.0051	<0.0051	<0.0051	0.020	0.0051	6454988	
Perfluorohexanesulfonic acid	ug/L	0.20	0.020	0.0052	<0.0052	<0.0052	0.020	0.0052	6454988	
Perfluoroheptanesulfonic acid	ug/L	0.013	0.020	0.0033	<0.0033	<0.0033	0.020	0.0033	6454988	
Perfluorooctanesulfonic acid	ug/L	4.2	0.20	0.052	0.12	<0.0052	0.020	0.0052	6454988	
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.0072	0.020	0.0072	<0.0072	<0.0072	0.020	0.0072	6454988	
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.0066	0.020	0.0066	<0.0066	<0.0066	0.020	0.0066	6454988	
EtFOSA	ug/L	<0.0090	0.020	0.0090	<0.0090	<0.0090	0.020	0.0090	6454988	
MeFOSA	ug/L	<0.0035	0.020	0.0035	<0.0035	<0.0035	0.020	0.0035	6454988	
EtFOSE	ug/L	<0.0094	0.020	0.0094	<0.0094	<0.0094	0.020	0.0094	6454988	
MeFOSE	ug/L	<0.0066	0.020	0.0066	<0.0066	<0.0066	0.020	0.0066	6454988	
6:2 Fluorotelomer sulfonic acid	ug/L	0.17	0.020	0.0059	<0.0059	<0.0059	0.020	0.0059	6454988	
8:2 Fluorotelomer sulfonic acid	ug/L	0.35	0.020	0.0059	<0.0059	<0.0059	0.020	0.0059	6454988	
Surrogate Recovery (%)										
13C2-6:2-Fluorotelomersulfonic Acid	%	103	N/A	N/A	119	114	N/A	N/A	6454988	
13C2-8:2-Fluorotelomersulfonic Acid	%	103	N/A	N/A	115	104	N/A	N/A	6454988	
13C2-Perfluorodecanoic acid	%	100	N/A	N/A	108	97	N/A	N/A	6454988	
13C2-Perfluorododecanoic acid	%	93	N/A	N/A	99	90	N/A	N/A	6454988	
13C2-Perfluorohexanoic acid	%	116	N/A	N/A	127	122	N/A	N/A	6454988	
13C2-perfluorotetradecanoic acid	%	75	N/A	N/A	83	80	N/A	N/A	6454988	
13C2-Perfluoroundecanoic acid	%	96	N/A	N/A	103	91	N/A	N/A	6454988	
13C4-Perfluorobutanoic acid	%	115	N/A	N/A	127	122	N/A	N/A	6454988	
13C4-Perfluoroheptanoic acid	%	113	N/A	N/A	121	116	N/A	N/A	6454988	
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable										



BUREAU
VERITAS

BV Labs Job #: B9W1244
Report Date: 2019/12/10

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: RT

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LHR003			LHR004		LHR005				
Sampling Date		2019/11/12 21:45			2019/11/12 21:30		2019/11/12 21:30				
COC Number		726342-04-01			726342-04-01		726342-04-01				
	UNITS	INFLUENT	RDL	MDL	SYSTEM 1-MIDPOINT	SYSTEM1-EFF	RDL	MDL	QC Batch		
13C4-Perfluorooctanesulfonic acid	%	105	N/A	N/A	114	105	N/A	N/A	6454988		
13C4-Perfluorooctanoic acid	%	109	N/A	N/A	117	112	N/A	N/A	6454988		
13C5-Perfluorononanoic acid	%	106	N/A	N/A	113	107	N/A	N/A	6454988		
13C5-Perfluoropentanoic acid	%	118	N/A	N/A	127	122	N/A	N/A	6454988		
13C8-Perfluorooctane Sulfonamide	%	103	N/A	N/A	111	98	N/A	N/A	6454988		
18O2-Perfluorohexanesulfonic acid	%	107	N/A	N/A	118	113	N/A	N/A	6454988		
D3-MeFOSA	%	77	N/A	N/A	76	76	N/A	N/A	6454988		
D5-EtFOSA	%	77	N/A	N/A	76	77	N/A	N/A	6454988		
D7-MeFOSE	%	94	N/A	N/A	98	88	N/A	N/A	6454988		
D9-EtFOSE	%	87	N/A	N/A	98	87	N/A	N/A	6454988		
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable											



BUREAU
VERITAS

BV Labs Job #: B9W1244
Report Date: 2019/12/10

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: RT

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LHR006	LHR007			
Sampling Date		2019/11/12 21:40	2019/11/12 21:40			
COC Number		726342-04-01	726342-04-01			
	UNITS	SYSTEM2-EFFLUENT	SYSTEM2-MIDPT	RDL	MDL	QC Batch
Perfluorinated Compounds						
Perfluorobutanoic acid	ug/L	<0.0070	<0.0070	0.020	0.0070	6454988
Perfluoropentanoic Acid (PFPeA)	ug/L	<0.0041	<0.0041	0.020	0.0041	6454988
Perfluorohexanoic Acid (PFHxA)	ug/L	<0.0064	<0.0064	0.020	0.0064	6454988
Perfluoroheptanoic Acid (PFHpA)	ug/L	<0.0071	<0.0071	0.020	0.0071	6454988
Perfluorooctanoic Acid (PFOA)	ug/L	<0.0074	<0.0074	0.020	0.0074	6454988
Perfluorononanoic Acid (PFNA)	ug/L	<0.0049	<0.0049	0.020	0.0049	6454988
Perfluorodecanoic Acid (PFDA)	ug/L	<0.0041	<0.0041	0.020	0.0041	6454988
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.0043	<0.0043	0.020	0.0043	6454988
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.0068	<0.0068	0.020	0.0068	6454988
Perfluorotridecanoic Acid	ug/L	<0.0069	<0.0069	0.020	0.0069	6454988
Perfluorotetradecanoic Acid	ug/L	<0.0067	<0.0067	0.020	0.0067	6454988
Perfluorobutanesulfonic acid	ug/L	<0.0051	<0.0051	0.020	0.0051	6454988
Perfluorohexanesulfonic acid	ug/L	<0.0052	<0.0052	0.020	0.0052	6454988
Perfluoroheptanesulfonic acid	ug/L	<0.0033	<0.0033	0.020	0.0033	6454988
Perfluorooctanesulfonic acid	ug/L	<0.0052	<0.0052	0.020	0.0052	6454988
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.0072	<0.0072	0.020	0.0072	6454988
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.0066	<0.0066	0.020	0.0066	6454988
EtFOSA	ug/L	<0.0090	<0.0090	0.020	0.0090	6454988
MeFOSA	ug/L	<0.0035	<0.0035	0.020	0.0035	6454988
EtFOSE	ug/L	<0.0094	<0.0094	0.020	0.0094	6454988
MeFOSE	ug/L	<0.0066	<0.0066	0.020	0.0066	6454988
6:2 Fluorotelomer sulfonic acid	ug/L	<0.0059	<0.0059	0.020	0.0059	6454988
8:2 Fluorotelomer sulfonic acid	ug/L	<0.0059	<0.0059	0.020	0.0059	6454988
Surrogate Recovery (%)						
13C2-6:2-Fluorotelomersulfonic Acid	%	113	113	N/A	N/A	6454988
13C2-8:2-Fluorotelomersulfonic Acid	%	111	101	N/A	N/A	6454988
13C2-Perfluorodecanoic acid	%	102	101	N/A	N/A	6454988
13C2-Perfluorododecanoic acid	%	94	94	N/A	N/A	6454988
13C2-Perfluorohexanoic acid	%	119	120	N/A	N/A	6454988
13C2-perfluorotetradecanoic acid	%	67	91	N/A	N/A	6454988
13C2-Perfluoroundecanoic acid	%	98	94	N/A	N/A	6454988
13C4-Perfluorobutanoic acid	%	120	122	N/A	N/A	6454988
13C4-Perfluoroheptanoic acid	%	114	117	N/A	N/A	6454988
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable						



BUREAU
VERITAS

BV Labs Job #: B9W1244
Report Date: 2019/12/10

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: RT

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LHR006	LHR007			
Sampling Date		2019/11/12 21:40	2019/11/12 21:40			
COC Number		726342-04-01	726342-04-01			
	UNITS	SYSTEM2-EFFLUENT	SYSTEM2-MIDPT	RDL	MDL	QC Batch
13C4-Perfluorooctanesulfonic acid	%	108	107	N/A	N/A	6454988
13C4-Perfluorooctanoic acid	%	110	112	N/A	N/A	6454988
13C5-Perfluorononanoic acid	%	108	113	N/A	N/A	6454988
13C5-Perfluoropentanoic acid	%	120	123	N/A	N/A	6454988
13C8-Perfluorooctane Sulfonamide	%	106	112	N/A	N/A	6454988
18O2-Perfluorohexanesulfonic acid	%	110	108	N/A	N/A	6454988
D3-MeFOSA	%	68	84	N/A	N/A	6454988
D5-EtFOSA	%	69	85	N/A	N/A	6454988
D7-MeFOSE	%	95	100	N/A	N/A	6454988
D9-EtFOSE	%	91	100	N/A	N/A	6454988
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable						



TEST SUMMARY

BV Labs ID: LHR003
Sample ID: INFLUENT
Matrix: Water

Collected: 2019/11/12
Shipped:
Received: 2019/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6454988	2019/11/21	2019/12/07	Adnan Khan

BV Labs ID: LHR004
Sample ID: SYSTEM 1-MIDPOINT
Matrix: Water

Collected: 2019/11/12
Shipped:
Received: 2019/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6454988	2019/11/21	2019/12/07	Adnan Khan

BV Labs ID: LHR005
Sample ID: SYSTEM1-EFF
Matrix: Water

Collected: 2019/11/12
Shipped:
Received: 2019/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6454988	2019/11/21	2019/12/07	Adnan Khan

BV Labs ID: LHR006
Sample ID: SYSTEM2-EFFLUENT
Matrix: Water

Collected: 2019/11/12
Shipped:
Received: 2019/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6454988	2019/11/21	2019/12/07	Adnan Khan

BV Labs ID: LHR007
Sample ID: SYSTEM2-MIDPT
Matrix: Water

Collected: 2019/11/12
Shipped:
Received: 2019/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6454988	2019/11/21	2019/12/07	Adnan Khan



BUREAU
VERITAS

BV Labs Job #: B9W1244

Report Date: 2019/12/10

Barnstable County

Client Project #: BARNSTABLE COUNTY

Site Location: BCFRTA

Sampler Initials: RT

GENERAL COMMENTS

Sample LHR003 [INFLUENT] : Per- and polyfluoroalkyl substances (PFAS): Due to high concentrations of the target analytes, a reduced sample volume was extracted and analyzed. Detection limits were adjusted accordingly.

Results relate only to the items tested.



BUREAU
VERITAS

BV Labs Job #: B9W1244
Report Date: 2019/12/10

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: RT

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
6454988	AKH	Matrix Spike	13C2-6:2-Fluorotelomersulfonic Acid	2019/12/07	97	%	50 - 150		
			13C2-8:2-Fluorotelomersulfonic Acid	2019/12/07	99	%	50 - 150		
			13C2-Perfluorodecanoic acid	2019/12/07	98	%	50 - 150		
			13C2-Perfluorododecanoic acid	2019/12/07	91	%	50 - 150		
			13C2-Perfluorohexanoic acid	2019/12/07	107	%	50 - 150		
			13C2-perfluorotetradecanoic acid	2019/12/07	87	%	50 - 150		
			13C2-Perfluoroundecanoic acid	2019/12/07	95	%	50 - 150		
			13C4-Perfluorobutanoic acid	2019/12/07	107	%	50 - 150		
			13C4-Perfluoroheptanoic acid	2019/12/07	104	%	50 - 150		
			13C4-Perfluorooctanesulfonic acid	2019/12/07	103	%	50 - 150		
			13C4-Perfluorooctanoic acid	2019/12/07	103	%	50 - 150		
			13C5-Perfluorononanoic acid	2019/12/07	99	%	50 - 150		
			13C5-Perfluoropentanoic acid	2019/12/07	109	%	50 - 150		
			13C8-Perfluorooctane Sulfonamide	2019/12/07	97	%	50 - 150		
			18O2-Perfluorohexanesulfonic acid	2019/12/07	103	%	50 - 150		
			D3-MeFOSA	2019/12/07	78	%	50 - 150		
			D5-EtFOSA	2019/12/07	77	%	50 - 150		
			D7-MeFOSE	2019/12/07	93	%	50 - 150		
			D9-EtFOSE	2019/12/07	90	%	50 - 150		
			Perfluorobutanoic acid	2019/12/07	94	%	70 - 130		
			Perfluoropentanoic Acid (PFPeA)	2019/12/07	94	%	70 - 130		
			Perfluorohexanoic Acid (PFHxA)	2019/12/07	97	%	70 - 130		
			Perfluoroheptanoic Acid (PFHpA)	2019/12/07	96	%	70 - 130		
			Perfluorooctanoic Acid (PFOA)	2019/12/07	95	%	70 - 130		
			Perfluorononanoic Acid (PFNA)	2019/12/07	95	%	70 - 130		
			Perfluorodecanoic Acid (PFDA)	2019/12/07	96	%	70 - 130		
			Perfluoroundecanoic Acid (PFUnA)	2019/12/07	95	%	70 - 130		
			Perfluorododecanoic Acid (PFDoA)	2019/12/07	96	%	70 - 130		
			Perfluorotridecanoic Acid	2019/12/07	92	%	70 - 130		
			Perfluorotetradecanoic Acid	2019/12/07	91	%	70 - 130		
			Perfluorobutanesulfonic acid	2019/12/07	98	%	70 - 130		
			Perfluorohexanesulfonic acid	2019/12/07	97	%	70 - 130		
			Perfluoroheptanesulfonic acid	2019/12/07	95	%	70 - 130		
			Perfluorooctanesulfonic acid	2019/12/07	94	%	70 - 130		
			Perfluorodecanesulfonic acid (PFDS)	2019/12/07	89	%	70 - 130		
			Perfluorooctane Sulfonamide (PFOSA)	2019/12/07	99	%	70 - 130		
EtFOSA	2019/12/07	96	%	70 - 130					
MeFOSA	2019/12/07	99	%	70 - 130					
EtFOSE	2019/12/07	91	%	70 - 130					
MeFOSE	2019/12/07	91	%	70 - 130					
6:2 Fluorotelomer sulfonic acid	2019/12/07	97	%	70 - 130					
8:2 Fluorotelomer sulfonic acid	2019/12/07	96	%	70 - 130					
6454988	AKH	Spiked Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/12/07	105	%	50 - 150		
			13C2-8:2-Fluorotelomersulfonic Acid	2019/12/07	108	%	50 - 150		
			13C2-Perfluorodecanoic acid	2019/12/07	104	%	50 - 150		
			13C2-Perfluorododecanoic acid	2019/12/07	102	%	50 - 150		
			13C2-Perfluorohexanoic acid	2019/12/07	112	%	50 - 150		
			13C2-perfluorotetradecanoic acid	2019/12/07	95	%	50 - 150		
			13C2-Perfluoroundecanoic acid	2019/12/07	106	%	50 - 150		
			13C4-Perfluorobutanoic acid	2019/12/07	116	%	50 - 150		
13C4-Perfluoroheptanoic acid	2019/12/07	109	%	50 - 150					



BUREAU
VERITAS

BV Labs Job #: B9W1244
Report Date: 2019/12/10

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: RT

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			13C4-Perfluorooctanesulfonic acid	2019/12/07		106	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/12/07		107	%	50 - 150
			13C5-Perfluorononanoic acid	2019/12/07		107	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/12/07		115	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/12/07		105	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/12/07		109	%	50 - 150
			D3-MeFOSA	2019/12/07		72	%	50 - 150
			D5-EtFOSA	2019/12/07		71	%	50 - 150
			D7-MeFOSE	2019/12/07		95	%	50 - 150
			D9-EtFOSE	2019/12/07		93	%	50 - 150
			Perfluorobutanoic acid	2019/12/07		93	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/12/07		93	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/12/07		97	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/12/07		97	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/12/07		95	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/12/07		93	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/12/07		98	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/12/07		93	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/12/07		93	%	70 - 130
			Perfluorotridecanoic Acid	2019/12/07		92	%	70 - 130
			Perfluorotetradecanoic Acid	2019/12/07		91	%	70 - 130
			Perfluorobutanesulfonic acid	2019/12/07		97	%	70 - 130
			Perfluorohexanesulfonic acid	2019/12/07		94	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/12/07		95	%	70 - 130
			Perfluorooctanesulfonic acid	2019/12/07		98	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/12/07		93	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/12/07		97	%	70 - 130
			EtFOSA	2019/12/07		97	%	70 - 130
			MeFOSA	2019/12/07		98	%	70 - 130
			EtFOSE	2019/12/07		92	%	70 - 130
			MeFOSE	2019/12/07		92	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2019/12/07		94	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2019/12/07		94	%	70 - 130
6454988	AKH	Method Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/12/07		137	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2019/12/07		132	%	50 - 150
			13C2-Perfluorodecanoic acid	2019/12/07		124	%	50 - 150
			13C2-Perfluorododecanoic acid	2019/12/07		121	%	50 - 150
			13C2-Perfluorohexanoic acid	2019/12/07		140	%	50 - 150
			13C2-perfluorotetradecanoic acid	2019/12/07		116	%	50 - 150
			13C2-Perfluoroundecanoic acid	2019/12/07		124	%	50 - 150
			13C4-Perfluorobutanoic acid	2019/12/07		143	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/12/07		136	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/12/07		132	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/12/07		134	%	50 - 150
			13C5-Perfluorononanoic acid	2019/12/07		129	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/12/07		143	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/12/07		129	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/12/07		132	%	50 - 150
			D3-MeFOSA	2019/12/07		101	%	50 - 150
			D5-EtFOSA	2019/12/07		103	%	50 - 150
			D7-MeFOSE	2019/12/07		120	%	50 - 150



BUREAU
VERITAS

BV Labs Job #: B9W1244
Report Date: 2019/12/10

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: RT

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
				D9-EtFOSE	2019/12/07		111	%	50 - 150
				Perfluorobutanoic acid	2019/12/07	<0.0070		ug/L	
				Perfluoropentanoic Acid (PFPeA)	2019/12/07	<0.0041		ug/L	
				Perfluorohexanoic Acid (PFHxA)	2019/12/07	<0.0064		ug/L	
				Perfluoroheptanoic Acid (PFHpA)	2019/12/07	<0.0071		ug/L	
				Perfluorooctanoic Acid (PFOA)	2019/12/07	<0.0074		ug/L	
				Perfluorononanoic Acid (PFNA)	2019/12/07	<0.0049		ug/L	
				Perfluorodecanoic Acid (PFDA)	2019/12/07	<0.0041		ug/L	
				Perfluoroundecanoic Acid (PFUnA)	2019/12/07	<0.0043		ug/L	
				Perfluorododecanoic Acid (PFDoA)	2019/12/07	<0.0068		ug/L	
				Perfluorotridecanoic Acid	2019/12/07	<0.0069		ug/L	
				Perfluorotetradecanoic Acid	2019/12/07	<0.0067		ug/L	
				Perfluorobutanesulfonic acid	2019/12/07	<0.0051		ug/L	
				Perfluorohexanesulfonic acid	2019/12/07	<0.0052		ug/L	
				Perfluoroheptanesulfonic acid	2019/12/07	<0.0033		ug/L	
				Perfluorooctanesulfonic acid	2019/12/07	<0.0052		ug/L	
				Perfluorodecanesulfonic acid (PFDS)	2019/12/07	<0.0072		ug/L	
				Perfluorooctane Sulfonamide (PFOSA)	2019/12/07	<0.0066		ug/L	
				EtFOSA	2019/12/07	<0.0090		ug/L	
				MeFOSA	2019/12/07	<0.0035		ug/L	
				EtFOSE	2019/12/07	<0.0094		ug/L	
				MeFOSE	2019/12/07	<0.0066		ug/L	
				6:2 Fluorotelomer sulfonic acid	2019/12/07	<0.0059		ug/L	
				8:2 Fluorotelomer sulfonic acid	2019/12/07	<0.0059		ug/L	
6454988	AKH		RPD - Sample/Sample Dup	Perfluorobutanoic acid	2019/12/07	NC		%	30
				Perfluoropentanoic Acid (PFPeA)	2019/12/07	NC		%	30
				Perfluorohexanoic Acid (PFHxA)	2019/12/07	NC		%	30
				Perfluoroheptanoic Acid (PFHpA)	2019/12/07	NC		%	30
				Perfluorooctanoic Acid (PFOA)	2019/12/07	NC		%	30
				Perfluorononanoic Acid (PFNA)	2019/12/07	NC		%	30
				Perfluorodecanoic Acid (PFDA)	2019/12/07	NC		%	30
				Perfluoroundecanoic Acid (PFUnA)	2019/12/07	NC		%	30
				Perfluorododecanoic Acid (PFDoA)	2019/12/07	NC		%	30
				Perfluorotridecanoic Acid	2019/12/07	NC		%	30
				Perfluorotetradecanoic Acid	2019/12/07	NC		%	30
				Perfluorobutanesulfonic acid	2019/12/07	NC		%	30
				Perfluorohexanesulfonic acid	2019/12/07	NC		%	30
				Perfluoroheptanesulfonic acid	2019/12/07	NC		%	30
				Perfluorooctanesulfonic acid	2019/12/07	NC		%	30
				Perfluorodecanesulfonic acid (PFDS)	2019/12/07	NC		%	30
				Perfluorooctane Sulfonamide (PFOSA)	2019/12/07	NC		%	30
				6:2 Fluorotelomer sulfonic acid	2019/12/07	NC		%	30
				8:2 Fluorotelomer sulfonic acid	2019/12/07	NC		%	30

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

BV Labs Job #: B9W1244
Report Date: 2019/12/10

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: RT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Colm McNamara, Senior Analyst, Liquid Chromatography

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel: (905) 817-5700 Toll-free 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

14-Nov-19 13:44

Page of

Patricia Legette
B9W1244

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name: #29803 Barnstable County	Company Name: <u>BETA Group</u>	Quotation #: B57344	P.O. #:		
Attention: Accounts Payable	Attention: <u>Steven Tebo / Roger Thibault</u>	Project: BARNSTABLE COUNTY	JCC env-1303		
Address: 3195 Main Street PO Box 427 Barnstable MA 02630	Address:	Project Name: BCFRTA	COC #: 		
Tel: (508) 362-3828 Ext: 1234 Fax:	Tel: (508) 375-6603 Fax:	Site #: <u>Roger Thibault</u>	Project Manager: Patricia Legette		
Email: eoconnell@barnstablecounty.org, stebo@barnstableco	Email: stebo@barnstablecounty.org, rthibault@noverarmstrong	Sampled By:	Bottle Order #: 		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY						ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required: Please provide advance notice for rush projects			
Regulation 153 (2011)		Other Regulations		Special Instructions		Field Filtered (please circle): Metals / Hg / Cr / VI											Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.		
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Medium/Fine	<input type="checkbox"/> CCME	<input type="checkbox"/> Sanitary Sewer Bylaw													Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number: _____ (call lab for #)		
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm	<input type="checkbox"/> Coarse	<input type="checkbox"/> Reg 558	<input type="checkbox"/> Storm Sewer Bylaw												# of Bottles		Comments	
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agril/Other	<input type="checkbox"/> For RSC	<input type="checkbox"/> MISA	Municipality _____															
<input type="checkbox"/> Table _____			<input checked="" type="checkbox"/> PWQO																
Include Criteria on Certificate of Analysis (Y/N)?																			
1		INFLEWENT	19/11/19	21:45	GW		X											2	
2		SYSTEM 1-MIDPOINT	19/11/19	21:30	GW		X											2	
3		SYSTEM 1 - EFF	19/11/19	21:30	GW		X											2	
4		SYSTEM 2 - EFFLUENT	19/11/19	21:40	GW		X											2	
5		SYSTEM 2 - MIDPT	19/11/19	21:40	GW		X											2	
6																			
7																			
8																			
9																			
10																			

* RELINQUISHED BY: (Signature/Print) <u>Mykel Mendes</u>		Date: (YY/MM/DD) 19/11/20	Time 1530	RECEIVED BY: (Signature/Print) <u>Mykel Mendes</u>	Date: (YY/MM/DD) 20/11/19	Time 1549	# jars used and not submitted	Laboratory Use Only				
								Time Sensitive	Temperature (°C) on Receipt 5/15.8/5.6	Custody Seal Present	Yes	No
										Intact		<input checked="" type="checkbox"/>

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client



Site#: 6206
 Site Location: BCFTA
 Your C.O.C. #: 709782-01-01

Attention: Steven Tebo

Barnstable County
 3195 Main Street
 PO Box 427
 Barnstable, MA
 USA 02630

Report Date: 2019/12/16
 Report #: R6008287
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9X3285
Received: 2019/11/26, 14:09

Sample Matrix: Water
 # Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
PFAS in water by SPE/LCMS (1)	4	2019/11/29	2019/12/13	CAM SOP-00894	EPA 537 m

Remarks:
 Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested. This Certificate shall not be reproduced except in full, without the written approval of the laboratory. Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
 (1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.



Site#: 6206
Site Location: BCFTA
Your C.O.C. #: 709782-01-01

Attention: Steven Tebo

Barnstable County
3195 Main Street
PO Box 427
Barnstable, MA
USA 02630

Report Date: 2019/12/16
Report #: R6008287
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9X3285
Received: 2019/11/26, 14:09

Encryption Key

Patricia Legette
Project Manager
16 Dec 2019 17:30:56

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Patricia Legette, Project Manager
Email: Patricia.Legette@bvlabs.com
Phone# (905)817-5799

=====

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

BV Labs Job #: B9X3285
Report Date: 2019/12/16

Barnstable County
Site Location: BCFTA
Sampler Initials: MM

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LKI548	LKI549	LKI550			
Sampling Date		2019/11/15 12:30	2019/11/15 12:40	2019/11/19 13:05			
COC Number		709782-01-01	709782-01-01	709782-01-01			
	UNITS	SYSTEM 2-MIDPOINT 12:30	SYSTEM 2-EFFLUENT 12:40	SYSTEM 2-MIDPOINT 13:05	RDL	MDL	QC Batch
Perfluorinated Compounds							
Perfluorobutanoic acid	ug/L	<0.0070	<0.0070	<0.0070	0.020	0.0070	6470643
Perfluoropentanoic Acid (PFPeA)	ug/L	<0.0041	<0.0041	0.013	0.020	0.0041	6470643
Perfluorohexanoic Acid (PFHxA)	ug/L	<0.0064	<0.0064	0.018	0.020	0.0064	6470643
Perfluoroheptanoic Acid (PFHpA)	ug/L	<0.0071	<0.0071	<0.0071	0.020	0.0071	6470643
Perfluorooctanoic Acid (PFOA)	ug/L	<0.0074	<0.0074	0.044	0.020	0.0074	6470643
Perfluorononanoic Acid (PFNA)	ug/L	<0.0049	<0.0049	<0.0049	0.020	0.0049	6470643
Perfluorodecanoic Acid (PFDA)	ug/L	<0.0041	<0.0041	<0.0041	0.020	0.0041	6470643
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.0043	<0.0043	<0.0043	0.020	0.0043	6470643
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.0068	<0.0068	<0.0068	0.020	0.0068	6470643
Perfluorotridecanoic Acid	ug/L	<0.0069	<0.0069	<0.0069	0.020	0.0069	6470643
Perfluorotetradecanoic Acid	ug/L	<0.0067	<0.0067	<0.0067	0.020	0.0067	6470643
Perfluorobutanesulfonic acid	ug/L	<0.0051	<0.0051	<0.0051	0.020	0.0051	6470643
Perfluorohexanesulfonic acid	ug/L	<0.0052	<0.0052	<0.0052	0.020	0.0052	6470643
Perfluoroheptanesulfonic acid	ug/L	<0.0033	<0.0033	<0.0033	0.020	0.0033	6470643
Perfluorooctanesulfonic acid	ug/L	<0.0052	<0.0052	<0.0052	0.020	0.0052	6470643
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.0072	<0.0072	<0.0072	0.020	0.0072	6470643
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.0066	<0.0066	<0.0066	0.020	0.0066	6470643
EtFOSA	ug/L	<0.0090	<0.0090	<0.0090	0.020	0.0090	6470643
MeFOSA	ug/L	<0.0035	<0.0035	<0.0035	0.020	0.0035	6470643
EtFOSE	ug/L	<0.0094	<0.0094	<0.0094	0.020	0.0094	6470643
MeFOSE	ug/L	<0.0066	<0.0066	<0.0066	0.020	0.0066	6470643
6:2 Fluorotelomer sulfonic acid	ug/L	<0.0059	<0.0059	<0.0059	0.020	0.0059	6470643
8:2 Fluorotelomer sulfonic acid	ug/L	<0.0059	<0.0059	<0.0059	0.020	0.0059	6470643
Surrogate Recovery (%)							
13C2-6:2-Fluorotelomersulfonic Acid	%	111	118	113	N/A	N/A	6470643
13C2-8:2-Fluorotelomersulfonic Acid	%	106	105	103	N/A	N/A	6470643
13C2-Perfluorodecanoic acid	%	97	102	101	N/A	N/A	6470643
13C2-Perfluorododecanoic acid	%	87	88	92	N/A	N/A	6470643
13C2-Perfluorohexanoic acid	%	105	109	108	N/A	N/A	6470643
13C2-perfluorotetradecanoic acid	%	60	58	69	N/A	N/A	6470643
13C2-Perfluoroundecanoic acid	%	92	95	96	N/A	N/A	6470643
13C4-Perfluorobutanoic acid	%	100	104	102	N/A	N/A	6470643
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable							



BUREAU
VERITAS

BV Labs Job #: B9X3285
Report Date: 2019/12/16

Barnstable County
Site Location: BCFTA
Sampler Initials: MM

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LKI548	LKI549	LKI550			
Sampling Date		2019/11/15 12:30	2019/11/15 12:40	2019/11/19 13:05			
COC Number		709782-01-01	709782-01-01	709782-01-01			
	UNITS	SYSTEM 2-MIDPOINT 12:30	SYSTEM 2-EFFLUENT 12:40	SYSTEM 2-MIDPOINT 13:05	RDL	MDL	QC Batch
13C4-Perfluoroheptanoic acid	%	105	108	107	N/A	N/A	6470643
13C4-Perfluorooctanesulfonic acid	%	97	103	102	N/A	N/A	6470643
13C4-Perfluorooctanoic acid	%	102	105	104	N/A	N/A	6470643
13C5-Perfluorononanoic acid	%	102	106	107	N/A	N/A	6470643
13C5-Perfluoropentanoic acid	%	104	109	105	N/A	N/A	6470643
13C8-Perfluorooctane Sulfonamide	%	95	100	97	N/A	N/A	6470643
18O2-Perfluorohexanesulfonic acid	%	104	106	107	N/A	N/A	6470643
D3-MeFOSA	%	81	86	79	N/A	N/A	6470643
D5-EtFOSA	%	78	84	80	N/A	N/A	6470643
D7-MeFOSE	%	89	90	89	N/A	N/A	6470643
D9-EtFOSE	%	85	86	88	N/A	N/A	6470643
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable							



BUREAU
VERITAS

BV Labs Job #: B9X3285
Report Date: 2019/12/16

Barnstable County
Site Location: BCFTA
Sampler Initials: MM

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LKI551			
Sampling Date		2019/11/19 13:10			
COC Number		709782-01-01			
	UNITS	SYSTEM 2-EFFLUENT 13:10	RDL	MDL	QC Batch
Perfluorinated Compounds					
Perfluorobutanoic acid	ug/L	<0.0070	0.020	0.0070	6470643
Perfluoropentanoic Acid (PFPeA)	ug/L	0.015	0.020	0.0041	6470643
Perfluorohexanoic Acid (PFHxA)	ug/L	<0.0064	0.020	0.0064	6470643
Perfluoroheptanoic Acid (PFHpA)	ug/L	<0.0071	0.020	0.0071	6470643
Perfluorooctanoic Acid (PFOA)	ug/L	0.042	0.020	0.0074	6470643
Perfluorononanoic Acid (PFNA)	ug/L	<0.0049	0.020	0.0049	6470643
Perfluorodecanoic Acid (PFDA)	ug/L	<0.0041	0.020	0.0041	6470643
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.017	0.020	0.0043	6470643
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.0068	0.020	0.0068	6470643
Perfluorotridecanoic Acid	ug/L	<0.0069	0.020	0.0069	6470643
Perfluorotetradecanoic Acid	ug/L	<0.0067	0.020	0.0067	6470643
Perfluorobutanesulfonic acid	ug/L	<0.0051	0.020	0.0051	6470643
Perfluorohexanesulfonic acid	ug/L	<0.0052	0.020	0.0052	6470643
Perfluoroheptanesulfonic acid	ug/L	<0.0033	0.020	0.0033	6470643
Perfluorooctanesulfonic acid	ug/L	<0.0052	0.020	0.0052	6470643
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.0072	0.020	0.0072	6470643
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.0066	0.020	0.0066	6470643
EtFOSA	ug/L	<0.0090	0.020	0.0090	6470643
MeFOSA	ug/L	<0.0035	0.020	0.0035	6470643
EtFOSE	ug/L	<0.0094	0.020	0.0094	6470643
MeFOSE	ug/L	<0.0066	0.020	0.0066	6470643
6:2 Fluorotelomer sulfonic acid	ug/L	<0.0059	0.020	0.0059	6470643
8:2 Fluorotelomer sulfonic acid	ug/L	<0.0059	0.020	0.0059	6470643
Surrogate Recovery (%)					
13C2-6:2-Fluorotelomersulfonic Acid	%	111	N/A	N/A	6470643
13C2-8:2-Fluorotelomersulfonic Acid	%	103	N/A	N/A	6470643
13C2-Perfluorodecanoic acid	%	96	N/A	N/A	6470643
13C2-Perfluorododecanoic acid	%	87	N/A	N/A	6470643
13C2-Perfluorohexanoic acid	%	106	N/A	N/A	6470643
13C2-perfluorotetradecanoic acid	%	60	N/A	N/A	6470643
13C2-Perfluoroundecanoic acid	%	89	N/A	N/A	6470643
13C4-Perfluorobutanoic acid	%	101	N/A	N/A	6470643
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable					



BUREAU
VERITAS

BV Labs Job #: B9X3285
Report Date: 2019/12/16

Barnstable County
Site Location: BCFTA
Sampler Initials: MM

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LKI551			
Sampling Date		2019/11/19 13:10			
COC Number		709782-01-01			
	UNITS	SYSTEM 2-EFFLUENT 13:10	RDL	MDL	QC Batch
13C4-Perfluoroheptanoic acid	%	104	N/A	N/A	6470643
13C4-Perfluorooctanesulfonic acid	%	99	N/A	N/A	6470643
13C4-Perfluorooctanoic acid	%	101	N/A	N/A	6470643
13C5-Perfluorononanoic acid	%	103	N/A	N/A	6470643
13C5-Perfluoropentanoic acid	%	104	N/A	N/A	6470643
13C8-Perfluorooctane Sulfonamide	%	92	N/A	N/A	6470643
18O2-Perfluorohexanesulfonic acid	%	104	N/A	N/A	6470643
D3-MeFOSA	%	76	N/A	N/A	6470643
D5-EtFOSA	%	77	N/A	N/A	6470643
D7-MeFOSE	%	87	N/A	N/A	6470643
D9-EtFOSE	%	84	N/A	N/A	6470643
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable					



BUREAU
VERITAS

BV Labs Job #: B9X3285
Report Date: 2019/12/16

Barnstable County
Site Location: BCFTA
Sampler Initials: MM

TEST SUMMARY

BV Labs ID: LKI548
Sample ID: SYSTEM 2-MIDPOINT 12:30
Matrix: Water

Collected: 2019/11/15
Shipped:
Received: 2019/11/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6470643	2019/11/29	2019/12/13	Sin Chii Chia

BV Labs ID: LKI549
Sample ID: SYSTEM 2-EFFLUENT 12:40
Matrix: Water

Collected: 2019/11/15
Shipped:
Received: 2019/11/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6470643	2019/11/29	2019/12/13	Sin Chii Chia

BV Labs ID: LKI550
Sample ID: SYSTEM 2-MIDPOINT 13:05
Matrix: Water

Collected: 2019/11/19
Shipped:
Received: 2019/11/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6470643	2019/11/29	2019/12/13	Sin Chii Chia

BV Labs ID: LKI551
Sample ID: SYSTEM 2-EFFLUENT 13:10
Matrix: Water

Collected: 2019/11/19
Shipped:
Received: 2019/11/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6470643	2019/11/29	2019/12/13	Sin Chii Chia



**BUREAU
VERITAS**

BV Labs Job #: B9X3285
Report Date: 2019/12/16

Barnstable County
Site Location: BCFTA
Sampler Initials: MM

GENERAL COMMENTS

Samples received with elevated temperature. Client consented to proceed with the analysis.

Results relate only to the items tested.



BUREAU
VERITAS

BV Labs Job #: B9X3285
Report Date: 2019/12/16

Barnstable County
Site Location: BCFTA
Sampler Initials: MM

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
	6470643	SCH	Spiked Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/12/13		101	%	50 - 150
				13C2-8:2-Fluorotelomersulfonic Acid	2019/12/13		101	%	50 - 150
				13C2-Perfluorodecanoic acid	2019/12/13		101	%	50 - 150
				13C2-Perfluorododecanoic acid	2019/12/13		95	%	50 - 150
				13C2-Perfluorohexanoic acid	2019/12/13		100	%	50 - 150
				13C2-perfluorotetradecanoic acid	2019/12/13		94	%	50 - 150
				13C2-Perfluoroundecanoic acid	2019/12/13		100	%	50 - 150
				13C4-Perfluorobutanoic acid	2019/12/13		105	%	50 - 150
				13C4-Perfluoroheptanoic acid	2019/12/13		101	%	50 - 150
				13C4-Perfluorooctanesulfonic acid	2019/12/13		99	%	50 - 150
				13C4-Perfluorooctanoic acid	2019/12/13		102	%	50 - 150
				13C5-Perfluorononanoic acid	2019/12/13		104	%	50 - 150
				13C5-Perfluoropentanoic acid	2019/12/13		103	%	50 - 150
				13C8-Perfluorooctane Sulfonamide	2019/12/13		92	%	50 - 150
				18O2-Perfluorohexanesulfonic acid	2019/12/13		104	%	50 - 150
				D3-MeFOSA	2019/12/13		72	%	50 - 150
				D5-EtFOSA	2019/12/13		75	%	50 - 150
				D7-MeFOSE	2019/12/13		91	%	50 - 150
				D9-EtFOSE	2019/12/13		87	%	50 - 150
				Perfluorobutanoic acid	2019/12/13		95	%	70 - 130
				Perfluoropentanoic Acid (PFPeA)	2019/12/13		96	%	70 - 130
				Perfluorohexanoic Acid (PFHxA)	2019/12/13		98	%	70 - 130
				Perfluoroheptanoic Acid (PFHpA)	2019/12/13		97	%	70 - 130
				Perfluorooctanoic Acid (PFOA)	2019/12/13		93	%	70 - 130
				Perfluorononanoic Acid (PFNA)	2019/12/13		92	%	70 - 130
				Perfluorodecanoic Acid (PFDA)	2019/12/13		96	%	70 - 130
				Perfluoroundecanoic Acid (PFUnA)	2019/12/13		94	%	70 - 130
				Perfluorododecanoic Acid (PFDoA)	2019/12/13		90	%	70 - 130
				Perfluorotridecanoic Acid	2019/12/13		88	%	70 - 130
				Perfluorotetradecanoic Acid	2019/12/13		86	%	70 - 130
				Perfluorobutanesulfonic acid	2019/12/13		95	%	70 - 130
				Perfluorohexanesulfonic acid	2019/12/13		95	%	70 - 130
				Perfluoroheptanesulfonic acid	2019/12/13		94	%	70 - 130
				Perfluorooctanesulfonic acid	2019/12/13		98	%	70 - 130
				Perfluorodecanesulfonic acid (PFDS)	2019/12/13		89	%	70 - 130
				Perfluorooctane Sulfonamide (PFOSA)	2019/12/13		90	%	70 - 130
				EtFOSA	2019/12/13		75	%	70 - 130
				MeFOSA	2019/12/13		74	%	70 - 130
				EtFOSE	2019/12/13		83	%	70 - 130
				MeFOSE	2019/12/13		84	%	70 - 130
				6:2 Fluorotelomer sulfonic acid	2019/12/13		95	%	70 - 130
				8:2 Fluorotelomer sulfonic acid	2019/12/13		94	%	70 - 130
	6470643	SCH	Spiked Blank DUP	13C2-6:2-Fluorotelomersulfonic Acid	2019/12/13		103	%	50 - 150
				13C2-8:2-Fluorotelomersulfonic Acid	2019/12/13		104	%	50 - 150
				13C2-Perfluorodecanoic acid	2019/12/13		107	%	50 - 150
				13C2-Perfluorododecanoic acid	2019/12/13		100	%	50 - 150
				13C2-Perfluorohexanoic acid	2019/12/13		104	%	50 - 150
				13C2-perfluorotetradecanoic acid	2019/12/13		98	%	50 - 150
				13C2-Perfluoroundecanoic acid	2019/12/13		105	%	50 - 150
				13C4-Perfluorobutanoic acid	2019/12/13		110	%	50 - 150
				13C4-Perfluoroheptanoic acid	2019/12/13		104	%	50 - 150
				13C4-Perfluorooctanesulfonic acid	2019/12/13		106	%	50 - 150



BUREAU
VERITAS

BV Labs Job #: B9X3285
Report Date: 2019/12/16

Barnstable County
Site Location: BCFTA
Sampler Initials: MM

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			13C4-Perfluorooctanoic acid	2019/12/13		106	%	50 - 150
			13C5-Perfluorononanoic acid	2019/12/13		107	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/12/13		108	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/12/13		98	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/12/13		109	%	50 - 150
			D3-MeFOSA	2019/12/13		76	%	50 - 150
			D5-EtFOSA	2019/12/13		80	%	50 - 150
			D7-MeFOSE	2019/12/13		95	%	50 - 150
			D9-EtFOSE	2019/12/13		91	%	50 - 150
			Perfluorobutanoic acid	2019/12/13		94	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/12/13		95	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/12/13		97	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/12/13		97	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/12/13		95	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/12/13		93	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/12/13		95	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/12/13		95	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/12/13		92	%	70 - 130
			Perfluorotridecanoic Acid	2019/12/13		92	%	70 - 130
			Perfluorotetradecanoic Acid	2019/12/13		91	%	70 - 130
			Perfluorobutanesulfonic acid	2019/12/13		96	%	70 - 130
			Perfluorohexanesulfonic acid	2019/12/13		95	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/12/13		96	%	70 - 130
			Perfluorooctanesulfonic acid	2019/12/13		97	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/12/13		92	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/12/13		91	%	70 - 130
			EtFOSA	2019/12/13		79	%	70 - 130
			MeFOSA	2019/12/13		83	%	70 - 130
			EtFOSE	2019/12/13		86	%	70 - 130
			MeFOSE	2019/12/13		85	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2019/12/13		97	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2019/12/13		97	%	70 - 130
6470643	SCH	RPD	Perfluorobutanoic acid	2019/12/13	0.49		%	30
			Perfluoropentanoic Acid (PFPeA)	2019/12/13	0.50		%	30
			Perfluorohexanoic Acid (PFHxA)	2019/12/13	0.087		%	30
			Perfluoroheptanoic Acid (PFHpA)	2019/12/13	0.54		%	30
			Perfluorooctanoic Acid (PFOA)	2019/12/13	1.6		%	30
			Perfluorononanoic Acid (PFNA)	2019/12/13	0.46		%	30
			Perfluorodecanoic Acid (PFDA)	2019/12/13	1.4		%	30
			Perfluoroundecanoic Acid (PFUnA)	2019/12/13	0.71		%	30
			Perfluorododecanoic Acid (PFDoA)	2019/12/13	2.2		%	30
			Perfluorotridecanoic Acid	2019/12/13	5.3		%	30
			Perfluorotetradecanoic Acid	2019/12/13	5.7		%	30
			Perfluorobutanesulfonic acid	2019/12/13	0.15		%	30
			Perfluorohexanesulfonic acid	2019/12/13	0.66		%	30
			Perfluoroheptanesulfonic acid	2019/12/13	1.5		%	30
			Perfluorooctanesulfonic acid	2019/12/13	1.1		%	30
			Perfluorodecanesulfonic acid (PFDS)	2019/12/13	4.0		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2019/12/13	0.69		%	30
			EtFOSA	2019/12/13	5.7		%	30
			MeFOSA	2019/12/13	11		%	30
			EtFOSE	2019/12/13	4.3		%	30



BUREAU
VERITAS

BV Labs Job #: B9X3285
Report Date: 2019/12/16

Barnstable County
Site Location: BCFTA
Sampler Initials: MM

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits		
6470643	SCH	Method Blank	MeFOSE	2019/12/13	1.0		%	30		
			6:2 Fluorotelomer sulfonic acid	2019/12/13	2.3		%	30		
			8:2 Fluorotelomer sulfonic acid	2019/12/13	3.4		%	30		
			13C2-6:2-Fluorotelomersulfonic Acid	2019/12/13			118	%	50 - 150	
			13C2-8:2-Fluorotelomersulfonic Acid	2019/12/13			110	%	50 - 150	
			13C2-Perfluorodecanoic acid	2019/12/13			107	%	50 - 150	
			13C2-Perfluorododecanoic acid	2019/12/13			96	%	50 - 150	
			13C2-Perfluorohexanoic acid	2019/12/13			109	%	50 - 150	
			13C2-perfluorotetradecanoic acid	2019/12/13			96	%	50 - 150	
			13C2-Perfluoroundecanoic acid	2019/12/13			99	%	50 - 150	
			13C4-Perfluorobutanoic acid	2019/12/13			113	%	50 - 150	
			13C4-Perfluoroheptanoic acid	2019/12/13			110	%	50 - 150	
			13C4-Perfluorooctanesulfonic acid	2019/12/13			107	%	50 - 150	
			13C4-Perfluorooctanoic acid	2019/12/13			108	%	50 - 150	
			13C5-Perfluorononanoic acid	2019/12/13			108	%	50 - 150	
			13C5-Perfluoropentanoic acid	2019/12/13			110	%	50 - 150	
			13C8-Perfluorooctane Sulfonamide	2019/12/13			98	%	50 - 150	
			18O2-Perfluorohexanesulfonic acid	2019/12/13			105	%	50 - 150	
			D3-MeFOSA	2019/12/13			92	%	50 - 150	
			D5-EtFOSA	2019/12/13			89	%	50 - 150	
			D7-MeFOSE	2019/12/13			94	%	50 - 150	
			D9-EtFOSE	2019/12/13			93	%	50 - 150	
			Perfluorobutanoic acid	2019/12/13			<0.0070		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2019/12/13			<0.0041		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2019/12/13			<0.0064		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2019/12/13			<0.0071		ug/L	
			Perfluorooctanoic Acid (PFOA)	2019/12/13			<0.0074		ug/L	
			Perfluorononanoic Acid (PFNA)	2019/12/13			<0.0049		ug/L	
			Perfluorodecanoic Acid (PFDA)	2019/12/13			<0.0041		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2019/12/13			<0.0043		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2019/12/13			<0.0068		ug/L	
			Perfluorotridecanoic Acid	2019/12/13			<0.0069		ug/L	
			Perfluorotetradecanoic Acid	2019/12/13			<0.0067		ug/L	
Perfluorobutanesulfonic acid	2019/12/13			<0.0051		ug/L				
Perfluorohexanesulfonic acid	2019/12/13			<0.0052		ug/L				
Perfluoroheptanesulfonic acid	2019/12/13			<0.0033		ug/L				
Perfluorooctanesulfonic acid	2019/12/13			<0.0052		ug/L				
Perfluorodecanesulfonic acid (PFDS)	2019/12/13			<0.0072		ug/L				
Perfluorooctane Sulfonamide (PFOSA)	2019/12/13			<0.0066		ug/L				
EtFOSA	2019/12/13			<0.0090		ug/L				
MeFOSA	2019/12/13			<0.0035		ug/L				
EtFOSE	2019/12/13			<0.0094		ug/L				
MeFOSE	2019/12/13			<0.0066		ug/L				
6:2 Fluorotelomer sulfonic acid	2019/12/13			<0.0059		ug/L				
8:2 Fluorotelomer sulfonic acid	2019/12/13			<0.0059		ug/L				

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.



BUREAU
VERITAS

BV Labs Job #: B9X3285

Report Date: 2019/12/16

Barnstable County

Site Location: BCFTA

Sampler Initials: MM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Adam Robinson, Supervisor, LC/MS/MS

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Your Project #: BARNSTABLE COUNTY
 Site Location: BCFRTA
 Your C.O.C. #: 726342-05-01

Attention: Steven Tebo

Barnstable County
 3195 Main Street
 PO Box 427
 Barnstable, MA
 USA 02630

Report Date: 2019/12/30
 Report #: R6022225
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Z8050

Received: 2019/12/19, 14:16

Sample Matrix: Water
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
PFAS in water by SPE/LCMS (1)	1	2019/12/23	2019/12/27	CAM SOP-00894	EPA 537 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.



Your Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Your C.O.C. #: 726342-05-01

Attention: Steven Tebo

Barnstable County
3195 Main Street
PO Box 427
Barnstable, MA
USA 02630

Report Date: 2019/12/30
Report #: R6022225
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Z8050

Received: 2019/12/19, 14:16

Encryption Key

Patricia Legette
Project Manager
30 Dec 2019 09:22:13

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Patricia Legette, Project Manager
Email: Patricia.Legette@bvlabs.com
Phone# (905)817-5799

=====

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

BV Labs Job #: B9Z8050
Report Date: 2019/12/30

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: CO

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LPT796			
Sampling Date		2019/12/17 13:25			
COC Number		726342-05-01			
	UNITS	SYSTEM 2- EFFLUENT	RDL	MDL	QC Batch
Perfluorinated Compounds					
Perfluorobutanoic acid	ug/L	<0.0070	0.020	0.0070	6512578
Perfluoropentanoic Acid (PFPeA)	ug/L	<0.0041	0.020	0.0041	6512578
Perfluorohexanoic Acid (PFHxA)	ug/L	<0.0064	0.020	0.0064	6512578
Perfluoroheptanoic Acid (PFHpA)	ug/L	<0.0071	0.020	0.0071	6512578
Perfluorooctanoic Acid (PFOA)	ug/L	<0.0074	0.020	0.0074	6512578
Perfluorononanoic Acid (PFNA)	ug/L	<0.0049	0.020	0.0049	6512578
Perfluorodecanoic Acid (PFDA)	ug/L	<0.0041	0.020	0.0041	6512578
Perfluoroundecanoic Acid (PFUnA)	ug/L	<0.0043	0.020	0.0043	6512578
Perfluorododecanoic Acid (PFDoA)	ug/L	<0.0068	0.020	0.0068	6512578
Perfluorotridecanoic Acid	ug/L	<0.0069	0.020	0.0069	6512578
Perfluorotetradecanoic Acid	ug/L	<0.0067	0.020	0.0067	6512578
Perfluorobutanesulfonic acid	ug/L	<0.0051	0.020	0.0051	6512578
Perfluorohexanesulfonic acid	ug/L	<0.0052	0.020	0.0052	6512578
Perfluoroheptanesulfonic acid	ug/L	<0.0033	0.020	0.0033	6512578
Perfluorooctanesulfonic acid	ug/L	<0.0052	0.020	0.0052	6512578
Perfluorodecanesulfonic acid (PFDS)	ug/L	<0.0072	0.020	0.0072	6512578
Perfluorooctane Sulfonamide (PFOSA)	ug/L	<0.0066	0.020	0.0066	6512578
EtFOSA	ug/L	<0.0090	0.020	0.0090	6512578
MeFOSA	ug/L	<0.0035	0.020	0.0035	6512578
EtFOSE	ug/L	<0.0094	0.020	0.0094	6512578
MeFOSE	ug/L	<0.0066	0.020	0.0066	6512578
6:2 Fluorotelomer sulfonic acid	ug/L	<0.0059	0.020	0.0059	6512578
8:2 Fluorotelomer sulfonic acid	ug/L	<0.0059	0.020	0.0059	6512578
Surrogate Recovery (%)					
13C2-6:2-Fluorotelomersulfonic Acid	%	115	N/A	N/A	6512578
13C2-8:2-Fluorotelomersulfonic Acid	%	105	N/A	N/A	6512578
13C2-Perfluorodecanoic acid	%	97	N/A	N/A	6512578
13C2-Perfluorododecanoic acid	%	91	N/A	N/A	6512578
13C2-Perfluorohexanoic acid	%	106	N/A	N/A	6512578
13C2-perfluorotetradecanoic acid	%	71	N/A	N/A	6512578
13C2-Perfluoroundecanoic acid	%	91	N/A	N/A	6512578
13C3-Perfluorobutanesulfonic acid	%	104	N/A	N/A	6512578
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable					



BUREAU
VERITAS

BV Labs Job #: B9Z8050
Report Date: 2019/12/30

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: CO

PERFLUOROALKYL SUBSTANCES (WATER)

BV Labs ID		LPT796			
Sampling Date		2019/12/17 13:25			
COC Number		726342-05-01			
	UNITS	SYSTEM 2- EFFLUENT	RDL	MDL	QC Batch
13C4-Perfluorobutanoic acid	%	106	N/A	N/A	6512578
13C4-Perfluoroheptanoic acid	%	107	N/A	N/A	6512578
13C4-Perfluorooctanesulfonic acid	%	100	N/A	N/A	6512578
13C4-Perfluorooctanoic acid	%	106	N/A	N/A	6512578
13C5-Perfluorononanoic acid	%	106	N/A	N/A	6512578
13C5-Perfluoropentanoic acid	%	104	N/A	N/A	6512578
13C8-Perfluorooctane Sulfonamide	%	91	N/A	N/A	6512578
18O2-Perfluorohexanesulfonic acid	%	106	N/A	N/A	6512578
D3-MeFOSA	%	67	N/A	N/A	6512578
D5-EtFOSA	%	69	N/A	N/A	6512578
D7-MeFOSE	%	86	N/A	N/A	6512578
D9-EtFOSE	%	82	N/A	N/A	6512578
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable					



BUREAU
VERITAS

BV Labs Job #: B9Z8050
Report Date: 2019/12/30

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: CO

TEST SUMMARY

BV Labs ID: LPT796
Sample ID: SYSTEM 2- EFFLUENT
Matrix: Water

Collected: 2019/12/17
Shipped:
Received: 2019/12/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in water by SPE/LCMS	LCMS	6512578	2019/12/23	2019/12/27	Adnan Khan



**BUREAU
VERITAS**

BV Labs Job #: B9Z8050
Report Date: 2019/12/30

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: CO

GENERAL COMMENTS

Results relate only to the items tested.



BUREAU
VERITAS

BV Labs Job #: B9Z8050
Report Date: 2019/12/30

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: CO

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
	6512578	AKH	Spiked Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/12/27		104	%	50 - 150
				13C2-8:2-Fluorotelomersulfonic Acid	2019/12/27		103	%	50 - 150
				13C2-Perfluorodecanoic acid	2019/12/27		104	%	50 - 150
				13C2-Perfluorododecanoic acid	2019/12/27		96	%	50 - 150
				13C2-Perfluorohexanoic acid	2019/12/27		104	%	50 - 150
				13C2-perfluorotetradecanoic acid	2019/12/27		92	%	50 - 150
				13C2-Perfluoroundecanoic acid	2019/12/27		102	%	50 - 150
				13C3-Perfluorobutanesulfonic acid	2019/12/27		105	%	50 - 150
				13C4-Perfluorobutanoic acid	2019/12/27		106	%	50 - 150
				13C4-Perfluoroheptanoic acid	2019/12/27		105	%	50 - 150
				13C4-Perfluorooctanesulfonic acid	2019/12/27		104	%	50 - 150
				13C4-Perfluorooctanoic acid	2019/12/27		107	%	50 - 150
				13C5-Perfluorononanoic acid	2019/12/27		106	%	50 - 150
				13C5-Perfluoropentanoic acid	2019/12/27		105	%	50 - 150
				13C8-Perfluorooctane Sulfonamide	2019/12/27		98	%	50 - 150
				18O2-Perfluorohexanesulfonic acid	2019/12/27		103	%	50 - 150
				D3-MeFOSA	2019/12/27		85	%	50 - 150
				D5-EtFOSA	2019/12/27		85	%	50 - 150
				D7-MeFOSE	2019/12/27		93	%	50 - 150
				D9-EtFOSE	2019/12/27		90	%	50 - 150
				Perfluorobutanoic acid	2019/12/27		88	%	70 - 130
				Perfluoropentanoic Acid (PFPeA)	2019/12/27		87	%	70 - 130
				Perfluorohexanoic Acid (PFHxA)	2019/12/27		89	%	70 - 130
				Perfluoroheptanoic Acid (PFHpA)	2019/12/27		89	%	70 - 130
				Perfluorooctanoic Acid (PFOA)	2019/12/27		87	%	70 - 130
				Perfluorononanoic Acid (PFNA)	2019/12/27		88	%	70 - 130
				Perfluorodecanoic Acid (PFDA)	2019/12/27		88	%	70 - 130
				Perfluoroundecanoic Acid (PFUnA)	2019/12/27		83	%	70 - 130
				Perfluorododecanoic Acid (PFDoA)	2019/12/27		88	%	70 - 130
				Perfluorotridecanoic Acid	2019/12/27		89	%	70 - 130
				Perfluorotetradecanoic Acid	2019/12/27		87	%	70 - 130
				Perfluorobutanesulfonic acid	2019/12/27		89	%	70 - 130
				Perfluorohexanesulfonic acid	2019/12/27		89	%	70 - 130
				Perfluoroheptanesulfonic acid	2019/12/27		88	%	70 - 130
				Perfluorooctanesulfonic acid	2019/12/27		88	%	70 - 130
				Perfluorodecanesulfonic acid (PFDS)	2019/12/27		83	%	70 - 130
				Perfluorooctane Sulfonamide (PFOSA)	2019/12/27		86	%	70 - 130
				EtFOSA	2019/12/27		88	%	70 - 130
				MeFOSA	2019/12/27		90	%	70 - 130
				EtFOSE	2019/12/27		83	%	70 - 130
				MeFOSE	2019/12/27		83	%	70 - 130
				6:2 Fluorotelomer sulfonic acid	2019/12/27		90	%	70 - 130
				8:2 Fluorotelomer sulfonic acid	2019/12/27		85	%	70 - 130
	6512578	AKH	Spiked Blank DUP	13C2-6:2-Fluorotelomersulfonic Acid	2019/12/27		101	%	50 - 150
				13C2-8:2-Fluorotelomersulfonic Acid	2019/12/27		97	%	50 - 150
				13C2-Perfluorodecanoic acid	2019/12/27		98	%	50 - 150
				13C2-Perfluorododecanoic acid	2019/12/27		90	%	50 - 150
				13C2-Perfluorohexanoic acid	2019/12/27		99	%	50 - 150
				13C2-perfluorotetradecanoic acid	2019/12/27		85	%	50 - 150
				13C2-Perfluoroundecanoic acid	2019/12/27		95	%	50 - 150
				13C3-Perfluorobutanesulfonic acid	2019/12/27		99	%	50 - 150



BUREAU
VERITAS

BV Labs Job #: B9Z8050
Report Date: 2019/12/30

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: CO

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			13C4-Perfluorobutanoic acid	2019/12/27		100	%	50 - 150
			13C4-Perfluoroheptanoic acid	2019/12/27		100	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2019/12/27		96	%	50 - 150
			13C4-Perfluorooctanoic acid	2019/12/27		101	%	50 - 150
			13C5-Perfluorononanoic acid	2019/12/27		101	%	50 - 150
			13C5-Perfluoropentanoic acid	2019/12/27		100	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2019/12/27		90	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2019/12/27		100	%	50 - 150
			D3-MeFOSA	2019/12/27		73	%	50 - 150
			D5-EtFOSA	2019/12/27		73	%	50 - 150
			D7-MeFOSE	2019/12/27		84	%	50 - 150
			D9-EtFOSE	2019/12/27		82	%	50 - 150
			Perfluorobutanoic acid	2019/12/27		91	%	70 - 130
			Perfluoropentanoic Acid (PFPeA)	2019/12/27		90	%	70 - 130
			Perfluorohexanoic Acid (PFHxA)	2019/12/27		92	%	70 - 130
			Perfluoroheptanoic Acid (PFHpA)	2019/12/27		92	%	70 - 130
			Perfluorooctanoic Acid (PFOA)	2019/12/27		89	%	70 - 130
			Perfluorononanoic Acid (PFNA)	2019/12/27		90	%	70 - 130
			Perfluorodecanoic Acid (PFDA)	2019/12/27		90	%	70 - 130
			Perfluoroundecanoic Acid (PFUnA)	2019/12/27		88	%	70 - 130
			Perfluorododecanoic Acid (PFDoA)	2019/12/27		90	%	70 - 130
			Perfluorotridecanoic Acid	2019/12/27		92	%	70 - 130
			Perfluorotetradecanoic Acid	2019/12/27		90	%	70 - 130
			Perfluorobutanesulfonic acid	2019/12/27		93	%	70 - 130
			Perfluorohexanesulfonic acid	2019/12/27		89	%	70 - 130
			Perfluoroheptanesulfonic acid	2019/12/27		88	%	70 - 130
			Perfluorooctanesulfonic acid	2019/12/27		96	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2019/12/27		86	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2019/12/27		89	%	70 - 130
			EtFOSA	2019/12/27		87	%	70 - 130
			MeFOSA	2019/12/27		88	%	70 - 130
			EtFOSE	2019/12/27		86	%	70 - 130
			MeFOSE	2019/12/27		84	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2019/12/27		89	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2019/12/27		87	%	70 - 130
6512578	AKH	RPD	Perfluorobutanoic acid	2019/12/27	3.1		%	30
			Perfluoropentanoic Acid (PFPeA)	2019/12/27	2.9		%	30
			Perfluorohexanoic Acid (PFHxA)	2019/12/27	3.7		%	30
			Perfluoroheptanoic Acid (PFHpA)	2019/12/27	2.7		%	30
			Perfluorooctanoic Acid (PFOA)	2019/12/27	2.5		%	30
			Perfluorononanoic Acid (PFNA)	2019/12/27	2.0		%	30
			Perfluorodecanoic Acid (PFDA)	2019/12/27	2.4		%	30
			Perfluoroundecanoic Acid (PFUnA)	2019/12/27	5.9		%	30
			Perfluorododecanoic Acid (PFDoA)	2019/12/27	2.5		%	30
			Perfluorotridecanoic Acid	2019/12/27	3.4		%	30
			Perfluorotetradecanoic Acid	2019/12/27	2.7		%	30
			Perfluorobutanesulfonic acid	2019/12/27	4.6		%	30
			Perfluorohexanesulfonic acid	2019/12/27	0.19		%	30
			Perfluoroheptanesulfonic acid	2019/12/27	0.20		%	30
			Perfluorooctanesulfonic acid	2019/12/27	7.7		%	30
			Perfluorodecanesulfonic acid (PFDS)	2019/12/27	3.0		%	30



BUREAU
VERITAS

BV Labs Job #: B9Z8050
Report Date: 2019/12/30

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: CO

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
				Perfluorooctane Sulfonamide (PFOSA)	2019/12/27	3.0		%	30
				EtFOSA	2019/12/27	0.87		%	30
				MeFOSA	2019/12/27	1.9		%	30
				EtFOSE	2019/12/27	3.6		%	30
				MeFOSE	2019/12/27	1.7		%	30
				6:2 Fluorotelomer sulfonic acid	2019/12/27	1.3		%	30
				8:2 Fluorotelomer sulfonic acid	2019/12/27	2.5		%	30
6512578	AKH		Method Blank	13C2-6:2-Fluorotelomersulfonic Acid	2019/12/27		101	%	50 - 150
				13C2-8:2-Fluorotelomersulfonic Acid	2019/12/27		95	%	50 - 150
				13C2-Perfluorodecanoic acid	2019/12/27		87	%	50 - 150
				13C2-Perfluorododecanoic acid	2019/12/27		82	%	50 - 150
				13C2-Perfluorohexanoic acid	2019/12/27		93	%	50 - 150
				13C2-perfluorotetradecanoic acid	2019/12/27		76	%	50 - 150
				13C2-Perfluoroundecanoic acid	2019/12/27		83	%	50 - 150
				13C3-Perfluorobutanesulfonic acid	2019/12/27		93	%	50 - 150
				13C4-Perfluorobutanoic acid	2019/12/27		94	%	50 - 150
				13C4-Perfluoroheptanoic acid	2019/12/27		93	%	50 - 150
				13C4-Perfluorooctanesulfonic acid	2019/12/27		87	%	50 - 150
				13C4-Perfluorooctanoic acid	2019/12/27		94	%	50 - 150
				13C5-Perfluorononanoic acid	2019/12/27		92	%	50 - 150
				13C5-Perfluoropentanoic acid	2019/12/27		93	%	50 - 150
				13C8-Perfluorooctane Sulfonamide	2019/12/27		81	%	50 - 150
				18O2-Perfluorohexanesulfonic acid	2019/12/27		90	%	50 - 150
				D3-MeFOSA	2019/12/27		61	%	50 - 150
				D5-EtFOSA	2019/12/27		62	%	50 - 150
				D7-MeFOSE	2019/12/27		72	%	50 - 150
				D9-EtFOSE	2019/12/27		71	%	50 - 150
				Perfluorobutanoic acid	2019/12/27	<0.0070		ug/L	
				Perfluoropentanoic Acid (PFPeA)	2019/12/27	<0.0041		ug/L	
				Perfluorohexanoic Acid (PFHxA)	2019/12/27	<0.0064		ug/L	
				Perfluoroheptanoic Acid (PFHpA)	2019/12/27	<0.0071		ug/L	
				Perfluorooctanoic Acid (PFOA)	2019/12/27	<0.0074		ug/L	
				Perfluorononanoic Acid (PFNA)	2019/12/27	<0.0049		ug/L	
				Perfluorodecanoic Acid (PFDA)	2019/12/27	<0.0041		ug/L	
				Perfluoroundecanoic Acid (PFUnA)	2019/12/27	<0.0043		ug/L	
				Perfluorododecanoic Acid (PFDoA)	2019/12/27	<0.0068		ug/L	
				Perfluorotridecanoic Acid	2019/12/27	<0.0069		ug/L	
				Perfluorotetradecanoic Acid	2019/12/27	<0.0067		ug/L	
				Perfluorobutanesulfonic acid	2019/12/27	<0.0051		ug/L	
				Perfluorohexanesulfonic acid	2019/12/27	<0.0052		ug/L	
				Perfluoroheptanesulfonic acid	2019/12/27	<0.0033		ug/L	
				Perfluorooctanesulfonic acid	2019/12/27	<0.0052		ug/L	
				Perfluorodecanesulfonic acid (PFDS)	2019/12/27	<0.0072		ug/L	
				Perfluorooctane Sulfonamide (PFOSA)	2019/12/27	<0.0066		ug/L	
				EtFOSA	2019/12/27	<0.0090		ug/L	
				MeFOSA	2019/12/27	<0.0035		ug/L	
				EtFOSE	2019/12/27	<0.0094		ug/L	
				MeFOSE	2019/12/27	<0.0066		ug/L	
				6:2 Fluorotelomer sulfonic acid	2019/12/27	<0.0059		ug/L	



BUREAU
VERITAS

BV Labs Job #: B9Z8050
Report Date: 2019/12/30

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: CO

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC									
Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits	
			8:2 Fluorotelomer sulfonic acid	2019/12/27	<0.0059		ug/L		
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.</p>									



BUREAU
VERITAS

BV Labs Job #: B9Z8050
Report Date: 2019/12/30

Barnstable County
Client Project #: BARNSTABLE COUNTY
Site Location: BCFRTA
Sampler Initials: CO

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Colm McNamara, Senior Analyst, Liquid Chromatography

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel: (905) 817-5700 Toll-free 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO: Company Name: #29803 Barnstable County Attention: Accounts Payable Address: 3195 Mair Street PO Box 427 Barnstable, MA 02630 Tel: (508) 362-3828 Ext: 1234 Fax: Email: eoconnell@barnstablecounty.org, stebo@barnstableco		REPORT TO: Company Name: Barnstable County/ BETA Group Attention: Steven Tebo / Peter Thibault Address: 701 George Washington Hwy #Thibault@beta-utc.com Tel: (508) 375-6603 Fax: Email: stebo@barnstablecounty.org, thibault@overarmstrong		PROJECT INFORMATION: Quotation #: B57344 P.O. # Project: BARNSTABLE COUNTY Project Name: Site #: BCFRTA Sampled By: C. Owen		Laboratory Use Only: BV Labs Job #: 726342 Bottle Order #: 726342 COC #: C#726342-05-01 Project Manager: Patricia Legette	
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MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY						ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required: Please provide advance notice for rush projects.						
Regulation 153 (2011)		Other Regulations		Special Instructions		Field Filtered (please circle): Metals / Hg / Cr-VI										Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.						
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Medium/Fine	<input type="checkbox"/> CCME	<input type="checkbox"/> Sanitary Sewer Bylaw		TOTAL PFAS 537M										Job Specific Rush TAT (if applies to entire submission) Date Required: 5-day Time Required: <input checked="" type="checkbox"/>						
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm	<input type="checkbox"/> Coarse	<input type="checkbox"/> Reg 558	<input type="checkbox"/> Storm Sewer Bylaw												Rush Confirmation Number: (call lab for #)						
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other	<input type="checkbox"/> For RSC	<input type="checkbox"/> MISA	Municipality																		
<input type="checkbox"/> Table			<input type="checkbox"/> PWQO																			
<input type="checkbox"/> Table			<input type="checkbox"/> Other																			
Include Criteria on Certificate of Analysis (Y/N)?						Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix											# of Bottles	Comments
						1	SYSTEM 2 - EFFLUENT	19/12/17	1325	GW	X										2	
						2																
						3																
						4																
						5																
						6																
						7																
						8																
						9																
						10																

19-Dec-19 14:16
Patricia Legette
 B9Z8050
GID ENV-1339

* RELINQUISHED BY: (Signature/Print) Mykel Mendes		Date: (YY/MM/DD) 19/12/18	Time 0930	RECEIVED BY: (Signature/Print) MS		Date: (YY/MM/DD) 19/12/19	Time 1916	# jars used and not submitted	Laboratory Use Only			
Time Sensitive	Temperature (°C) on Receipt 3.8/4.7/3.6	Custody Seal Present/Intact	Yes	No								

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C.) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client



March 2020

Mark S. Ells, Town Manager
Town of Barnstable
200 Main Street
Hyannis, MA 02601

RE: Immediate Response Action Status and Remedial Monitoring Report #36
Barnstable County Fire and Rescue Training Academy
155 South Flint Rock Road
Barnstable, Massachusetts
DEP Release Tracking No. 4-26179
Project File #6206

Dear Mr. Ells,

As required by the Massachusetts Contingency Plan (MCP) 310 CMR 40.1403(3)(e) and 40.1403(6), BETA Group, Inc. (BETA) is notifying you on behalf of our client, Barnstable County, that an Immediate Response Action (IRA) Status and Remedial Monitoring Report (RMR) No. 36 is being submitted to the Massachusetts Department of Environmental Protection – Bureau of Waste Site Cleanup (MassDEP – BWSC) for the release site referenced as the Barnstable County Fire and Rescue Training Academy (BCFRTA) located at 155 South Flint Rock Road in Barnstable, Massachusetts (the site). This Report summarizes the IRA activities that occurred from November 1 to November 30, 2019.

Pursuant to the Massachusetts Contingency Plan (310 CMR 40.0480), an Initial Site Investigation has been performed at the site. A release of oils and/or hazardous materials has occurred at the site. In August 2016, MassDEP Southeast Regional Office issued a Notice of Responsibility (NOR) to Barnstable County, as current owner and operator of the Barnstable County Fire and Rescue Training Academy (BCFRTA), that the detection of elevated concentrations of poly- and perfluoralkyl substances (PFAS) in groundwater at the site constituted a release under the MCP. MassDEP issued Release Tracking Number (RTN) 4-26179 to this release. As summarized in the NOR, based on the detected PFAS concentrations in soil and groundwater at the BCFRTA and the inferred groundwater flow, MassDEP determined that the releases of PFAS from the use of aqueous film-forming foam (AFFF) at the BCFRTA is a source of PFAS detected in the Mary Dunn wells.

During the November 2019 reporting period, the treatment system was operable for 29 days. Approximately 0.56 million gallons of groundwater were treated at an average, estimated (effluent) flow rate of 21.6 gpm and 0.022 kilograms of PFAs were estimated to have been removed from the plume area during this reporting period. PFAs breakthrough into the effluent from the activated carbon treatment system was not observed. Additionally, on November 11, 2019, a second, temporary groundwater treatment system was put into service. On November 11, 2019 the original GWTS was shut down for short period of time to split the influent flow at the force mains and start up a temporary GWTS.

For the purposes of this and future IRA and RMR reports, the original GWTS will be referred as GWTS #1 and the newly installed temporary system will be referred to as GWTS #2. Details of the installation and startup of GWTS #2 are provided in the IRA Status and RMR for the November 2019 reporting period. For the period of November 1 through November 30, 2019, both systems treated an approximate combined 0.8 million gallons of groundwater from the downgradient recovery well PRW-4 at an average (effluent) flow rate of 30 gpm and on this basis, approximately 0.02 kilograms of PFAS were estimated to have been removed from the plume area during this reporting period.

At this time, IRA activities are ongoing. Continuing IRA activities will include operation and monitoring the on-Site Groundwater Pump and Treatment System (GWPTS), including performance sampling of GWPTS, review and evaluation of the on-Site GWPTS operation and maintenance activities as they affect groundwater treatment, and periodic groundwater monitoring. Additional details regarding the continuing IRA activities are included in the IRA Status and RMR No. 37 report document.

The IRA Status and RMR document is available electronically via the searchable sites database of the MassGOV / MassDEP website via the following link:

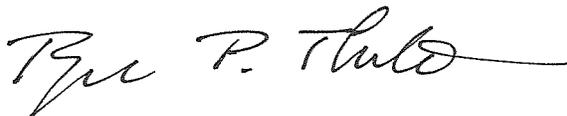
<https://eeaonline.eea.state.ma.us/portal#!/wastesite/4-0026179>.

A copy of the Report is available upon request by contacting the undersigned at BETA at (508) 866.8383. It is also available for review at MassDEP Southeast Regional Office (SERO), 20 Riverside Drive in Lakeville, Massachusetts 02347. You also have the right to request additional Public Involvement activities under 310 CMR 40.1403(9).

If you have any questions or comments, please do not hesitate to contact our office.

Sincerely,

Nover-Armstrong, a Division of BETA Group, Inc.

A handwritten signature in black ink, appearing to read "Roger P. Thibault". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Roger P. Thibault, P.E., LSP
Senior Environmental Engineer

Enclosures

CC: Mass Department of Environmental Protection
Southeast Regional Office
20 Riverside Drive
Lakeville, MA 02347

Thomas Mckean, Director
Town of Barnstable Health Division
200 Main Street
Hyannis, MA 02601

Hans Keijser, Supervisor
Town of Barnstable Water Supply Division
47 Old Yarmouth Road
Hyannis, MA 02601

