Electronic Transmittal
September 7, 2022

Bureau of Waste Site Cleanup
Massachusetts Department of Environmental Protection
Northeast Regional Office
205B Lowell Street
Wilmington, MA 01887

Re: **Immediate Response Action Plan**
Tractor Trailer Vehicle Accident Site
Ipswich Road (Between Porter Road and Mulberry Lane)
Boxford, MA 01906
RTN 3-37579

To Whom It May Concern:

Enclosed, please find the Immediate Response Action Plan (the Report) which outlines the response action activities planned and being implemented at the above-listed location along Ipswich Road in Boxford, Massachusetts (the site) in response to the conditions that gave rise to Release Tracking Number (RTN) 3-37579.

This Report has been prepared by CarriageHouse Consulting, Inc. on behalf of P E N Fuel Co., Inc. (PEN Fuel Co.) for submittal to the Massachusetts Department of Environmental Protection as an electronic attachment to Transmittal Form BWSC-105 under RTN 3-37579 through the eDEP Program. As indicated in the Report, the party overseeing response actions associated with this submittal is Mr. Nasser Abu-Eid of PEN Fuel Co. and future correspondence should be directed to his attention at 18 Lark Avenue, Saugus, MA 01906; he may also be reached by telephone at (781) 246-0201.

As indicated in the enclosed Report, PEN Fuel Co. has implemented initial response actions at this site under the provisions set forth in 310 CMR 40.0410 for RTN 3-37579 as the result of conditions arising from a vehicle accident.

Please do not hesitate to contact us with any questions or comments at (508) 315-3146.

Sincerely,
CarriageHouse Consulting, Inc.

McKayla M. Olig
Environmental Scientist

Brian D. Moore, P.G., L.S.P.
President

cc: PEN Fuel Co., *(electronic)*

Receipt

Forms → Attach Files → Signature → Receipt

Summary/Receipt

print receipt Exit

Your submission is complete. Thank you for using DEP's online reporting system. You can select "My eDEP" to see a list of your transactions.

DEP Transaction ID: 1426531
Date and Time Submitted: 9/7/2022 6:10:51 PM
Other Email :

Form Name: BWSC105 Immediate Response Action Transmittal Form

RTN: 3-37579
Location: IN FRONT OF 461 IPSWICH ROAD
Address: 461 IPSWICH ROAD, BOXFORD, 019210000

Person Making Submittal
PEN FUEL COMPANY INC
NASSER ABU-EID
18 LARK AVE
SAUGUS, MA 019060000

LSP
LSP #: 8435
LSP Name: BRIAN D MOORE

Person Making Certification
PEN FUEL COMPANY INC
Nasser Abu-Eid

Ancillary Document Uploaded/Mailed
BWSC-105 Q.B02 - IRA Plan - Uploaded (2022 09 07 IRA Plan.pdf)

My eDEP

IMMEDIATE RESPONSE ACTION PLAN

SEPTEMBER 2022

TRACTOR TRAILER VEHICLE ACCIDENT SITE
IPSWICH ROAD (BETWEEN PORTER ROAD AND MULBERRY LANE)
BOXFORD
MASSACHUSETTS 01921
RTN 3-37579

Prepared for:
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CHCI Project #: MA220701

TRACTOR TRAILER VEHICLE ACCIDENT SITE.
IPSWICH ROAD (BETWEEN PORTER ROAD AND MULBERRY LANE)
BOXFORD
MASSACHUSETTS 01921
RTN 3-37579

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TRACTOR TRAILER VEHICLE ACCIDENT SITE.
IPSWICH ROAD (BETWEEN PORTER ROAD AND MULBERRY LANE)
BOXFORD
MASSACHUSETTS 01921
RTN 3-37579

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1.0 INTRODUCTION AND OBJECTIVE OF REPORT

This Immediate Response Action (IRA) Plan (the Report) has been prepared by CarriageHouse Consulting, Inc. (CHCI) on behalf of P E N Fuel Co., Inc. (PEN Fuel Co.) for response action activities initiated to address conditions identified at the location of a tractor trailer vehicle accident site within the Ipswich Road right-of-way, between Porter Road and Mulberry Lane, in Boxford, Massachusetts (the site).

The objectives of this Report are to identify the nature and magnitude of potential oil and/or hazardous material (OHM) at this site where IRA activities were initiated in response to conditions observed during a vehicle accident involving a tractor trailer carrying gasoline, and to provide the Massachusetts Department of Environmental Protection (the Department) with the information required by the provisions set forth in 310 CMR 40.0410 of the Massachusetts Contingency Plan (MCP). This IRA Plan is also intended to confirm the response actions approved by the Department and further planned for this site since initial notification, as well as additional actions being contemplated for this location in the future in a format consistent with 310 CMR 40.0424.

2.0 GENERAL SITE INFORMATION

The subsections which follow present a brief description of the subject property and study area, the surrounding area and potential receptors, and the specific conditions which resulted in both the verbal notification provided to the Department and IRA activities proposed for this location. This information is presented herein pursuant to 310 CMR 40.0424(1)(a), (b), and (d), while further details on site monitoring activities and additional actions being contemplated and proposed for this site under this IRA are presented in Section 3.0.

2.1 Property and Study Area Description

The subject property is a wooded section of the roadside, along the southern side of Ipswich Road, between Mulberry Land and Porter Road, owned and operated by The Town of Boxford and located in a predominantly residential portion of Boxford, Massachusetts.

A Locus Plan depicting the location of the subject site and topographic features in the vicinity thereof was prepared using the United States Geological Survey 7.5-minute series map for the Lawrence, Massachusetts quadrangle (1987) is included as Figure 1. As noted on Figure 1, the subject property exists at an elevation of approximately 47 meters (approximately 154 feet) above mean sea level. The geographic coordinates for locating the subject property are as follows:

- 42° 41' 53" North latitude by 71° 02' 41" West longitude; and
- 4,729,312 meters North by 332,512 meters East on Universal Transverse Mercator Grid Zone 19.

A Site Plan has also been prepared and is included herein as Figure 2 to depict the approximate boundaries of the tractor trailer vehicle accident site, and an Area Plan has been prepared as Figure 3 to depict the surrounding study area, including open space and surface water nearby. These figures have been prepared to show the estimated extent of the release location, the proximity and layout of surrounding properties, the general arrangement and layout of relevant features, and potential sensitive receptors in the site area as gathered through municipal and state research conducted to-date.

The topography of the subject site area is of low to moderate relief, with surface elevations generally decreasing in the northwesterly direction. Wooded and/or grassy areas are situated along the southern and norther edges of the Ipswich Road right-of-way. The surrounding property uses include agricultural, open space, and residential development.

2.2 Surrounding Area and Potential Receptors

Information obtained through the Massachusetts Geographic Information System was used to prepare an Environmental Resources Plan, which is included herein as Figure 4 to assist with depicting information about potential receptors in the immediate vicinity of the subject property in the following subsections.

2.2.1 Schools and Institutions

No schools, institutions, day care centers, or hospitals are known to exist within 1,000 feet of this site.

2.2.2 Surface Waters and Wetlands

The site is located within a mapped wooded marsh and wetland area which extends directly north and south of the disposal site on both sides of Ipswich Road. This wetland area is believed to be subject to the jurisdiction of the Town of Boxford Wetlands Protection Bylaw and the Wetlands Protection Act (WPA). There is a mapped intermittent stream immediately east of the accident site, which is directed through a 24-inch reinforced concrete pipe (RCP) culvert beneath Ipswich Road and flows south to north perpendicular to the roadway. No other vernal pools, ponds, lakes, streams, reservoirs, wetlands, or surface water bodies are known to exist within 500 feet of the subject site.

2.2.3 Water Supply Protection Areas

As shown on Figures 3 and 4, the subject site is located in an area designated as a Department–approved Zone II Wellhead Protection Area. No Interim Zone II Wellhead Protection Areas, Class A Surface Water Bodies, or Zone A for Class A Surface Water Bodies are known to exist within 500 feet of the site, but at least three (3) private water supply wells are known to be located within 500 feet of the subject site. Accordingly, the site is situated within an area viewed to be subject to Current Drinking Water Source Area (CDWSA) designation pursuant to the definition set forth in 310 CMR 40.0006.

The entire study area is serviced by private water supply wells, and no municipal public water supply infrastructure exists in this portion of Boxford. No aquifer protection districts, municipal overlay districts, or Potentially Productive Aquifers (PPAs) are known to have been mapped or underlie the site or study area. Accordingly, the site is situated within an area also viewed to be subject to Potential Drinking Water Source Area (PDWSA) designation pursuant to the definition set forth in 310 CMR 40.0006.

2.2.4 Utilities and Subsurface Structure

Subsurface utilities are presumed to exist near the site, but are currently believed to be limited to stormwater and surface water subsurface conduit, and potentially natural gas and electric service lines. The Town of Boxford does not maintain a centralized sewage treatment facility, indicating that properties proximate to the site are likely serviced by private septic systems. Other subsurface utilities in the site area may include telecommunication lines and other utility conduits. Basements are likely present at all residential properties situated in the study area proximate to the site.

2.2.5 Habitats and Natural Resource Areas

There are two (2) Protected Open Spaces are located within 1,000 feet of the property. The first is located directly east of the disposal site while the other is located in the general south-southwest direction of the site. No Natural Heritage and Endangered Species Program, Estimated Habitat of Rare Wildlife, Rare Species are located within 1,000 feet of the property.

2.3 Entity Conducting Immediate Response Action

The entity responsible for conducting response actions associated with RTN 3-37579 is P E N Fuel Co., Inc. as the owner of the tractor trailer and trailer involved in the vehicle accident. Correspondence to their attention should be addressed to Mr. Nasser Abu-Eid of PEN Fuel Co. c/o 18 Lark Avenue in Saugus, MA 01906. He may also be reached by telephone at (781) 246-0201. PEN Fuel Co.'s relationship to the site is that of a Potentially Responsible Party (PRP).

2.4 Conditions Warranting IRA Activities

On the morning of Saturday July 9, 2022, a PEN Fuel Co. tractor trailer traveling west on Ipswich Road in Boxford, Massachusetts rolled over and hit a utility pole on the southern side of the Ipswich Road right-of-way. The vehicle accident occurred at approximately 6:45 am, as witnessed by a Town of Boxford police officer. The tractor trailer was hauling a full load of approximately 5,800 gallons of gasoline.

Notification of these conditions was provided to the Department at 07:37 am on July 9, 2022 by the Town of Boxford Fire Department and resulted in the assignment of RTN 3-37579. In addition, a field Notice of Responsibility (NOR) was also issued for the release of an unknown quantity of gasoline at the tractor trailer accident site by Department personnel Stephen Ross on July 9, 2022.

Preliminary response actions directed by the Town of Boxford Fire Department at the tractor trailer accident site included the deployment of approximately 30 gallons of aqueous film forming foam (AFFF). Town of Boxford Fire Department reportedly used less than 30 gallons of foam from the pumper's foam compartment. Fire Department records indicate it likely was FireAde 2000 AFFF manufactured by Fire Service Plus, Inc. of Fayetteville, Georgia circa 2009. The Lot number (#L172009-SA-F6) was provided to the manufacturer and they confirmed that the concentrate likely contained approximately 1 percent (%) C8 fluorinated surfactant.

Following the removal of the tractor trailer, preliminary inspections of the vehicle accident site indicated that neither gasoline from the trailer nor diesel fuel from the saddle tanks was released to the environment. The inspection did confirm a relatively small quantity of motor oil and grease from the tractor trailer engine block had been released to the ground surface in a localized area near the base of the damaged telephone pole.

Reproductions of the Release Notification Form (RNF) submitted to the Department on September 2, 2022, and associated correspondences used to provide the relevant parties of record with appropriate notice in accordance with the provisions set forth in 310 CMR 40.1403, are included herein as Appendix A.

3.0 IMMEDIATE RESPONSE ACTION ACTIVITIES

The following subsections provide a summary of the response actions completed at the subject site under RTN 3-57579 to-date, including preliminary investigatory and monitoring data, as required by 310 CMR 40.0424(1)(c) and (f).

3.1 Emergency Response Actions

The removal of the tractor trailer and other preliminary response actions were witnessed by PEN Fuel Co., personnel from the Department's Northeast Regional Office, and fire companies from the Massachusetts Port Authority, the Town of Boxford, and the Town of North Andover. Preliminary response action undertaken by U.S. Ecology of Franklin, Massachusetts (US Ecology) included containment and removal of the small quantities of petroleum released to the ground surface. Additional parties also reportedly present during this time included Police and other municipal personnel, the Massachusetts Department of Transportation (DOT), and Coady's Towing of Lawrence, Massachusetts (Coady's Towing).

Personnel from Coady's Towing and PEN Fuel Co. successfully cut two (2) holes in the side of the overturned tanker using non-sparking tools to allow access to each compartment with a drop tube to pump the gasoline out of the tanker compartments. The fuel was transferred to another PEN Fuel Co. tanker truck and removed from study area without incident. A reconciliation of the volume of the fuel removed the overturned tanker compared to the volume of fuel that had been manifested within the tanker indicated that no gasoline was reportedly lost from the overturned tanker into the environment during this incident.

National Grid then cut the utility pole and temporarily suspended the pole to allow for the extrication of the overturned truck. National Grid ultimately replaced the utility pole with a new pole on the evening of July 9, 2022. The tanker truck was righted by Coady's Towing and was inspected by DOT personnel before being towed from the site, at which time a small quantity of motor oil was noted on the surface of the roadway. This incidental oil was also contained and recovered using hand tools and adsorbent materials (e.g., Speedy Dry). Recovered adsorbents and impacted surface soil were containerized in three (3) 55-gallon capacity steel drums.

3.2 Selective Soil Excavation Activities

CHCI mobilized to the site on July 11, 2022 to assess site conditions and begin remediation activities, which included excavation and sampling of the impacted soil. Due to proximity to protected wetlands, these activities were completed under a duly-executed WPA Emergency Certification Form. During excavation activities which were completed on July 11 and 12, 2022, CHCI was present on-site to document soil conditions during ground intrusive activities in accordance with Department Guidance Documents and Policy. The excavation activities were conducted by US Ecology utilizing a CAT Model 4022 mini excavator to remove soils from the sloped embankment along the southern side of the Ipswich Road right-of-way.

During selective excavation work, soil samples were collected on nearly a continuous basis for both field screening and potential laboratory analyses. Excavated soils were subject to segregation based on visual, olfactory, and field screening indications of petroleum or AFFF impact. The excavated area was extended vertically to depths of approximately 6 inches below grade and horizontally until no readily-apparent indications of impact were observed.

Soils that were considered to be remediation waste were put in roll-off containers to be taken off site to the Town of Boxford Department of Public Works (DPW) yard with the consent of the DPW representative and the Town Administrator. The area of excavation was then covered in plastic sheeting and weighted down by tires. Straw waddles were installed along the perimeter to prevent erosion. On July 19, 2022, additional erosion control measures were also approved and deployed in the area to maintain slope stability as requested by the Town of Boxford Conservation Commission Agent.

3.3 Soil Sample Collection and Analyses

Following the selective excavation activities described in Section 3.1, soil samples were collected from the limits of the excavations for confirmatory laboratory analyses. A total of six (6) soil samples were collected from the terminus of the excavation activities, along with two (2) soil samples collected to represent "background" conditions outside of the area of the vehicle accident and one (1) waste characterization sample. These soil samples were submitted to Alpha Analytical Laboratory of Westborough, Massachusetts (Alpha) for the analyses of target volatile organic compounds (VOCs), target polynuclear aromatic hydrocarbons (PAHs), concentrations of volatile petroleum hydrocarbon (VPH) and extractable petroleum hydrocarbon (EPH) fractions, and PFAS by Department-approved Methods.

The analytical results of these soil samples have been tabulated in Tables 1 through 3, while a completed reproduction of the laboratory reports have provided in Appendix B. The locations of individual soil samples and the limits of excavation are shown on Figure 5 while the locations of "background" samples B-1 and B-2 are shown on Figure 3.

3.4 Waste Management

The IRA activities initiated at this site under RTN 3-37579 resulted in the excavation and temporary storage of approximately 30 cubic yards of OHM-impacted soil from this site, contained in both 55-gallon steel drums and roll off containers staged at the Town of Boxford DPW property at 7B Spofford Road. Waste characterization samples were collected and profiling/manifesting of the contained materials continues. Complete records on the disposition of this waste stream will be included in the next regulatory submittal to be filed for RTN 3-37579

3.5 Public Involvement

Aside from the notice submitted to the Town of Boxford Chief Municipal Officer and Board of Health pursuant to the requirements set forth in 310 CMR 40.1403(3)(h) that included a reproduction of the RNF submitted to the Department, no other known public involvement activities were required during this portion of the project. Select notifications have also been made related to the Emergency Certification provided Pursuant to the WPA and Town of Boxford Wetland Bylaw, while future actions in WPA jurisdictional areas will be the subject of pending submittals with the Town of Boxford Conservation Commission.

4.0 FURTHER IRA ACTIVITIES

The following subsections provide a summary of the work still anticipated to be completed at the subject property pursuant to 310 CMR 40.0424(1)(e) and (g), along with additional activities anticipated to be completed within the next sixty (60) days. The results of these activities will be presented in future regulatory submittals that will be prepared for this site in accordance with the relevant provisions of 310 CMR 40.0400. At this time, no federal, state, or local permits aside from those being obtained from the Town of Boxford are viewed to be necessary to complete the IRA activities described herein.

4.1 Groundwater Monitoring Well Installation

It is anticipated that three (3) groundwater monitoring wells will be installed to assess the impact to groundwater resulting from this vehicle accident and response activities. One (1) well will be installed in the area of excavation to assess impact derived from the vehicle accident and application of AFFF while two (2) additional wells will be installed outside the area of potential impact to serve as points of comparison to "background" conditions. Given the ubiquitous nature of PFAS compounds, these two (2) additional wells will aid in determination of concentrations of PFAS which may be present in the environment in absence of these release conditions (i.e., anthropogenic ambient background). They will also serve as controls for potential of cross contamination by installation and sampling methods. Select rinse 'blanks' may also be collected at the discretion of the supervising professional due to the ubiquitous nature of PFAS in the environment.

The wells will be constructed of 2-inch polyvinyl chloride (PVC) well materials installed to a sufficient depth and screened across the water table, to function as a "water table" style groundwater monitoring devices. The well screens and annulus will be surrounded by a sand pack and sealed at depth using bentonite. The monitoring wells will be set in traffic-bearing roadboxes flush with existing grade and developed upon completion. A top of casing (TOC) elevation survey may be completed as needed to determine water table elevation and groundwater flow direction.

4.2 Groundwater Monitoring and Sampling

Periodic groundwater monitoring activities will include gauging of site-related wells using a decontaminated electronic interface probe (EIP) capable of measuring depth of groundwater from the surveyed reference elevation situated at the top of each monitoring well casing, and the presence/thickness of light non-aqueous phase liquid (NAPL), with an accuracy of ±0.01 feet.

Periodic groundwater sampling activities will be accomplished using "low-flow" sampling techniques with a peristaltic pump, dedicated disposable polyethylene tubing, and a multimeter probe set within a flow-through cell to confirm the stability of groundwater at the point of sampling. In this manner, site-related wells will be purged of three (3) volumes of "standing formation" groundwater or until geochemical parameters indicate that stability has been achieved during pumping prior to collecting the groundwater samples. Groundwater sampling may also be accomplished using manual sampling techniques employing disposable, bucket-type bailers in instances at the discretion of the supervising professional.

It is currently anticipated that collected groundwater samples will be submitted to Alpha for laboratory analyses of targeted VOCs, PAHs, VPH/EPH fractions, and PFAS using Department-approved methods. If analytical results indicate the need, the groundwater monitoring well network may be expanded to fully delineate the plume associated with this RTN. Additional samples may also be collected a background and 'blank' samples may also be collected at the discretion of the supervising professional due to the ubiquitous nature of PFAS in the environment.

4.3 Private Drinking Water Supply Well Sampling

If indicated by the results of the groundwater monitoring and sampling, CHCI may elect to conduct sampling of private water supply wells at select nearby properties within 500 feet of the vehicle accident locale. This process will require coordination to access and sample said parcels, as well as consent from the respective owners. Any such samples would be collected from the closest location possible to the pressure tank. The sample will be collected after purging the private water supply system by activation and continuous operation of the interior water spigot for approximately ten (10) minutes to collect a representative sample. The collected samples will be submitted to Alpha for analyses of target VOC, target PAHs, VPH/EPH fractions, and PFAS, as indicated by the results of the groundwater sampling analytical results.

Background and blank samples may also be collected at the discretion of the supervising professional due to the ubiquitous nature of PFAS in the environment.

4.4 Resource Area Protection and Site Restoration Activities

Once excavation and groundwater monitoring well installation is completed, PEN Fuel Co. anticipates completing resource area restoration activities in the manner prescribed by the Boxford Conservation Commission, which is anticipated to include a resource area band boundary survey completed by Williams & Sparages Engineering of Middleton, Massachusetts to ensure that the backfill and restoration of the area of excavation and associated erosion control(s) are appropriate for this site. The excavation will be backfilled at the completion of excavation activities. The fill used in this project shall be clean fill, and not contain trash, refuse, or other construction debris such as bricks, plaster, lath, paper, cardboard, pipe, tire, ashes, etc. Sedimentation barriers shall be inspected, certified, and maintained in good repair until the disturbed areas have been stabilized in accordance with Boxford requirements.

4.5 Characterization and Management of Waste

At this time, future characterization and management of waste associated with RTN 3-37579 is believed to be limited to relatively small quantities of OHM-impacted soil or groundwater. Other future waste is not anticipated to be produced during the remaining site redevelopment activities being contemplated for this property. However, if an additional volume of impacted soils needs characterization and/or off-site management as part of this project, analytical testing and field screening activities will be utilized to segregate this material from that other remaining material that is viewed to be suitable for on-site reuse as described previously in Section 3.0.

Soils to be transported off-site for recycling/disposal will be encapsulated in polyethylene sheeting and/or roll off containers at the DPW facility for temporary storage in accordance with Department Guidance Documents and Policies and standard industry practice. Temporarily stored soil stockpiles will be

encapsulated with polyethylene sheeting in such a way as to prevent the erosion of the stockpiles by wind, rain, or stormwater flow. Waste will be appropriately managed by a licensed hauler and treated or recycled as needed as a permitted facility.

4.6 Limitations of IRA

As the conditions which gave rise to this new RTN are already of-record with the Department under RTN 3-37579, and this IRA Plan is being prepared and submitted to address and manage OHM-impacted media being targeted for remediation as detailed herein, only conditions that are considered to be truly "new", or situations that represent "significant changes" in existing site conditions, will be contemplated within the context of the criteria for regulatory notification under 310 CMR 40.0300.

Acknowledging this history, the degree to which site conditions are determined to be "new" or "significantly different" from those previously documented in the associated records will be subjected to the judgment of the supervising professional in responsible charge of the response actions or assessment work conducted hereunder. Should such conditions be encountered, the work being performed in conjunction with this IRA will be suspended while appropriate notification is provided.

On-site health and safety practices in accordance with standards set forth by the Occupational Safety and Health Administration (29 CFR 1910.120) will continue to be observed by workers associated with this IRA for the duration of field activities. A site-specific Soil Management Plan and a site-specific Health and Safety Plan have been prepared for these activities and will be utilized by CHCI personnel and their subcontractors during the activities described herein. If site conditions become significantly different from those previously documented for this site, if an Imminent Hazard is identified to exist, or if newly-discovered conditions requiring a two (2) or seventy-two (72) hour notification of a release pursuant to 310 CMR 40.0300 are encountered, all work being performed in conjunction with the IRA shall be suspended while appropriate notification is provided.

5.0 FINDINGS AND CONCLUSIONS

The following is a statement of the findings of this IRA Plan completed to outline further response actions planned to assess and address residual hydrocarbon impact identified at the Tractor Trailer Vehicle Accident Site situated along Ipswich Road and conclusions based thereon:

- The vehicle accident site is located along the southern shoulder of Ipswich Road between Porter Road and Mulberry Lane in a predominantly residential portion of Boxford, Massachusetts.

- On July 9, 2022, a tractor trailer hauling gasoline overturned and struck a telephone pole during a vehicle accident on the southern edge of Ipswich Road releasing less than 10 gallons of grease and engine oil to the ground and roadway surface; none of the gasoline or diesel motor fuel was released as the result of this accident.

- Initial response actions at the vehicle accident site included deployment of approximately 30 gallons of FireAde 2000 Brand AFFF to the environment as a precautionary fire suppressant.

- Receptors in the study area appear to be limited to surficial soils at the location of the release, but may also include subsurface groundwater, wetlands, surface water, and nearby private water supply wells.

- Excavation activities appear to have been successful in removing the impacted soils from the site, resulting in approximately 30 cubic yards of soil temporarily stored at the DPW yard awaiting final characterization and management.

Based on current site conditions, it is anticipated that significant strides towards site stability have been achieved as the result of the remedial efforts implemented under the Department authorized IRA for RTN 3-37579. Further soil and groundwater samples will likely need to be collected from this site to confirm these assertions, but only limited future management and recycling of incremental quantities of petroleum-impacted material from the property are anticipated from this point moving forward.

Following removal of the soil and groundwater, none of the remaining conditions at this site are viewed to pose an Imminent Hazard, represent a Condition of Substantial Release Migration, or otherwise have the potential to meet Critical Exposure Pathway criteria. Accordingly, further research on potential receptors situated in the vicinity of the site, combined with planned soil and groundwater characterization efforts, will provide additional information to complete the evaluations necessary to determine if site conditions are stable and comply with the remaining criteria for IRA Completion specified in 310 CMR 40.0427.

These conclusions are based on the subsurface conditions encountered at this site, the nature and location of potential receptors in the site area, and analytical results from groundwater sampling activities presented herein. Insofar as the specific information required by 310 CMR 40.0424 has been provided to the Department in this submittal the objectives stated previously herein for this Report are viewed to have been achieved.

6.0 REFERENCES

The following is a list of references for regulations, guidance documents, policies, and/or other information reviewed, cited, incorporated, or otherwise utilized during the preparation and review of this Report:

- The Commonwealth of Massachusetts:
  - Department of Environmental Protection
  - Department of Fire Services
  - Geographic Information Systems

- Town of Boxford:
  - Fire Department
  - Conservation Commission
  - Health Department
  - Assessor's Department

- Lawrence, MA-NH 15-Minute Series Topographic Map, United States Geologic Survey (1987)

- Interviews, records, and information provided by PEN Fuel Co. and employees

7.0 LIMITATIONS AND QUALITY ASSURANCE/CONTROL

This Report has been prepared in accordance with standard industry practices related to environmental engineering, geology, and hydrogeology generally accepted in the Commonwealth of Massachusetts. This Report represents the results of work and actions completed by CarriageHouse Consulting, Inc. and other parties on behalf of P E N Fuel Co., Inc., for the purpose of evaluating subsurface conditions at this site. The information received, obtained, or otherwise provided by those parties or references cited herein was used to substantiate those conclusions and recommendations contained herein or transmitted herewith, subject to the judgment of the supervising professional. Subsurface conditions encountered at this site may not directly correlate to those stated herein, or extrapolated from herein, and are subject to change with time.

The following personnel certify that quality assurance and quality control procedures were diligently observed during data collection, reduction, analyses, and preparation of this Report by CarriageHouse Consulting, Inc. to ensure the content, accuracy, and quality of this document:

McKayla M. Olig
Environmental Scientist

9/7/22
Date

Karlyn J. Whipple
Senior Project Manager

9/7/22
Date

Brian D. Moore, P.G., L.S.P.
President

9/7/22
Date

Figures

Universal Transverse Mercator Coordinates:

4 729 312 m North
332 512 m East
Grid Zone 19

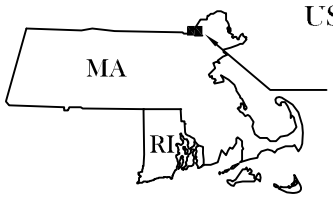
Latitude: 42° 41' 53" N
Longitude: 71° 02' 41" W

N

Scale 1 : 25,000

1000 0 1000 2000 3000 4000 FEET

Contour Intervals are 3 meters based on National Geodetic Vertical Datum of 1929 (Refer to References)



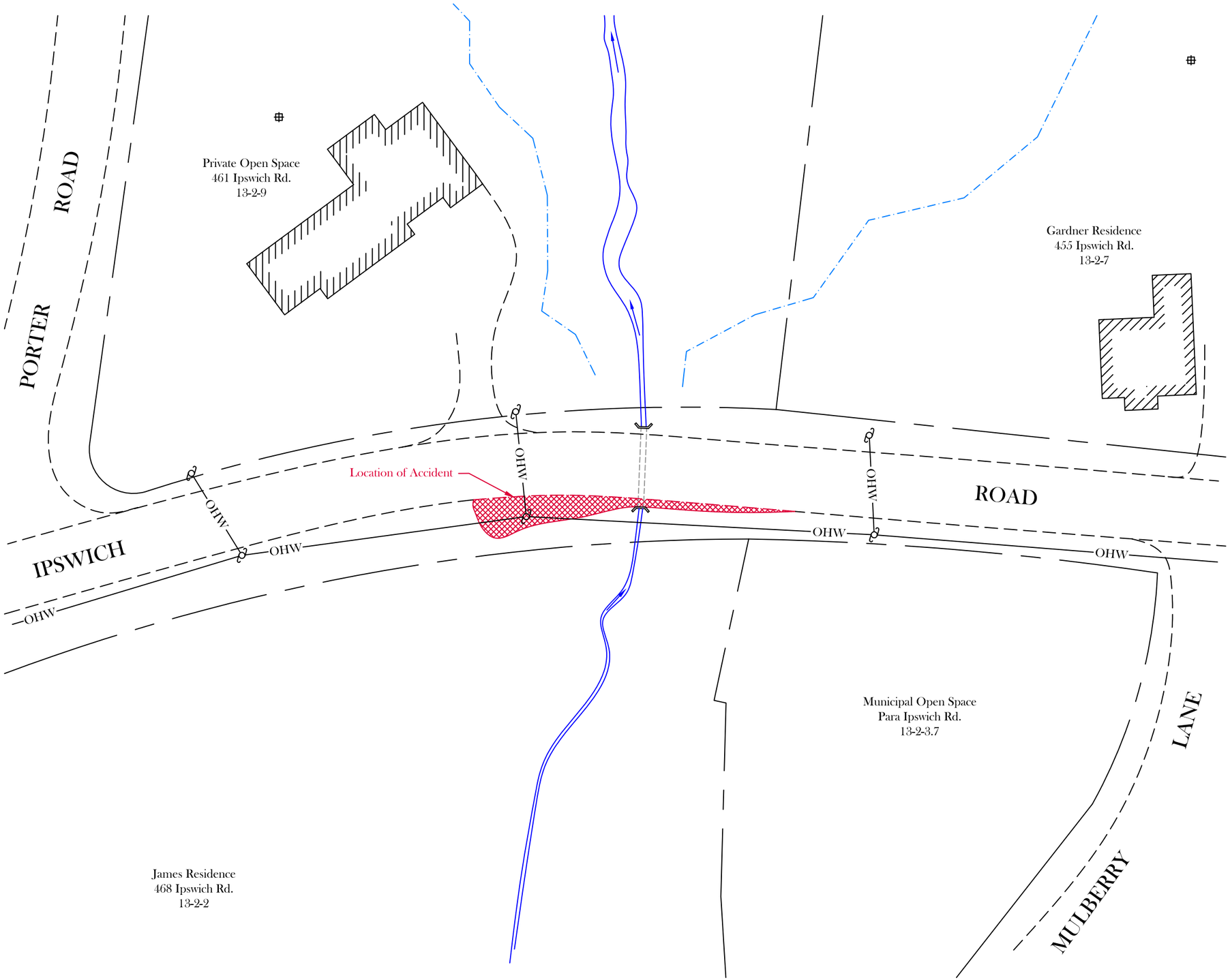
USGS Quadrangle Location(s)

Lawrence, MA-NH

FIGURE 1

LOCUS PLAN
Tractor Trailer Vehicle Accident Site
Ipswich Road (between Porter Rd. and Mulberry Ln.)
Ipswich, Massachusetts

Ref.: Locus Plan	Checked By: BDM
Drafted By: ELS	Date: 07/15/22
Revised By: HKY	Date: 07/28/22
Source(s): United States Geologic Survey 7.5 x 15 Minute Series Topographic Maps - Lawrence, MA-NH, Quadrangle (1987)	



North

KEY

Gardner Residence 455 Ipswich Rd. 13-2-7	Owner/Occupant Street Address Parcel ID (Map-Block-Lot)
⌖	Approximate Location of Private Domestic Water Supply Well
———	Parcel/Property Boundaries
– – –	Edge of Roadway/Traveled Way
~	Intermittent Surface Water
-·-·-	Mapped Resource Area Border
⩙	Headwall/Culvert
←	Surface water flow direction
℘	Utility Pole
-OHW-	Location of Overhead Wires

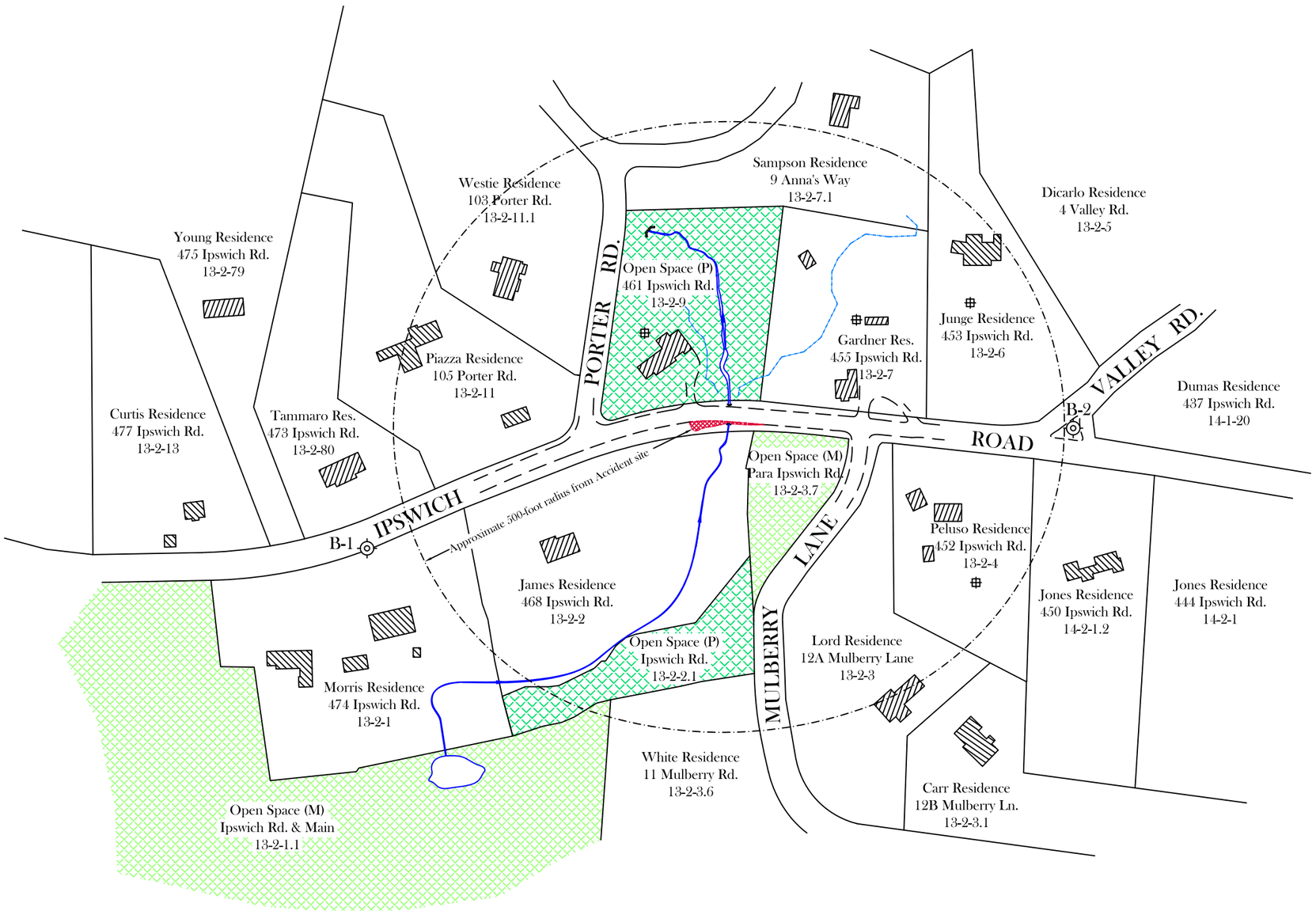
0 40

Scale in feet
(Approximate)

FIGURE 2

SITE PLAN
Tractor Trailer Vehicle Accident Site
Ipswich Road (between Porter Rd. and Mulberry Ln.)
Boxford, Massachusetts

Ref.: Study Area Plan	Checked By: BDM
Drafted By: BDM	Date: 07/25/22
Revised By: HKY	Date: 08/24/22
Source: Town of Boxford Municipal Office Plans and Records, Site Plans, and CHCI Field Reconnaissance	



KEY

Gardner Residence 455 Ipswich Rd. 13-2-7	Owner/Occupant Street Address Parcel ID (Map-Block-Lot)
	Approximate Location of Private Domestic Water Supply Well
	Location of Accident
	Parcel/Property Boundaries
	Soil Sample Location
	Edge of Roadway/Traveled Way
	Open Space (Municipal)
	Open Space (Private)
	Mapped/Intermittent Surface Water
	Mapped Resource Area Border
	Headwall/Culvert
	Surface water flow direction

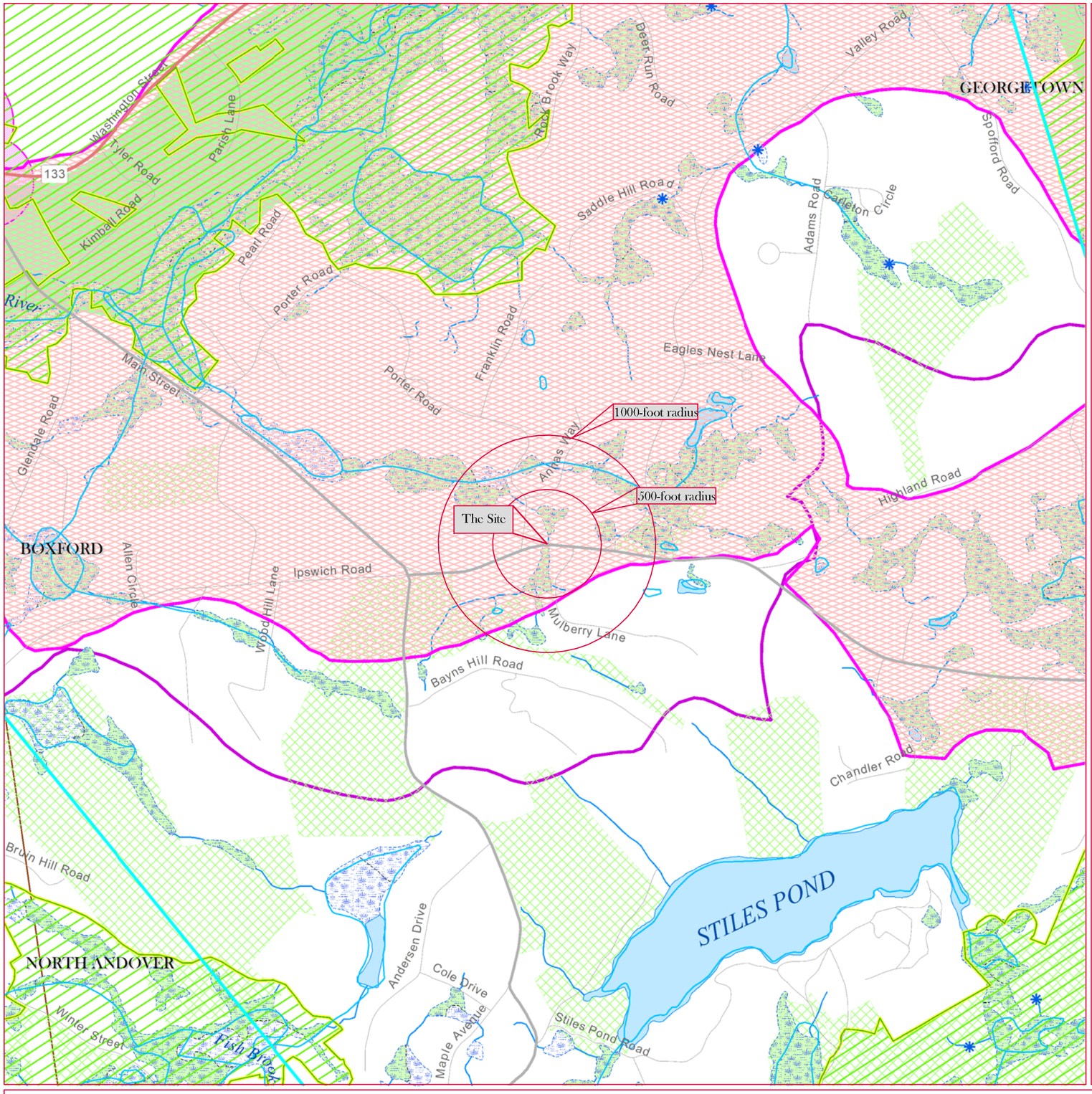
0 200

Scale in feet
(Approximate)

FIGURE 3

AREA PLAN
Tractor Trailer Vehicle Accident Site
Ipswich Road (between Porter Rd. and Mulberry Ln.)
Boxford, Massachusetts

Ref.: Study Area Plan	Checked By: BDM
Drafted By: BDM	Date: 07/25/22
Revised By: HKY	Date: 08/24/22
Source: Town of Boxford Municipal Office Plans and Records, Site Plans, and CHCI Field Reconnaissance	



Legend

21E Tier Classified Sites
- TIER I
- TIER II
- TIER1D
- AUL Sites
- Hydrographic Linear Features
- Railroads

MassDOT Roads
- Limited Access Highway
- Multi-lane Hwy, not limited access
- Other Numbered Highway
- Major Road, Collector
- Minor Road, Arterial
- Ramp
- Tunnel
- Tunnel (Limited Access Hwy)
- Tunnel (Multi-lane Hwy)
- Tunnel (Other Numbered Hwy)
- Community Groundwater Source
- Surface Water Intake
- Non-Community Groundwater Source
- Emergency Surface Water
- Surface Water Protection Zone A
- NHESP Certified Vernal Pools
- NHESP Estimated Habitats of Rare Wildlife
- NHESP Priority Habitats of Rare Species
- Area of Critical Environmental Concern
- Solid Waste Facilities

- Sole Source Aquifers
- DEP Approved Zone I
- DEP Approved Zone II
- IWPA
- Shoreline
- Hydrologic Connection
- Mean Low Water Line
- Wetland Limit
- Closure Line
- Marsh/Bog
- Wooded marsh
- Cranberry Bog
- Salt Marsh
- Open Water
- Reservoir (with PWSID)
- Tidal Flats
- Beach/Dune
- High Yield NPDWSA
- Medium Yield NPDWSA
- High Yield PPA
- Medium Yield PPA
- Protected Open Space
- Major Basins
- Transmission Lines
- Town Boundary

This image based on GIS data obtained: October 6, 2021.

GIS data provided by Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

500 0 500 1000 1500 2000 FEET

Scale 1 : 12,000

North

FIGURE 4

ENVIRONMENTAL RESOURCES PLAN
Tractor Trailer Vehicle Accident Site
Ipswich Road (between Porter Rd. and Mulberry Ln.)
Boxford, Massachusetts

Ref.: ERP 2022	Checked By: BDM
Drafted By: ELS	Date: 07/15/22
Revised By: HKY	Date: 07/28/22
Source: Massachusetts Geographic Information System	

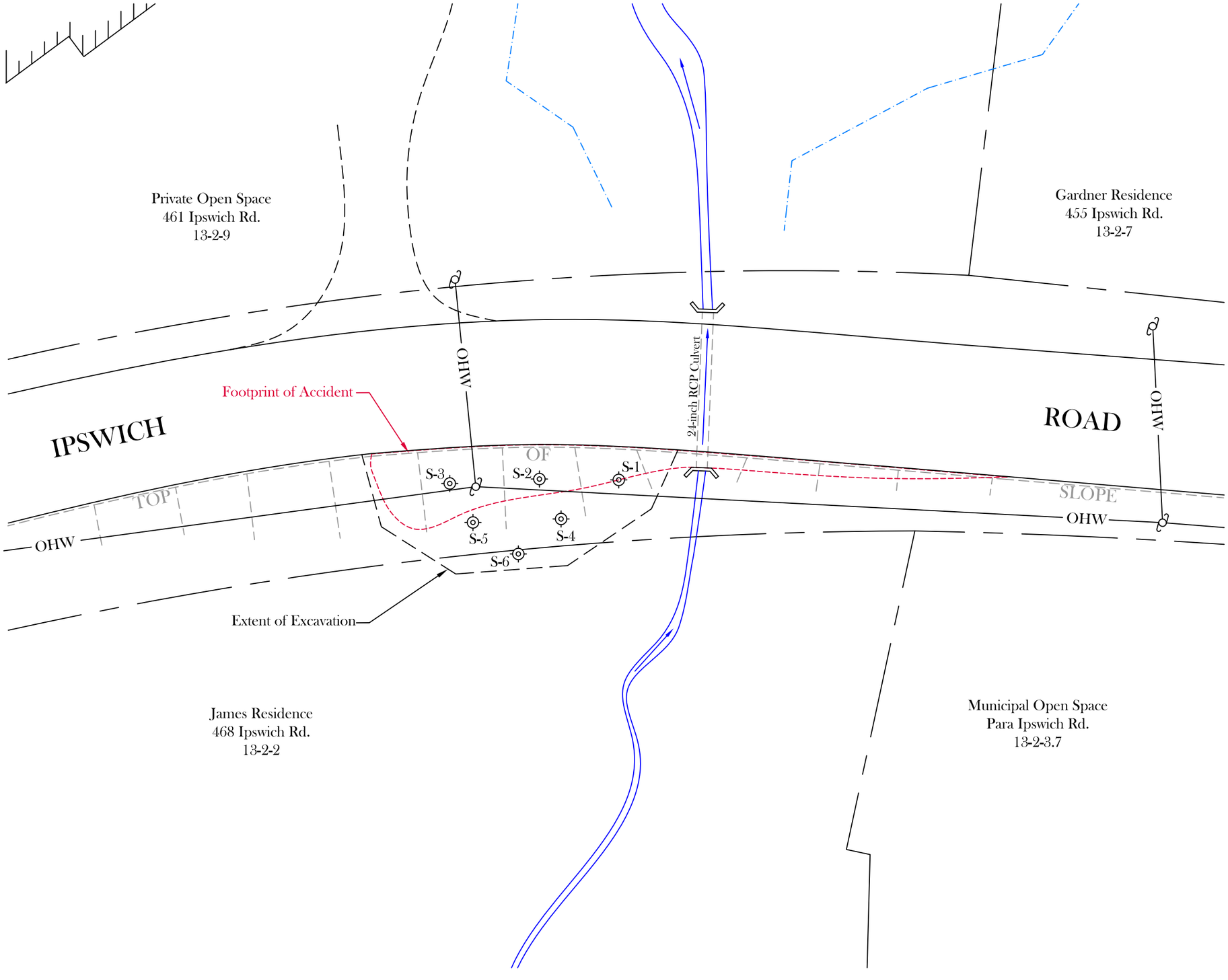


FIGURE 5

SOIL SAMPLE LOCATION PLAN
Tractor Trailer Vehicle Accident Site
Ipswich Road (between Porter Rd. and Mulberry Ln.)
Boxford, Massachusetts

Ref.: ssamp	Checked By: BDM
Drafted By: BDM	Date: 07/25/22
Revised By: HKY	Date: 08/24/22
Source: Town of Boxford Municipal Office Plans and Records, Site Plans, and CHCI Field Reconnaissance	

CARRIAGE HOUSE CONSULTING, INC.

Tables

TABLE 1

Soil Sample Analytical Data Summary
Volatile Organic Compounds and Volatile Petroleum Hydrocarbon Fractions
Tractor Trailer Vehicle Accident
Ipswich Road (between Porter Rd. and Mulberry Ln.)
Boxford, Massachusetts
July 12, 2022

MCP Method 1 Risk Characterization Standards Listed in 310 CMR 40.0000 (effective June 20, 2014)

Category S-1/GW-1 Soil Standard (ug/g)	*2*	*30*	*40*	*400*	*0.1*	*4*	*100*	*1,000*	*100*
Category S-1/GW-2 Soil Standard (ug/g)	*40*	*500*	*500*	*100*	*100*	*20*	*100*	*1,000*	*100*
Category S-1/GW-3 Soil Standard (ug/g)	*40*	*500*	*500*	*500*	*100*	*500*	*100*	*1,000*	*100*
Category S-2/GW-1 Soil Standard (ug/g)	*2*	*30*	*40*	*400*	*0.1*	*4*	*500*	*3,000*	*300*
Category S-2/GW-2 Soil Standard (ug/g)	*200*	*1,000*	*1,000*	*100*	*100*	*20*	*500*	*3,000*	*500*
Category S-2/GW-3 Soil Standard (ug/g)	*200*	*1,000*	*1,000*	*1,000*	*500*	*1,000*	*500*	*3,000*	*500*
Category S-3/GW-1 Soil Standard (ug/g)	*2*	*30*	*40*	*400*	*0.1*	*4*	*500*	*5,000*	*300*
Category S-3/GW-2 Soil Standard (ug/g)	*400*	*2,000*	*1,000*	*100*	*100*	*20*	*500*	*5,000*	*500*
Category S-3/GW-3 Soil Standard (ug/g)	*1,000*	*3,000*	*3,000*	*3,000*	*500*	*3,000*	*500*	*5,000*	*500*

Laboratory Analytical Results

Soil Sample Location or ID	Date	Depth (feet)	Benzene (ug/g)	Toluene (ug/g)	Ethyl-benzene (ug/g)	Total Xylenes (ug/g)	MTBE (ug/g)	Naph-thalene (ug/g)	C_5-C_8 Aliphatics (ug/g)	C_9-C_{12} Aliphatics (ug/g)	C_9-C_{10} Aromatics (ug/g)
S-2	7/12/22	0-0.5	<0.119	<0.119	<0.119	<0.238	<0.060	0.253	<5.95	<5.95	<5.95

Notes:

MTBE - methyl tert-butyl ether (CAS# 1634-04-4, a.k.a. methyl t-butyl ether)

Naphthalene - values presented reflect results of laboratory analyses conducted for volatile organic compounds only

Aliphatics - values represent adjusted aliphatic hydrocarbons (compounds having an open-chain structure such as parafins, olefins, acetylenes, and derivatives thereof) for the boiling point range associated with the carbon range (C_n-C_n) defined by the MassDEP approved method

Aromatics - values represent unadjusted aromatic hydrocarbons (compounds containing at least one benzene ring such as cyclic hydrocarbons and derivatives thereof) for the boiling point range associated with the carbon range (C_n-C_n) defined by the MassDEP approved method

ug/g - micrograms per gram (parts per million)

<0.09 - not detected at or above the associated compound(s) method reporting limit(s)

TABLE 2

Soil Sample Analytical Data Summary
Polynuclear Aromatic Hydrocarbons and Extractable Petroleum Hydrocarbons Fractions
Tractor Trailer Vehicle Accident
Ipswich Road (between Porter Rd. and Mulberry Ln.)
Boxford, Massachusetts
July 12, 2022

MCP Method 1 Risk Characterization Standards Listed in 310 CMR 40.0000 (effective June 20, 2014)

Category S-1/GW-1 Soil Standard (ug/g)	*4*	*1*	*1,000*	*7*	*2*	*7*	*1,000*	*70*	*70*	*0.7*	*1,000*	*1,000*	*7*	*0.7*	*4*	*10*	*1,000*	*1,000*	*3,000*	*1,000*
Category S-1/GW-2 Soil Standard (ug/g)	*1,000*	*600*	*1,000*	*7*	*2*	*7*	*1,000*	*70*	*70*	*0.7*	*1,000*	*1,000*	*7*	*80*	*20*	*500*	*1,000*	*1,000*	*3,000*	*1,000*
Category S-1/GW-3 Soil Standard (ug/g)	*1,000*	*10*	*1,000*	*7*	*2*	*7*	*1,000*	*70*	*70*	*0.7*	*1,000*	*1,000*	*7*	*300*	*500*	*500*	*1,000*	*1,000*	*3,000*	*1,000*
Category S-2/GW-1 Soil Standard (ug/g)	*4*	*1*	*3,000*	*40*	*7*	*40*	*3,000*	*400*	*400*	*4*	*3,000*	*3,000*	*40*	*1*	*4*	*20*	*3,000*	*3,000*	*5,000*	*1,000*
Category S-2/GW-2 Soil Standard (ug/g)	*3,000*	*600*	*3,000*	*40*	*7*	*40*	*3,000*	*400*	*400*	*4*	*3,000*	*3,000*	*40*	*80*	*20*	*1,000*	*3,000*	*3,000*	*5,000*	*3,000*
Category S-2/GW-3 Soil Standard (ug/g)	*3,000*	*10*	*3,000*	*40*	*7*	*40*	*3,000*	*400*	*400*	*4*	*3,000*	*3,000*	*40*	*500*	*1,000*	*1,000*	*3,000*	*3,000*	*5,000*	*3,000*
Category S-3/GW-1 Soil Standard (ug/g)	*4*	*1*	*5,000*	*300*	*30*	*300*	*5,000*	*3,000*	*3,000*	*30*	*5,000*	*5,000*	*300*	*1*	*4*	*20*	*5,000*	*5,000*	*5,000*	*1,000*
Category S-3/GW-2 Soil Standard (ug/g)	*5,000*	*600*	*5,000*	*300*	*30*	*300*	*5,000*	*3,000*	*3,000*	*30*	*5,000*	*5,000*	*300*	*80*	*20*	*3,000*	*5,000*	*5,000*	*5,000*	*5,000*
Category S-3/GW-3 Soil Standard (ug/g)	*5,000*	*10*	*5,000*	*300*	*30*	*300*	*5,000*	*3,000*	*3,000*	*30*	*5,000*	*5,000*	*300*	*500*	*3,000*	*3,000*	*5,000*	*5,000*	*5,000*	*5,000*

Laboratory Analytical Results

Soil Sample Location or ID	Date	Depth (feet)	Acenaph-thene (ug/g)	Acenaph-thylene (ug/g)	Anthra-cene (ug/g)	BaA (ug/g)	BaP (ug/g)	BbF (ug/g)	BgP (ug/g)	BkF (ug/g)	Chrysene (ug/g)	DaA (ug/g)	Fluoran-thene (ug/g)	Fluorene (ug/g)	IP (ug/g)	2-Methyl-naphthalene (ug/g)	Naph-thalene (ug/g)	Phenan-threne (ug/g)	Pyrene (ug/g)	C_9-C_{18} Aliphatics (ug/g)	C_{19}-C_{36} Aliphatics (ug/g)	C_{11}-C_{22} Aromatics (ug/g)
S-2	7/12/22	0.0-0.5	<1.88	<1.88	3.82	16.3	14.3	21.5	7.24	22.3	21.9	2.95	48.8	3.57	8.77	<1.88	<1.88	39.8	43.3	<37.6	<37.6	381
S-3	7/12/22	0.0-0.5	<0.708	<0.708	1.71	7.35	7.12	10.3	4.18	4.17	10.2	1.48	20.7	1.52	4.79	<0.708	<0.708	16.3	17.9	<14.2	20.6	191
S-4	7/12/22	0.0-0.5	<0.847	<0.847	<0.847	1.11	1.16	1.88	1.72	<0.847	1.71	<0.847	2.75	<0.847	<0.847	<0.847	<0.847	1.52	2.57	<16.9	<16.9	39.2
S-5	7/12/22	0.0-0.5	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<0.518	<10.4	<10.4	15.5
S-6	7/12/22	0.0-0.5	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<0.762	<15.2	<15.2	15.3

Notes:
BaA - benzo(a)anthracene
BaP - benzo(a)pyrene
BbF - benzo(b)fluoranthene
BgP - benzo(g,h,i)perylene
BkF - benzo(k)fluoranthene
DaA - dibenzo(a,h)anthracene
IP - indeno(1,2,3-cd)pyrene
Naphthalene - the values presented in this Table for this compound reflect the results of laboratory analyses conducted for extractable hydrocarbons only
Aliphatics - values represent unadjusted aliphatic hydrocarbons (organic compounds having an open-chain structure such as parafins, olefins, acetylenes, and derivatives thereof) for the boiling point range associated with the carbon range (C_n-C_n) defined by the MassDEP M
Aromatics - values represent adjusted aromatic hydrocarbons (compounds containing at least one benzene ring such as cyclic hydrocarbons and derivatives thereof) for the boiling point range associated with the carbon range (C_n-C_n) defined by the MassDEP Method
ug/g - micrograms per gram (parts per million)
<0.526 - not detected at or above the associated compound(s) method reporting limit(s)
- shading indicates detected concentration of targeted analyte exceeds one or more applicable MCP Method 1 Standards presented above

TABLE 3

Soil Sample Analytical Data Summary
Perfluoroalkyl and Polyfluoroalkyl Substances
Tractor Trailer Vehicle Accident
Ipswich Road (between Porter Rd. and Mulberry Ln.)
Boxford, Massachusetts
July 11, 2022 through July 12, 2022

MCP Method 1 Risk Characterization Standards Listed in 310 CMR 40.0000 (promulgated December 27, 2019)

Category S-1/GW-1 Soil Standard (ug/g)	*0.3*	*0.32*	*0.72*	*0.5*	*2.0*	*0.3*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Category S-1/GW-2 Soil Standard (ug/g)	*300*	*300*	*300*	*300*	*300*	*300*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Category S-1/GW-3 Soil Standard (ug/g)	*300*	*300*	*300*	*300*	*300*	*300*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Category S-2/GW-1 Soil Standard (ug/g)	*0.3*	*0.32*	*0.72*	*0.5*	*2.0*	*0.3*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Category S-2/GW-2 Soil Standard (ug/g)	*400*	*400*	*400*	*400*	*400*	*400*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Category S-2/GW-3 Soil Standard (ug/g)	*400*	*400*	*400*	*400*	*400*	*400*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Category S-3/GW-1 Soil Standard (ug/g)	*0.3*	*0.32*	*0.72*	*0.5*	*2.0*	*0.3*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Category S-3/GW-2 Soil Standard (ug/g)	*400*	*400*	*400*	*400*	*400*	*400*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Category S-3/GW-3 Soil Standard (ug/g)	*400*	*400*	*400*	*400*	*400*	*400*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Laboratory Analytical Results

Soil Sample Location or ID	Date	Depth (feet)	PFDA (ng/g)	PFNA (ng/g)	PFOA (ng/g)	PFHpA (ng/g)	PFOS (ng/g)	PFHxS (ng/g)	PFTA (ng/g)	PFTrDA (ng/g)	PFDoA (ng/g)	PFUnA (ng/g)	PFHxA (ng/g)	PFPeA (ng/g)	PFBA (ng/g)	PFDS (ng/g)	PFNS (ng/g)	PFHpS (ng/g)	PFPeS (ng/g)	PFBS (ng/g)	8:2FTS (ng/g)	6:2FTS (ng/g)	4:2FTS (ng/g)	FOSA (ng/g)	NEtFOSAA (ng/g)	NMeFOSAA (ng/g)
B-1	7/11/22	0.0-0.5	<0.239	<0.239	<0.239	<0.239	<0.239	<0.239	<0.477	<0.477	<0.477	<0.477	<0.477	<0.477	<0.477	<0.477	<0.955	<0.477	<0.955	<0.239	<0.477	<0.477	<0.955	<0.477	<0.477	<0.477
B-2	7/11/22	0.0-0.5	<0.239	<0.239	<0.239	<0.239	<0.239	<0.239	<0.478	<0.478	<0.478	<0.478	<0.478	<0.478	<0.478	<0.478	<0.955	<0.478	<0.955	<0.239	<0.478	<0.478	<0.955	<0.478	<0.478	<0.478
WC-1	7/12/22	0.0-0.5	<0.425	<0.425	<0.425	<0.425	<0.425	<0.425	<0.850	<0.850	<0.850	<0.850	1.57	<0.850	<0.850	<0.425	<1.70	<0.850	<1.70	<0.425	<0.850	12.0	<1.70	<0.850	<0.850	<0.850
S-1	7/12/22	0.0-0.5	<0.254	<0.254	<0.254	<0.254	0.328	<0.254	<0.507	<0.507	<0.507	<0.507	<0.507	<0.507	<0.507	<0.507	<1.01	<0.507	<1.01	<0.254	<0.507	<0.507	<1.01	<0.507	<0.507	<0.507
S-2	7/12/22	0.0-0.5	<0.264	<0.264	<0.264	<0.264	<0.264	<0.264	<0.528	<0.528	<0.528	<0.528	0.733	<0.528	<0.528	<0.528	<1.06	<0.528	<1.06	<0.264	<0.528	3.44	<1.06	<0.528	<0.528	<0.528
S-3	7/12/22	0.0-0.5	<0.246	<0.246	<0.246	<0.246	0.328	<0.246	<0.492	<0.492	<0.492	<0.492	<0.492	<0.492	<0.492	<0.492	<0.983	<0.492	<0.983	<0.246	<0.492	2.74	<0.983	<0.492	<0.492	<0.492
S-4	7/12/22	0.0-0.5	<0.907	<0.907	<0.907	<0.907	1.02	<0.907	<1.81	<1.81	<1.81	<1.81	4.24	<1.81	<1.81	<1.81	<3.63	<1.81	<3.63	<0.907	<1.81	20.4	<3.63	<1.81	<1.81	<1.81
S-5	7/12/22	0.0-0.5	<0.357	<0.357	<0.357	<0.357	<0.357	<0.357	<0.714	<0.714	<0.714	<0.714	1.59	<0.714	<0.714	<0.714	<1.43	<0.714	<1.43	<0.357	<0.714	9.79	<1.43	<0.714	<0.714	<0.714
S-6	7/12/22	0.0-0.5	<0.439	<0.439	<0.439	<0.439	<0.439	<0.439	<0.878	<0.878	<0.878	<0.878	<0.878	<0.878	<0.878	<0.878	<1.76	<0.878	<1.76	<0.439	<0.878	<0.878	<1.76	<0.878	<0.878	<0.878

Notes:
PFDA - Perfluorodecanoic Acid (CAS #335-76-2)
PFNA - Perfluorononanoic Acid (CAS #375-95-1)
PFOA - Perfluorooctanoic Acid (CAS #335-67-1)
PFHpA - Perfluoroheptanoic Acid (CAS #375-85-9)
PFOS - Perfluorooctanesulfonic Acid (CAS #1763-23-1)
PFHxS - Perfluorohexanesulfonic Acid (CAS #355-46-4)
PFTA - Perfluorotetradecanoic Acid (CAS #376-06-7)
PFTrDA - Perfluorotridecanoic Acid (CAS #72629-84-8)
PFDoA - Perfluorododecanoic Acid (CAS #307-55-1)
PFUnA - Perfluoroundecanoic Acid (CAS #2058-94-8)
PFHxA - Perfluorohexanoic Acid (CAS #307-24-4)
PFPeA - Perfluoropentanoic Acid (CAS #2760-90-3)
PFBA - Perfluorobutanoic Acid (CAS #375-22-4)
PFDS - Perfluorodecanesulfonic Acid (CAS #335-77-3)
PFNS - Perfluorononanesulfonic Acid (CAS #68259-12-1)
PFHpS - Perfluoroheptanesulfonic Acid (CAS #375-92-8)
PFPeS - Perfluoropentanesulfonic Acid (CAS #2706-91-4)
PFBS - Perfluorobutanesulfonic Acid (CAS #375-73-5)
8:2FTS - 1H,1H,2H,2H-Perfluorodecanesulfonic Acid (CAS #120226-60-0)
6:2FTS - 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (CAS #27619-97-2)
4:2FTS - 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (CAS #757124-72-4)
FOSA - Perfluorooctanesulfonamide (CAS #754-91-6)
NEtFOSAA - N-Ethyl Perfluorooctanesulfonamidoacetic Acid (CAS #2991-50-6)
NMeFOSAA - N-Methyl Perfluorooctanesulfonamidoacetic Acid (CAS #2355-31-9)
ng/g - nanograms per gram (parts per trillion)
<0.526 - not detected at or above the associated compound(s) method reporting limit(s)
* - indicates that a published value or Standard does not exist for this analyte

Appendix A

Public Involvement and Participation Correspondences

U.S. Priority Mail
September 6, 2022

Matthew Coogan
Town Administrator
Boxford Town Hall
7A Spofford Road
Boxford, MA 01921

Re: Notification of Submittal of Release Notification Form
Tractor Trailer Vehicle Accident Site
Ipswich Road (Between Porter Road and Mulberry Lane)
Boxford, MA 01906
RTN 3-37579

To Whom it May Concern:

We have prepared this letter on behalf of our client, P E N Fuel Co., Inc., with the objective of providing the Chief Municipal Office and Health Department, by copy hereto, with the written notification required by provisions set forth in 310 CMR 40.0000, the Massachusetts Contingency Plan (MCP).

Please accept this correspondence as notice prepared pursuant to 310 CMR 40.0371(3) that the BWSC-103 Release Notification Form (RNF) attached hereto was prepared and submitted to the Massachusetts Department of Environmental Protection (the Department) on September 2, 2022 for response action activities initiated to address potential oil and/or hazardous material-impact identified at the location of a tractor trailer vehicle accident site. The Department has assigned Release Tracking Number (RTN) 3-37579 to these conditions.

This correspondence has also been prepared pursuant to 310 CMR 40.1403, the same portion of the MCP in which additional public involvement opportunities are described. Further information is available for site-related RTNs through the Department's on-line file viewer at the following URL: https://eeaonline.eea.state.ma.us/portal#!/search/wastesite. Requests to review the referenced report or other information related to this site may also be directed to the Department's Northeast Regional Office at 205B Lowell Street in Wilmington, MA 01887 (Phone 978-694-3200).

Please do not hesitate to contact us with any questions or comments at (508) 315-3146.

Respectfully,
CarriageHouse Consulting, Inc.

Karlyn J. Whipple
Senior Project Manager

Brian D. Moore, P.G., L.S.P.
President

cc: Kendell Longo, Director of the Boxford Health Department, 7A Spofford Road, Boxford, MA 01921 *(U.S Priority Mail)*
P E N Fuel Co., Inc, 18 Lark Avenue, Saugus, MA 01906 *(electronic)*

Enclosure

Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC 103

RELEASE NOTIFICATION & NOTIFICATION RETRACTION FORM
Pursuant to 310 CMR 40.0335 and 310 CMR 40.0371 (Subpart C)

Release Tracking Number
3 - 37579

A. RELEASE OR THREAT OF RELEASE LOCATION:

1. Release Name/Location Aid: IN FRONT OF 461 IPSWICH ROAD

2. Street Address: 461 IPSWICH ROAD

3. City/Town: BOXFORD 4. ZIP Code: 019210000

5. Coordinates: a. Latitude: N 42.01139 b. Longitude: W 71.04472

B. THIS FORM IS BEING USED TO: (check one)

- [x] 1. Submit a **Release Notification**
- [ ] 2. Submit a **Revised Release Notification**
- [ ] 3. Submit a **Retraction of a Previously Reported Notification** of a release or threat of release including supporting documentation required pursuant to 310 CMR 40.0335 (Section C is not required)

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

C. INFORMATION DESCRIBING THE RELEASE OR THREAT OF RELEASE (TOR):

1. Date and time of Oral Notification, if applicable: 7/9/2022 (mm/dd/yyyy) Time: 07:37 (hh:mm) [x] AM [ ] PM
2. Date and time you obtained knowledge of the Release or TOR: 7/9/2022 (mm/dd/yyyy) Time: 07:00 (hh:mm) [x] AM [ ] PM
3. Date and time release or TOR occurred, if known: 7/9/2022 (mm/dd/yyyy) Time: 06:45 (hh:mm) [x] AM [ ] PM

Check all Notification Thresholds that apply to the Release or Threat of Release:
(for more information see 310 CMR 40.0310 - 40.0315)

4. 2 HOUR REPORTING CONDITIONS

- [ ] a. Sudden Release
- [x] b. Threat of Sudden Release
- [ ] c. Oil Sheen on Surface Water
- [ ] d. Poses Imminent Hazard
- [ ] e. Could Pose Imminent Hazard
- [ ] f. Release Detected in Private Well
- [ ] g. Release to Storm Drain
- [ ] h. Sanitary Sewer Release (Imminent Hazard Only)

5. 72 HOUR REPORTING CONDITIONS

- [ ] a. Subsurface Non-Aqueous Phase Liquid (NAPL) Equal to or Greater than 1/2 Inch (.04 feet)
- [ ] b. Underground Storage Tank (UST) Release
- [ ] c. Threat of UST Release
- [ ] d. Release to Groundwater near Water Supply
- [ ] e. Substantial Release Migration

6. 120 DAY REPORTING CONDITIONS

- [ ] a. Release of Hazardous Material(s) to Soil or Groundwater Exceeding Reportable Concentration(s)
- [x] b. Release of Oil to Soil Exceeding Reportable Concentration(s) and Affecting More than 2 Cubic Yards
- [ ] c. Release of Oil to Groundwater Exceeding Reportable Concentration(s)
- [ ] d. Subsurface Non-Aqueous Phase Liquid (NAPL) Equal to or Greater than 1/8 Inch (.01 feet) and Less than 1/2 Inch (.04 feet)

C. INFORMATION DESCRIBING THE RELEASE OR THREAT OF RELEASE (TOR): (cont.)

7. List below the Oils (O) or Hazardous Materials (HM) that exceed their Reportable Concentration (RC) or Reportable Quantity (RQ) by the greatest amount.

☐ Check here if an amount or concentration is unknown or less than detectable.

O or HM Released	CAS Number, if known	O or HM	Amount or Concentration	Units	RCs Exceeded, if Applicable (RCS-1, RCS-2,RCGW-1, RCGW-2)
ENGINE OIL/CRANKCASE OIL		O	10	GAL	N/A

☑ Check here if a list of additional Oil and Hazardous Materials subject to reporting, or any other documentation relating to this notification is attached.

D. PERSON REQUIRED TO NOTIFY:

1. Check all that apply: ☐ a. change in contact name ☐ b. change of address ☐ c. change in the person notifying

2. Name of Organization: PEN FUEL COMPANY INC

3. Contact First Name: NASSER 4. Last Name: ABU-EID

5. Street: 18 LARK AVE 6. Title: TREASURER

7. City/Town: SAUGUS 8. State: MA 9. ZIP Code: 019060000

10. Telephone: 781-246-0201 11. Ext.: 12. Email: NASSERA@ALPRIME.COM

☑ 13. Check here if attaching names and addresses of owners of properties affected by the Release or Threat of Release, other than an owner who is submitting this Release Notification (required).

E. RELATIONSHIP OF PERSON TO RELEASE OR THREAT OF RELEASE: ☐ Check here to change relationship

☑ 1. RP or PRP ☐ a. Owner ☐ b. Operator ☐ c. Generator ☐ d. Transporter

☑ e. Other RP or PRP Specify: NON-SPECIFIED PRP

☐ 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 Otherwise Required to Notify Specify Relationship:

F. CERTIFICATION OF PERSON REQUIRED TO NOTIFY:

1. I, NASSER ABU-EID, 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 those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is 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 : NASSER ABU-EID (Signature) 3. Title: TREASURER

4. For: PEN FUEL COMPANY INC (Name of person or entity recorded in Section D) 5. Date : 9/2/2022 mm/dd/yyyy

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

7. Street:

8. City/Town: 9. State: 10. ZIP Code:

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

YOU ARE SUBJECT TO ANNUAL COMPLIANCE ASSURANCE FEES FOR EACH BILLABLE YEAR FOR TIER CLASSIFIED DISPOSAL SITES. 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:)

Received by DEP on 9/2/2022 2:52:21 PM

This document is a Statement of Provision for BWSC-103, Section C, Question 8:

The original tractor trailer vehicle accident included the tractor and trailer owned by PEN Fuel and the trailer containing gasoline. Reconciliation of the trailer inventory confirmed that no gasoline is believed to have been released to the environment as the result of the accident. Although some fluid was lost to the surficial soils at the accident site from the tractor engine, the tractor was successfully re-started after being winched back onto the roadway. No reported loss of diesel fuel was noted from the tractor saddle tanks as the result of the accident.

Three (3) municipal/inter-agency fire companies were deployed to the site, including Town of Boxford, and the incident commander directed the deployment of Aqueous Film-Forming Foam (AFFF) in a precautionary manner at the accident site. The volume and composition of the foam deployed at the accident site were reportedly approximately 30 gallons of FireAide 2000 brand AFFF.

Analyses of source area soil samples – including the composite soil samples collected for waste characterization - has indicated that the following three (3) compounds have been found in soils located proximate to the vehicle accident locale:

PFOS - Perfluorooctanesulfonic Acid (CAS #1763-23-1)
PFHxA - Perfluorohexanoic Acid (CAS #307-24-4)
6:2FTS - 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (CAS #27619-97-2)

None of the detected concentrations of these compounds in the collected soil samples exceeded the reportable concentrations promulgated by the Department in 310 CMR 40.1600.

This document is a Statement of Provision for BWSC-103, Section D, Question 13:

The location where the vehicle accident occurred is within the Ipswich Road right-of-way, at and adjacent to the southern edge of the paved portion of the right-of-way, between Porter Road (to the west) and Mulberry Lane (to the east). The right-of-way is owned by the Town of Boxford, and the Town Administrator has been identified as a point of contact for this municipal entity as follows:

Mr. Matthew Coogan
Town Administrator
Boxford Town Hall
7A Spofford Road
Boxford, MA 01921
(978) 887-6000

Appendix B

Soil Sample Analytical Data

ANALYTICAL REPORT

Lab Number:	L2237077
Client:	CarriageHouse Consulting Inc. 8A Pleasant Street South Natick, MA 01760
ATTN:	Brian Moore
Phone:	(508) 315-3146
Project Name:	PEN-BOXFORD
Project Number:	MA220701
Report Date:	08/04/22

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2237077-01	S-1	SOIL	BOXFORD, MA	07/12/22 12:25	07/12/22
L2237077-02	S-2	SOIL	BOXFORD, MA	07/12/22 12:20	07/12/22
L2237077-03	S-3	SOIL	BOXFORD, MA	07/12/22 12:10	07/12/22
L2237077-04	S-4	SOIL	BOXFORD, MA	07/12/22 11:55	07/12/22
L2237077-05	S-5	SOIL	BOXFORD, MA	07/12/22 12:05	07/12/22
L2237077-06	S-6	SOIL	BOXFORD, MA	07/12/22 11:45	07/12/22

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237077
Project Number:	MA220701	**Report Date:**	08/04/22

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: PEN-BOXFORD **Lab Number:** L2237077
Project Number: MA220701 **Report Date:** 08/04/22

Case Narrative (continued)

Perfluorinated Alkyl Acids by Isotope Dilution

L2237077-01, -02, -03, -04, -06, WG1667173-1, WG1667173-1 (MEOH), WG1667173-2R, WG1667173-3, and WG1667173-4: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2237077-04 and -06: The MeOH fraction of the extraction is reported for perfluorooctanesulfonamide (fosa) due to better extraction efficiency of the perfluoro[13c8]octanesulfonamide (m8fosa) Extracted Internal Standard.

The Extracted Internal Standard recovery for the WG1667173-1 Method Blank, associated with L2237077-01 through -06, is below the acceptance criteria for perfluoro[13c8]octanesulfonamide (m8fosa) (less than 5%); however, the method blank is non-detect for all associated target analytes; therefore, no further action was taken.

WG1667173-2R: The sample was re-analyzed due to QC failures in the original analysis. The results of the re-analysis are reported.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Kelly O'Neill

Title: Technical Director/Representative Date: 08/04/22

ORGANICS

SEMIVOLATILES

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-01
Client ID: S-1
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 12:25
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/02/22 14:58
Analyst: RS
Percent Solids: 91%

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 16:49

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.507	--	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.507	--	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.254	--	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.01	--	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.507	--	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.01	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.254	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.254	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.254	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.507	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.507	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.254	--	1
Perfluorooctanesulfonic Acid (PFOS)	0.328		ng/g	0.254	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.254	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.507	--	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.01	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.507	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.507	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.507	--	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.507	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.507	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.507	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.507	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.507	--	1

Project Name: PEN-BOXFORD **Lab Number:** L2237077

Project Number: MA220701 **Report Date:** 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-01 Date Collected: 07/12/22 12:25

Client ID: S-1 Date Received: 07/12/22

Sample Location: BOXFORD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	108		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	100		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	99		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	91		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	101		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	97		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**162**	Q	20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	101		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	112		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	104		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**203**	Q	19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	93		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	120		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	20		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	100		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	110		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	123		24-159

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-02
Client ID: S-2
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 12:20
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/02/22 15:31
Analyst: RS
Percent Solids: 88%

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 16:49

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.528	--	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.528	--	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.264	--	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.06	--	1
Perfluorohexanoic Acid (PFHxA)	0.733		ng/g	0.528	--	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.06	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.264	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.264	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.264	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	3.44		ng/g	0.528	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.528	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.264	--	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.264	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.264	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.528	--	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.06	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.528	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.528	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.528	--	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.528	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.528	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.528	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.528	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.528	--	1

Project Name: PEN-BOXFORD **Lab Number:** L2237077

Project Number: MA220701 **Report Date:** 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-02 Date Collected: 07/12/22 12:20

Client ID: S-2 Date Received: 07/12/22

Sample Location: BOXFORD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	99		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	104		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**173**	Q	14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	89		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	96		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	103		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	93		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**193**	Q	20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	99		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	109		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	96		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**255**	Q	19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	90		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	116		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	32		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	112		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	110		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	104		24-159

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-03
Client ID: S-3
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 12:10
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/02/22 16:04
Analyst: RS
Percent Solids: 93%

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 16:49

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.492	--	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.492	--	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.246	--	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.983	--	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.492	--	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.983	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.246	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.246	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.246	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	2.74		ng/g	0.492	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.492	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.246	--	1
Perfluorooctanesulfonic Acid (PFOS)	0.328		ng/g	0.246	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.246	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.492	--	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.983	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.492	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.492	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.492	--	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.492	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.492	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.492	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.492	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.492	--	1

Project Name: PEN-BOXFORD **Lab Number:** L2237077

Project Number: MA220701 **Report Date:** 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-03 Date Collected: 07/12/22 12:10

Client ID: S-3 Date Received: 07/12/22

Sample Location: BOXFORD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	96		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	101		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	99		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	108		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	91		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	94		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	102		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	98		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	127		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	99		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	108		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	100		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**178**	Q	19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	61		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	112		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	40		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	66		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	113		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	113		24-159

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-04
Client ID: S-4
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 11:55
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/02/22 16:21
Analyst: RS
Percent Solids: 24%

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 16:49

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.81	--	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.81	--	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.907	--	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	3.63	--	1
Perfluorohexanoic Acid (PFHxA)	4.24		ng/g	1.81	--	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	3.63	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.907	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.907	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.907	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	20.4		ng/g	1.81	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.81	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.907	--	1
Perfluorooctanesulfonic Acid (PFOS)	1.02		ng/g	0.907	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.907	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.81	--	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	3.63	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.81	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.81	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.81	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.81	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.81	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.81	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.81	--	1

Project Name: PEN-BOXFORD **Lab Number:** L2237077

Project Number: MA220701 **Report Date:** 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-04 Date Collected: 07/12/22 11:55

Client ID: S-4 Date Received: 07/12/22

Sample Location: BOXFORD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	82		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	85		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	86		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	96		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	79		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	82		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	85		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	83		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	106		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	78		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	86		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	76		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	132		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	46		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	79		61-155
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	40		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	70		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**11**	Q	24-159

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-04
Client ID: S-4
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 11:55
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/03/22 16:09
Analyst: MP
Percent Solids: 24%

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 16:49

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.81	--	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	99		5-117

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-05
Client ID: S-5
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 12:05
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/02/22 16:37
Analyst: RS
Percent Solids: 63%

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 16:49

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.714	--	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.714	--	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.357	--	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.43	--	1
Perfluorohexanoic Acid (PFHxA)	1.59		ng/g	0.714	--	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.43	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.357	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.357	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.357	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	9.79		ng/g	0.714	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.714	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.357	--	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.357	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.357	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.714	--	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.43	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.714	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.714	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.714	--	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.714	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.714	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.714	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.714	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.714	--	1

Project Name: PEN-BOXFORD **Lab Number:** L2237077

Project Number: MA220701 **Report Date:** 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-05 Date Collected: 07/12/22 12:05

Client ID: S-5 Date Received: 07/12/22

Sample Location: BOXFORD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	87		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	89		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	88		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	89		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	80		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	79		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	92		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	78		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	111		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	87		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	96		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	81		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	131		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	47		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	93		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	21		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	42		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	86		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	27		24-159

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-06
Client ID: S-6
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 11:45
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/02/22 16:54
Analyst: RS
Percent Solids: 53%

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 17:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.878	--	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.878	--	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.439	--	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.76	--	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.878	--	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.76	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.439	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.439	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.439	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.878	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.878	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.439	--	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.439	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.439	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.878	--	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.76	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.878	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.878	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.878	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.878	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.878	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.878	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.878	--	1

Project Name: PEN-BOXFORD **Lab Number:** L2237077

Project Number: MA220701 **Report Date:** 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-06 Date Collected: 07/12/22 11:45

Client ID: S-6 Date Received: 07/12/22

Sample Location: BOXFORD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	81		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	85		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	86		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	93		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	80		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	80		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	86		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	78		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	99		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	89		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	93		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	87		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	136		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	53		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	94		61-155
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	49		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	82		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**14**	Q	24-159

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-06
Client ID: S-6
Sample Location: BOXFORD, MA

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/03/22 16:16
Analyst: MP
Percent Solids: 53%

Date Collected: 07/12/22 11:45
Date Received: 07/12/22
Field Prep: Not Specified

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 17:45

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.878	--	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	103		5-117

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/02/22 14:25
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 16:49

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-06 Batch: WG1667173-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.500	--
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.500	--
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.250	--
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	--
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.500	--
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	--
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.250	--
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.250	--
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.250	--
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.500	--
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.500	--
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.250	--
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.250	--
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.250	--
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.500	--
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	--
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.500	--
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.500	--
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.500	--
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.500	--
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.500	--
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.500	--
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.500	--
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.500	--

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/02/22 14:25
Analyst: RS

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 16:49

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-06 Batch: WG1667173-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	66		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	68		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	**71**	Q	74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	72		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**62**	Q	66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**65**	Q	71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	**70**	Q	78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**68**	Q	75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	88		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	75		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	**67**	Q	79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**71**	Q	75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	115		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	49		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	73		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**4**	Q	5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	43		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	66		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	33		24-159

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/03/22 15:54
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 07/25/22 16:49

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-06 Batch: WG1667173-1					
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.500	--

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**125**	Q	5-117

Lab Control Sample Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-06 Batch: WG1667173-2								
Perfluorobutanoic Acid (PFBA)	94		-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	94		-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	98		-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	108		-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	97		-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	101		-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	95		-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	111		-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	93		-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	107		-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	97		-		70-132	-		30
Perfluorononanoic Acid (PFNA)	92		-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	95		-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	97		-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	94		-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	95		-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	95		-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	96		-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	94		-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	86		-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	99		-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	94		-		69-135	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237077

Report Date: 08/04/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-06 Batch: WG1667173-2								
Perfluorotridecanoic Acid (PFTrDA)	108		-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	98		-		69-133	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	64				61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	69				58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	**73**	Q			74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	59				14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**64**	Q			66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**66**	Q			71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	**70**	Q			78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**69**	Q			75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	66				20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**71**	Q			72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	**70**	Q			79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**64**	Q			75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	66				19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	38				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	66				61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	6				5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	36				34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	64				54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	36				24-159

Lab Control Sample Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237077

Report Date: 08/04/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab	Associated sample(s): 01-06		Batch: WG1667173-2					
Perfluorooctanesulfonamide (FOSA)	88		-		67-137	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	116				5-117

Matrix Spike Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237077

Report Date: 08/04/22

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab	Associated sample(s): 01-06	QC Batch ID: WG1667173-3	QC Sample: L2237077-01	Client ID: S-1								
Perfluorobutanoic Acid (PFBA)	ND	5.22	5.25	99		-	-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	ND	5.22	5.57	103		-	-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	4.63	4.34	94		-	-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	4.89	5.28	108		-	-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	ND	5.22	5.44	101		-	-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	4.91	4.94	101		-	-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	ND	5.22	5.05	97		-	-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	4.77	5.40	113		-	-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	ND	5.22	5.33	102		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	4.96	5.69	105		-	-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	4.98	4.45	89		-	-		70-132	-		30
Perfluorononanoic Acid (PFNA)	ND	5.22	5.67	109		-	-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	0.328	4.84	5.49	107		-	-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	ND	5.22	5.85	112		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	5.01	5.08	101		-	-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	5.02	4.98	99		-	-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	5.22	4.99	96		-	-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	5.22	6.19	118		-	-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	5.04	4.45	88		-	-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	ND	5.22	5.29F	101		-	-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	5.22	4.80	92		-	-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	ND	5.22	5.41	104		-	-		69-135	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237077
Report Date: 08/04/22

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab	Associated sample(s): 01-06	QC Batch ID: WG1667173-3	QC Sample: L2237077-01	Client ID: S-1								
Perfluorotridecanoic Acid (PFTrDA)	ND	5.22	5.77	111		-	-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	5.22	5.33	102		-	-		69-133	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**229**	Q			19-175
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	120				14-167
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**177**	Q			20-154
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	109				34-137
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	101				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	115				61-155
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	99				75-130
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	94				66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	104				71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	110				78-139
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	112				54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	116				24-159
Perfluoro[13C4]Butanoic Acid (MPFBA)	106				61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	108				58-150
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	18				5-117
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	124				79-136
Perfluoro[13C8]Octanoic Acid (M8PFOA)	102				75-130
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	107				72-140
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	113				74-139

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-06 QC Batch ID: WG1667173-4 QC Sample: L2237077-02 Client ID: S-2						
Perfluorobutanoic Acid (PFBA)	ND	ND	ng/g	NC		30
Perfluoropentanoic Acid (PFPeA)	ND	ND	ng/g	NC		30
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/g	NC		30
Perfluorohexanoic Acid (PFHxA)	0.733	0.783	ng/g	7		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	ND	ng/g	NC		30
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ng/g	NC		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ng/g	NC		30
Perfluorooctanoic Acid (PFOA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	3.44	3.90	ng/g	13		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/g	NC		30
Perfluorononanoic Acid (PFNA)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonic Acid (PFOS)	ND	ND	ng/g	NC		30
Perfluorodecanoic Acid (PFDA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/g	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/g	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/g	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/g	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/g	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-06 QC Batch ID: WG1667173-4 QC Sample: L2237077-02 Client ID: S-2						
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/g	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/g	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/g	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/g	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	99		102		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	104		106		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		100		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	173	Q	161		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	89		99		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	96		106		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	103		99		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	93		107		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**193**	Q	**180**	Q	20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	99		107		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	109		106		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	96		101		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	**255**	Q	**233**	Q	19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	90		104		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	116		118		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	32		36		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	112		97		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	110		114		54-150

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-06 QC Batch ID: WG1667173-4 QC Sample: L2237077-02 Client ID: S-2

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	104		107		24-159

INORGANICS
&
MISCELLANEOUS

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-01
Client ID: S-1
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 12:25
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	91.3		%	0.100	--	1	-	07/28/22 21:12	121,2540G	JM

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-02
Client ID: S-2
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 12:20
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	88.1		%	0.100	--	1	-	07/28/22 21:12	121,2540G	JM

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-03
Client ID: S-3
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 12:10
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	92.9		%	0.100	--	1	-	07/28/22 21:12	121,2540G	JM

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-04
Client ID: S-4
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 11:55
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	24.4		%	0.100	--	1	-	07/28/22 21:12	121,2540G	JM

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-05
Client ID: S-5
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 12:05
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	62.8		%	0.100	--	1	-	07/28/22 21:12	121,2540G	JM

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

SAMPLE RESULTS

Lab ID: L2237077-06
Client ID: S-6
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 11:45
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	52.6		%	0.100	--	1	-	07/28/22 21:12	121,2540G	JM

Lab Duplicate Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237077

Report Date: 08/04/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Mansfield Lab Associated sample(s): 01-06 QC Batch ID: WG1668722-1 QC Sample: L2237077-01 Client ID: S-1						
Solids, Total	91.3	91.4	%	0		10

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2237077-01A	Plastic 8oz unpreserved	A	NA		4.8	Y	Absent		A2-537-ISOTOPE(14)
L2237077-01B	Plastic 2oz unpreserved for TS	A	NA		4.8	Y	Absent		A2-TS(7)
L2237077-02A	Plastic 8oz unpreserved	A	NA		4.8	Y	Absent		A2-537-ISOTOPE(14)
L2237077-02B	Plastic 2oz unpreserved for TS	A	NA		4.8	Y	Absent		A2-TS(7)
L2237077-03A	Plastic 8oz unpreserved	A	NA		4.8	Y	Absent		A2-537-ISOTOPE(14)
L2237077-03B	Plastic 2oz unpreserved for TS	A	NA		4.8	Y	Absent		A2-TS(7)
L2237077-04A	Plastic 8oz unpreserved	A	NA		4.8	Y	Absent		A2-537-ISOTOPE(14)
L2237077-04B	Plastic 2oz unpreserved for TS	A	NA		4.8	Y	Absent		A2-TS(7)
L2237077-05A	Plastic 8oz unpreserved	A	NA		4.8	Y	Absent		A2-537-ISOTOPE(14)
L2237077-05B	Plastic 2oz unpreserved for TS	A	NA		4.8	Y	Absent		A2-TS(7)
L2237077-06A	Plastic 8oz unpreserved	A	NA		4.8	Y	Absent		A2-537-ISOTOPE(14)
L2237077-06B	Plastic 2oz unpreserved for TS	A	NA		4.8	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237077
Report Date: 08/04/22

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237077
Project Number:	MA220701	**Report Date:**	08/04/22

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237077
Project Number:	MA220701	**Report Date:**	08/04/22

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237077
Project Number:	MA220701	**Report Date:**	08/04/22

Data Qualifiers

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237077
Project Number:	MA220701	**Report Date:**	08/04/22

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Serial_No:08042215:29

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL

8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 7/12/22

ALPHA Job #: L2237077

Client Information

Client: CHCI
Address: 8 Pleasant St. S. Natick, MA 01760
Phone: 508 315 3146
Email: bMoore + jwiggin@carr—

Additional Project Information:
21J Project

Project Information

Project Name: PEN-BOXFORD
Project Location: Boxford, MA
Project #: MA220701
Project Manager: Brian Moore
ALPHA Quote #: See Michael Chang

Turn-Around Time

☒ Standard ☒ RUSH (only confirmed if pre-approved!)

Date Due:

Report Information - Data Deliverables

☒ ADEx ☐ EMAIL

Billing Information

☒ Same as Client info PO #: MA220701

Regulatory Requirements & Project Information Requirements

☒ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☒ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program ____ Criteria RCS-1

ANALYSIS: VOC: ☐ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint; PFAS 24

SAMPLE INFO
Filtration ☐ Field ☐ Lab to do
Preservation ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	PFAS 24	Sample Comments	TOTAL # BOTTLES
37077-01	S-1	7/12/22	12:25	Soil	SJH	X	Extract/HOLD	2
-02	S-2		12:20			X	Extract/HOLD	2
-03	S-3		12:10			X	Extract/HOLD	2
-04	S-4		11:55			X	Extract/HOLD	2
-05	S-5		12:05			X	Extract/HOLD	2
-06	S-6		11:45			X	Extract/HOLD	2

	PFAS 24
Container Type	P
Preservative	A

Container Type: P= Plastic, A= Amber glass, V= Vial, G= Glass, B= Bacteria cup, C= Cube, O= Other, E= Encore, D= BOD Bottle

Preservative: A= None, B= HCl, C= HNO_3, D= H_2SO_4, E= NaOH, F= MeOH, G= $NaHSO_4$, H = $Na_2S_2O_3$, I= Ascorbic Acid, J = NH_4Cl, K= Zn Acetate, O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	7/12/22 4:58	[signature]	7/12/22 16:58
[signature]	7/12 1845	[signature]	7/12/22 1845
[signature]	7/12/22 2004	[signature]	7/12/22 20:04

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L2237076
Client:	CarriageHouse Consulting Inc. 8A Pleasant Street South Natick, MA 01760
ATTN:	Brian Moore
Phone:	(508) 315-3146
Project Name:	PEN-BOXFORD
Project Number:	MA220701
Report Date:	07/22/22

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2237076-01	B-1	SOIL	BOXFORD, MA	07/11/22 13:30	07/12/22
L2237076-02	B-2	SOIL	BOXFORD, MA	07/11/22 15:15	07/12/22

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237076
Project Number:	MA220701	**Report Date:**	07/22/22

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Case Narrative (continued)

Perfluorinated Alkyl Acids by Isotope Dilution

WG1663825-1R and WG1663825-2R: These samples were re-analyzed due to QC failures in the original analysis. The results of the re-analysis are reported.

WG1663825-1R,WG1663825-1R MeOH, WG1663825-2R, and WG1663825-2R MeOH: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

WG1663825-2: The Extracted Internal Standard recovery for the WG1663825-2 LCS, associated with L2237076-01 and -02, is below the acceptance criteria (less than 5%) for perfluoro[13c8]octanesulfonamide (m8fosa) (4%); however, all associated target analytes are within LCS criteria; therefore, no further action was taken.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Darian Dailey

Title: Technical Director/Representative

Date: 07/22/22

ORGANICS

SEMIVOLATILES

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237076
Report Date: 07/22/22

SAMPLE RESULTS

Lab ID: L2237076-01
Client ID: B-1
Sample Location: BOXFORD, MA

Date Collected: 07/11/22 13:30
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/18/22 06:22
Analyst: SG
Percent Solids: 96%

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.477	--	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.477	--	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.239	--	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.955	--	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.477	--	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.955	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.239	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.239	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.239	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.477	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.477	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.239	--	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.239	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.239	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.477	--	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.955	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.477	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.477	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.477	--	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.477	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.477	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.477	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.477	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.477	--	1

Project Name: PEN-BOXFORD **Lab Number:** L2237076

Project Number: MA220701 **Report Date:** 07/22/22

SAMPLE RESULTS

Lab ID: L2237076-01 Date Collected: 07/11/22 13:30

Client ID: B-1 Date Received: 07/12/22

Sample Location: BOXFORD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	100		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	96		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	124		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	103		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	102		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	94		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	107		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	152		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	108		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	112		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	107		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	158		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	91		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	105		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	101		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	86		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	91		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	78		24-159

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237076
Report Date: 07/22/22

SAMPLE RESULTS

Lab ID: L2237076-02
Client ID: B-2
Sample Location: BOXFORD, MA

Date Collected: 07/11/22 15:15
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/18/22 06:55
Analyst: SG
Percent Solids: 100%

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.478	--	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.478	--	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.239	--	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.955	--	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.478	--	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.955	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.239	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.239	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.239	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.478	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.478	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.239	--	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.239	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.239	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.478	--	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.955	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.478	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.478	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.478	--	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.478	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.478	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.478	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.478	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.478	--	1

Project Name: PEN-BOXFORD **Lab Number:** L2237076

Project Number: MA220701 **Report Date:** 07/22/22

SAMPLE RESULTS

Lab ID: L2237076-02 Date Collected: 07/11/22 15:15

Client ID: B-2 Date Received: 07/12/22

Sample Location: BOXFORD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	102		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	97		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	95		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	116		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	105		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	105		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	93		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	102		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	124		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	102		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	101		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	104		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	128		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	89		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	108		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	25		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	84		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	104		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	68		24-159

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/18/22 02:46
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1663825-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.500	--
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.500	--
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.250	--
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	--
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.500	--
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	--
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.250	--
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.250	--
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.250	--
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.500	--
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.500	--
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.250	--
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.250	--
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.250	--
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.500	--
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	--
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.500	--
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.500	--
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.500	--
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.500	--
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.500	--
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.500	--
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.500	--
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.500	--

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/18/22 02:46
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1663825-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**53**	Q	61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**51**	Q	58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	**60**	Q	74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	52		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**57**	Q	66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**59**	Q	71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	**59**	Q	78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**59**	Q	75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	58		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**58**	Q	72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	**61**	Q	79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**56**	Q	75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	63		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	38		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**53**	Q	61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	5		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	34		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**46**	Q	54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**18**	Q	24-159

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/21/22 13:07
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1663825-1 R					
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.500	--

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**145**	Q	5-117

Lab Control Sample Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237076

Report Date: 07/22/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1663825-2								
Perfluorobutanoic Acid (PFBA)	89		-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	89		-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	92		-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	96		-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	88		-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	96		-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	91		-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	106		-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	94		-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	96		-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	92		-		70-132	-		30
Perfluorononanoic Acid (PFNA)	90		-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	100		-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	94		-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	97		-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	94		-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	89		-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	82		-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	86		-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	100		-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	83		-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	92		-		69-135	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237076

Report Date: 07/22/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1663825-2								
Perfluorotridecanoic Acid (PFTrDA)	108		-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	110		-		69-133	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**53**	Q			61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**52**	Q			58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	**60**	Q			74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	55				14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**59**	Q			66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**60**	Q			71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	**60**	Q			78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**59**	Q			75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	65				20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**56**	Q			72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	**58**	Q			79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**54**	Q			75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	58				19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	41				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**55**	Q			61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**4**	Q			5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	39				34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**49**	Q			54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**19**	Q			24-159

Lab Control Sample Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237076

Report Date: 07/22/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab	Associated sample(s): 01-02		Batch: WG1663825-2					
Perfluorooctanesulfonamide (FOSA)	105		-		67-137	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**153**	Q			5-117

Matrix Spike Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237076

Report Date: 07/22/22

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1663825-3 QC Sample: L2237075-01 Client ID: MS Sample												
Perfluorobutanoic Acid (PFBA)	ND	8.44	7.94	91		-	-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	ND	8.44	8.30	90		-	-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	7.5	6.67	89		-	-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	7.92	7.13	90		-	-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	1.57	8.44	9.20	90		-	-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	7.95	7.49	94		-	-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	ND	8.44	8.00	90		-	-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	7.72	8.24	107		-	-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	ND	8.44	7.78	89		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	12.0	8.04	22.4	129		-	-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	8.06	7.49	93		-	-		70-132	-		30
Perfluorononanoic Acid (PFNA)	ND	8.44	8.07	96		-	-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	ND	7.84	7.91	97		-	-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	ND	8.44	7.66	91		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	8.11	7.81F	96		-	-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	8.12	7.32	90		-	-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	8.44	8.39	99		-	-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	8.44	7.21	85		-	-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	8.16	5.99	73		-	-		59-134	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	8.44	8.46	100		-	-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	ND	8.44	8.07	96		-	-		69-135	-		30
Perfluorotridecanoic Acid (PFTrDA)	ND	8.44	5.81	69		-	-		66-139	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237076
Report Date: 07/22/22

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1663825-3 QC Sample: L2237075-01 Client ID: MS Sample												
Perfluorotetradecanoic Acid (PFTA)	ND	8.44	8.48	100		-	-		69-133	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	92				19-175
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	86				14-167
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	91				20-154
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**27**	Q			34-137
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	40				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	77				61-155
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	81				75-130
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	85				66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	85				71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	78				78-139
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	57				54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**5**	Q			24-159
Perfluoro[13C4]Butanoic Acid (MPFBA)	83				61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	78				58-150
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	81				79-136
Perfluoro[13C8]Octanoic Acid (M8PFOA)	83				75-130
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	78				72-140
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	81				74-139

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1663825-4 QC Sample: L2237076-01 Client ID: B-1						
Perfluorobutanoic Acid (PFBA)	ND	ND	ng/g	NC		30
Perfluoropentanoic Acid (PFPeA)	ND	ND	ng/g	NC		30
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/g	NC		30
Perfluorohexanoic Acid (PFHxA)	ND	ND	ng/g	NC		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	ND	ng/g	NC		30
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ng/g	NC		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ng/g	NC		30
Perfluorooctanoic Acid (PFOA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/g	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/g	NC		30
Perfluorononanoic Acid (PFNA)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonic Acid (PFOS)	ND	ND	ng/g	NC		30
Perfluorodecanoic Acid (PFDA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/g	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/g	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/g	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/g	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/g	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1663825-4 QC Sample: L2237076-01 Client ID: B-1						
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/g	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/g	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/g	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/g	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104		100		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	100		95		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	96		95		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	124		124		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	103		102		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	102		101		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	94		92		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	107		101		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	152		136		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	108		98		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	112		106		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	107		104		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	158		154		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	91		78		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	105		101		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	101		102		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	86		84		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	91		86		54-150

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1663825-4 QC Sample: L2237076-01 Client ID: B-1

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	78		74		24-159

INORGANICS
&
MISCELLANEOUS

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

SAMPLE RESULTS

Lab ID: L2237076-01
Client ID: B-1
Sample Location: BOXFORD, MA

Date Collected: 07/11/22 13:30
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	96.1		%	0.100	--	1	-	07/15/22 18:08	121,2540G	JM

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

SAMPLE RESULTS

Lab ID: L2237076-02
Client ID: B-2
Sample Location: BOXFORD, MA

Date Collected: 07/11/22 15:15
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	99.7		%	0.100	--	1	-	07/15/22 18:08	121,2540G	JM

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1663497-1 QC Sample: L2237075-01 Client ID: DUP Sample						
Solids, Total	56.8	57.8	%	2		10

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2237076-01A	Plastic 8oz unpreserved	A	NA		5.1	Y	Absent		A2-537-ISOTOPE(14)
L2237076-01B	Plastic 2oz unpreserved for TS	A	NA		5.1	Y	Absent		A2-TS(7)
L2237076-02A	Plastic 8oz unpreserved	A	NA		5.1	Y	Absent		A2-537-ISOTOPE(14)
L2237076-02B	Plastic 2oz unpreserved for TS	A	NA		5.1	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237076
Report Date: 07/22/22

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237076
Project Number:	MA220701	**Report Date:**	07/22/22

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237076
Project Number:	MA220701	**Report Date:**	07/22/22

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237076
Project Number:	MA220701	**Report Date:**	07/22/22

Data Qualifiers

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237076
Project Number:	MA220701	**Report Date:**	07/22/22

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Date Rec'd in Lab: 7/12/22

ALPHA Job #: L2237076

Client Information

Client: CHC1

Address: 8 Pleasant St. S
Natick, MA, 01760

Phone: (508)-315-3146

Email: bmoore + juggin@carriagehous...

Project Information

Project Name: ~~PFAS~~ - Boxford

Project Location: Boxford, MA

Project #: MA220101

Project Manager: B. Moore

ALPHA Quote #:

Turn-Around Time

~~Standard~~ X RUSH (only confirmed if pre-approved)

Date Due: 10-DAY TAT

Additional Project Information:
21S project

Report Information - Data Deliverables

X ADEx ☐ EMAIL

Billing Information

X Same as Client info PO #: MA220101

Regulatory Requirements & Project Information Requirements

X Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
X Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program _____ Criteria RCGW-1/S-1

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	ANALYSIS: PFAS 24	SAMPLE INFO: Filtration ☐ Field ☐ Lab to do; Preservation ☐ Lab to do	Sample Comments	TOTAL # BOTTLES
37076-01	B-1	7/11/22	13:30	Soil	SJH	X			2
-02	B-2	7/11/22	15:15	Soil	SJH	X			2

Container Type: P
Preservative: A

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	7/12/22 4:48		7/12/22 16:58
	7/12/22 1845		7/12/22 1845
	7/12/22 2000		7/12/22 20:00

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L2237075
Client:	CarriageHouse Consulting Inc. 8A Pleasant Street South Natick, MA 01760
ATTN:	Brian Moore
Phone:	(508) 315-3146
Project Name:	PEN-BOXFORD
Project Number:	MA220701
Report Date:	07/25/22

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2237075-01	WC-1	SOIL	BOXFORD, MA	07/12/22 13:40	07/12/22

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237075
Project Number:	MA220701	**Report Date:**	07/25/22

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: PEN-BOXFORD **Lab Number:** L2237075
Project Number: MA220701 **Report Date:** 07/25/22

Case Narrative (continued)

Perfluorinated Alkyl Acids by Isotope Dilution

L2237075-01: The Extracted Internal Standard recoveries are less than 5% for perfluoro[1,2-13c2]tetradecanoic acid (m2pfteda) (4%); however, the results are confirmed by the batch QC performed on this sample; therefore, re-extraction was not required.

L2237075-01: The MeOH fraction of the extraction is reported for perfluorooctanesulfonamide (fosa) due to better extraction efficiency of the perfluoro[13c8]octanesulfonamide (m8fosa) Extracted Internal Standard.

L2237075-01, WG1663825-1/R, WG1663825-2/R, and WG1663825-3: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

WG1663825-1R and WG1663825-2R: The sample was re-analyzed due to QC failures in the original analysis. The results of the re-analysis are reported.

WG1663825-2: The Extracted Internal Standard recovery for the WG1663825-2 LCS, associated with L2237075-01, is below the acceptance criteria (less than 5%) for perfluoro[13c8]octanesulfonamide (m8fosa) (4%); however, all associated target analytes are within LCS criteria; therefore, no further action was taken.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Alycia Mogayzel

Title: Technical Director/Representative Date: 07/25/22

ORGANICS

SEMIVOLATILES

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237075
Report Date: 07/25/22

SAMPLE RESULTS

Lab ID: L2237075-01
Client ID: WC-1
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 13:40
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/18/22 05:49
Analyst: SG
Percent Solids: 57%

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.850	--	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.850	--	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.425	--	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.70	--	1
Perfluorohexanoic Acid (PFHxA)	1.57		ng/g	0.850	--	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.70	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.425	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.425	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.425	--	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	12.0		ng/g	0.850	--	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.850	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.425	--	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.425	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.425	--	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.850	--	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.70	--	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.850	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.850	--	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.850	--	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.850	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.850	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.850	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.850	--	1

Project Name: PEN-BOXFORD **Lab Number:** L2237075

Project Number: MA220701 **Report Date:** 07/25/22

SAMPLE RESULTS

Lab ID: L2237075-01 Date Collected: 07/12/22 13:40

Client ID: WC-1 Date Received: 07/12/22

Sample Location: BOXFORD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	82		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	76		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	79		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	76		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	84		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	83		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	**77**	Q	78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	84		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	87		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	79		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	84		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	80		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	87		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	36		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	78		61-155
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**29**	Q	34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	65		54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**4**	Q	24-159

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

SAMPLE RESULTS

Lab ID: L2237075-01
Client ID: WC-1
Sample Location: BOXFORD, MA

Sample Depth:
Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/23/22 20:37
Analyst: SG
Percent Solids: 57%

Date Collected: 07/12/22 13:40
Date Received: 07/12/22
Field Prep: Not Specified

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.850	--	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	67		5-117

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/18/22 02:46
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1663825-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.500	--
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.500	--
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.250	--
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	--
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.500	--
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	--
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.250	--
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.250	--
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.250	--
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.500	--
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.500	--
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.250	--
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.250	--
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.250	--
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.500	--
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	--
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.500	--
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.500	--
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.500	--
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.500	--
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.500	--
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.500	--
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.500	--
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.500	--

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/18/22 02:46
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1663825-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**53**	Q	61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**51**	Q	58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	**60**	Q	74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	52		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**57**	Q	66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**59**	Q	71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	**59**	Q	78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**59**	Q	75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	58		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**58**	Q	72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	**61**	Q	79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**56**	Q	75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	63		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	38		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**53**	Q	61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	5		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	34		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**46**	Q	54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**18**	Q	24-159

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 07/21/22 13:07
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 07/17/22 10:02

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1663825-1 R					
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.500	--

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**145**	Q	5-117

Lab Control Sample Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1663825-2								
Perfluorobutanoic Acid (PFBA)	89		-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	89		-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	92		-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	96		-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	88		-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	96		-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	91		-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	106		-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	94		-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	96		-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	92		-		70-132	-		30
Perfluorononanoic Acid (PFNA)	90		-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	100		-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	94		-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	97		-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	94		-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	89		-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	82		-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	86		-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	100		-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	83		-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	92		-		69-135	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237075

Report Date: 07/25/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1663825-2								
Perfluorotridecanoic Acid (PFTrDA)	108		-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	110		-		69-133	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**53**	Q			61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**52**	Q			58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	**60**	Q			74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	55				14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**59**	Q			66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**60**	Q			71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	**60**	Q			78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**59**	Q			75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	65				20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**56**	Q			72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	**58**	Q			79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**54**	Q			75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	58				19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	41				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**55**	Q			61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**4**	Q			5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	39				34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	**49**	Q			54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**19**	Q			24-159

Lab Control Sample Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237075

Report Date: 07/25/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1663825-2								
Perfluorooctanesulfonamide (FOSA)	105		-		67-137	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	**153**	Q			5-117

Matrix Spike Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237075

Report Date: 07/25/22

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab	Associated sample(s): 01	QC Batch ID: WG1663825-3	QC Sample: L2237075-01	Client ID: WC-1								
Perfluorobutanoic Acid (PFBA)	ND	8.44	7.94	91		-	-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	ND	8.44	8.30	90		-	-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	7.5	6.67	89		-	-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	7.92	7.13	90		-	-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	1.57	8.44	9.20	90		-	-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	7.95	7.49	94		-	-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	ND	8.44	8.00	90		-	-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	7.72	8.24	107		-	-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	ND	8.44	7.78	89		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	12.0	8.04	22.4	129		-	-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	8.06	7.49	93		-	-		70-132	-		30
Perfluorononanoic Acid (PFNA)	ND	8.44	8.07	96		-	-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	ND	7.84	7.91	97		-	-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	ND	8.44	7.66	91		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	8.11	7.81F	96		-	-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	8.12	7.32	90		-	-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	8.44	8.39	99		-	-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	8.44	7.21	85		-	-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	8.16	5.99	73		-	-		59-134	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	8.44	8.46	100		-	-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	ND	8.44	8.07	96		-	-		69-135	-		30
Perfluorotridecanoic Acid (PFTrDA)	ND	8.44	5.81	69		-	-		66-139	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237075
Report Date: 07/25/22

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1663825-3 QC Sample: L2237075-01 Client ID: WC-1												
Perfluorotetradecanoic Acid (PFTA)	ND	8.44	8.48	100		-	-		69-133	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	92				19-175
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	86				14-167
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	91				20-154
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	**27**	Q			34-137
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	40				31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	77				61-155
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	81				75-130
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	85				66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	85				71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	78				78-139
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	57				54-150
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	**5**	Q			24-159
Perfluoro[13C4]Butanoic Acid (MPFBA)	83				61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	78				58-150
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	81				79-136
Perfluoro[13C8]Octanoic Acid (M8PFOA)	83				75-130
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	78				72-140
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	81				74-139

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1663825-4 QC Sample: L2237076-01 Client ID: DUP Sample						
Perfluorobutanoic Acid (PFBA)	ND	ND	ng/g	NC		30
Perfluoropentanoic Acid (PFPeA)	ND	ND	ng/g	NC		30
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/g	NC		30
Perfluorohexanoic Acid (PFHxA)	ND	ND	ng/g	NC		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	ND	ng/g	NC		30
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ng/g	NC		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ng/g	NC		30
Perfluorooctanoic Acid (PFOA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/g	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/g	NC		30
Perfluorononanoic Acid (PFNA)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonic Acid (PFOS)	ND	ND	ng/g	NC		30
Perfluorodecanoic Acid (PFDA)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/g	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/g	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/g	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/g	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/g	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1663825-4 QC Sample: L2237076-01 Client ID: DUP Sample						
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/g	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/g	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/g	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/g	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	104		100		61-135
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	100		95		58-150
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	96		95		74-139
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	124		124		14-167
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	103		102		66-128
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	102		101		71-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	94		92		78-139
Perfluoro[13C8]Octanoic Acid (M8PFOA)	107		101		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	152		136		20-154
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	108		98		72-140
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	112		106		79-136
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	107		104		75-130
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	158		154		19-175
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	91		78		31-134
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	105		101		61-155
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	101		102		5-117
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	86		84		34-137
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	91		86		54-150

Lab Duplicate Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1663825-4 QC Sample: L2237076-01 Client ID: DUP Sample

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	78		74		24-159

INORGANICS
&
MISCELLANEOUS

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

SAMPLE RESULTS

Lab ID: L2237075-01
Client ID: WC-1
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 13:40
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	56.8		%	0.100	--	1	-	07/15/22 18:08	121,2540G	JM

Lab Duplicate Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237075

Report Date: 07/25/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1663497-1 QC Sample: L2237075-01 Client ID: WC-1						
Solids, Total	56.8	57.8	%	2		10

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2237075-01A	Plastic 8oz unpreserved	A	NA		5.7	Y	Absent		A2-537-ISOTOPE(14)
L2237075-01B	Plastic 2oz unpreserved for TS	A	NA		5.7	Y	Absent		A2-TS(7)

*Values in parentheses indicate holding time in days

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237075
Report Date: 07/25/22

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237075
Project Number:	MA220701	**Report Date:**	07/25/22

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237075
Project Number:	MA220701	**Report Date:**	07/25/22

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237075
Project Number:	MA220701	**Report Date:**	07/25/22

Data Qualifiers

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237075
Project Number:	MA220701	**Report Date:**	07/25/22

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 7/12/22

ALPHA Job #: L2237075

ALPHA ANALYTICAL

8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220

320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: CHCI

Address: 8 Pleasant St. S. Natick, MA 01760

Phone: 508 315-3146

Email: bmoore + jswiggin @ car~

Project Information

Project Name: PEN-Boxford

Project Location: Boxford, MA

Project #: MA220701

Project Manager: Brian Moore

ALPHA Quote #:

Turn-Around Time

☐ Standard ☒ RUSH (only confirmed if pre-approved!)

Date Due: 10-day

Additional Project Information:

21J Project

Report Information - Data Deliverables

☒ ADEx ☐ EMAIL

Billing Information

☒ Same as Client info PO #: MA220701

Regulatory Requirements & Project Information Requirements

☒ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods

☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)

☒ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)

☐ Yes ☐ No NPDES RGP

☐ Other State /Fed Program ______ Criteria RCS-1

ANALYSIS: VOC: ☐ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint; PFAS 24

SAMPLE INFO: Filtration ☐ Field ☐ Lab to do; Preservation ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	PFAS 24	Sample Comments	TOTAL # BOTTLES
37075-01	WC-1	7/12/22	13:40	Soil	SJH	X		2
Container Type						P		
Preservative						A		

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	7/12/22 14:58	[signature]	7/12/22 16:58
[signature]	7/12 1845	R. Mac...	7/12/22 1845
R. Mac...	7/12/22 2000	[signature] AAL	7/12/22 20:00

FORM NO: 01-01 (rev. 12-Mar-2012)

ANALYTICAL REPORT

Lab Number:	L2237070
Client:	CarriageHouse Consulting Inc. 8A Pleasant Street South Natick, MA 01760
ATTN:	Brian Moore
Phone:	(508) 315-3146
Project Name:	PEN-BOXFORD
Project Number:	MA220701
Report Date:	07/27/22

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2237070-01	S-2	SOIL	BOXFORD, MA	07/12/22 13:25	07/12/22
L2237070-02	S-3	SOIL	BOXFORD, MA	07/12/22 13:20	07/12/22
L2237070-03	S-4	SOIL	BOXFORD, MA	07/12/22 13:15	07/12/22
L2237070-04	S-5	SOIL	BOXFORD, MA	07/12/22 13:10	07/12/22
L2237070-05	S-6	SOIL	BOXFORD, MA	07/12/22 13:05	07/12/22
L2237070-06	S-2	SOIL	BOXFORD, MA	07/12/22 13:00	07/12/22

Project Name: PEN-BOXFORD **Lab Number:** L2237070

Project Number: MA220701 **Report Date:** 07/27/22

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	YES
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	NO
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	YES
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237070
Project Number:	MA220701	**Report Date:**	07/27/22

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237070
Project Number:	MA220701	**Report Date:**	07/27/22

Case Narrative (continued)

MCP Related Narratives

EPH

In reference to question G:

L2237070-01D and -02D: One or more of the target analytes did not achieve the requested CAM reporting limits.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Kelly Stenstrom

Title: Technical Director/Representative Date: 07/27/22

QC OUTLIER SUMMARY REPORT

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment

There are no QC Outliers associated with this report.

ORGANICS

PETROLEUM HYDROCARBONS

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID:	L2237070-01	D	Date Collected:	07/12/22 13:25
Client ID:	S-2		Date Received:	07/12/22
Sample Location:	BOXFORD, MA		Field Prep:	Not Specified
Sample Depth:				
Matrix:	Soil		Extraction Method:	EPA 3546
Analytical Method:	135,EPH-19-2.1		Extraction Date:	07/26/22 12:42
Analytical Date:	07/27/22 12:23		Cleanup Method1:	EPH-19-2.1
Analyst:	JB		Cleanup Date1:	07/27/22
Percent Solids:	85%			

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	37.6	--	5
C19-C36 Aliphatics	ND		mg/kg	37.6	--	5
C11-C22 Aromatics	635		mg/kg	37.6	--	5
C11-C22 Aromatics, Adjusted	381		mg/kg	37.6	--	5
Naphthalene	ND		mg/kg	1.88	--	5
2-Methylnaphthalene	ND		mg/kg	1.88	--	5
Acenaphthylene	ND		mg/kg	1.88	--	5
Acenaphthene	ND		mg/kg	1.88	--	5
Fluorene	3.57		mg/kg	1.88	--	5
Phenanthrene	39.8		mg/kg	1.88	--	5
Anthracene	3.82		mg/kg	1.88	--	5
Fluoranthene	48.8		mg/kg	1.88	--	5
Pyrene	43.3		mg/kg	1.88	--	5
Benzo(a)anthracene	16.3		mg/kg	1.88	--	5
Chrysene	21.9		mg/kg	1.88	--	5
Benzo(b)fluoranthene	21.5		mg/kg	1.88	--	5
Benzo(k)fluoranthene	22.3		mg/kg	1.88	--	5
Benzo(a)pyrene	14.3		mg/kg	1.88	--	5
Indeno(1,2,3-cd)Pyrene	8.77		mg/kg	1.88	--	5
Dibenzo(a,h)anthracene	2.95		mg/kg	1.88	--	5
Benzo(ghi)perylene	7.24		mg/kg	1.88	--	5

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-01 D
Client ID: S-2
Sample Location: BOXFORD, MA
Date Collected: 07/12/22 13:25
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Extractable Petroleum Hydrocarbons - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	53		40-140
o-Terphenyl	76		40-140
2-Fluorobiphenyl	67		40-140
2-Bromonaphthalene	73		40-140

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID:	L2237070-02	D	Date Collected:	07/12/22 13:20
Client ID:	S-3		Date Received:	07/12/22
Sample Location:	BOXFORD, MA		Field Prep:	Not Specified
Sample Depth:				
Matrix:	Soil		Extraction Method:	EPA 3546
Analytical Method:	135,EPH-19-2.1		Extraction Date:	07/13/22 07:13
Analytical Date:	07/27/22 10:42		Cleanup Method1:	EPH-19-2.1
Analyst:	JB		Cleanup Date1:	07/16/22
Percent Solids:	91%			

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	14.2	--	2
C19-C36 Aliphatics	20.6		mg/kg	14.2	--	2
C11-C22 Aromatics	299		mg/kg	14.2	--	2
C11-C22 Aromatics, Adjusted	191		mg/kg	14.2	--	2
Naphthalene	ND		mg/kg	0.708	--	2
2-Methylnaphthalene	ND		mg/kg	0.708	--	2
Acenaphthylene	ND		mg/kg	0.708	--	2
Acenaphthene	ND		mg/kg	0.708	--	2
Fluorene	1.52		mg/kg	0.708	--	2
Phenanthrene	16.3		mg/kg	0.708	--	2
Anthracene	1.71		mg/kg	0.708	--	2
Fluoranthene	20.7		mg/kg	0.708	--	2
Pyrene	17.9		mg/kg	0.708	--	2
Benzo(a)anthracene	7.35		mg/kg	0.708	--	2
Chrysene	10.2		mg/kg	0.708	--	2
Benzo(b)fluoranthene	10.3		mg/kg	0.708	--	2
Benzo(k)fluoranthene	4.17		mg/kg	0.708	--	2
Benzo(a)pyrene	7.12		mg/kg	0.708	--	2
Indeno(1,2,3-cd)Pyrene	4.79		mg/kg	0.708	--	2
Dibenzo(a,h)anthracene	1.48		mg/kg	0.708	--	2
Benzo(ghi)perylene	4.18		mg/kg	0.708	--	2

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-02 D
Client ID: S-3
Sample Location: BOXFORD, MA
Date Collected: 07/12/22 13:20
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Extractable Petroleum Hydrocarbons - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	45		40-140
o-Terphenyl	70		40-140
2-Fluorobiphenyl	71		40-140
2-Bromonaphthalene	73		40-140

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID:	L2237070-03	Date Collected:	07/12/22 13:15
Client ID:	S-4	Date Received:	07/12/22
Sample Location:	BOXFORD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Soil	Extraction Method:	EPA 3546
Analytical Method:	135,EPH-19-2.1	Extraction Date:	07/13/22 07:13
Analytical Date:	07/18/22 01:54	Cleanup Method1:	EPH-19-2.1
Analyst:	SR	Cleanup Date1:	07/16/22
Percent Solids:	39%		

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	16.9	--	1
C19-C36 Aliphatics	ND		mg/kg	16.9	--	1
C11-C22 Aromatics	53.6		mg/kg	16.9	--	1
C11-C22 Aromatics, Adjusted	39.2		mg/kg	16.9	--	1
Naphthalene	ND		mg/kg	0.847	--	1
2-Methylnaphthalene	ND		mg/kg	0.847	--	1
Acenaphthylene	ND		mg/kg	0.847	--	1
Acenaphthene	ND		mg/kg	0.847	--	1
Fluorene	ND		mg/kg	0.847	--	1
Phenanthrene	1.52		mg/kg	0.847	--	1
Anthracene	ND		mg/kg	0.847	--	1
Fluoranthene	2.75		mg/kg	0.847	--	1
Pyrene	2.57		mg/kg	0.847	--	1
Benzo(a)anthracene	1.11		mg/kg	0.847	--	1
Chrysene	1.71		mg/kg	0.847	--	1
Benzo(b)fluoranthene	1.88		mg/kg	0.847	--	1
Benzo(k)fluoranthene	ND		mg/kg	0.847	--	1
Benzo(a)pyrene	1.16		mg/kg	0.847	--	1
Indeno(1,2,3-cd)Pyrene	ND		mg/kg	0.847	--	1
Dibenzo(a,h)anthracene	ND		mg/kg	0.847	--	1
Benzo(ghi)perylene	1.72		mg/kg	0.847	--	1

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-03
Client ID: S-4
Sample Location: BOXFORD, MA
Date Collected: 07/12/22 13:15
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Extractable Petroleum Hydrocarbons - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	63		40-140
o-Terphenyl	50		40-140
2-Fluorobiphenyl	50		40-140
2-Bromonaphthalene	51		40-140

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID:	L2237070-04	Date Collected:	07/12/22 13:10
Client ID:	S-5	Date Received:	07/12/22
Sample Location:	BOXFORD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Soil	Extraction Method:	EPA 3546
Analytical Method:	135,EPH-19-2.1	Extraction Date:	07/26/22 12:42
Analytical Date:	07/27/22 10:51	Cleanup Method1:	EPH-19-2.1
Analyst:	JB	Cleanup Date1:	07/27/22
Percent Solids:	63%		

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	10.4	--	1
C19-C36 Aliphatics	ND		mg/kg	10.4	--	1
C11-C22 Aromatics	15.5		mg/kg	10.4	--	1
C11-C22 Aromatics, Adjusted	15.5		mg/kg	10.4	--	1
Naphthalene	ND		mg/kg	0.518	--	1
2-Methylnaphthalene	ND		mg/kg	0.518	--	1
Acenaphthylene	ND		mg/kg	0.518	--	1
Acenaphthene	ND		mg/kg	0.518	--	1
Fluorene	ND		mg/kg	0.518	--	1
Phenanthrene	ND		mg/kg	0.518	--	1
Anthracene	ND		mg/kg	0.518	--	1
Fluoranthene	ND		mg/kg	0.518	--	1
Pyrene	ND		mg/kg	0.518	--	1
Benzo(a)anthracene	ND		mg/kg	0.518	--	1
Chrysene	ND		mg/kg	0.518	--	1
Benzo(b)fluoranthene	ND		mg/kg	0.518	--	1
Benzo(k)fluoranthene	ND		mg/kg	0.518	--	1
Benzo(a)pyrene	ND		mg/kg	0.518	--	1
Indeno(1,2,3-cd)Pyrene	ND		mg/kg	0.518	--	1
Dibenzo(a,h)anthracene	ND		mg/kg	0.518	--	1
Benzo(ghi)perylene	ND		mg/kg	0.518	--	1

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-04
Client ID: S-5
Sample Location: BOXFORD, MA
Date Collected: 07/12/22 13:10
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Extractable Petroleum Hydrocarbons - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	68		40-140
o-Terphenyl	61		40-140
2-Fluorobiphenyl	78		40-140
2-Bromonaphthalene	79		40-140

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID:	L2237070-05	Date Collected:	07/12/22 13:05
Client ID:	S-6	Date Received:	07/12/22
Sample Location:	BOXFORD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Soil	Extraction Method:	EPA 3546
Analytical Method:	135,EPH-19-2.1	Extraction Date:	07/13/22 07:13
Analytical Date:	07/17/22 23:00	Cleanup Method1:	EPH-19-2.1
Analyst:	SR	Cleanup Date1:	07/16/22
Percent Solids:	42%		

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	15.2	--	1
C19-C36 Aliphatics	ND		mg/kg	15.2	--	1
C11-C22 Aromatics	15.3		mg/kg	15.2	--	1
C11-C22 Aromatics, Adjusted	15.3		mg/kg	15.2	--	1
Naphthalene	ND		mg/kg	0.762	--	1
2-Methylnaphthalene	ND		mg/kg	0.762	--	1
Acenaphthylene	ND		mg/kg	0.762	--	1
Acenaphthene	ND		mg/kg	0.762	--	1
Fluorene	ND		mg/kg	0.762	--	1
Phenanthrene	ND		mg/kg	0.762	--	1
Anthracene	ND		mg/kg	0.762	--	1
Fluoranthene	ND		mg/kg	0.762	--	1
Pyrene	ND		mg/kg	0.762	--	1
Benzo(a)anthracene	ND		mg/kg	0.762	--	1
Chrysene	ND		mg/kg	0.762	--	1
Benzo(b)fluoranthene	ND		mg/kg	0.762	--	1
Benzo(k)fluoranthene	ND		mg/kg	0.762	--	1
Benzo(a)pyrene	ND		mg/kg	0.762	--	1
Indeno(1,2,3-cd)Pyrene	ND		mg/kg	0.762	--	1
Dibenzo(a,h)anthracene	ND		mg/kg	0.762	--	1
Benzo(ghi)perylene	ND		mg/kg	0.762	--	1

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-05
Client ID: S-6
Sample Location: BOXFORD, MA
Date Collected: 07/12/22 13:05
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Extractable Petroleum Hydrocarbons - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	53		40-140
o-Terphenyl	48		40-140
2-Fluorobiphenyl	54		40-140
2-Bromonaphthalene	55		40-140

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID:	L2237070-06	Date Collected:	07/12/22 13:00
Client ID:	S-2	Date Received:	07/12/22
Sample Location:	BOXFORD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Soil		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	07/19/22 15:54		
Analyst:	BAD		
Percent Solids:	93%		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Were samples received in methanol?	Covering the Soil
Methanol ratio:	1:1 +/- 25%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		mg/kg	5.95	--	1
C9-C12 Aliphatics	ND		mg/kg	5.95	--	1
C9-C10 Aromatics	ND		mg/kg	5.95	--	1
C5-C8 Aliphatics, Adjusted	ND		mg/kg	5.95	--	1
C9-C12 Aliphatics, Adjusted	ND		mg/kg	5.95	--	1
Benzene	ND		mg/kg	0.119	--	1
Toluene	ND		mg/kg	0.119	--	1
Ethylbenzene	ND		mg/kg	0.119	--	1
p/m-Xylene	ND		mg/kg	0.119	--	1
o-Xylene	ND		mg/kg	0.119	--	1
Methyl tert butyl ether	ND		mg/kg	0.060	--	1
Naphthalene	0.253		mg/kg	0.238	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	98		70-130
2,5-Dibromotoluene-FID	110		70-130

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 135,EPH-19-2.1
Analytical Date: 07/17/22 13:50
Analyst: SR

Extraction Method: EPA 3546
Extraction Date: 07/13/22 07:13
Cleanup Method: EPH-19-2.1
Cleanup Date: 07/16/22

Parameter	Result	Qualifier	Units	RL	MDL
Extractable Petroleum Hydrocarbons - Westborough Lab for sample(s): 02-03,05 Batch: WG1662188-1					
C9-C18 Aliphatics	ND		mg/kg	6.34	--
C19-C36 Aliphatics	ND		mg/kg	6.34	--
C11-C22 Aromatics	ND		mg/kg	6.34	--
C11-C22 Aromatics, Adjusted	ND		mg/kg	6.34	--
Naphthalene	ND		mg/kg	0.317	--
2-Methylnaphthalene	ND		mg/kg	0.317	--
Acenaphthylene	ND		mg/kg	0.317	--
Acenaphthene	ND		mg/kg	0.317	--
Fluorene	ND		mg/kg	0.317	--
Phenanthrene	ND		mg/kg	0.317	--
Anthracene	ND		mg/kg	0.317	--
Fluoranthene	ND		mg/kg	0.317	--
Pyrene	ND		mg/kg	0.317	--
Benzo(a)anthracene	ND		mg/kg	0.317	--
Chrysene	ND		mg/kg	0.317	--
Benzo(b)fluoranthene	ND		mg/kg	0.317	--
Benzo(k)fluoranthene	ND		mg/kg	0.317	--
Benzo(a)pyrene	ND		mg/kg	0.317	--
Indeno(1,2,3-cd)Pyrene	ND		mg/kg	0.317	--
Dibenzo(a,h)anthracene	ND		mg/kg	0.317	--
Benzo(ghi)perylene	ND		mg/kg	0.317	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	64		40-140
o-Terphenyl	62		40-140
2-Fluorobiphenyl	65		40-140
2-Bromonaphthalene	65		40-140

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 131,VPH-18-2.1
Analytical Date: 07/19/22 14:27
Analyst: BAD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Petroleum Hydrocarbons - Westborough Lab for sample(s): 06 Batch: WG1665342-4					
C5-C8 Aliphatics	ND		mg/kg	5.00	--
C9-C12 Aliphatics	ND		mg/kg	5.00	--
C9-C10 Aromatics	ND		mg/kg	5.00	--
C5-C8 Aliphatics, Adjusted	ND		mg/kg	5.00	--
C9-C12 Aliphatics, Adjusted	ND		mg/kg	5.00	--
Benzene	ND		mg/kg	0.100	--
Toluene	ND		mg/kg	0.100	--
Ethylbenzene	ND		mg/kg	0.100	--
p/m-Xylene	ND		mg/kg	0.100	--
o-Xylene	ND		mg/kg	0.100	--
Methyl tert butyl ether	ND		mg/kg	0.050	--
Naphthalene	ND		mg/kg	0.200	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	89		70-130
2,5-Dibromotoluene-FID	97		70-130

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 135,EPH-19-2.1
Analytical Date: 07/27/22 10:00
Analyst: JB

Extraction Method: EPA 3546
Extraction Date: 07/25/22 15:28
Cleanup Method: EPH-19-2.1
Cleanup Date: 07/27/22

Parameter	Result	Qualifier	Units	RL	MDL
Extractable Petroleum Hydrocarbons - Westborough Lab for sample(s): 01,04 Batch: WG1667136-1					
C9-C18 Aliphatics	ND		mg/kg	6.50	--
C19-C36 Aliphatics	ND		mg/kg	6.50	--
C11-C22 Aromatics	ND		mg/kg	6.50	--
C11-C22 Aromatics, Adjusted	ND		mg/kg	6.50	--
Naphthalene	ND		mg/kg	0.325	--
2-Methylnaphthalene	ND		mg/kg	0.325	--
Acenaphthylene	ND		mg/kg	0.325	--
Acenaphthene	ND		mg/kg	0.325	--
Fluorene	ND		mg/kg	0.325	--
Phenanthrene	ND		mg/kg	0.325	--
Anthracene	ND		mg/kg	0.325	--
Fluoranthene	ND		mg/kg	0.325	--
Pyrene	ND		mg/kg	0.325	--
Benzo(a)anthracene	ND		mg/kg	0.325	--
Chrysene	ND		mg/kg	0.325	--
Benzo(b)fluoranthene	ND		mg/kg	0.325	--
Benzo(k)fluoranthene	ND		mg/kg	0.325	--
Benzo(a)pyrene	ND		mg/kg	0.325	--
Indeno(1,2,3-cd)Pyrene	ND		mg/kg	0.325	--
Dibenzo(a,h)anthracene	ND		mg/kg	0.325	--
Benzo(ghi)perylene	ND		mg/kg	0.325	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	65		40-140
o-Terphenyl	60		40-140
2-Fluorobiphenyl	76		40-140
2-Bromonaphthalene	75		40-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237070

Report Date: 07/27/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 02-03,05 Batch: WG1662188-2 WG1662188-3								
C9-C18 Aliphatics	46		51		40-140	10		25
C19-C36 Aliphatics	59		64		40-140	8		25
C11-C22 Aromatics	66		72		40-140	9		25
Naphthalene	56		60		40-140	7		25
2-Methylnaphthalene	57		62		40-140	8		25
Acenaphthylene	57		62		40-140	8		25
Acenaphthene	60		66		40-140	10		25
Fluorene	62		69		40-140	11		25
Phenanthrene	63		70		40-140	11		25
Anthracene	64		71		40-140	10		25
Fluoranthene	66		71		40-140	7		25
Pyrene	66		73		40-140	10		25
Benzo(a)anthracene	67		74		40-140	10		25
Chrysene	65		72		40-140	10		25
Benzo(b)fluoranthene	64		71		40-140	10		25
Benzo(k)fluoranthene	62		68		40-140	9		25
Benzo(a)pyrene	66		73		40-140	10		25
Indeno(1,2,3-cd)Pyrene	64		70		40-140	9		25
Dibenzo(a,h)anthracene	65		71		40-140	9		25
Benzo(ghi)perylene	60		66		40-140	10		25

Lab Control Sample Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 02-03,05 Batch: WG1662188-2 WG1662188-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Chloro-Octadecane	52		56		40-140
o-Terphenyl	63		69		40-140
2-Fluorobiphenyl	67		67		40-140
2-Bromonaphthalene	70		69		40-140
% Naphthalene Breakthrough	0		0		
% 2-Methylnaphthalene Breakthrough	0		0		

Lab Control Sample Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701
Lab Number: L2237070
Report Date: 07/27/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 06 Batch: WG1665342-2 WG1665342-3								
C5-C8 Aliphatics	108		116		70-130	7		25
C9-C12 Aliphatics	108		110		70-130	2		25
C9-C10 Aromatics	100		101		70-130	1		25
Benzene	99		102		70-130	3		25
Toluene	97		99		70-130	2		25
Ethylbenzene	99		102		70-130	3		25
p/m-Xylene	102		104		70-130	2		25
o-Xylene	99		100		70-130	1		25
Methyl tert butyl ether	98		96		70-130	2		25
Naphthalene	94		93		70-130	0		25
1,2,4-Trimethylbenzene	100		101		70-130	1		25
Pentane	101		113		70-130	11		25
2-Methylpentane	98		103		70-130	5		25
2,2,4-Trimethylpentane	109		114		70-130	4		25
n-Nonane	109		112		30-130	3		25
n-Decane	105		105		70-130	0		25
n-Butylcyclohexane	109		112		70-130	3		25

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2,5-Dibromotoluene-PID	92		91		70-130
2,5-Dibromotoluene-FID	102		100		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 01,04 Batch: WG1667136-2 WG1667136-3								
C9-C18 Aliphatics	63		72		40-140	13		25
C19-C36 Aliphatics	77		86		40-140	11		25
C11-C22 Aromatics	68		69		40-140	1		25
Naphthalene	67		65		40-140	3		25
2-Methylnaphthalene	68		66		40-140	3		25
Acenaphthylene	66		64		40-140	3		25
Acenaphthene	68		67		40-140	1		25
Fluorene	68		68		40-140	0		25
Phenanthrene	67		68		40-140	1		25
Anthracene	68		68		40-140	0		25
Fluoranthene	67		68		40-140	1		25
Pyrene	66		68		40-140	3		25
Benzo(a)anthracene	66		67		40-140	2		25
Chrysene	64		64		40-140	0		25
Benzo(b)fluoranthene	63		65		40-140	3		25
Benzo(k)fluoranthene	60		61		40-140	2		25
Benzo(a)pyrene	65		66		40-140	2		25
Indeno(1,2,3-cd)Pyrene	62		63		40-140	2		25
Dibenzo(a,h)anthracene	62		62		40-140	0		25
Benzo(ghi)perylene	56		57		40-140	2		25

Lab Control Sample Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237070

Report Date: 07/27/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 01,04 Batch: WG1667136-2 WG1667136-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Chloro-Octadecane	68		75		40-140
o-Terphenyl	63		63		40-140
2-Fluorobiphenyl	74		72		40-140
2-Bromonaphthalene	76		73		40-140
% Naphthalene Breakthrough	0		0		
% 2-Methylnaphthalene Breakthrough	0		0		

INORGANICS
&
MISCELLANEOUS

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-01
Client ID: S-2
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 13:25
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	85.3		%	0.100	NA	1	-	07/13/22 07:47	121,2540G	RI

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-02
Client ID: S-3
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 13:20
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	90.8		%	0.100	NA	1	-	07/13/22 07:47	121,2540G	RI

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-03
Client ID: S-4
Sample Location: BOXFORD, MA

Sample Depth:
Matrix: Soil

Date Collected: 07/12/22 13:15
Date Received: 07/12/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	38.8		%	0.100	NA	1	-	07/13/22 07:47	121,2540G	RI

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-04
Client ID: S-5
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 13:10
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	62.8		%	0.100	NA	1	-	07/13/22 07:47	121,2540G	RI

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-05
Client ID: S-6
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 13:05
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	42.1		%	0.100	NA	1	-	07/13/22 07:47	121,2540G	RI

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

SAMPLE RESULTS

Lab ID: L2237070-06
Client ID: S-2
Sample Location: BOXFORD, MA

Date Collected: 07/12/22 13:00
Date Received: 07/12/22
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	93.3		%	0.100	NA	1	-	07/13/22 07:47	121,2540G	RI

Lab Duplicate Analysis

Batch Quality Control

Project Name: PEN-BOXFORD

Project Number: MA220701

Lab Number: L2237070

Report Date: 07/27/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG1662149-1 QC Sample: L2237070-01 Client ID: S-2						
Solids, Total	85.3	86.7	%	2		20

Project Name: PEN-BOXFORD
Project Number: MA220701

Lab Number: L2237070
Report Date: 07/27/22

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2237070-01A	Glass 60mL/2oz unpreserved	A	NA		5.6	Y	Absent		EPH-DELUX-20(14)
L2237070-01B	Plastic 2oz unpreserved for TS	A	NA		5.6	Y	Absent		TS(7)
L2237070-02A	Glass 60mL/2oz unpreserved	A	NA		5.6	Y	Absent		EPH-DELUX-20(14)
L2237070-02B	Plastic 2oz unpreserved for TS	A	NA		5.6	Y	Absent		TS(7)
L2237070-03A	Glass 60mL/2oz unpreserved	A	NA		5.6	Y	Absent		EPH-DELUX-20(14)
L2237070-03B	Plastic 2oz unpreserved for TS	A	NA		5.6	Y	Absent		TS(7)
L2237070-04A	Glass 60mL/2oz unpreserved	A	NA		5.6	Y	Absent		EPH-DELUX-20(14)
L2237070-04B	Plastic 2oz unpreserved for TS	A	NA		5.6	Y	Absent		TS(7)
L2237070-05A	Glass 60mL/2oz unpreserved	A	NA		5.6	Y	Absent		EPH-DELUX-20(14)
L2237070-05B	Plastic 2oz unpreserved for TS	A	NA		5.6	Y	Absent		TS(7)
L2237070-06A	Plastic 2oz unpreserved for TS	A	NA		5.6	Y	Absent		TS(7)
L2237070-06B	Vial MeOH preserved	A	NA		5.6	Y	Absent		VPH-DELUX-18(28)

*Values in parentheses indicate holding time in days

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237070
Project Number:	MA220701	**Report Date:**	07/27/22

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237070
Project Number:	MA220701	**Report Date:**	07/27/22

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237070
Project Number:	MA220701	**Report Date:**	07/27/22

Data Qualifiers

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Report Format: Data Usability Report

Project Name:	PEN-BOXFORD	**Lab Number:**	L2237070
Project Number:	MA220701	**Report Date:**	07/27/22

REFERENCES

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

131 Method for the Determination of Volatile Petroleum Hydrocarbons (VPH), MassDEP, February 2018, Revision 2.1 with QC Requirements & Performance Standards for the Analysis of VPH under the Massachusetts Contingency Plan, WSC-CAM-IVA, June 1, 2018.

135 Method for the Determination of Extractable Petroleum Hydrocarbons (EPH), MassDEP, December 2019, Revision 2.1 with QC Requirements & Performance Standards for the Analysis of EPH under the Massachusetts Contingency Plan, WSC-CAM-IVB, March 1, 2020.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 7/12/22

ALPHA Job #: L2237070

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Project Information
- Project Name: PEN-BOXFORD
- Project Location: Boxford, MA
- Project #: MA220701
- Project Manager: Brian Moore
- ALPHA Quote #:

Report Information - Data Deliverables
- ☒ ADEx ☐ EMAIL

Billing Information
- ☒ Same as Client info
- PO #: MA220701

Client Information
- Client: CHCE
- Address: 8 Pleasant St, S. Natick, MA 01760
- Phone: 508 315 3146
- Email: bmoore rjwiggin@carr

Regulatory Requirements & Project Information Requirements
- ☒ Yes ☐ No MA MCP Analytical Methods
- ☐ Yes ☐ No CT RCP Analytical Methods
- ☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
- ☒ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
- ☐ Yes ☐ No NPDES RGP
- ☐ Other State /Fed Program ____ Criteria RCS-1

Turn-Around Time
- ☒ Standard ☐ RUSH (only confirmed if pre-approved!)
- Date Due:

Additional Project Information:
2IJ Project

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC: ☐ 8260 ☐ 624	SVOC: ☐ ABN ☐ PAH ☐ 524.2	METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15	METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13	EPH: ☒ Ranges & Targets ☐ Ranges Only	VPH: ☒ Ranges & Targets ☐ Ranges Only	☐ PCB ☐ PEST	TPH: ☐ Quant Only ☐ Fingerprint	Sample Comments	TOTAL # BOTTLES
	~~S-1~~ (JSH)														
37070-01	S-2	7/12/22	13:25	601	SJH					X					2
-02	S-3	"	13:20							X					2
-03	S-4		13:15							X					2
-04	S-5		13:10							X					2
-05	S-6		13:05							X					2
-06	S-2		13:00								X				2

SAMPLE INFO
Filtration: ☐ Field ☐ Lab to do
Preservation: ☐ Lab to do

Container Type	A	V
Preservative	A	F

Container Type: P= Plastic, A= Amber glass, V= Vial, G= Glass, B= Bacteria cup, C= Cube, O= Other, E= Encore, D= BOD Bottle

Preservative: A= None, B= HCl, C= HNO_3, D= H_2SO_4, E= NaOH, F= MeOH, G= $NaHSO_4$, H = $Na_2S_2O_3$, I= Ascorbic Acid, J = NH_4Cl, K= Zn Acetate, O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
	7/12/22 4:58		7/12/22 16:55

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)