REMEDIAL INVESTIGATION WORK PLAN

The Green

137 Smith Street and
140 and 146 Montgomery Street
City of Newburgh, Orange County, New York

NYSDEC BCP Site: C336099

November 2024

GBTS Project: 22003-0092

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November 2024

GBTS Project: 22003-0092

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The undersigned have reviewed this Remedial Investigation Work Plan and certify to Kearney Realty & Development Group Inc. and to the New York State Department of Environmental Conservation that the information provided in this document is accurate as of the date of issuance by this office.

I, Dan Bellucci P.E., certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

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1.0 INTRODUCTION

1.1 Purpose

This Remedial Investigation (RI) Work Plan (RIWP) describes actions proposed by Gallagher Bassett Technical Services (GBTS) to investigate the property located at 137 Smith Street, and 140 and 146 Montgomery Street, City of Newburgh, Orange County, New York (the Site) in accordance with the requirements of the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). The Brownfield Cleanup Agreement (BCA), dated October 28, 2024, identifies the Site as “The Green” (Site No. C336099).

This RIWP proposes an investigation to document environmental conditions at the Site (this work supplements earlier fieldwork conducted during previous due diligence activities). Work will be conducted in accordance with a Site-specific Health and Safety Plan (HASP, Appendix A) and a Community Air Monitoring Plan (CAMP, Appendix C).

1.2 Site Location and Description

The Site consists of the 1.16-acre property located at 137 Smith Street, and 140 and 146 Montgomery Street, City of Newburgh, Orange County, New York (identified, respectively, as City of Newburgh tax lot parcels: Section 12, Block 4, Lots 4.1, 10, and 2.1). The property is located in a developed urban area generally comprised of commercial, residential, and institutional uses. Figure 1 shows the Site location. The Site is a somewhat rectangular, vacant parcel, which has approximately 357 feet of frontage on the eastern side of Montgomery Street, 147 feet on the northern side of South Street, and 378 feet on the western side of Smith Street. The property is vacant wooded land, with a grass clearing at the southern portion. A chain-link fence defines the eastern border; remaining property lines are undefined. Site features are shown on Figure 2 and all Figures show the BCP Site boundaries.

Site development plans include construction of two new mixed-use and mixed-income buildings with associated infrastructure and landscaping. Building 1 is a 3½-story rowhouse 45-unit residential building and Building 2 is a 5-story midrise 73-unit residential building and two partial parking garage levels. Both structures will have retail uses along South Street.

1.3 Physical Setting

1.3.1 Site Topography

The Site and nearby sites are located on land with overall moderate to steep downward slopes to the east and southeast, towards the Hudson River. The USGS Topographic map providing coverage for the property indicates approximate on-site surface elevations ranging from 140 to 80 feet above mean sea level (the property was observed to slope downward from northwest to southeast).

1.3.2 Site Geology and Hydrogeology

Soils in the vicinity of the Site are likely to be derived from glacial till deposits, and soil survey maps indicate that deep, moderately well drained Mardin gravelly silt loam (8-15% and 15-25% slopes) soils are likely to be present. Depth to bedrock in Mardin soils is generally greater than 6 feet below grade surface (bgs); bedrock outcrops were not observed on the property. Soil survey data indicate generalized groundwater depths of 1 to 2 feet bgs.

A limited subsurface investigation performed in November 2022 in support of future Site development activities documented likely fill materials throughout the property, underlain by variable texture glacial till. Boring refusal was encountered from 4.5 to 12 feet bgs, apparently on shale or slate bedrock (or possible remains of building foundations). Wet soil was encountered in one boring at the northeastern portion of the property at a depth of approximately 10 feet bgs.

Shallow groundwater flow in the vicinity of the property is likely to generally follow surficial topography and be to the east, towards the Hudson River, located approximately 0.1-mile from the property.

1.4 Summary of Previous Environmental Investigations

A Phase I Environmental Site Assessment issued for the subject property by GBTS in January 2023 indicated that the Site formerly contained multiple structures (likely used for residential purposes) from at least the late 1800s through sometime between 1971 and 1992.

A concurrent Summary Report of Subsurface Investigation issued by GBTS documented collection of soil samples from nine (9) mechanized borings (maximum depth 12 feet bgs) and an additional five (5) surface locations. Fill material with debris was found throughout the Site, potentially related to construction and/or subsequent demolition of the former buildings. Limited laboratory analysis documented total metal concentrations above NYSDEC Soil Cleanup Objectives (SCOs) for Restricted-Residential Use (RRU) throughout the Site, and pesticide levels above Unrestricted Use (UU) SCOs; no significant field evidence of contamination, however, was observed. These findings are consistent with impacts from poor-quality fill, demolition debris, and/or from debris materials historically dumped on the Site (including at least one former automobile). Soil contamination above RRU SCOs is summarized below (maximum values and RRU SCOs in parts per million [ppm]):

Analytes Above RRU SCOs	Detections	Maximum Value	RRU SCO	Depth (ft bgs)
arsenic	8	51.9	16	0 - 7
barium	1	544	400	0 - 1
cadmium	1	4.66	4.3	0 - 1
lead	9	3,050	400	0 - 5
mercury	7	2.87	0.81	0 - 6

Previous sampling data are shown on Figure 2, Site Map and Known Contamination Conditions.

1.5 Areas of Concern

Based on documented Site history and the results of previous environmental investigations, the following areas of concern (AOC), requiring additional investigation, have been identified:

AOC 1: Documented Soil Contamination

Soil with debris (poor-quality urban fill) is present throughout the Site. Existing laboratory data document the presence of metals at concentrations above RRU SCOs. Previous sampling results were limited to laboratory analysis of metals and pesticides, only, and do not provide delineation data for known metal impacts.

AOC 2: Potential Impacts to Groundwater and Soil Vapor Quality

Previous environmental investigation at the Site was limited to soil sampling; groundwater and soil vapor quality at the Site is unknown.

2.0 REMEDIAL INVESTIGATION WORK PLAN

This RIWP details activities proposed by GBTS to further characterize the Site so that a comprehensive assessment of Site conditions, as required by the NYSDEC BCP guidelines, is completed.

Previous environmental fieldwork will be supplemented by the work described below to complete a Site Characterization in compliance with NYSDEC *Technical Guidance for Site Investigation and Remediation* (DER-10), Section 3. Additional investigation will be completed to fully characterize contamination associated with the identified areas of concern (known significant impacts to soil and unknown groundwater and soil vapor quality), and establish a comprehensive data set for all NYSDEC Part 375 analytical parameters in accordance with BCP requirements.

A Proposed Remedial Investigation Map depicting relevant Site features, and previous and proposed sampling locations, is provided as Figure 3. All proposed work will be conducted according to a site-specific Health and Safety Plan (Appendix A).

For the purpose of the work detailed in this RIWP, the Volunteer is Kearney Realty & Development Group, who will contract with the environmental consultant/remediation firm (hereafter referred to as the On-site Coordinator [OSC]) to provide the services detailed below. The OSC shall be a firm with experience in investigating NYSDEC BCP sites, with the capability to certify the final Remedial Investigation Report (RIR) in conformance with DER-10 Section 1.5.

2.1 Overview of Proposed Investigative Services

The proposed investigative services described in detail in subsequent sections of this RIWP consist of the following:

- Documentation of Underground Structures (2.2.3);
- Initiation of air monitoring during ground intrusive activities (Section 2.3.1);
- Collection of eight (8) soil vapor samples to define on-Site contamination and any potential off-Site impacts (Section 2.3.3);
- Extension of eighteen (18) soil borings, and collection of two or more soil samples from each boring, to document soil conditions (Section 2.3.4);
- Installation of six (6) permanent groundwater monitoring wells, and sampling to document groundwater quality (Section 2.3.5); and,
- Preparation of a RIR for the Volunteer and NYSDEC (Section 2.4)

Prior to, or in conjunction with, the initiation of these actions (see Section 2.3), the tasks detailed in Section 2.2, below, will also be conducted.

2.2 Proposed Site Preparation Services

This section of the RIWP provides details of activities and services necessary to be initiated and/or completed prior to the implementation of Site remediation services.

2.2.1 Agency Notification and Reporting

The NYSDEC will be notified in writing at least five (5) business days prior to the start of fieldwork. Notification of subsequent field activities will be in accordance with reasonable business practice, with verbal notification for immediate (within 48 hours) activities and written notification otherwise. Written notifications will be transmitted to the NYSDEC via facsimile or electronic mail. Daily reports will be provided to NYSDEC and NYSDOH by the end of the following business day.

2.2.2 Utility Markout

Prior to the implementation of any of the investigative tasks outlined in Section 2.3, below, a request for a complete utility markout of the Site will be submitted as required by New York State Department of Labor regulations. Confirmation of underground utility locations will be secured, a field check of the utility markout will be conducted prior to the initiation of work.

2.2.3 Documentation of Underground Structures

A geophysical survey (e.g. ground-penetrating radar) will be performed to document the presence or absence of Site underground structures such as storage tanks and utilities, and to clear areas where intrusive subsurface work is proposed.

2.2.4 Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) provided in Appendix B details necessary procedures to generate data of sufficient quality and quantity to represent successful performance of the Remedial Investigation at the Site. The QAPP includes a Sampling and Analysis Plan (SAP) for all media, which identifies methods for sample collection and handling.

A photo-ionization detector will be utilized to screen encountered materials for the presence of volatile vapors. The PID will be calibrated at the onset of each workday, and a written calibration log will be maintained for this project. The PID will be calibrated to read ppm gas equivalents of isobutylene in accordance with protocols set forth by the equipment manufacturer.

All samples will be collected in accordance with applicable DER-10 requirements and NYSDEC and NYSDOH guidance documents, and will be submitted to a NYSDOH ELAP-certified laboratory using appropriate chain of custody procedures. Dedicated, laboratory supplied containers will be used for sample collection. Field personnel will maintain all samples at cold temperatures, as necessary, and complete all chain of custody forms. Laboratory reports will include detailed Quality Assurance/Quality Control (QA/QC) analyses, including sample duplicates, mass spike/mass spike duplicates, field blanks (PFAS), equipment blanks (non-dedicated sampling equipment), and trip blanks (VOCs and PFAS).

A Data Usability Summary Report (DUSR) will be prepared by a third, independent party, which has been deemed acceptable by NYSDEC.

2.2.5 Subcontractor Coordination

Subcontractors will perform services under the direct supervision of the OSC and will be given a copy of the Health and Safety Plan (Section 2.2.6) prior to the start of fieldwork. All insurance certificates will be secured from subcontractors. It is anticipated that the following subcontractors will be used during the RI: geophysical, driller, laboratory and data validator.

2.2.6 Health and Safety Plan

The Site-specific Health and Safety Plan provided in Appendix A will be reviewed with on-Site personnel (including subcontractors) prior to the initiation of fieldwork. It is anticipated that all work will be performed in “Level D” personal protective equipment; however, all field personnel will be prepared to continue services wearing more protective levels of equipment as warranted by field conditions. The HASP provides practices to be implemented in order to protect off-Site receptors, such as users of adjoining sidewalks and adjoining properties.

2.2.7 Site Security

The Volunteer will secure the property with a six-foot fence and locking gates to prevent unauthorized access to the BCP Site. [Note: While egress points must be determined based on actual Site conditions and practical considerations for the utilization of heavy equipment, all efforts will be made to avoid locating such areas near the adjoining school or other sensitive uses.]

2.3 Proposed Specific Investigation Services

This section of the RIWP provides a detailed description of the investigative tasks that will be conducted at the Site.

2.3.1 Community Air Monitoring

A Site-specific CAMP, inclusive of the NYSDOH Generic Community Air Monitoring Plan (DER-10 Appendix 1A; provided in Appendix C), will be initiated during all ground intrusive activities. The implementation of the CAMP will document the presence or absence of specific compounds in the air surrounding the work zone, which may migrate off-site due to fieldwork activities.

This plan provides guidance on the need for implementing more stringent dust and emission controls based on air quality data. Air monitoring will be conducted for VOCs and dust. Water misting will be used to control dust (as needed) during all ground intrusive activities, which will be limited to the extension of soil borings and installation of the monitoring wells (hand-held equipment and portable water tanks will be supplied by the driller). Water spray will include use of an odor/vapor suppressant (e.g., BioSolve) if required.

2.3.2 General Fieldwork Methodology

Fieldwork methodology will be in conformance with the QAPP (including sample handling and custody for per- and polyfluoroalkyl substances [PFAS]), which includes copies of applicable Standard Operating Procedures (SOPs) for fieldwork activities. The QAPP provides tables indicating appropriate types of sample containers, sampling frequency and the approved USEPA Methods for laboratory analysis.

All sampling locations will be determined in the field, documented using a handheld GPS unit (accuracy ±0.5 foot), and recorded in fieldwork logs for use in production of all final maps. Anticipated sampling locations, and planned new monitoring wells, are depicted on the Proposed Remedial Investigation Map (Figure 3).

An assessment of media characteristics, including soil type, presence or absence of foreign materials, field indications of contamination (e.g., unusual coloration patterns or odors), and instrument readings, will be made by the OSC during all Site investigative work.

The OSC will be responsible for identifying any materials that require special handling (media that may contain elevated contaminant levels or is grossly contaminated, hazardous materials, etc.) and will ensure that they are properly securely stored on-Site (soil stockpiled on plastic and covered, or soil and water placed in approved containers) pending characterization and proper disposition. The OSC will ensure that unforeseen environmental conditions are managed in accordance with applicable federal and state regulations.

2.3.3 Vapor Assessment

A total of eight (8) soil vapor samples will be collected to define and delineate potential VOC contamination, and determine the potential for any off-Site migration of impacted vapor. All sampling will be in accordance with NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, October 2006, and subsequent updates.

Sampling Methodology

Vapor probes will be constructed by advancing a boring using mechanized direct-push equipment (approximate depth of 4 feet bgs). Sampling tubing with an attached "air stone" will be placed near the invert of the hole/boring and covered with clean silica sand. The upper portions of the borehole will be backfilled, with the near surface interval sealed with hydrated bentonite clay to prevent surface air from entering the system.

All locations will utilize approved tubing (0.188-inch inner diameter Teflon), be screened with a PID for VOCs prior to purging, and will be checked for a proper surface seal. A tracer gas will be used to verify that there is no significant infiltration of outside air. The space surrounding the sampling point will be enclosed and sealed (e.g., with a metal hemisphere and clay seal, over plastic sheeting) in order to introduce helium into the area surrounding the probe. Real-time sampling equipment (Radiodetection Multi-vapor Leak Locator, model MDG 2002, or equivalent) will be utilized to determine when the interior atmosphere in the enclosure reaches a concentration of 80%, and the tubing for the vapor implant will then be sampled for helium. If helium is detected in vapor at a concentration greater than 10%, the annular seal will be repaired and gas tracing performed again until less than 10% helium is detected.

Successful exclusion of the tracer gas will be considered adequate documentation that sampling techniques are sufficiently preventing air infiltration (screening will be conducted at additional locations, as needed, based on any variable conditions encountered in the field).

For all vapor sampling locations, the exact purge volume will be dependent on boring depth and tubing length. Three borehole and tubing volumes will be purged prior to collection. The purge rate will not exceed 0.2 liters per minute. All vapor samples will be collected into laboratory-certified clean Summa canisters (rate not exceeding 0.2 L/minute), equipped with two-hour flow regulators.

Sample Submission

Vapor samples will be analyzed for VOCs using USEPA method TO-15.

2.3.4 Soil Assessment

Soil Borings

An initial total of eighteen (18) soil borings will be extended, with additional "step out" borings as needed based on field and instrument observations of contamination, in order to define the extent of soil contaminated above SCOs. Additional fieldwork rounds for the advancement of soil borings and/or installation of monitoring wells may be required to fully delineate identified contamination, and to determine if contamination extends or is migrating off-site (the need for an expanded investigation scope will be determine in consultation with NYSDEC).

All borings will be extended using mechanized equipment, to at least the deeper of 15 feet bgs or to a sample interval below the groundwater interface, or until refusal (all borings to be completed as groundwater wells will be extended to a minimum depth that allows for proper installation of the well screen). Boring equipment will be capable of collecting soil cores at discreet intervals.

Soil is anticipated to be collected using coring barrels (4 or 5 feet in length) lined with disposable acetate sleeves (split spoons may be utilized based on Site conditions and equipment availability).

Sampling Methodology

Soil will be continuously recovered from borings, and material in each sampling interval will be characterized in order to identify existing subsurface physical conditions and any overt evidence of contamination. Sampling of recovered material for laboratory submission will be conducted from all boring intervals, as warranted, to fully define contaminants in soil and provide sufficient areal and vertical delineation. Samples will be collected (at a minimum) from the upper 2 inches of soil and the soil stratum intercepting the groundwater table, and additionally from any fill material and/or soil exhibiting field evidence of impacts (if encountered) or at soil strata corresponding to previously identified contamination in nearby boring locations (for delineation).

Sampling may occur in multiple rounds to ensure complete Site characterization in compliance with DER-10, Chapter 3, including a full characterization of any existing soils proposed to remain in place as a clean cover system (based on Site development requirements, the characterization of *in situ* cover soils may be conducted in full or part during a Pre-design Investigation).

Samples will be collected directly from the freshly cut open sleeve, using disposable plastic trowels or properly decontaminated stainless steel instruments, or may be manually collected directly from exposed soil or the sampling instrument using dedicated disposable latex gloves.

Soil sampling for VOCs will follow USEPA Method 5035 protocols, using disposable 5-gram plastic syringes to place material into laboratory-supplied glass vials (prepared with stirs bars and appropriate preservatives).

Sample Submission

Soil samples will be analyzed for NYSDEC Part 375-6.8 parameters, including USEPA Target Compound List (TCL) VOCs and SVOCs plus 30 tentatively identified compounds (TICs), USEPA TAL metals including Cr^{+6}, polychlorinated biphenyls (PCBs), pesticides, herbicides, cyanide, and 1,4-dioxane and PFAS in accordance with the most current NYSDEC guidance. Methods of analysis for all analyte classes are specified in the QAPP.

Analysis of samples may be modified in consultation with the NYSDEC Project Manager based on initial sampling results, including the presence or absence of field evidence of contamination. Additional analysis may be performed based repository requirements for waste characterization prior to off-site disposal.

2.3.5 Groundwater Assessment

The RI will identify current and potential groundwater uses at the Site and document current groundwater conditions. Six (6) soil borings will be converted to permanent monitoring wells, to be located throughout the Site. Monitoring wells may be relocated in consultation with NYSDEC, or additional wells may be installed, based on subsurface conditions, including the presence of non-aqueous phase liquids (NAPL) or other indications of gross contamination. All monitoring wells will be sampled. Well installation, well development, and sample collection and laboratory submission are detailed below.

Monitoring Well Installation

The likely completion depths for new wells are not known at this time, and wells may require installation within the underlying bedrock. All well casings above bedrock will be constructed of two-inch PVC, with 0.01-inch slotted PVC screening across the water table (screen length 5 to 10 feet with a minimum of 2 feet of screening above the water table, as practicable). No glue will be used to thread the casing lengths. If paired, deeper wells are required, screening depths will be determined in consultation with NYSDEC

The annular space between the well screen and the borehole will be backfilled with clean silica sand to a depth of approximately two feet above the well screen. A seal consisting of hydrated bentonite clay will be placed above the sand pack (minimum of least 12 inches at shallow wells, and the depth required to exclude the upper water column at deep wells) and the remaining annular space will be grouted with cement.

If bedrock wells are required, borings will be implemented using either air-rotary or sonic equipment, based on encountered Site conditions and the recommendation of the driller. Two-inch (minimum diameter) PVC or metal casing will be extended through the overburden soils and socketed into the upper portion of the bedrock in order to prevent contact with vadose zone media and/or contaminants. The open borehole within the bedrock will be extended to a depth sufficient to ensure a minimum water column depth of 8 feet (screening may be used within the borehole if bedrock does not appear to be competent).

A locked cap with vent will be installed at the top of the PVC riser and the wells will be protected by secure metal covers or casings. A transit level will be used to determine the elevation of the top of the PVC well riser, relative to a permanent on-site marker, for use in determining relative groundwater elevations. Well locations and relative elevations will be recorded in field logs and indicated on all fieldwork maps.

Monitoring Well Development

One week following installation, wells will be developed with a decontaminated mechanical pump and dedicated polyethylene tubing in order to clear fine-grained material that may have settled around the well screen and to enhance the natural hydraulic connection between the well screen and the surrounding soils. Well development will begin at the top of the screened interval to prevent pump clogging. Development will be discontinued when the discharge water is free of obvious sediment, turbidity is below 50 NTUs and indicator parameters (e.g., dissolved oxygen, temperature, etc.) have stabilized. The pump assembly will be removed from the well while the pump is running to avoid discharge of purged water back into the well. Development water will be securely stored on-site pending laboratory analysis.

Sampling Methodology

All Site monitoring wells will be sampled one week following development using USEPA Low-Stress ("low flow") methodology. Sampling will be conducted using the following protocol:

1. Basic weather conditions and all field observations will be recorded in the field logbook. Sampling will begin at the potentially least contaminated well (as determined from well location and/or previous data) and proceed to the potentially most contaminated well. Wells will be checked for damage or evidence of tampering before initiating sampling.

2. If permissible under QAPP requirements, plastic sheeting will be placed around wells to minimize potential contamination of sampling equipment from the ground surface, and all monitoring, purging and sampling equipment will be placed on the sheeting.

3. The protective casing on the well will be unlocked, the air in the well head will be screened with a PID, and the static water level (relative to the top of the casing) will be measured with a decontaminated water-level meter. A peristaltic pump with plastic tubing (or equivalent equipment) will be used for sampling. The tubing (or a submersible pump attached to tubing, if required by Site conditions) will be slowly lowered until reaching two to three feet off of the well bottom to prevent disturbance of sediment.

4. The water level will be measured before the pump is started and at three to five minute intervals. Pumping rates will be reduced (as needed) to the minimum capabilities of the pump to ensure stabilization of the water level (drawdown of 0.3 feet or less).

5. During pumping, field indicator parameters (turbidity, temperature, specific conductance, pH, redox potential, and dissolved oxygen) will be monitored and recorded approximately every five minutes. The well will be considered stabilized when the indicator parameters have stabilized for three consecutive readings (the minimum purge interval will be at least 15 minutes).

6. All groundwater samples will be collected in a manner consistent with the QAPP.

7. The protective cap on the well will be replaced and locked, and the field sampling crew will move to the next most contaminated well and the process will be repeated.

Sample Submission

Groundwater samples will be analyzed for NYSDEC Part 375-6.8 parameters, including USEPA TCL VOCs and SVOCs plus 30 TICs, USEPA TAL metals including Cr^{+6}, PCBs, pesticides, herbicides, and cyanide, and 1,4-dioxane and PFAS in accordance with the most current NYSDEC guidance. Methods of analysis are specified in the QAPP.

Analysis of samples may be modified in consultation with the NYSDEC Project Manager based on initial sampling results, including the presence or absence of field evidence of contamination.

Groundwater Flow Calculations

The direction of groundwater flow will be determined based on elevations of static groundwater as measured at all wells, measured prior to water quality sample collection. Measurements will be collected with an electronic depth meter with an accuracy of +/- 0.01 foot. All data will be recorded in field logs and presented on a Direction of Groundwater Flow Map in the RIR.

2.3.6 Sampling Summary

The overall sampling rationale is to delineate the nature and extent of contamination in all Site media, assess potential human exposures and/or off-Site environmental impacts, and to provide information sufficient for developing potential remedial response actions.

Site-wide sampling will include collection of: soil from borings using a mechanized Geoprobe with macro-core barrel (multiple depths) to address AOC 1; and groundwater from permanent monitoring wells using USEPA low-flow methodology, and vapor using probes installed in borings, following relevant NYSDOH protocols, to address AOC 2. Heavy equipment may be used to extend test pits, as necessary, to collect soil where use of boring equipment is impractical.

Additional soil sampling will be conducted from step-out borings as needed, based on any observed contamination conditions or based on any newly documented “hot spots” indicated by laboratory analysis. If needed, manual confirmatory endpoint soil sampling will be conducted in all excavation areas associated with removal of on-Site USTs (details regarding any UST excavation activities and associated remedial actions will be provided in a Work Plan for the review and approval of NYSDEC). The location, number, and depth of these samples will be based on encountered field conditions.

The following tables summarize proposed Site investigation sampling, including matrix type, location, sampling collection method, laboratory analytical parameters, sampling rationale, and required QA/QC samples as needed. All laboratory analysis, minimum reporting limits, and QA/QC sampling as per the QAPP, including TICs, duplicates, and blanks.

Table 2.3.6a - Summary of Sample Analytical Parameters and Sampling Rationale

Sample Matrix	Analytical Parameters	Sampling Rationale
Soil (borings or test pits)	Full Part 375 list; PFAS	Site-wide analysis of upper fill materials and the soil interval intercepting groundwater table, as well as other soil intervals that may exhibit overt contamination and/or for delineation
Soil (excavation endpoints)	Full Part 375 list; PFAS	Document any releases at excavation areas (USTs and/or buried equipment)
Groundwater	Full Part 375 list (includes dissolved metals); PFAS	Site-wide analysis of groundwater (concurrently allows determining direction of groundwater flow)
Vapor	TO-15 VOCs	Site-wide analysis of vapor and potential for off-Site impacts

Notes:

- *Reporting limits for all analytical parameters are provided in Attachment E of the QAPP (RIWP Appendix C)*
- *Part 375 list includes TCL VOCs/SVOCs +30 TICs, TAL metals with* Cr^{+6}*, cyanide, pesticides, PCBs, herbicides, PFAS 1633, and 1,4-dioxane 8270 SIM*
- *Analyte list may be modified in consultation with NYSDEC*

Table 2.3.6b - Sample Location, Depth, and Collection Method

Sample ID	Grid Location	Sample Matrix	Sample Depth (GWI = groundwater interface)	Collection Method	Area of Concern
2SB-01	A2	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-02	C1	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-03	D2	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-04	A4	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-05	C4	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-06	D4	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-07	A6	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-08	C6	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-09	E6	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-10	B8	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-11	C8	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-12	E8	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-13	B10	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-14	D10	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-15	E10	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-16	B12	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-17	C12	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
2SB-18	E12	soil	0-2 inches; 0-5 feet; GWI	Geoprobe macro-core	AOC 1
MW-01	A2	water	TBD	USEPA low-flow	AOC 2
MW-02	D2	water	TBD	USEPA low-flow	AOC 2
MW-03	A6	water	TBD	USEPA low-flow	AOC 2
MW-04	E6	water	TBD	USEPA low-flow	AOC 2
MW-05	B10	water	TBD	USEPA low-flow	AOC 2
MW-06	E12	water	TBD	USEPA low-flow	AOC 2

Sample ID	Grid Location	Sample Matrix	Sample Depth (GWI = groundwater interface)	Collection Method	Area of Concern
SV-01	A1	vapor	4; or foundation depth	NYSDOH, Summa canister	AOC 2
SV-02	D1	vapor	4; or foundation depth	NYSDOH, Summa canister	AOC 2
SV-03	A3	vapor	4; or foundation depth	NYSDOH, Summa canister	AOC 2
SV-04	D3	vapor	4; or foundation depth	NYSDOH, Summa canister	AOC 2
SV-05	A7	vapor	4; or foundation depth	NYSDOH, Summa canister	AOC 2
SV-06	D7	vapor	4; or foundation depth	NYSDOH, Summa canister	AOC 2
SV-07	B11	vapor	4; or foundation depth	NYSDOH, Summa canister	AOC 2
SV-08	E11	vapor	4; or foundation depth	NYSDOH, Summa canister	AOC 2

Notes:

- *Soil and vapor Samples to be collected at additional depth intervals as required*
- *Sampling at any excavation areas requires prior review and approval of a work plan by NYSDEC*

Table 2.3.6c - QAPP Required Duplicates and Blanks

Required QAPP Samples	Number of Samples
Duplicates, MS/MSD	1 for every 20 samples (minimum 1/week), as per sample collection requirements
Trip Blank (PFAS)	1 per sample cooler (each day of sampling)
Trip Blank (VOCs)	1 per sample cooler (each day of sampling)
Field Blank (PFAS)	1 per sampling day (each matrix)
Equipment Blank	1 for every 20 samples (non-dedicated), as per sample collection requirements

2.3.7 Management of Investigation-Derived Waste

Waste materials generated during the investigation will be stored within DOT-approved 55-gallon metal drums, which will be immediately and properly labeled upon use. If wastes exhibit gross field evidence of contamination (or are suspected or known to be significantly contaminated) they will be stored within an additional Site-constructed containment system and/or placed upon a commercial spill pad. Soil cuttings may alternatively be stored on plastic sheeting and securely covered, or be backfilled within the originating borehole to within 12-inches of the surface, unless the following conditions exist: soil is grossly contaminated; the boring has penetrated a confining layer; a path for vertical migration would be completed; cuttings do not fit in the borehole; or, the boring will be converted to a monitoring point for groundwater or vapor.

Any materials remaining at the Site at the end of each workday will be properly covered and secured (tarps fully weighted and sealing-bands on drums bolted shut). All materials remaining after completion of the fieldwork will be containerized and disposed off-site at a permitted facility following the schedule provided in Section 3.0. Waste characterization sampling will be in accordance with the requirements of the disposal facility. Discarded personal protective equipment and other fieldwork supplies will be disposed as municipal solid waste.

2.3.8 Management of Contingency Conditions

General Methodology

Identification of unknown contamination source areas during invasive Site work will be promptly communicated to NYSDEC's Project Manager, and petroleum spills will be reported to the NYSDEC Spill Hotline. These findings will be included in the daily report. If previously unidentified sources of gross contamination are found during the investigation, sampling will be performed on targeted material and surrounding soils; chemical analytical testing will be performed in accordance with the QAPP and any NYSDEC directives.

On-site personnel should be prepared to respond appropriately if the following previously unknown materials are encountered (if encountered, this material could result in a recommendation from the QEP for an immediate, temporary shutdown of construction activities):

- Previously unknown tanks (including drums) containing a liquid product that is not likely to be water and is likely to present a threat to worker health or safety;
- Previously unknown demolition debris, which could contain significant quantities of asbestos, the disturbance of which is determined, based on field observations, to violate or likely to violate Federal, State, or local asbestos regulations; and,
- Material which cannot be readily identified.

Procedures for Encountered Underground Storage Tanks (USTs)

If a UST is encountered, all accessible portions of the tank will be inspected and documented, including tank integrity and the presence or absence of liquids and/or sludge. If accessible, any significant quantities of materials in the tank will be identified, and be removed by a qualified contractor and disposed off-Site at a permitted facility. Manifests of liquid waste management will be maintained by the OSC and be included in final documentation submitted to NYSDEC. Soil sampling in the vicinity of the tank will be completed in accordance with the QAPP and DER-10 (3.9), after consultation with NYSDEC. The removal of any tanks and/or ancillary piping will be performed only in accordance with an approved Site-specific Work Plan.

Procedures for Encountered Demolition Debris

To the extent practical, any investigation derived wastes that contain clearly identifiable material suspected of containing asbestos will be handled separately from other wastes, following all applicable Federal, State and local asbestos regulations. The presence of significant quantities of asbestos will result in a temporary shutdown of the Site.

Procedures for Encountered Unknown Material

Material which cannot be readily identified but which is considered, based on field observations, to be material that needs further investigation before disposal will be properly segregated.

Unknown material will be screened with a PID and all levels will be documented. Samples will be collected and analyzed for full Part 375 parameters to identify the compounds present and to assist in determining appropriate disposal practices. Until determined by laboratory analysis otherwise, this material will be considered a hazardous substance. A plan to describe the handling and disposal of such materials will be submitted to NYSDEC for review and approval.

2.4 Documentation of Environmental Conditions

A RIR will be prepared at the completion of all fieldwork services, in accordance with DER-10, summarizing the nature of environmental conditions for all identified areas of concern. The RIR will: summarize Site history and all previous investigations; document Site conditions and the investigative work performed during implementation of the RIWP; provide complete analytical findings and compare results to applicable Standards, Criteria, and Guidance (SCG); and, include an on-site and off-site Qualitative Human Health Exposure Assessment in accordance with DER-10(3.3)(c)(4).

An on-site and off-site qualitative fish and wildlife resource exposure assessment (identification of impacts to fish and wildlife resources from Site contaminants of ecological concern) will be completed if it is determined that there are likely to be ecological resources present on or in the vicinity of the Site. Any potential groundwater uses within a 0.25-mile radius will be identified.

The RIR will provide complete data summary tables, figures showing all exceedances of SCGs, fieldwork and construction logs, laboratory and data validation reports, CAMP monitoring data and waste disposal documentation. All laboratory data presented in the RIR will be submitted to NYSDEC in an acceptable electronic data deliverable (EDD) format.

2.5 Green and Sustainable Remediation Practices

NYSDEC DER-31 *Green Remediation* requires that Green and Sustainable Remediation (GSR) concepts be considered and/or implemented in all phases of site investigation and cleanup, and that reports required under the BCP document all GSR efforts.

The following general goals, consistent with DER-31, are applicable to the proposed RI:

- Reduce total energy use and increase the percentage of energy from renewable resources.
- Reduce air pollutants and greenhouse gas (GHG) emissions.
- Reduce water use and preserve water quality.
- Conserve material resources and reduce waste.
- Protect land and ecosystem services.

In support of these goals, the following best management practices to minimize the environmental footprint of the RI will be implemented (to the extent feasible) and documented in the RIR:

- Schedule fieldwork activities to minimize mobilization of equipment, field personnel, and supplies to the Site;
- Plan fieldwork to efficiently manage: use of equipment utilizing fuel/generating exhaust, including heavy machinery, generators, and/or personal vehicles; of water for decontamination activities; and, minimize travel distances by using local contractors;
- Minimize waste generation through efficient material use, and re-use or recycling (as possible) of materials that could be considered wastes (e.g., use drilling spoils of acceptable quality for on-Site backfill); and,
- Conduct fieldwork such that soil compaction, soil erosion, and surface runoff are limited.

GSR practices implemented at the Site during the RI will be documented in the RIR, including quantitative reporting using an approved environmental footprint analysis calculator, such as the USEPA's SEFA (Spreadsheets for Environmental Footprint Analysis) or SiteWise™ from the Sustainable Remediation Forum (SURF).

3.0 PROJECT SCHEDULE

The following schedule is anticipated for this project (Week 0 based on date of RIWP approval):

Week	Task(s)
1	Utility markout and geophysical survey; selection of driller; secure insurance, NYSDEC notification of fieldwork
2 to 3	Installation of borings; collection of soil and vapor samples, completion of monitoring wells
4 to 5	Well development; collection of groundwater samples; establish groundwater elevations
5-7	Laboratory analysis of media samples completed; removal of investigation derived wastes
8-11	Preparation of RIR
12	Submission of RIR to NYSDEC (a Remedial Alternatives Report and Remedial Action Work Plan may also be submitted at this time)

FIGURES

0 50 100
SCALE IN FEET
(APPROXIMATELY)

All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 1: Site Location Map

137 Smith Street
140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

Legend:

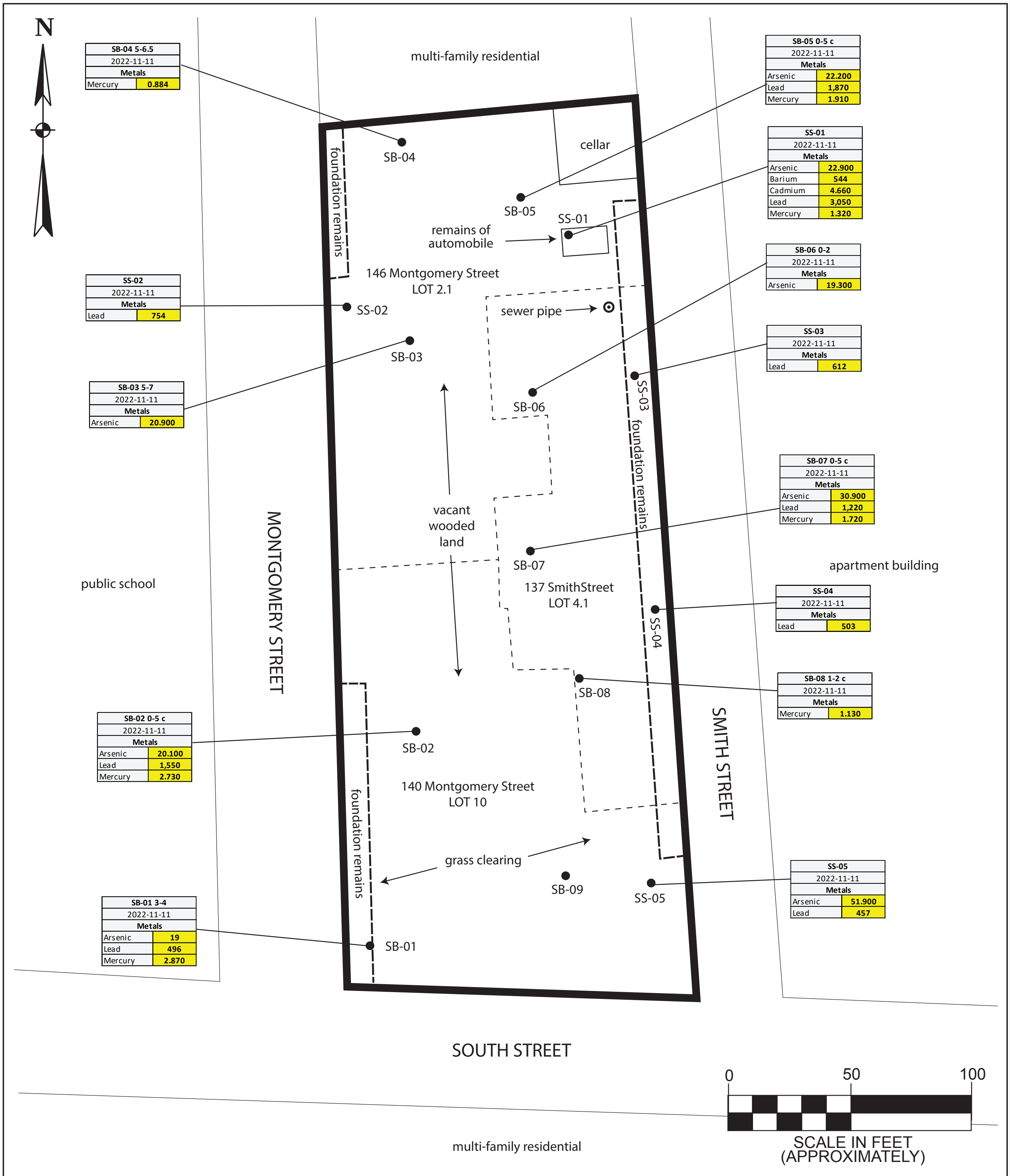
- 🟥 BCP Site Boundary
- - - - tax lot lines

File: 22003-0092

November 2024

Scale as shown

Figures



SB-04 5-6.5	
2022-11-11	
Metals	
Mercury	0.884

SB-05 0-5 c	
2022-11-11	
Metals	
Arsenic	22.200
Lead	1,870
Mercury	1.910

SS-01	
2022-11-11	
Metals	
Arsenic	22.900
Barium	544
Cadmium	4.660
Lead	3,050
Mercury	1.320

SS-02	
2022-11-11	
Metals	
Lead	754

SB-06 0-2	
2022-11-11	
Metals	
Arsenic	19.300

SS-03	
2022-11-11	
Metals	
Lead	612

SB-03 5-7	
2022-11-11	
Metals	
Arsenic	20.900

SB-07 0-5 c	
2022-11-11	
Metals	
Arsenic	30.900
Lead	1,220
Mercury	1.720

SS-04	
2022-11-11	
Metals	
Lead	503

SB-08 1-2 c	
2022-11-11	
Metals	
Mercury	1.130

SB-02 0-5 c	
2022-11-11	
Metals	
Arsenic	20.100
Lead	1,550
Mercury	2.730

SS-05	
2022-11-11	
Metals	
Arsenic	51.900
Lead	457

SB-01 3-4	
2022-11-11	
Metals	
Arsenic	19
Lead	496
Mercury	2.870

All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 2: Site Map with Known Contamination Conditions

137 Smith Street
140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

Legend:

▬ BCP site boundary
- - - lot lines
● soil sample location

All data in mg/Kg (ppm)
Analyte Above RRU SCO

File: 22003-0092

November 2024

Scale as shown

Figures

All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 3: Proposed Remedial Investigation Map

137 Smith Street, 140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

Legend:

- ▬ subject property border
- - - - - lot lines
- ● proposed soil sample location
- ∅ proposed soil vapor location
- ⊕ proposed soil sample and monitoring well location

File: 22003-0092

November 2024

Scale as shown

Figures

APPENDIX A: Health and Safety Plan

GALLAGHER BASSETT | TECHNICAL SERVICES

SITE INVESTIGATION
HEALTH AND SAFETY PLAN

The Green - Newburgh

137 Smith Street and
140 and 146 Montgomery Street
City of Newburgh, Orange County, New York

NYSDEC BCP Site: 336099

November 2024

GBTS Project: 22003-0092

Technical Services Division

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GALLAGHER BASSETT | TECHNICAL SERVICES

SITE INVESTIGATION
HEALTH AND SAFETY PLAN

November 2024

GBTS Project: 22003-0092

Prepared By:	**Prepared For:**
Gallagher Bassett Technical Services **22 IBM Road, Suite 101** **Poughkeepsie, New York 12601**	**Kearney Realty & Development Group Inc.** **57 Route 6, Suite 207** **Baldwin Place, New York 10505**

The undersigned have reviewed this Site Investigation Health And Safety Plan and certify to Kearney Realty & Development Group Inc. and to the New York State Department of Environmental Conservation that the information provided in this document is accurate as of the date of issuance by this office.

Scott Spitzer

Scott Spitzer
Gallagher Bassett Technical Services
Technical Director – Environmental Consulting

R Hooker

Richard Hooker
Gallagher Bassett Technical Services
Manager – Environmental Consulting

TABLE OF CONTENTS

Attachments

1.0 INTRODUCTION

1.1 Purpose

This Site Investigation Health and Safety Plan (HASP) has been developed to provide the requirements and general procedures to be followed by Gallagher Bassett Technical Services (GBTS) and subcontractors while performing investigative services at The Green - Newburgh BCP Site (ID: 336099) located in the City of Newburgh, Orange County, New York.

This HASP incorporates policies, guidelines and procedures intended to protect the public health of the community during fieldwork activities, and therefore serves as a Community Health and Safety Plan. The objectives of the HASP are met by establishing guidelines to minimize potential exposures during fieldwork, and by planning for and responding to emergencies affecting the public adjacent to the site.

This HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be utilized by all personnel while on the Site. All on-site personnel and visitors shall follow the guidelines, rules, and procedures contained in this HASP. The Project Manager or Site Health and Safety Officer (SHSO) may impose any other procedures or prohibitions necessary for safe operations. This HASP incorporates by reference applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR 1910 and 1926.

The requirements and guidelines in this HASP are based on a review of available information and evaluation of potential on-site hazards. This HASP will be discussed with Site personnel and will be available on-site for review while work is underway. On-site personnel will report to the SHSO in matters of health and safety. The on-site project supervisor(s) are responsible for the enforcement and implementation of this HASP, which is applicable to all on-site field personnel, including contractors and subcontractors.

This HASP is specifically intended for the conduct of activities within the defined scope of work in specified areas of the Site. Changes in conditions or future actions that may be conducted at the Site may necessitate the modification of the requirements of the HASP. Although this HASP can be made available to interested persons for informational purposes, GBTS cannot be held accountable for the interpretations or activities of any other persons or entities other than the employees of GBTS or its subcontractors.

1.2 Site Location and Description

The Site is defined as the property located at 137 Smith Street, and 140 and 146 Montgomery Street, City of Newburgh, Orange County, New York. A Fieldwork Map illustrating the Site configuration and areas of proposed fieldwork activities is included as an Attachment to this HASP.

1.3 Work Activities

Environmental investigative activities are detailed in the NYSDEC-approved Remedial Investigation Work Plan (RIWP), which describes the tasks required to investigate any environmental contamination at the Site. The specific tasks detailed in the RIWP are wholly incorporated by reference into this HASP.

Previous investigations of the Site documented poor-quality urban fill soils, which are impacted by elevated levels of metals and pesticides. Metal concentrations in soil are above NYSDEC Soil Cleanup Objectives for both Unrestricted and Restricted-Residential Use. Groundwater and soil-vapor quality are unknown at this time.

2.0 HEALTH AND SAFETY HAZARDS

2.1 Hazard Overview for On-Site Personnel

Elevated concentrations of metals and pesticides are documented in Site soil (additional analytes may also be present in Site soils, and groundwater and/or soil vapor may potentially be contaminated). The possibility exists for on-site personnel to have contact with contaminated soils, groundwater, and/or vapor during investigative activities. Contact with contaminated substances may present a skin contact, inhalation, and/or ingestion hazard. These potential hazards are addressed in Sections 3.0 through 11.0, below.

2.2 Potential Hazards to the Public from Fieldwork Activities

The potential exists for the public to be exposed to contaminated soils, groundwater, and/or vapor, which may present a skin contact, inhalation, and/or ingestion hazard. Additional potential hazards to the public that are associated with fieldwork activities include mechanical/physical hazards, traffic hazards from fieldwork vehicles, and noise impacts associated with operation of mechanical equipment. Impacts to public health and safety are expected to be limited to hazards that could directly affect on-Site visitors and/or trespassers. These effects will be mitigated through site access and control measures (see Section 6.0, below). Specific actions taken to protect the public health (presented in Sections 3.0 through 11, below) are anticipated to minimize any potential off-site impacts from contaminant migration, noise, and traffic hazards.

3.0 PERSONAL PROTECTIVE EQUIPMENT

The levels of protection identified for the services specified in the RIWP represent a best estimate of exposure potential and protective equipment needed for that exposure. The determination of levels was based on data provided by previous Site studies and information reviewed on current and past Site usage. Personal protective equipment (PPE) will be worn at all times, as designated by this HASP.

The SHSO may recommend revisions to these levels based on an assessment of exposures and may at any time require Site workers, supervisors, and/or visitors to use specific safety equipment.

The level of protective clothing and equipment selected for this project is Level D. Level D PPE provides minimal skin protection and no respiratory protection, and is used when the atmosphere contains no known hazard, oxygen concentrations are not less than 19.5%, and work activities exclude splashes, immersion or the potential for unexpected inhalation or contact with hazardous levels of chemicals. Workers will wear Level D protective clothing including, but not limited to, a hard hat, steel-toed boots, nitrile gloves (when handling soils and/or groundwater), hearing protection (foam ear plugs or ear muffs, as required), and safety goggles (in areas of exposed groundwater and when decontaminating equipment). Disposable gloves will be changed immediately following the handling of contaminated soils, water, or equipment. Tyvek suits will be worn during activities likely to excessively expose work clothing to contaminated dust or soil (chemically-resistant over garments will be required in situations where exposures could lead to penetration of clothing and direct dermal contact by contaminants).

The requirement for the use of PPE by official on-site visitors shall be determined by the SHSO, based on the most restrictive PPE requirement for a particular Work Zones (see Section 6 for Work Zone definitions). All on-site visitors shall, at a minimum, be required to wear an approved hardhat and be provided with appropriate hearing protection as necessary.

The need for an upgrade in PPE will be determined based upon encountered Site conditions, including measurements taken in the breathing zone of the work area using a photo-ionization detector (PID). An upgrade to a higher level of protection (Level C) will begin when specific action levels are reached (see Section 5.0, below), or as otherwise required by the SHSO (the need for Level B or Level A PPE is not anticipated for the likely remedial activities at this Site).

Level C PPE includes a full-face or half-mask air-purifying respirator (NIOSH approved for the compound[s] of concern), hooded chemical-resistant clothing, outer and inner chemical-resistant gloves, and (as needed) coveralls, outer boots/boot covers, escape mask, and face shield. Level C PPE may be used only when: oxygen levels are not less than 19.5%; contaminant contact will not adversely affect exposed skin; types of air contaminants have been identified, levels measured, and a cartridge/canister is available that can remove the contaminant; atmospheric contaminant levels do not exceed immediately dangerous to life or health (IDLH) levels; and job functions do not require self-contained breathing apparatus (SCBAs).

If any equipment fails and/or any employee experiences a failure or other alteration of their protective equipment that may affect its protective ability, that person will immediately leave the work area. The Project Manager and the SHSO will be notified and, after reviewing the situation, determine the effect of the failure on the continuation of on-going operations. If the failure affects the safety of personnel, the work site, or the surrounding environment, personnel will be evacuated until appropriate corrective actions have been taken.

4.0 CONTAMINANT CONTROL

Precautions will be taken during dry weather (e.g., wetting or covering exposed soils) to avoid generating and breathing dust-generated from soils. A PID (or equivalent equipment) will be used to monitor potential contaminant levels. Response to the monitoring will be in accordance with the action levels provided in Section 5.0.

Fieldwork activities near the Site perimeter will not be conducted during times with high off-Site pedestrian activity, including but not limited to, school pick-up and drop-off.

Vehicles exiting the Site will be examined for the presence or absence of soil or other materials on tires, etc., and will be brushed to remove materials adhering to surfaces in order to prevent off-Site tracking. Any soil or other materials that escape the Site will be immediately contained and removed using generally accepted best construction practices (any such materials exhibiting field evidence of contamination or otherwise known to be significantly contaminated will be handled in accordance with applicable NYSDEC and NYSDOH regulations, including reporting of spill events as warranted).

5.0 MONITORING AND ACTION LEVELS

Concentrations of petroleum compounds in the air are expected to be below the OSHA Permissible Exposure Limits (PELs). Air monitoring will be conducted for VOCs and dust according to the RIWP Community Air Monitoring Plan (CAMP). Monitoring will be conducted at all times that fieldwork activities which are likely to generate emissions are occurring. PID and dust readings consistently in excess of CAMP limits will be used as an indication of the need to initiate personnel monitoring, increase worker protective measures, and/or modify or cease on-site operations in order to mitigate off-site community exposure.

PID readings that consistently exceed background in the breathing zone (during any proposed tasks) will necessitate moving away from the source or implementing a higher PPE level.

<u>Special Requirements for Work within 20 Feet of Potentially Exposed Individuals or Structures</u>

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be predetermined). Background readings in the occupied spaces must be taken and discussed with NYSDOH prior to commencement of the work.

If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, and carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work with Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g., weekends or evenings) when building occupancy is at a minimum.

6.0 SITE CONTROL/WORK ZONES

Site control procedures will be established to reduce the possibility of worker/visitor contact with environmental contaminants, to protect the public in the area surrounding the Site and to limit access to the Site to only those persons required to be in the work zone. Notices placed near the Site will warn the public not to enter fieldwork areas and direct visitors to report to the Project Manager or SHSO. Measures will be taken to limit the entry of unauthorized personnel into the specific areas of field activity and to safely direct and control all vehicular traffic in and near the Site (e.g., placement of traffic cones and warning tape).

Work Areas are defined as follows:

Exclusion Zone - The exclusion zone will be that area immediately surrounding the work being performed to accomplish fieldwork activities involving the handling or potential exposures to contaminated media. Only individuals with appropriate PPE and training are allowed into this zone. It is the responsibility of the SHSO to prevent unauthorized personnel from entering the exclusion zone. When necessary (e.g., high traffic areas) the exclusion zone will be delineated with barricade tape, cones and/or barricades. The exclusion zone will encompass the adjacent off-Site sidewalks when fieldwork is conducted in close proximity to the Site perimeter.

Dedicated Decontamination Area - A dedicated decontamination area for personnel and equipment (including contamination reduction and support zones) is not anticipated to be required during completion of fieldwork activities, but will be established and utilized, as warranted, based on changes in Site conditions. Care will be taken at all times to remove gloves, excess soil from boots, and soiled clothing (if necessary) before entering the Intermediate Zone.

Intermediate Zone - The intermediate zone, also known as the decontamination zone, is where patient decontamination should take place, if necessary. A degree of contamination still is found in this zone and some PPE is required, although it is usually of a lesser degree than that required for the exclusion zone.

Command Zone - The command zone is located outside the decontamination zone. All exposed individuals and equipment from the exclusion zone and the decontamination zone should be decontaminated before entering the command zone. Access to all zones must be controlled. Keeping onlookers, media, etc. well away from the Site is critical and will be the responsibility of both the SHSO and the Project Manager, and other Site personnel as appropriate.

7.0 NOISE CONTROL

All fieldwork activities will be conducted in a manner designed to reduce unnecessary noise generation, and to minimize the potential for both on-site and off-site harmful noise levels. The Project Manager and SHSO will establish noise reduction procedures (as appropriate to the Site and the work) to meet these requirements.

8.0 PERSONNEL TRAINING

Work zones that will accomplish the general objective stated above will be established by the Project Manager and the SHSO. Site access will be monitored by the SHSO, who will maintain a log-in sheet for personnel that will include, at the minimum, personnel on the Site, their arrival and departure times, and their destination on the Site. All workers will be properly trained in accordance with OSHA requirements (29 CFR 1910). Personnel exiting the work zone(s) will be decontaminated prior to exiting the Site.

Site-specific training will be provided to each employee. Personnel will be briefed by the SHSO as to the potential hazards to be encountered.

Topics will include:

- Availability of this HASP;
- General site hazards and specific hazards in the work areas, including those attributable to known of suspect on-site contaminants;
- Selection, use, testing, and care of the body, eye, hand, and foot protection being worn, with the limitations of each;
- Decontamination procedures for personnel, their personal protective equipment, and other equipment used on the Site;
- Emergency response procedures and requirements;
- Emergency alarm systems and other forms of notification, and evacuation routes to be followed; and,
- Methods to obtain emergency assistance and medical attention.

9.0 DECONTAMINATION

The SHSO will establish a decontamination system and decontamination procedures (appropriate to the Site and the work) that will prevent potentially hazardous materials from leaving the Site, including the brushing of vehicles prior to existing the Site in order to remove materials adhering to surfaces. All fieldwork protocols will be in accordance with RIWP Appendix B, Quality Assurance Project Plan, Attachment B Field Sampling and Decontamination Standard Operating Procedures). Sampling equipment will be segregated and, after decontamination, stored separately from PPE, and all decontaminated or clean sampling equipment not in use will be protected and stored in a designated, controlled storage area.

10.0 EMERGENCY RESPONSE

10.1 Notification of Site Emergencies

In the event of an emergency, the SHSO will be immediately notified of the nature and extent of the emergency (the names and contact information for key site safety and management personnel, as well as other site safety contact telephone numbers, shall be posted at the Site). Table 1 in this HASP contains Emergency Response Telephone Numbers, and immediately following is a map detailing the directions to the nearest hospital emergency room. This information will be maintained at the work Site by the SHSO. The location of the nearest telephone will be determined prior to the initiation of on-site activities. In addition to any permanent phone lines, a cellular phone will be in the possession of the SHSO, or an authorized designee, at all times.

10.2 Responsibilities

Prior to the initiation of on-site work activities, the SHSO will:

- Notify individuals, authorities and/or health care facilities of the potentially hazardous activities and potential wastes that may develop as a result of the remedial activities;
- Confirm that first aid supplies and a fire extinguisher are available on-site;
- Have a working knowledge of safety equipment available; and,
- Confirm that a map detailing the most direct route to the hospital is prominently posted with the emergency telephone numbers.

The SHSO will be responsible for directing notification, response, and follow-up actions and for contacting outside response personnel (ambulance, fire department, or others). In the case of an evacuation, the SHSO will account for personnel. A log of individuals entering and leaving the Site will be kept so that everyone can be accounted for in an emergency.

Upon notification of an exposure incident, the SHSO will contact the appropriate emergency response personnel for recommended medical diagnosis and, if necessary, treatment. The SHSO will determine whether and at what levels exposure actually occurred, the cause of such exposure, and the means to prevent similar incidents from occurring.

10.3 Accidents and Injuries

In the event of an accident or injury, measures will be taken to assist those who have been injured or exposed and to protect others from hazards. If an individual is transported to a hospital or doctor, a copy of the HASP will accompany the individual.

The SHSO will be notified and respond according to the severity of the incident. The SHSO will investigate the incident and prepare a signed and dated report documenting the investigation. An exposure-incident report will also be completed by the SHSO and the exposed individual. The form will be filed with the employee's medical and safety records to serve as documentation of the incident and the actions taken.

10.4 Communication

No special hand signals will be utilized within the work zone. Field personnel will utilize standard hand signals during the operation of heavy equipment.

10.5 Safe Refuge

Vehicles and on-site structures will serve as the immediate place of refuge in the event of an emergency. If evacuation from the area is necessary, project vehicles will be used to transport on-site personnel to safety.

10.6 Site Security and Control

Site security and control during emergencies, accidents, and incidents will be monitored by the SHSO. The SHSO is responsible for limiting access to the Site to authorized personnel and for oversight of reaction activities.

10.7 Emergency Evacuation

In case of an emergency, personnel will evacuate to the safe refuge identified by the SHSO, both for their personal safety and to prevent the hampering of response/rescue efforts.

10.8 Resuming Work

A determination that it is safe to return to work will be made by the SHSO and/or any personnel assisting in the emergency, e.g., fire department, police department, utility company, etc. No personnel will be allowed to return to the work areas until a full determination has been made by the above-identified personnel that all field activities can continue unobstructed. Such a determination will depend upon the nature of the emergency (e.g., downed power lines -- removal of all lines from the property; fire -- extinguished fire; injury -- safe transport of the injured party to a medical facility with either assurance of acceptable medical care present or completion of medical care; etc.). Before on-site work is resumed following an emergency, necessary emergency equipment will be recharged, refilled, or replaced. Government agencies will be notified as appropriate. An Incident Report Form will be filed.

10.9 Fire Fighting Procedures

A fire extinguisher will be available in the work zone during on-site activities. This extinguisher is intended for small fires. When a fire cannot be controlled with the extinguisher, the area will be evacuated immediately. The SHSO will be responsible for directing notification, response, and follow-up actions and for contacting ambulance and fire department personnel.

10.10 Emergency Decontamination Procedure

The extent of emergency decontamination depends on the severity of the injury or illness and the nature of the contamination. Whenever possible, minimum decontamination will consist of washing, rinsing, and/or removal of contaminated outer clothing and equipment. If time does not permit decontamination, the person will be given first aid treatment and then wrapped in plastic or a blanket prior to transport.

10.11 Emergency Equipment

The SHSO will maintain a dedicated vehicle containing the following on-site equipment for safety and emergency response: fire extinguisher; first-aid kit; and, extra copy of this HASP.

11.0 SPECIAL PRECAUTIONS AND PROCEDURES

The activities associated with this remediation may involve potential risks of exposure to both chemical and physical hazards. The potential for chemical exposure to hazardous or regulated substances will be significantly reduced through the use of monitoring, personal protective clothing, engineering controls, and implementation of safe work practices.

11.1 Heat/Cold Stress

Training in prevention of heat/cold stress will be provided as part of the site-specific training. The timing of this project is such that heat/cold stress may pose a threat to the health and safety of personnel.

Work/rest regimens will be employed, as necessary, so that personnel do not suffer adverse effects from heat/cold stress.

Special clothing and appropriate diet and fluid intake regimens will be recommended to personnel to further reduce this temperature-related hazard.

Rest periods will be recommended in the event of high/low temperatures and/or humidity to counter the negative effects of heat/cold stress.

11.2 Heavy Equipment

Working in the vicinity of heavy equipment is the primary safety hazard at the Site. Physical hazards in working near heavy construction equipment include the following: overhead hazards, slips/trip/falls, hand and foot injuries, moving part hazards, improper lifting/back injuries, and noise. All workers will be properly trained in accordance with OSHA requirements (29 CFR 1910).

No workers will be permitted within any excavated areas without proper PPE, including, as warranted, any necessary Level C equipment (e.g., respirators and protective suits). Air monitoring in/near excavations will be conducted for VOCs in accordance with Section 5.0.

11.3 Additional Safety Practices

The following are important safety precautions to be enforced during the remedial activities.

Medicine and alcohol can aggravate the effect of exposure to certain compounds. Controlled substances and alcoholic beverages will not be consumed during remedial activities. Consumption of prescribed drugs will only be at the discretion of a physician familiar with the person's work.

Eating, drinking, chewing gum or tobacco, smoking, or other practices that increase the probability of hand-to-mouth transfer and ingestion of material is prohibited except in areas designated by the SHSO.

Contact with potentially contaminated surfaces will be avoided whenever possible. Workers will not unnecessarily walk through puddles, mud or other discolored surfaces; kneel on the ground; or lean, sit, or place equipment on drums, containers, vehicles, or the ground.

Personnel and equipment in the work areas will be minimized, consistent with site operations.

Unsafe equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.

Work areas for various operational activities will be established.

11.4 Daily Log Contents

The SHSO will establish a system appropriate to the Site, the work and the work zones that will record, at a minimum, the following information:

- Personnel on the Site (arrival and departure times) and their destination on the Site;
- Incidents and unusual activities Site such as (but not limited to) accidents, spills, breaches of security, injuries, equipment failures and weather-related problems;
- Changes to the HASP; and,
- Daily information, such as: changes to work and health and safety plans, work accomplished and the current Site status, and monitoring results.

Daily logs will be provided in periodic reports to NYSDEC and NYSDOH, as specified in the RIWP.

12.0 EMERGENCY INFORMATION

12.1 Emergency Contact Information

The following table presents emergency contact information. This table should be copied and freely distributed and/or posted at the Site to ensure ready access.

Emergency Contact Information

Emergency Agencies	Phone Numbers
EMERGENCY	**911**
HOSPITAL Montefiore St. Luke's Cornwall 70 Dubois Street, Newburgh, NY 12550	**(845) 561-4400 or 911**
POLICE City of Newburgh - Police Department 55 Broadway, Newburgh, NY 12550	**(845) 561-3131 or 911**
FIRE City of Newburgh - Fire Department 22 Grand Street, Newburgh, NY 12550	**911** (office 845-562-1212)
City of Newburgh – City Hall	(845) 569-7300
City of Newburgh - Department of Public Works	(845) 565-3297
Site Health and Safety Officer, Richard Hooker, GBTS	(845) 452-1658 (845) 867-4715

12.2 Directions to Hospital

Approximately 4 minutes travel time – 0.7 mile

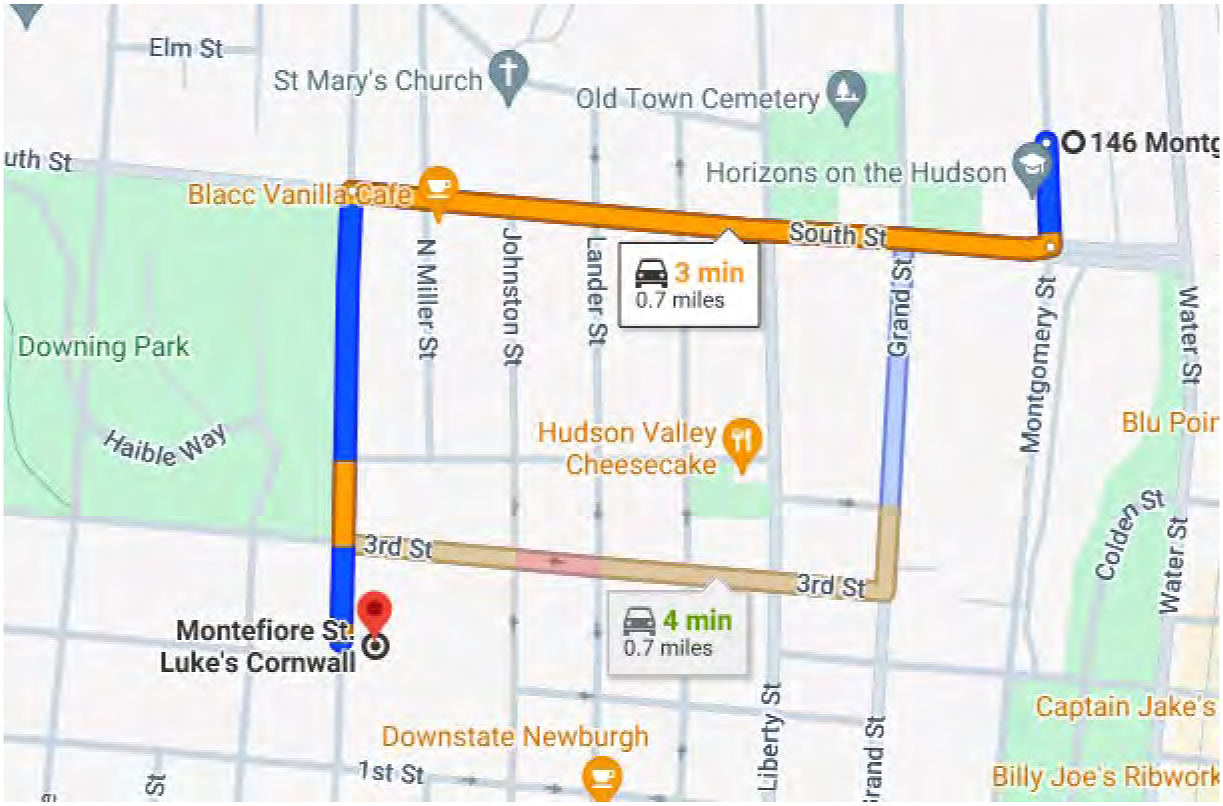
As needed, **South** on either Montgomery Street OR Smith Street

West on South Street Broadway (0.4 mile)

South on Dubois Street (0.2 mil)

Follow signs on Left for Montefiore St Luke's Cornwall Emergency Room

12.3 Map to Hospital



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure: Proposed Remedial Investigation Map

137 Smith Street, 140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

Legend:

▬ subject property border
- - - - lot lines
● proposed soil sample location
⌀ proposed soil vapor location
⊕ proposed soil sample and monitoring well location

File: 22003-0092

November 2024

Scale as shown

Figures

APPENDIX B: Quality Assurance Project Plan

GALLAGHER BASSETT | TECHNICAL SERVICES

SITE INVESTIGATION
QUALITY ASSURANCE PROJECT PLAN

The Green - Newburgh

137 Smith Street, and 140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

NYSDEC BCP Site: 336099

November 2024

GBTS Project: 22003-0092

Technical Services Division
22 IBM Road, Suite 101, Poughkeepsie, NY 12601 T: 845-452-1658 F: 845-485-7083
www.gallagherbassett.com

GALLAGHER BASSETT | TECHNICAL SERVICES

SITE INVESTIGATION
QUALITY ASSURANCE PROJECT PLAN

November 2024

GBTS Project: 22003-0092

Prepared By:

Gallagher Bassett Technical Services
22 IBM Road, Suite 101
Poughkeepsie, New York 12601

Prepared For:

Kearney Realty & Development Group Inc.
57 Route 6, Suite 207
Baldwin Place, New York 10505

The undersigned have reviewed this Site Investigation Quality Assurance Project Plan and certify to Kearney Realty & Development Group Inc. and to the New York State Department of Environmental Conservation that the information provided in this document is accurate as of the date of issuance by this office.

Scott Spitzer

Scott Spitzer
Gallagher Bassett Technical Services
Technical Director – Environmental Consulting

RHooker

Richard Hooker
Gallagher Bassett Technical Services
Manager – Environmental Consulting

TABLE OF CONTENTS

Attachment(s)

1.0 PROJECT MANAGEMENT

1.1 Project/Task Organization

Major participants in the project are shown below along with their specific responsibilities and authorities. Resumes for Gallagher Bassett Technical Services (GBTS) personnel and for the Data Validator are provided in Attachment D this Quality Assurance Project Plan (QAPP).

Caroline Jalanti New York State Department of Environmental Conservation (NYSDEC)

Caroline Jalanti is the project manager for the NYSDEC, responsible for review and approval of all project submittals.

Melissa Doroski, New York State Department of Health (NYSDOH)

Melissa Doroski, is the project manager for the NYSDOH, responsible for review and approval of project submittals.

Dan Bellucci P.E., Bellucci Engineering, PLLC

Jay Jaros is the Qualified Environmental Professional (QEP) for the project, responsible for overview of all project activities. Mr. Jaros has authority over all GBTS personnel and subcontractors and will be responsible for final review and approval of all project submittals prior to submission to the NYSDEC.

Scott Spitzer Technical Director, Environmental Consulting, GBTS

Scott Spitzer will be the Project Manager, responsible for directing and coordinating all project activities, reviewing all project documents, and ensuring that project plans are followed. Mr. Spitzer has authority to direct the activities of the field team (OSC and subcontractors).

Richard Hooker Quality Assurance Officer, GBTS

Richard Hooker, PhD will be responsible for reviewing all sampling procedures and certifying that the data was collected and analyzed using the appropriate procedures, and will assist in the development of the sampling and analytical portion of a site-specific quality assurance project plan (QAPP).

Erick Salazar On-Site Coordinator (OSC), GBTS

The OSC will be responsible for the completion of all on-site fieldwork, collection of all samples, completion of the field log, and chains of custody. The OSC will have authority over all on-site subcontractors.

Laboratory York Analytical Laboratories

York Analytical Laboratories, will be responsible for analysis of samples, and is New York State Department of Health (NYSDOH) Environmental Laboratory Approved Program (ELAP) certified in the appropriate analytical categories.

Subcontractors *To be determined*

Subcontractors will be responsible for the operation of special equipment and providing technical assistance as needed. The laboratory subcontractor will be responsible for analysis of samples and will be New York State Department of Health (NYSDOH) Environmental Laboratory Approved Program (ELAP) certified in the appropriate categories.

1.2 Principal Data Users

The principal users of the generated data in this project are listed below.

1. Residents of the City of Newburgh, especially those residing near the Site
2. Kearney Realty & Development Group Inc.
3. NYSDEC

1.3 Problem Definition/Background

Site investigation is planned under the NYSDEC Brownfields Cleanup Program (BCP ID: 336099), in accordance with the Remedial Investigation Work Plan (RIWP). The specific tasks detailed in the RIWP are wholly incorporated by reference into this QAPP. Previous investigations documented soil with debris (poor-quality urban fill) throughout the Site. Existing laboratory data document the presence of metals at concentrations above NYSDEC Soil Cleanup Objectives (SCOs) for Restricted-Residential Use (RRU). Groundwater and soil vapor quality at the Site are unknown at this time.

1.4 Project/Task Description

The project will meet its objective through compliance with NYSDEC DER-10 Technical Guidance for site investigations.

1.5 Quality Objectives and Criteria

The data collected in this project will be used to document Site environmental conditions. In order to meet the data quality objectives of precision, accuracy, representation, comparability, and completeness the following actions will be taken:

- Soil, groundwater and vapor samples will be collected based on the procedures in the RIWP and this QAPP, to ensure data consistency.
- Data generated during sampling will be submitted for review by a third, independent party (see Section 3.2.1, below).

Prior to field activities, the QEP, Project Manager and the OSC will review the RIWP to ensure that the data quality objectives of precision, accuracy, representation, comparability, and completeness will be met during the field activities. At the completion of field activities, the Project Manager will review field logs and chains of custody to ensure that field activities met the intent of the RIWP. If a problem is identified, Mr. Richard Hooker and the Project Manager will meet to determine corrective measures necessary to meet data quality objectives.

1.6 Documents and Records

Electronic and paper copies of all fieldwork observations and measurements will be retained by GBTS.

2.0 SAMPLING AND ANALYSIS PLAN

Sample collection, handling and laboratory analysis is summarized below. A Proposed Remedial Investigation Map showing Site features and fieldwork locations is provided as Attachment A.

2.1 Sampling Overview

Borings will be extended in order to recover representative soil samples at various depths and to allow for the collection of soil vapor samples. Several borings will be completed as permanent groundwater monitoring wells to allow for the collection of reproducible groundwater quality samples.

2.2 Fieldwork and Sampling Methodology

All fieldwork activities, including collection and handling of media samples, will be in accordance with the Standard Operating Procedures (SOPs) provided in Attachment B. Sampling will occur for per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane (“emerging contaminants”, ECs) and guidelines for such sampling will be strictly followed by all field and laboratory personnel. Basic SOP components are summarized below.

2.2.1 General Fieldwork

The OSC will be responsible for compliance with the SOPs, including:

- Documentation of all fieldwork activities in logbooks for inclusion in final reports, including soil boring logs for each boring location and monitoring well construction and sampling logs (sample fieldwork log sheets are provided in Attachment B);
- Assessment of media characteristics (soil type, presence or absence of foreign materials, field indications of contamination), and instrument readings using properly calibrated and operated precision instruments;

- Identification of materials requiring special handling (media that may contain elevated concentrations of contaminants or is grossly contaminated, hazardous materials, etc.) and ensuring proper secure on-site storage, pending characterization and disposition;
- Ensuring that unforeseen environmental conditions are managed in accordance with applicable federal and state regulations;
- Sample collection, including procedures to minimize potential cross-contamination; and,
- Implementation of decontamination procedures.

Sample collection and laboratory analysis for PFAS and 1,4-dioxane will comply with NYSDEC guidance (*Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs*, April 2023), provided in Attachment B (SOPs), which includes a target list of PFAS compounds.

Guidelines for sampling of soil and/or groundwater for PFAS include the following (detailed protocols, including lists of prohibited behaviors and materials, are provided in the SOP):

- Sampling for PFAS will be conducted prior to sampling for other analytes, as practicable, to minimize cross contamination from sample containers utilized for other methods;
- Sampling personnel will comply with specific prohibitions in regards to field equipment, PPE, rain gear, personal clothing and body-care, food, etc.;
- Sample coolers will be held at low temperature using only ice (plastic freezer packs are prohibited);
- Decontamination protocols specific to PFAS will be followed, including use of "PFAS free" water and approved cleaning agents (Liquinox is prohibited); and,
- Compliance with laboratory requirements for sampling containers, field blanks, etc.

2.2.2 Vapor

A total of eight (8) soil vapor samples will be collected. Vapor sampling will be in accordance with applicable NYSDOH guidance, including use of a tracer gas to confirm adequate surface seals. Purge and sample rates will not exceed 0.2 liters per minute. Vapor samples will be collected over a two-hour period into laboratory-certified clean Summa canisters equipped with applicable flow regulators.

2.2.3 Extension of Borings and Soil Sampling

An initial total of eighteen (18) soil borings will be extended, with additional "step out" borings as needed based on field and instrument observations of contamination, in order to define the extent of Site soil containing analyte concentrations above applicable SCOs. Additional fieldwork rounds for the advancement of soil borings and/or installation of monitoring wells may be required to fully delineate identified contamination, and to determine if contamination extends or is migrating off-site (the need for an expanded investigation scope will be determine in consultation with NYSDEC).

Borings will be extended using mechanized equipment capable of collecting soil cores at discreet intervals. Borings will be extended to at least the deeper of 15 feet below ground surface or to a sample interval below the groundwater interface, or until refusal (all borings to be completed as groundwater wells will be extended to a minimum depth that allows for proper installation of the well screen). Soil is anticipated to be collected using coring barrels lined with disposable acetate sleeves (split spoons may be utilized based on Site conditions/equipment availability).

Soil will be continuously recovered from borings, and material in each sampling interval will be characterized in order to identify existing subsurface physical conditions and any overt evidence of contamination (presence of foreign materials, nonaqueous-phase liquid, unusual coloration or odors, or PID readings). Sampling of recovered material for laboratory submission will be conducted from all boring intervals, as warranted, to fully define contaminants in soil and provide sufficient areal and vertical delineation. Samples will be collected (at a minimum) from the soil stratum intercepting the groundwater table, any fill material, and from soil exhibiting field evidence of impacts (if encountered) or at soil strata corresponding to previously identified contamination in nearby boring locations (for delineation).

Sampling may occur in multiple rounds to ensure complete Site characterization in compliance with DER-10, Chapter 3, including a full characterization of any existing soils proposed to remain in place as a clean cover system (based on Site development requirements, the characterization of *in situ* cover soils may be conducted in full or part during a Pre-design Investigation).

Samples will be collected directly from the freshly cut open sleeve, using disposable plastic trowels or properly decontaminated stainless steel instruments, or may be manually collected directly from exposed soil or the sampling instrument using dedicated disposable latex gloves. Soil sampling for volatile organic compounds (VOCs) will follow USEPA Method 5035 protocols, using disposable 5-gram plastic syringes to place material into laboratory-supplied glass vials (prepared with stirs bars and appropriate preservatives).

2.2.4 Installation of Monitoring Wells and Groundwater Sampling

Six (6) permanent monitoring wells will be installed. The completion depths for new wells are not known at this time (wells may need to be installed within the underlying bedrock). All well casings above bedrock will be constructed of two-inch PVC, with 0.01-inch slotted PVC screening across the water table (minimum of 2 feet of screening above the water table, as practicable). No glue will be used to thread the casing lengths. If paired, deeper wells are required, they will be constructed with the screening located to intercept the lowest level of the water column. The annular space between the well screen/casing and the borehole will be backfilled with clean silica sand and hydrated bentonite and/or cement grout. Wells will be secured with locked caps and metal covers. The elevation of the top of the well riser, relative to a permanent on-site marker, will be documented for use in determining relative groundwater elevations (elevations based on NAD 83 will be determined by a licensed surveyor at the conclusion of the RI fieldwork activities). The wells will be developed one week following installation.

All Site monitoring wells will be purged and sampled using USEPA Low Flow methodology. Sampling will begin at the potentially least contaminated well and proceed to the potentially most contaminated well.

Prior to purging, the air in the well head will be screened with a PID and the static water level (relative to the top of the casing) will be measured with a decontaminated water-level meter. A peristaltic pump with plastic tubing (or equivalent equipment) will be used for sampling. The tubing (or a submersible pump attached to tubing, if required by Site conditions) will be slowly lowered until reaching two to three feet off of the well bottom to prevent disturbance and re-suspension of any remaining sediment.

The water level will be measured before the pump is started and at intervals of every three to five minutes. Pumping rates will be reduced (as needed) to the minimum capabilities of the pump to ensure stabilization of the water level (drawdown of 0.3 feet or less). During pumping, field indicator parameters (turbidity, temperature, specific conductance, pH, redox potential, and dissolved oxygen) will be monitored and recorded approximately every five minutes. The well will be considered stabilized, and sampling may proceed, when the indicator parameters have stabilized for three consecutive readings (minimum purge interval at least 15 minutes).

2.2.5 Other Materials

Any non-soil solid materials requiring laboratory analysis will be placed into laboratory supplied glassware when possible, or will alternatively be placed into double locking plastic bags and then boxed in order to prevent a tear or other breach in the bags. Liquid samples from excavations, collection pits, or drums/tanks, etc., will be sampled using a dedicated disposal sampling device.

2.3 Sample Handling and Custody

2.3.1 Sample Containers

The following laboratory-supplied containers will be used for sample collection (as applicable):

Media	Analyte Class	Collection Container (subject to laboratory requirements)	Preservation
Vapor	VOCs	1, 6-liter Summa canister (or equivalent)	none
Soil	PFAS	1, 250-ml HDPE plastic (fill halfway)	4° C
Soil	VOCs	Laboratory 5035 VOA kit, (4, 40-ml glass vials)	Method 5035
Soil	SVOCs, metals, PCBs, pesticides, herbicides, cyanide	1, 8-oz. glass jar	4° C
Soil	PFAS MS/MSD	1, 250-ml HDPE plastic (fill halfway), (may use soil from a sample container)	4° C
Soil	All other MS/MSD	additional 8-oz. glass jar	4° C
Water	PFAS	2, 250-ml HDPE plastic (fill to neck)	4° C
Water	VOCs	4, 40-ml prepared glass vials	4° C, HCl
Water	SVOCs, PCBs, pesticides, herbicides	1-liter amber glass (specified by laboratory)	4° C
Water	Metals - total	1, 500-ml HDPE plastic	4° C, HNO3
Water	Metals - dissolved	1, 500-ml HDPE plastic	4° C
Water	Cyanide	1, 500-ml HDPE plastic	4° C, NaOH
Water	Trip blank (PFAS)	2, 250-ml HDPE plastic (fill to neck)	4° C
Water	Field blank (PFAS)	1, 250-ml HDPE plastic (fill to neck)	4° C
Water	Trip blank (VOCs)	3, 40-ml prepared glass vials	4° C, HCl
Water	Field blank (other analytes)	As per sample collection requirements	See above

2.3.2 Sampling Frequency

VAPOR

Eight (8) soil vapor samples will be collected.

SOIL

An initial total of eighteen (18) soil borings will be extended, with additional "step out" borings as needed based on field and instrument observations of contamination, in order to define the extent of Site soil containing analyte concentrations above the applicable SCOs.

Additional fieldwork rounds for the advancement of soil borings and/or installation of monitoring wells may be required to fully delineate identified contamination, and to determine if contamination extends or is migrating off-site (the need for an expanded investigation scope will be determine in consultation with NYSDEC).

All boring locations will be sampled for soil. Based on three 5-foot intervals per boring, a likely maximum of fifty-four (54) soil samples will be submitted for laboratory analysis.

Samples will be analyzed for NYSDEC Part 375-6.8 parameters, including USEPA Target Compound List (TCL) VOCs and semi-volatile organic compounds (SVOCs) plus 30 tentatively identified compounds (TICs), USEPA Target Analyte List (TAL) metals, Cr^{+6}, polychlorinated biphenyls (PCBs), pesticides, herbicides and cyanide, as well as 1,4-dioxane and PFAS in accordance with the most current NYSDEC guidance.

Analysis of samples may be modified in consultation with the NYSDEC Project Manager based on initial sampling results, including the presence or absence of field evidence of contamination. Additional analysis may be performed based repository requirements for waste characterization prior to off-site disposal.

GROUNDWATER

All monitoring wells will be sampled for NYSDEC Part 375-6.8 parameters, including TCL VOCs and SVOCs plus 30 TICs, USEPA TAL metals including Cr^{+6}, PCBs, pesticides, herbicides and cyanide, as well as 1,4-dioxane and PFAS in accordance with the most current NYSDEC guidance.

Analysis of samples may be modified in consultation with the NYSDEC Project Manager based on initial sampling results, including the presence or absence of field evidence of contamination.

SUMMARY OF PROPOSED SOIL BORINGS, MONITORING WELLS, AND VAPOR IMPLANTS

The proposed number of soil borings, new monitoring wells, and vapor implants is summarized below (may be modified in consultation with NYSDEC based on encountered field conditions).

Quantity	Fieldwork Element	Purpose
8	Install Vapor Implants	Collect soil vapor/sub-slab vapor samples
18	Extend Soil Borings	Collect soil samples from multiple depth
6	Install Monitoring Wells	Collect groundwater samples from fixed location

The estimated approximate number of samples to be collected is outlined below (actual number of samples may vary based on conditions encountered during the investigation).

Media /QC Parameter	Number of Samples [a]	Analytes (USEPA Method) [b, c]
Vapor	8	VOCs (TO-15)
Soil	36 to 54	PFAS: NYSDEC target list (1633) TCL: VOCs +10 and SVOCs +20 (8260C/8270D) TAL: metals (6010D and 7473); chromium^{+6} (7196A); cyanide (9010C) Other: pesticides (8081); herbicides (8151A); PCBs (8082)
Groundwater	6	PFAS: NYSDEC target list (1633) TCL: VOCs +10 and SVOCs +20 (8260C/8270D) TAL: metals, total & dissolved (6010D and 7473); chromium^{+6} (7196A); cyanide (9010C) Other: pesticides (8081); herbicides (8151A); PCBs (8082)
Trip Blank (PFAS)	1 per sample cooler (each day of sampling)	PFAS NYSDEC target list (1633)
Trip Blank (VOCs)	1 per sample cooler (each day of sampling)	TCL VOCs +10 (8260)
Field Blank (PFAS)	1 per sample day	PFAS NYSDEC target list (1633)
Equipment Blank (PFAS)	1 per sampling day (non-dedicated)	PFAS NYSDEC target list (1633)
Field Blank (other)	1 for every 20 samples (non-dedicated)	As per sample collection requirements
Duplicates, MS/MSD	1 for every 20 samples (minimum 1/week)	As per sample collection requirements; PFAS soil MS/MSD may be from same container as sample

Notes

[a] Assumes a maximum of 2 to 3 soil samples from each of 18 borings. Equipment blanks (when required) to be collected at a minimum of one per day for each matrix.

[b] PFAS will be analyzed by LC-MS/MS for PFAS using methodologies based on EPA Method 1633; additional laboratory methods may include Synthetic Precipitation Leaching Procedure (SPLP, by 1312, and/or Total Oxidizable Precursor Assay (TOP Assay).

[c] 1,4-dioxane by 8270 SIM

2.3.3 Sample Custody

Samples will be handled by the OSC and maintained at specified cold temperatures (4 +/- 2 °C), as warranted. Upon the completion of each day of sample collection activities, all samples will be shipped via either courier or overnight delivery (per laboratory requirements) to a NYSDOH ELAP certified laboratory under proper chain of custody.

Laboratory personnel will record the cooler temperature upon receipt and analyze the samples prior to the expiration of the hold times specified in NYSDEC Analytical Services Protocols (ASP).

2.4 Analytical Methods

Media samples will be analyzed as indicated in Section 2.3.2, above. Analytical methods for the samples will be implemented as follows:

Matrix	Sample Analysis (Holding Time)	USEPA Analytical Method
Vapor	VOCs (30 days)	TO-15
Soil	PFAS (14 days)	1633 (reporting limit 1 µg/kg)
Soil	TCL VOCs+10 (14 days)	8260C; 8270 for 1,4-dioxane (1,4-dioxane reporting limit 0.1 mg/kg) [a]
Soil	TCL SVOCs+20 (14 days)	8270B
Soil	TAL metals (180 days; mercury 28 days)	6010C/7471B
Soil	cyanide (14 days)	9010C
Soil	pesticides/PCBs/herbicides (14 days [b])	8081A/8082/8151A
Water	PFAS (14 days)	1633 (reporting limit 2 ng/L)
Water	TCL VOCs+10 (14 days)	8260C; 8270 SIM for 1,4-dioxane (1,4-dioxane reporting limit 0.35 µg/L) [a]
Water	TCL SVOCs+20 (7 days [b])	8270B
Water	TAL metals (180 days; mercury 28 days)	6010C/7471B
Water	cyanide (14 days)	9010C
Water	pesticides/PCBs/herbicides (7 days [b])	8081A/8082/8151A
a Laboratory will meet required reporting limits running standard USEPA Method 8270 b Days for extraction, 40 days after extraction for laboratory analysis		

2.5 Quality Control

Accuracy and precision will be determined by repeated analysis of laboratory standards, and matrix effects and recovery will be determined through use of spiked samples. The laboratory will run standards, blanks, and spiked samples during sample analysis.

Duplicate sampling (for all parameters), and matrix spike (MS)/matrix spike duplicate (MSD) analyses, will be performed in accordance with Section 2.3.2. For each day of sampling, a trip blank will be included with each sample cooler and be analyzed for PFAS or VOCs, as applicable.

Samples will be identified using a unique ID number. This ID will be recorded on the sampling log and/or field record and the sampling container (samples for each fieldwork day will be assigned to a Sample Delivery Group [SDG] by the laboratory). In accordance with current best fieldwork practices, permanent marker will not be utilized to label samples planned for analysis for PFAS. Samples for each day of fieldwork will be shipped via courier to the laboratory under proper chain of custody procedures.

2.6 Quality Assurance

2.6.1 Instrument/Equipment, Testing, Inspection, and Maintenance

Field measurements will be conducted using monitoring equipment specialized for each task, including use of a PID during fieldwork to screen for volatile organic vapors. All equipment will be properly stored (within buildings or construction trailers when not in use) and calibrated (as warranted) in accordance with the manufacturer's instructions (instrument malfunction is normally apparent during calibration). In the event of malfunction, equipment will be cleaned and tested. Equipment testing, inspection, and maintenance will be the responsibility of the Project Manager and OSC. Any other equipment selected for field measurements will be similarly managed.

2.6.2 Inspection/Acceptance of Supplies and Consumables

All supplies and consumables will be inspected and tested (if necessary) by either the Project Manager or the OSC upon receipt.

The following supplies and consumables will be used for each sample:

- Laboratory-supplied sampling containers, as specified in Section 2.3.1
- Laboratory-supplied materials for PFAS sampling, including trip blanks and PFAS-free cooler
- Plastic tubing for groundwater and vapor sampling
- PFAS-free water for decontamination
- Disposable gloves (nitrile or equivalent)

2.6.3 Data Management

For the purpose of data management, the data can be divided into field and laboratory data.

Field data will be recorded at the time of measurement on written field logs.

Laboratory data will be reviewed upon receipt and summarized in data summary tables. The NYSDEC electronic data deliverable format for the analytical data will be requested from the testing laboratory.

NYSDEC ASP Category B Data Deliverables will be requested from the testing laboratory and forwarded to an independent third party data validator for the development of Data Usability Summary Report (DUSR).

3.0 DATA REVIEW, VALIDATION AND USABILITY

3.1 Field Measurements

If field instruments are determined to be functioning correctly through calibration and measurements of standards, and if there are no inconsistencies between written records and data recorded in the meters, the data will be assumed to be valid and will be accepted as an indication of field conditions. If instruments malfunction prior to field measurement, they will be restored to proper function prior to re-use. If they malfunction immediately after field measurements are taken, the measurements will be retaken as soon as possible. Inconsistencies between written records and recorded meter data will be resolved by re-testing the material, if possible. If re-testing is not possible, (i.e. the sample has been shipped to the laboratory), the inconsistency will be described in appropriate subsequent reporting and the laboratory analysis will be utilized to classify the material. In addition, all field data will be reviewed by the Project Manager for consistency and plausibility.

3.2 Laboratory Analysis

A NYSDOH ELAP-certified laboratory will provide a NYSDEC ASP Category B data package and NYSDEC Electronic Data Deliverable format for the determinative sample analyses. Laboratory documentation is provided in Attachment E.

3.3 Standards, Criteria and Guidance

The following Standards, Criteria, and Guidance (SCGs) are applicable for this Site:

VAPOR

The State of New York does not have any SCG for volatile chemicals in subsurface vapors. Vapor results will be evaluated in terms of Site data as a whole, and will include any needed discussion of potential vapor intrusion concerns (referencing applicable NYSDOH Decision Matrices).

SOIL

Soil results are compared to SCOs provided in 6 NYCRR Subpart 375, Table 375-6.8(a) Unrestricted Use and 6.8(b) Restricted-Residential Use, Supplemental SCOs and/or Soil Cleanup Levels in NYSDEC CP-51 Soil Cleanup Guidance, Tables 1 to 3, and current NYSDEC guidance for PFAS. SCOs are provided as Attachment C.

WATER

Water results are compared to NYSDEC Division of Water Ambient Water Quality Standards and Guidance Values (AWQS), provided in Technical and Operational Guidance Series 1.1.1, and current NYSDEC guidance for PFAS.

3.4 Verification and Validation Methods

3.4.1 Verification Method

Once collected, all data will go to the Project Manager for review and verification. Review will involve determining that data has been collected at the proper locations by the proper persons and that all field and laboratory logs are complete. In addition, a Data Usability Summary Report (DUSR) will be prepared by a third, independent party. A resume outlining the education and data validation experience of the individual preparing the DUSR is provided in Attachment D.

3.4.2 Authority for Verification

Authority for verification, validation, and resolution of data issues will be distributed among the investigators. Authority to resolve issues regarding verification of field measurements will rest with the QEP, Project Manager, and Mr. Richard Hooker.

4.0 REPORTING REQUIREMENTS

Following review, validation, and verification, all data will be conveyed to users via a Remedial Investigation Report (RIR) in accordance with the requirements of NYSDEC DER-10 Section 3.1.4.

The RIR will summarize all data collected during implementation of the RIWP (and any additional work), and will include, at a minimum:

- Descriptions of fieldwork activities and observations;
- Summaries of laboratory analytical results from sampling events, described in the report text and provided in data summary tables, as well as DUSRs for all data;
- Characterization of contamination sources (including environmental fate and transport);
- A qualitative human exposure assessment;
- Accounts of any deviations from RIWP procedural requirements;
- Conclusions drawn from applicable, available data; and,
- A summary of required Green and Sustainable Remediation (GSR) metrics.

Attachment A: Figures

All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure: Proposed Remedial Investigation Map

137 Smith Street, 140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

Legend:

▬	subject property border
- - - -	lot lines
●	proposed soil sample location
Ø	proposed soil vapor location
⊕	proposed soil sample and monitoring well location

File: 22003-0092

November 2024

Scale as shown

Attachment B: Fieldwork SOPs

GALLAGHER BASSETT | TECHNICAL SERVICES

STANDARD OPERATING PROCEDURES

Fieldwork Sampling
and
Decontamination

Updated November 2024

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Supplement C	NYSDOH Vapor and Air Sampling
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I. INTRODUCTION

This document provides Standard Operating Procedures (SOPs) for use by Gallagher Bassett Technical Services (GBTS) personnel during fieldwork events that require the collection of soil, groundwater, soil vapor and/or air samples. General procedures are presented below; detailed protocols, as available, are provided in the supplemental documentation. Equipment checklists, forms, and calibration documents are maintained at GBTS offices. All SOPs and supporting documentation are periodically updated.

II. FIELDWORK SAMPLING

Fieldwork sampling procedures are described below (model field logs are provided in Supplement A). Selection of field equipment will be based on anticipated site conditions (updated check-lists of equipment and supplies required for sampling activities are maintained at the local field office). All equipment operations will be in accordance with applicable operating manuals and specifications, and will be conducted (as needed) by an experienced subcontractor holding applicable permits/licenses. Decontamination procedures will be implemented as warranted during all fieldwork activities. Special requirements for PFAS sampling are noted in Section III.

A. Procedures to be Conducted Prior to Fieldwork

Prior to the initiation of any ground-intrusive fieldwork, a request for a complete utility markout of the fieldwork site will be submitted to an appropriate service, as required by state regulations. Confirmation of underground utility locations will be secured and a field check of the utility markout will be conducted prior to the extension of soil borings[1].

A Fieldwork Map and Work Plan, indicating sampling locations and objectives, will be prepared prior to fieldwork activities, and sampling locations will be confirmed and located prior to starting work.

B. General Fieldwork Methodology

At the start of the wok day, all on-site personnel, including environmental subcontractors and observers, will be briefed on planned activities and the contents of the site-specific Health and Safety Plan (HASP). Independent field logs will be utilized to document relevant information, including arrival and departure times of on-site personnel, safety meetings, basic weather conditions, and detailed notes and drawings documenting all fieldwork activities and/or any other relevant events and conditions.

On-site personnel will be properly dressed for the intended activities[2] and the anticipated weather conditions, including use of personnel protective equipment in accordance with the HASP.

Sampling locations will be determined in the field, measured to the nearest 0.5-foot relative to a fixed on-site marker, and will be recorded in logbooks for inclusion in all final maps.

---

[1] Markout requirements apply to any ground intrusive methodologies, including the extension of test pits.

[2] Special care is required when for sampling of PFAS; see Section IV

Media will be collected in accordance with the Quality Assurance Project Plan (QAPP) and in a manner consistent with NYSDEC and/or NYSDOH requirements, including protocols for handling and custody. New, dedicated disposable nitrile gloves will be worn at each sampling location, and will be changed frequently based on field conditions. Fieldwork personnel will assess media characteristics (e.g., soil type, presence of debris, indications of contamination, etc.) and record all observations in log books.

On-site senior personnel will be responsible for: a) identifying any materials that require special handling, such as media that may contain high levels of contaminants or is grossly contaminated or likely to be hazardous; b) ensuring that identified materials are properly securely stored on-site (stockpiled on plastic and covered, or placed in approved containers), pending characterization and proper disposition; and, c) ensuring that unforeseen environmental conditions are managed in accordance with applicable federal and state regulations.

Sample collection from recovered media will be performed without unnecessary delay. Samples will be placed into labeled containers provided by the laboratory, stored in dedicated coolers kept at 4 (+/-2) °C and handled under proper chain of custody. All samples will be shipped to a NYSDOH ELAP certified laboratory via laboratory courier (either upon completion of each day of sample collection activities, or the following day after overnight storage in a dedicated sample refrigerator).

C. Extension of Soil Borings

Soil borings will be extended using either hand-held or mechanized equipment, based on site conditions and Work Plan requirements. Mechanized equipment includes using either direct push technology (DPT) or rotary methods, including hollow stem auger (HSA) and sonic drilling. The small size of DPT rigs allows for sampling in tight spaces and areas that are sensitive to the use of heavy equipment. DPT can be used in overburden soils where the soil texture allows for direct push of sampling equipment. A HSA or sonic rig will be utilized if significant subsurface obstructions (e.g., large cobbles, boulders, concrete, etc) are (or are expected to be) encountered.

Hand borings will be extended (as warranted) using manual DPT equipment (e.g., Geoprobe), which includes a collection barrel lined with disposable acetate sleeves, extension rods and a slide hammer. The barrel will collect samples from discreet intervals of 2 feet. Hand boring methods are generally restricted to shallow soil sampling (0 to 6’ below grade) and may be employed/attempted if access by mechanized equipment is not practical.

DPT will typically be utilized during the extension of borings in overburden soils. The DPT rig will be equipped with a macro-core sampling barrel (minimum diameter 4”) lined with disposable acetate sleeves. The barrel will collect samples from discreet intervals of either 4 or 5 feet. HSA rigs will use a continuous hollow stem auger with a split-spoon (collection interval of 2 feet) or other collection device. This system drives drill cuttings to the surface as drilling progresses, which will require management. Sonic drill rigs will utilize coring barrels of various lengths lined with plastic tubing.

Bore hole openings will be periodically screened with a photoionization detector (PID).

D. Installation and Development of Monitoring wells

Groundwater monitoring wells will be installed by the drilling subcontractor. Unless otherwise specified, monitoring wells will be constructed of two-inch PVC casing with a ten-foot length of 0.01-inch slotted PVC well screening across the water table. No glue will be used to thread the casing lengths. A minimum of 2 feet of screening will extend above the water table, with approximately 8 feet below the water level (depth to water will be inferred based on saturated soils encountered during installation, or from data from existing groundwater monitoring wells).

The annular space between the well screen and the borehole will be backfilled with clean silica sand to approximately two feet above the screen. A seal consisting of at least 12 inches of hydrated bentonite clay will be placed above the sand pack and the remaining annular space will be grouted with cement.

A locked cap with vent will be installed at the top of the PVC riser (well protection will be in accordance with the Work Plan, including use of secure "drive-over" metal cover or stick-up metal outer casing). A surveyor's transit level will be used to determine the elevation of the top of the PVC well riser, relative to a permanent on-site marker, for use in determining relative groundwater elevations. Well locations and relative elevations will be recorded in field logs and indicated on all fieldwork maps.

The wells will be developed one week following installation. The wells will be developed with a properly decontaminated mechanical pump and dedicated polyethylene tubing in order to clear fine-grained material that may have settled around the well screen and to enhance the natural hydraulic connection between the well screen and the surrounding soils. Well development will begin at the top of the screened interval to prevent clogging of the pump within the well casing. Well development will be discontinued when the discharge water is free of obvious sediment, turbidity is below 50 NTUs, and indicator parameters (e.g., dissolved oxygen, temperature, etc.) have stabilized. Upon completion, the pump assembly will be removed from the well while the pump is still running to avoid discharge of purged water back into the well. Development water will be securely stored on-site pending laboratory analysis.

E. Soil Sampling

Recovered sampling equipment will be placed on a clean surface (folding table, plastic sheeting, etc.) and opened (liners will be sliced with a clean razor knife). Recovered soils will be observed for potential contamination through observation and use of properly calibrated field instruments, e.g., PID. Samples will be collected directly from the sampling device. The volume of material collected will be sufficient for the required analyses and for reasonably anticipated potential additional analyses. Soil to be analyzed for volatile organic compounds (VOCs) will be collected following USEPA Method 5035 protocols, using laboratory sampling kits. Samples to be analyzed for parameters other than VOCs will be collected as either grab or composite samples, using disposable plastic trowels or properly decontaminated stainless steel instruments, or directly by the fieldwork technician using dedicated, fresh disposable nitrile gloves.

F. Groundwater Sampling

Groundwater sampling will be conducted using USEPA "Low-Stress" protocols (detailed in Supplement B). Sampling will be conducted using the following general procedures:

1. Groundwater sampling will begin at the potentially least contaminated well (as determined from well location and/or previous data) and proceed to the potentially most contaminated well. The field technician will check and record the condition of all monitoring wells for damage or evidence of tampering before initiating sampling. Plastic will be placed around wells to minimize potential contamination of sampling equipment from the ground surface, and all monitoring, purging, and sampling equipment will be placed on the sheeting.
2. The protective casing on the well will be unlocked, the air in the well head will be screened with a PID, and static water level (from the top of the casing) will be measured with a decontaminated water-level meter. A peristaltic pump with plastic tubing, or a submersible pump attached to tubing (if required by Site conditions, e.g., well depth) will be used for sampling. The tubing (or pump attached to tubing) will be slowly lowered until reaching two to three feet off of the well bottom to prevent disturbance and re-suspension of any remaining sediment.
3. Depth to water will be measured to nearest 0.01 feet, relative to a reference measuring point on the well casing (if no pre-existing reference point is found, a reference point will be marked on the inner casing and noted in the field logbook). The water level will be measured before the pump is started and at intervals of every three to five minutes. Pumping rates will be reduced (as needed) to the minimum capabilities of the pump to ensure stabilization of the water level (drawdown of 0.3 feet or less).
4. During pumping, field indicator parameters (turbidity, temperature, specific conductance, pH, redox potential, and dissolved oxygen) will be monitored and recorded approximately every five minutes. The well will be considered stabilized when the indicator parameters have stabilized for three consecutive readings (the minimum purge interval will be at least 15 minutes).
5. All groundwater samples will be collected in a manner consistent with the QAPP.
6. The protective cap on the well will be replaced and locked following sampling, and the field sampling crew will move to the next most contaminated well and the process will be repeated.

G. Soil Vapor Sampling

Soil vapor sampling will be conducted consistent with applicable NYSDOH guidance and fieldwork protocols (detailed in Supplement C). Sampling will be conducted using the following general procedures:

Soil vapor samples may be collected from beneath building foundations or paved areas, or from exterior areas not otherwise covered by material that trap soil vapor at the surface. Concrete slabs and exterior pavement will generally be breached with rotary equipment, which produce a small-diameter hole. The hole will be extended into underlying soil/sub-base to a depth required by the sampling technology (typically 6 to 12 inches below the base of the overlying materials for temporary installations). Sampling at exterior areas will require extension of a borehole to at least 3 to 4 feet below the surface (greater depths may be specified by the Work Plan).

Construction details for soil vapor implants are provided in the Supplement C. All soil vapor probes will be installed with a properly sealed surface opening to prevent ambient air from entering the system.

A tracer gas (e.g., helium) will be used at soil vapor sampling locations to verify that adequate sampling techniques are being implemented (i.e. to verify the absence of significant infiltration of outside air), in accordance with applicable NYSDOH guidance. The space around the sampling point will be enclosed and sealed (with a metal hemisphere and clay) in order to introduce a tracer gas (helium) into the area surrounding the probe point. Real-time sampling equipment (Radiodetection Multi-vapor Leak Locator, model MDG 2002, or equivalent) will be utilized to determine when the interior atmosphere in the enclosure reaches a concentration of 80%, and the tubing for the vapor implant will then be sampled for the tracer gas. If helium is detected in vapor at a concentration greater than 10%, the annular seal will be repaired and gas tracing performed again until less than 10% helium is detected.

Vapor in the sampling tubing will be screened with a PID for VOCs prior to purging. For all sampling locations, the exact purge volume will be dependent on the boring depth and subsequent length of tubing. Three borehole and tubing volumes will be purged prior to collection. The purge rate will not exceed 0.2 liters per minute. Following purging of ambient air from the collection device, soil vapor samples will be (at a rate not exceeding 0.2 liters per minute) into individual laboratory-certified clean Summa canisters equipped with flow regulators (sampling period as specified in the Work Plan).

III. GENERAL DECONTAMINATION PROTOCOL

Consistent decontamination methods will be used to reduce or eliminate contamination and cross-contamination of samples by field equipment, other samples, or personnel, and to minimize potential exposures caused by the spread of contaminants. Decontamination will occur any time a sampling tool or instrument used in field investigations contacts sampled media or personnel using the equipment. These procedures will be used in conjunction with all non-dedicated (i.e. reusable) equipment used during the handling, sampling or measuring of environmental media, and will be implemented primarily on-site at the point of use or at a designated equipment decontamination station at the project site.

Types of equipment usually requiring decontamination include pumps, gauges, augers, and sampling barrels. Drilling equipment, water level meters, submersible pumping equipment, and any other non-dedicated monitoring and sampling equipment will be decontaminated prior to the start of fieldwork, after the collection of each media sample, and between boring intervals and/or sampling locations. Water quality parameter sensors and flow-through cell will be cleaned between sampling locations in accordance with the manufacturer's recommendations.

Materials and methods for decontamination are provided in Supplement D.

IV. PFAS SAMPLING - SPECIAL REQUIREMENTS

Special requirements apply to all fieldwork procedures during sampling for per- and polyfluoroalkyl substances (PFAS). Because of the potential presence of PFAS in common consumer products and in equipment typically used to collect media and the need for very low reporting limits, special handling and care must be taken when collecting samples for PFAS analysis to avoid sample contamination. There is only limited research regarding how the use of various procedures and materials affect sample results, and this SOP therefore represent a conservative approach. Field personnel should take precautions to avoid items that are likely to contain PFAS at the sampling site as well as avoid specific items during the sampling event, and must frequently check for updates to this SOP. The most recent NYSDEC guidance document, as well as a *PFAS Sampling Quick Reference Field Guide* (provided by Michigan Department of Environment, Great Lakes, and Energy), are provided in Supplement E.

A. EQUIPMENT AND SUPPLIES

Avoid personal protective equipment (PPE, including clothing chemically treated for UV protection) and field supplies that may include PFAS and which could cross-contaminate field samples. Personal body products such as shampoos, moisturizers, and cosmetics may contain PFAS and should be used with care the day of sampling. Sunblock and insect repellent ingredients need to be verified to ensure that they do not contain PFAS before use in the field.

Food and food packaging should not enter the sampling zone.

Water resistant, waterproof, stain-treated, clothing recently washed with fabric softeners, and new clothing should be avoided. If sampling in inclement weather a canopy tent may be a good option (note, however, that water resistant/waterproof material likely contains PFAS and disposable gloves should be worn when putting up and/or moving the tent.

Waterproof field books may contain PFAS and should not be used. Documentation of field activities should be on loose paper on an aluminum clipboard or in a waterproof field book that does not use PFAS. Field notes should be taken with a ball point pen (avoid large felt tip markers; fine and ultra-fine point Sharpie® markers are acceptable). Sticky notes, etc., may contain PFAS and should be avoided (pre-printed labels should be verified PFAS-free.

Disposable, powderless, nitrile gloves must be worn during PFAS sampling and handling activities and should be changed frequently during and between sampling activities.

Sealed laboratory-supplied sampling containers may be placed into LDPE re-sealable storage bags (e.g., Ziploc®) that will not contact the sample media.

Chemical ice packs should not be used unless it is verified that they are PFAS-free. Samples for PFAS analysis should be placed on water ice immediately and should ideally be received by the laboratory at a temperature less than 6º Celsius.

B. GENERAL SAMPLING PROCEDURES

Sampling must be conducted in accordance with the project-specific QAPP, including use of laboratory-supplied sample containers.

If non-dedicated non-disposable equipment is used for sampling, proper decontamination is necessary. Decontamination reagents should be checked to ensure that they do not contain PFAS before use. Similarly, water used for decontamination should be checked (i.e. field equipment blanks) to verify that it does not contain PFAS. It may be necessary to collect samples of decontamination water prior to use to ensure that water being used for decontamination does not contain PFAS.

Soil samples should be collected using stainless steel, acetate, or polypropylene constructed equipment. Liners for soil sampling should not contain PFAS.

If a monitoring well has dedicated tubing that may contain PFAS, the dedicated tubing should be removed, and silicone or HDPE tubing should be used to sample for PFAS following at least one well volume purge prior to sampling for PFAS. The recommended length of time that dedicated tubing should be removed, and the recommended amount of purging conducted prior to sampling where dedicated tubing has been present is variable. If it is anticipated that dedicated tubing may be a source of PFAS cross contamination extra precaution, such as removal of the tubing 14 days prior to sampling or purging of three well volumes, should be considered.

Care should be taken to not cross contaminate PFAS samples if samples for non-PFAS analyses are being collected. For example, if VOCs and PFAS water samples are being collected, the VOCs would be collected using a peristaltic pump with HDPE and silicone tubing, and then a second set of samples would be collected for PFAS after changing gloves and switching sample container sets.

If transfer bottles are necessary for surface water sample collection, they should be PFAS-free and made of the same material as the laboratory provided sample containers.

If a water supply is to be sampled, both a pre- and post-treatment sample may be necessary. Carbon filtration, reverse osmosis, and other filter media may bias laboratory results for PFAS. Water should be allowed to run freely until water quality parameter stabilization has occurred, typically between 3 and 5 minutes. Water flow rate should be reduced for minimal aeration.

Do not filter samples for PFAS analysis.

C. DECONTAMINATION OF PFAS SAMPLING EQUIPMENT

Special requirements apply to decontaminating non-dedicated equipment used for PFAS sampling. Laboratory supplied PFAS-free deionized water is preferred for decontamination (commercially available deionized water in an HDPE container, and municipal drinking water, may be used for decontamination if verified to be PFAS-free. Sampling equipment can be scrubbed using a polyethylene or polyvinyl chloride (PVC) brush to remove particulates. Decontamination procedures should include triple rinsing with PFAS-free water. Note that a QAPP prepared for NYSDEC program sites prohibits use of Liquinox®.

V. INVESTIGATION DERIVED WASTES

Disposal of any waste materials will be in accordance with provisions of the applicable site-specific Work Plan. If not otherwise specified: 1) discarded personal protective equipment and other fieldwork supplies not significantly impacted by free petroleum or other gross contaminants will be disposed as municipal solid waste; and, 2) well development purge water, spent absorbents or other significantly contaminated materials, and/or any recovered free-petroleum, will be properly stored on-site, in properly labeled and secured containers, pending final off-site disposal at a permitted facility.

Supplement A - Model Fieldwork Logs

Soil Boring Log

GALLAGHER BASSETT | TECHNICAL SERVICES

Boring ID Page____of____	**Site ID:**	**GBTS Project**
	Date: GBTS Staff:	Driller (Rig) Weather:

Boring Interval (Recovery)	Surface Material: **Soil / Material Description**	Moisture	PID (ppm)	Odors	Staining	NAPL	Samples Collected
___–___ (___%)							
___–___ (___%)							
___–___ (___%)							
___–___ (___%)							
___–___ (___%)							
___–___ (___%)							

Notes Fill, water conditions, field evidence of contamination, well installation details, etc

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic)

GROUNDWATER MONITORING WELL PURGE DATA SHEET

GALLAGHER BASSETT | TECHNICAL SERVICES

Project Name: ______________________________

GBTS PROJECT #: ______________________________

Date: ______________________________

Field Personnel: ______________________________

Weather: ______________________________

Well ID: ______________________________

PID Reading: ______________________________

Depth of well: ______________________________

Depth to water: ______________________________

Pump type: ______________________________

Time	Temp (^{o}C)	pH	ORP (mv)	Specific Conductivity (ms/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Depth to Water (ft)	Purge Rate (mL/m)	Comments (e.g. color/clarity)

***** STABILIZATION CRITERIA*****

Temp +/- 3% **pH** +/- 0.1 **ORP** +/- 10 **Spec Cond** +/- 3% **Turb** +/- 10% **DO** +/- 10%

*****PURGED WATER DETAILS*****

Start/End time: ______________________________

Total purge time: ______________________________

Total volume: ______________________________

Purge rate: ______________________________

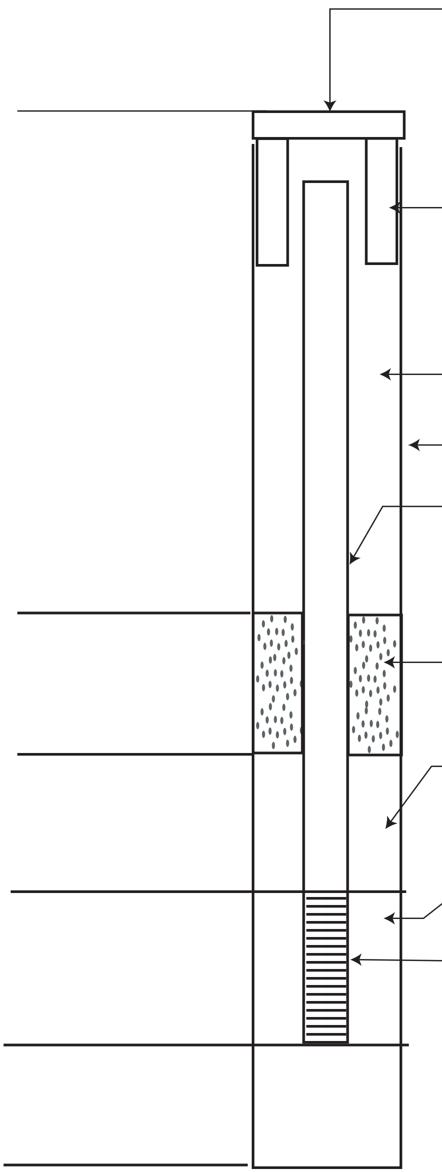
CHARACTERISTICS:

Odor: none | slight | moderate | strong

Sheen: none | slight | moderate | strong

L/DNAPL: Yes | No **L/DNAPL thickness (in.):**_______

NOTES:



Drive over Cover ____ Yes _____ No

Protective Metal Casing _____ Yes _____ No

Backfill Material: ___________

Borehole Dia. : ____

Type of Casing : _______

Impermeable Backfill: ______________

Backfill Material: __________________

Screen Packing: ___________________

Screen Slot Size: ___________

Refusal: _____ Yes _____ No

Materials Used:

- Screen (PVC)
- Riser (PVC)
- Plug (PVC)
- Silica Sand
- Bentonite clay

Monitor Well Construction Log - Well ID:

Site:

Project:

Date:

Appendix:

Supplement B - USEPA Groundwater Sampling

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I

LOW STRESS (low flow) PURGING AND SAMPLING PROCEDURE FOR THE COLLECTION OF GROUNDWATER SAMPLES FROM MONITORING WELLS

Quality Assurance Unit
U.S. Environmental Protection Agency – Region 1
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North Chelmsford, MA 01863

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Prepared by:_________________________________ ____________
(Robert Reinhart, Quality Assurance Unit) Date

Approved by:_________________________________ ____________
(John Smaldone, Quality Assurance Unit) Date

Revision Page

Date	Rev #	Summary of changes	Sections
7/30/96	1	Finalized	
01/19/10	2	Updated	All sections
3/23/17	3	Updated	All sections
9/20/17	4	Updated	Section 7.0

Table of Contents

1.0 USE OF TERMS

Equipment blank: The equipment blank shall include the pump and the pump's tubing. If tubing is dedicated to the well, the equipment blank needs only to include the pump in subsequent sampling rounds. If the pump and tubing are dedicated to the well, the equipment blank is collected prior to its placement in the well. If the pump and tubing will be used to sample multiple wells, the equipment blank is normally collected after sampling from contaminated wells and not after background wells.

Field duplicates: Field duplicates are collected to determine precision of the sampling procedure. For this procedure, collect duplicate for each analyte group in consecutive order (VOC original, VOC duplicate, SVOC original, SVOC duplicate, etc.).

Indicator field parameters: This SOP uses field measurements of turbidity, dissolved oxygen, specific conductance, temperature, pH, and oxidation/reduction potential (ORP) as indicators of when purging operations are sufficient and sample collection may begin.

Matrix Spike/Matrix Spike Duplicates: Used by the laboratory in its quality assurance program. Consult the laboratory for the sample volume to be collected.

Potentiometric Surface: The level to which water rises in a tightly cased well constructed in a confined aquifer. In an unconfined aquifer, the potentiometric surface is the water table.

QAPP: Quality Assurance Project Plan

SAP: Sampling and Analysis Plan

SOP: Standard operating procedure

Stabilization: A condition that is achieved when all indicator field parameter measurements are sufficiently stable (as described in the “Monitoring Indicator Field Parameters” section) to allow sample collection to begin.

Temperature blank: A temperature blank is added to each sample cooler. The blank is measured upon receipt at the laboratory to assess whether the samples were properly cooled during transit.

Trip blank (VOCs): Trip blank is a sample of analyte-free water taken to the sampling site and returned to the laboratory. The trip blanks (one pair) are added to each sample cooler that contains VOC samples.

2.0 SCOPE & APPLICATION

The goal of this groundwater sampling procedure is to collect water samples that reflect the total mobile organic and inorganic loads (dissolved and colloidal sized fractions) transported through the subsurface under ambient flow conditions, with minimal physical and chemical alterations from sampling operations. This standard operating procedure (SOP) for collecting groundwater samples will help ensure that the project's data quality objectives (DQOs) are met under certain low-flow conditions.

The SOP emphasizes the need to minimize hydraulic stress at the well-aquifer interface by maintaining low water-level drawdowns, and by using low pumping rates during purging and sampling operations. Indicator field parameters (e.g., dissolved oxygen, pH, etc.) are monitored during purging in order to determine when sample collection may begin. Samples properly collected using this SOP are suitable for analysis of groundwater contaminants (volatile and semi-volatile organic analytes, dissolved gases, pesticides, PCBs, metals and other inorganics), or naturally occurring analytes. This SOP is based on Puls, and Barcelona (1996).

This procedure is designed for monitoring wells with an inside diameter (1.5-inches or greater) that can accommodate a positive lift pump with a screen length or open interval ten feet or less and with a water level above the top of the screen or open interval (Hereafter, the "screen or open interval" will be referred to only as "screen interval"). This SOP is not applicable to other well-sampling conditions.

While the use of dedicated sampling equipment is not mandatory, dedicated pumps and tubing can reduce sampling costs significantly by streamlining sampling activities and thereby reducing the overall field costs.

The goal of this procedure is to emphasize the need for consistency in deploying and operating equipment while purging and sampling monitoring wells during each sampling event. This will help to minimize sampling variability.

This procedure describes a general framework for groundwater sampling. Other site specific information (hydrogeological context, conceptual site model (CSM), DQOs, etc.) coupled with systematic planning must be added to the procedure in order to develop an appropriate site specific SAP/QAPP. In addition, the site specific SAP/QAPP must identify the specific equipment that will be used to collect the groundwater samples.

This procedure does not address the collection of water or free product samples from wells containing free phase LNAPLs and/or DNAPLs (light or dense non-aqueous phase liquids). For this type of situation, the reader may wish to check: Cohen, and Mercer (1993) or other pertinent documents.

This SOP is to be used when collecting groundwater samples from monitoring wells at all Superfund, Federal Facility and RCRA sites in Region 1 under the conditions described herein. Request for modification of this SOP, in order to better address specific situations at individual wells, must include adequate technical justification for proposed changes. <u>All changes and modifications must be approved and included in a revised SAP/QAPP before implementation in field.</u>

3.0 BACKGROUND FOR IMPLEMENTATION

It is expected that the monitoring well screen has been properly located (both laterally and vertically) to intercept existing contaminant plume(s) or along flow paths of potential contaminant migration. Problems with inappropriate monitoring well placement or faulty/improper well installation cannot be overcome by even the best water sampling procedures. This SOP presumes that the analytes of interest are moving (or will potentially move) primarily through the more permeable zones intercepted by the screen interval.

Proper well construction, development, and operation and maintenance cannot be overemphasized. The use of installation techniques that are appropriate to the hydrogeologic setting of the site often prevent "problem well" situations from occurring. During well development, or redevelopment, tests should be conducted to determine the hydraulic characteristics of the monitoring well. The data can then be used to set the purging/sampling rate, and provide a baseline for evaluating changes in well performance and the potential need for well rehabilitation. Note: if this installation data or well history (construction and sampling) is not available or discoverable, for all wells to be sampled, efforts to build a sampling history should commence with the next sampling event.

The pump intake should be located within the screen interval and at a depth that will remain under water at all times. It is recommended that the intake depth and pumping rate remain the same for all sampling events. The mid-point or the lowest historical midpoint of the saturated screen length is often used as the location of the pump intake. For new wells, or for wells without pump intake depth information, the site's SAP/QAPP must provide clear reasons and instructions on how the pump intake depth(s) will be selected, and reason(s) for the depth(s) selected. If the depths to top and bottom of the well screen are not known, the SAP/QAPP will need to describe how the sampling depth will be determined and how the data can be used.

Stabilization of indicator field parameters is used to indicate that conditions are suitable for sampling to begin. Achievement of turbidity levels of less than 5 NTU, and stable drawdowns of less than 0.3 feet, while desirable, are not mandatory. Sample collection may still take place provided the indicator field parameter criteria in this procedure are met. If after 2 hours of purging indicator field parameters have not stabilized, one of three optional courses of action may be taken: a) continue purging until stabilization is achieved, b) discontinue purging, do not collect any samples, and record in log book that stabilization could not be achieved (documentation must describe attempts to achieve stabilization), c) discontinue purging, collect samples and provide full explanation of attempts to achieve stabilization (note: there is a risk that the analytical data obtained, especially metals and strongly hydrophobic organic analytes, may reflect a sampling bias and therefore, the data may not meet the data quality objectives of the sampling event).

It is recommended that low-flow sampling be conducted when the air temperature is above 32°F (0°C). If the procedure is used below 32°F, special precautions will need to be taken to prevent the groundwater from freezing in the equipment. Because sampling during freezing temperatures may adversely impact the data quality objectives, the need for water sample collection during months when these conditions are likely to occur should be evaluated during site planning and special sampling measures may need to be developed. Ice formation in the flow-through-cell will cause the monitoring probes to act erratically. A transparent flow-through-cell needs to be used to observe if ice is forming in the cell. If ice starts to form on the other pieces of the sampling equipment, additional problems may occur.

4.0 HEALTH & SAFETY

When working on-site, comply with all applicable OSHA requirements and the site's health/safety procedures. All proper personal protection clothing and equipment are to be worn. Some samples may contain biological and chemical hazards. These samples should be handled with suitable protection to skin, eyes, etc.

5.0 CAUTIONS

The following cautions need to be considered when planning to collect groundwater samples when the below conditions occur.

If the groundwater degasses during purging of the monitoring well, dissolved gases and VOCs will be lost. When this happens, the groundwater data for dissolved gases (e.g., methane, ethene, ethane, dissolved oxygen, etc.) and VOCs will need to be qualified. Some conditions that can promote degassing are the use of a vacuum pump (e.g., peristaltic pumps), changes in aperture along the sampling tubing, and squeezing/pinching the pump's tubing which results in a pressure change.

When collecting the samples for dissolved gases and VOCs analyses, avoid aerating the groundwater in the pump's tubing. This can cause loss of the dissolved gases and VOCs in the groundwater. Having the pump's tubing completely filled prior to sampling will avoid this problem when using a centrifugal pump or peristaltic pump.

Direct sun light and hot ambient air temperatures may cause the groundwater in the tubing and flow-through-cell to heat up. This may cause the groundwater to degas which will result in loss of VOCs and dissolved gases. When sampling under these conditions, the sampler will need to shade the equipment from the sunlight (e.g., umbrella, tent, etc.). If possible, sampling on hot days, or during the hottest time of the day, should be avoided. The tubing exiting the monitoring well should be kept as short as possible to avoid the sun light or ambient air from heating up the groundwater.

Thermal currents in the monitoring well may cause vertical mixing of water in the well bore. When the air temperature is colder than the groundwater temperature, it can cool the top of the water column. Colder water which is denser than warm water sinks to the bottom of the well and the warmer water at the bottom of the well rises, setting up a convection cell. "During low-flow sampling, the pumped water may be a mixture of convecting water from within the well casing and aquifer water moving inward through the screen. This mixing of water during low-flow sampling can substantially increase equilibration times, can cause false stabilization of indicator parameters, can give false indication of redox state, and can provide biological data that are not representative of the aquifer conditions" (Vroblesky 2007).

Failure to calibrate or perform proper maintenance on the sampling equipment and measurement instruments (e.g., dissolved oxygen meter, etc.) can result in faulty data being collected.

Interferences may result from using contaminated equipment, cleaning materials, sample containers, or uncontrolled ambient/surrounding air conditions (e.g., truck/vehicle exhaust nearby).

Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment and/or proper planning to avoid ambient air interferences. Note that the use of dedicated sampling equipment can also significantly reduce the time needed to complete each sampling event, will promote consistency in the sampling, and may reduce sampling bias by having the pump's intake at a constant depth.

Clean and decontaminate all sampling equipment prior to use. All sampling equipment needs to be routinely checked to be free from contaminants and equipment blanks collected to ensure that the equipment is free of contaminants. Check the previous equipment blank data for the site (if they exist) to determine if the previous cleaning procedure removed the contaminants. If contaminants were detected and they are a concern, then a more vigorous cleaning procedure will be needed.

6.0 PERSONNEL QUALIFICATIONS

All field samplers working at sites containing hazardous waste must meet the requirements of the OSHA regulations. OSHA regulations may require the sampler to take the 40 hour OSHA health and safety training course and a refresher course prior to engaging in any field activities, depending upon the site and field conditions.

The field samplers must be trained prior to the use of the sampling equipment, field instruments, and procedures. Training is to be conducted by an experienced sampler before initiating any sampling procedure.

The entire sampling team needs to read, and be familiar with, the site Health and Safety Plan, all relevant SOPs, and SAP/QAPP (and the most recent amendments) before going onsite for the sampling event. It is recommended that the field sampling leader attest to the understanding of these site documents and that it is recorded.

7.0 EQUIPMENT AND SUPPLIES

A. Informational materials for sampling event

A copy of the current Health and Safety Plan, SAP/QAPP, monitoring well construction data, location map(s), field data from last sampling event, manuals for sampling, and the monitoring instruments’ operation, maintenance, and calibration manuals should be brought to the site.

B. Well keys.

C. Extraction device

Adjustable rate, submersible pumps (e.g., centrifugal, bladder, etc.) which are constructed of stainless steel or polytetrafluoroethylene (PTFE, i.e. Teflon®) are preferred. PTFE, however, should not be used when sampling for per- and polyfluoroalkyl substances (PFAS) as it is likely to contain these substances.

Note: If extraction devices constructed of other materials are to be used, adequate information must be provided to show that the substituted materials do not leach contaminants nor cause interferences to the analytical procedures to be used. Acceptance of these materials must be obtained before the sampling event.

If bladder pumps are selected for the collection of VOCs and dissolved gases, the pump setting should be set so that one pulse will deliver a water volume that is sufficient to fill a 40 mL VOC vial. This is not mandatory, but is considered a "best practice". For the proper operation, the bladder pump will need a minimum amount of water above the pump; consult the manufacturer for the recommended submergence. The pump's recommended submergence value should be determined during the planning stage, since it may influence well construction and placement of dedicated pumps where water-level fluctuations are significant.

Adjustable rate, peristaltic pumps (suction) are to be used with caution when collecting samples for VOCs and dissolved gases (e.g., methane, carbon dioxide, etc.) analyses. Additional information on the use of peristaltic pumps can be found in Appendix A. If peristaltic pumps are used, the inside diameter of the rotor head tubing needs to match the inside diameter of the tubing installed in the monitoring well.

Inertial pumping devices (motor driven or manual) are not recommended. These devices frequently cause greater disturbance during purging and sampling, and are less easily controlled than submersible pumps (potentially increasing turbidity and sampling variability, etc.). This can lead to sampling results that are adversely affected by purging and sampling operations, and a higher degree of data variability.

D. Tubing

PTFE (Teflon®) or PTFE-lined polyethylene tubing are preferred when sampling is to include VOCs, SVOCs, pesticides, PCBs and inorganics. As discussed in the previous section, PTFE tubing should not be used when sampling for PFAS. In this case, a suitable alternative such as high-density polyethylene tubing should be used.

PVC, polypropylene or polyethylene tubing may be used when collecting samples for metal and other inorganics analyses.

Note: If tubing constructed of other materials is to be used, adequate information must be provided to show that the substituted materials do not leach contaminants nor cause interferences to the analytical procedures to be used. Acceptance of these materials must be obtained before the sampling event.

The use of 1/4 inch or 3/8 inch (inside diameter) tubing is recommended. This will help ensure that the tubing remains liquid filled when operating at very low pumping rates when using centrifugal and peristaltic pumps.

Silastic tubing should be used for the section around the rotor head of a peristaltic pump. It should be less than a foot in length. The inside diameter of the tubing used at the pump rotor head must be the same as the inside diameter of tubing placed in the well. A tubing connector is used to connect the pump rotor head tubing to the well tubing. Alternatively, the two pieces of tubing can be connected to each other by placing the one end of the tubing inside the end of the other tubing. The tubing must not be reused.

E. The water level measuring device

Electronic ”tape”, pressure transducer, water level sounder/level indicator, etc. should be capable of measuring to 0.01 foot accuracy. Recording pressure transducers, mounted above the pump, are especially helpful in tracking water levels during pumping operations, but their use must include check measurements with a water level “tape” at the start and end of each sampling event.

F. Flow measurement supplies

Graduated cylinder (size according to flow rate) and stopwatch usually will suffice.

Large graduated bucket used to record total water purged from the well.

G. Interface probe

To be used to check on the presence of free phase liquids (LNAPL, or DNAPL) before purging begins (as needed).

H. Power source (generator, nitrogen tank, battery, etc.)

When a gasoline generator is used, locate it downwind and at least 30 feet from the well so that the exhaust fumes do not contaminate samples.

I. Indicator field parameter monitoring instruments

Use of a multi-parameter instrument capable of measuring pH, oxidation/reduction potential (ORP), dissolved oxygen (DO), specific conductance, temperature, and coupled with a flow-through-cell is required when measuring all indicator field parameters, except turbidity. Turbidity is collected using a separate instrument. Record equipment/instrument identification (manufacturer, and model number).

Transparent, small volume flow-through-cells (e.g., 250 mLs or less) are preferred. This allows observation of air bubbles and sediment buildup in the cell, which can interfere with the operation of the monitoring instrument probes, to be easily detected. A small volume cell facilitates rapid turnover of water in the cell between measurements of the indicator field parameters.

It is recommended to use a flow-through-cell and monitoring probes from the same manufacturer and model to avoid incompatibility between the probes and flow-through-cell.

Turbidity samples are collected before the flow-through-cell. A "T" connector coupled with a valve is connected between the pump's tubing and flow-through-cell. When a turbidity measurement is required, the valve is opened to allow the groundwater to flow into a container. The valve is closed and the container sample is then placed in the turbidimeter.

Standards are necessary to perform field calibration of instruments. A minimum of two standards are needed to bracket the instrument measurement range for all parameters except ORP which use a Zobell solution as a standard. For dissolved oxygen, a wet sponge used for the 100% saturation and a zero dissolved oxygen solution are used for the calibration.

Barometer (used in the calibration of the Dissolved Oxygen probe) and the conversion formula to convert the barometric pressure into the units of measure used by the Dissolved Oxygen meter are needed.

J. Decontamination supplies

Includes (for example) non-phosphate detergent, distilled/deionized water, isopropyl alcohol, etc.

K. Record keeping supplies

Logbook(s), well purging forms, chain-of-custody forms, field instrument calibration forms, etc.

L. Sample bottles

M. Sample preservation supplies (as required by the analytical methods)

N. Sample tags or labels

O. PID or FID instrument

If appropriate, to detect VOCs for health and safety purposes, and provide qualitative field evaluations.

P. Miscellaneous Equipment

Equipment to keep the sampling apparatus shaded in the summer (e.g., umbrella) and from freezing in the winter. If the pump's tubing is allowed to heat up in the warm weather, the cold groundwater may degas as it is warmed in the tubing.

8.0 EQUIPMENT/INSTRUMENT CALIBRATION

Prior to the sampling event, perform maintenance checks on the equipment and instruments according to the manufacturer's manual and/or applicable SOP. This will ensure that the equipment/instruments are working properly before they are used in the field.

Prior to sampling, the monitoring instruments must be calibrated and the calibration documented. The instruments are calibrated using U.S Environmental Protection Agency Region 1 *Calibration of Field Instruments (temperature, pH, dissolved oxygen, conductivity/specific conductance, oxidation/reduction [ORP], and turbidity),* March 23, 2017, or latest version or from one of the methods listed in 40CFR136, 40CFR141 and SW-846.

The instruments shall be calibrated at the beginning of each day. If the field measurement falls outside the calibration range, the instrument must be re-calibrated so that all measurements fall within the calibration range. At the end of each day, a calibration check is performed to verify that instruments remained in calibration throughout the day. This check is performed while the instrument is in measurement mode, not calibration mode. If the field instruments are being used to monitor the natural attenuation parameters, then a calibration check at mid-day is highly recommended to ensure that the instruments did not drift out of calibration. Note: during the day if the instrument reads zero or a negative number for dissolved oxygen, pH, specific conductance, or turbidity (negative value only), this indicates that the instrument drifted out of calibration or the instrument is malfunctioning. If this situation occurs the data from this instrument will need to be qualified or rejected.

9.0 PRELIMINARY SITE ACTIVITIES (as applicable)

Check the well for security (damage, evidence of tampering, missing lock, etc.) and record pertinent observations (include photograph as warranted).

If needed, lay out a sheet of clean polyethylene for monitoring and sampling equipment, unless equipment is elevated above the ground (e.g., on a table, etc.).

Remove well cap and if appropriate measure VOCs at the rim of the well with a PID or FID instrument and record reading in field logbook or on the well purge form.

If the well casing does not have an established reference point (usually a V-cut or indelible mark in the well casing), make one. Describe its location and record the date of the mark in the logbook (consider a photographic record as well). All water level measurements must be recorded relative to this reference point (and the altitude of this point should be determined using techniques that are appropriate to site's DQOs.

If water-table or potentiometric surface map(s) are to be constructed for the sampling event, perform synoptic water level measurement round (in the shortest possible time) before any purging and sampling activities begin. If possible, measure water level depth (to 0.01 ft.) and total well depth (to 0.1 ft.) the day before sampling begins, in order to allow for re-settlement of any particulates in the water column. This is especially important for those wells that have not been recently sampled because sediment buildup in the well may require the well to be redeveloped. If measurement of total well depth is not made the day before, it should be measured after sampling of the well is complete. All measurements must be taken from the established referenced point. Care should be taken to minimize water column disturbance.

Check newly constructed wells for the presence of LNAPLs or DNAPLs before the initial sampling round. If none are encountered, subsequent check measurements with an interface probe may not be necessary unless analytical data or field analysis signal a worsening situation. This SOP cannot be used in the presence of LNAPLs or DNAPLs. If NAPLs are present, the project team must decide upon an alternate sampling method. All project modifications must be approved and documented prior to implementation.

If available check intake depth and drawdown information from previous sampling event(s) for each well. Duplicate, to the extent practicable, the intake depth and extraction rate (use final pump dial setting information) from previous event(s). If changes are made in the intake depth or extraction rate(s) used during previous sampling event(s), for either portable or dedicated extraction devices, record new values, and explain reasons for the changes in the field logbook.

10.0 PURGING AND SAMPLING PROCEDURE

Purging and sampling wells in order of increasing chemical concentrations (known or anticipated) are preferred.

The use of dedicated pumps is recommended to minimize artificial mobilization and entrainment of particulates each time the well is sampled. Note that the use of dedicated sampling equipment can also significantly reduce the time needed to complete each sampling event, will promote consistency in the sampling, and may reduce sampling bias by having the pump's intake at a constant depth.

A. Initial Water Level

Measure the water level in the well before installing the pump if a non-dedicated pump is being used. The initial water level is recorded on the purge form or in the field logbook.

B. Install Pump

Lower pump, safety cable, tubing and electrical lines slowly (to minimize disturbance) into the well to the appropriate depth (may not be the mid-point of the screen/open interval). The Sampling and Analysis Plan/Quality Assurance Project Plan should specify the sampling depth (used previously), or provide criteria for selection of intake depth for each new well. If possible keep the pump intake at least two feet above the bottom of the well, to minimize mobilization of particulates present in the bottom of the well.

Pump tubing lengths, above the top of well casing should be kept as short as possible to minimize heating the groundwater in the tubing by exposure to sun light and ambient air temperatures. Heating may cause the groundwater to degas, which is unacceptable for the collection of samples for VOC and dissolved gases analyses.

C. Measure Water Level

Before starting pump, measure water level. Install recording pressure transducer, if used to track drawdowns, to initialize starting condition.

D. Purge Well

From the time the pump starts purging and until the time the samples are collected, the purged water is discharged into a graduated bucket to determine the total volume of groundwater purged. This information is recorded on the purge form or in the field logbook.

Start the pump at low speed and slowly increase the speed until discharge occurs. Check water level. Check equipment for water leaks and if present fix or replace the affected equipment. Try to match pumping rate used during previous sampling event(s). Otherwise, adjust pump speed until there is little or no water level drawdown. If the minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, continue purging.

Monitor and record the water level and pumping rate every five minutes (or as appropriate) during purging. Record any pumping rate adjustments (both time and flow rate). Pumping rates should, as needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. Adjustments are best made in the first fifteen minutes of pumping in order to help minimize purging time. During pump start-up, drawdown may exceed the 0.3 feet target and then "recover" somewhat as pump flow adjustments are made. Purge volume calculations should utilize stabilized drawdown value, not the initial drawdown. If the initial water level is above the top of the screen do not allow the water level to fall into the well screen. The final purge volume must be greater than the stabilized drawdown volume plus the pump's tubing volume. If the drawdown has exceeded 0.3 feet and stabilizes, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are collected.

Avoid the use of constriction devices on the tubing to decrease the flow rate because the constrictor will cause a pressure difference in the water column. This will cause the groundwater to degas and result in a loss of VOCs and dissolved gasses in the groundwater samples.

Note: the flow rate used to achieve a stable pumping level should remain constant while monitoring the indicator parameters for stabilization and while collecting the samples.

Wells with low recharge rates may require the use of special pumps capable of attaining very low pumping rates (e.g., bladder, peristaltic), and/or the use of dedicated equipment. For new monitoring wells, or wells where the following situation has not occurred before, if the recovery rate to the well is less than 50 mL/min., or the well is being essentially dewatered during purging, the well should be sampled as soon as the water level has recovered sufficiently to collect the volume needed for all anticipated samples. The project manager or field team leader will need to make the decision when samples should be collected, how the sample is to be collected, and the reasons recorded on the purge form or in the field logbook. A water level measurement needs to be performed and recorded before samples are collected. If the project manager decides to collect the samples using the pump, it is best during this recovery period that the pump intake tubing not be removed, since this will aggravate any turbidity problems. Samples in this specific situation may be collected without stabilization of indicator field parameters. Note that field conditions and efforts to overcome problematic situations must be recorded in order to support field decisions to deviate from normal procedures described in this SOP. If this type of problematic situation persists in a well, then water sample collection should be changed to a passive or no-purge method, if consistent with the site's DQOs, or have a new well installed.

E. Monitor Indicator Field Parameters

After the water level has stabilized, connect the "T" connector with a valve and the flow-through-cell to monitor the indicator field parameters. If excessive turbidity is anticipated or encountered with the pump startup, the well may be purged for a while without connecting up the flow-through-cell, in order to minimize particulate buildup in the cell (This is a judgment call made by the sampler). Water level drawdown measurements should be made as usual. If possible, the pump may be installed the day before purging to allow particulates that were disturbed during pump insertion to settle.

During well purging, monitor indicator field parameters (turbidity, temperature, specific conductance, pH, ORP, DO) at a frequency of five minute intervals or greater. The pump's flow rate must be able to "turn over" at least one flow-through-cell volume between measurements (for a 250 mL flow-through-cell with a flow rate of 50 mLs/min., the monitoring frequency would be every five minutes; for a 500 mL flow-through-cell it would be every ten minutes). If the cell volume cannot be replaced in the five minute interval, then the time between measurements must be increased accordingly. Note: during the early phase of purging, emphasis should be put on minimizing and stabilizing pumping stress, and recording those adjustments followed by stabilization of indicator parameters. Purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings are within the following limits:

Turbidity (10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized),
Dissolved Oxygen (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),
Specific Conductance (3%),
Temperature (3%),
pH (± 0.1 unit),
Oxidation/Reduction Potential (±10 millivolts).

All measurements, except turbidity, must be obtained using a flow-through-cell. Samples for turbidity measurements are obtained before water enters the flow-through-cell. Transparent flow-through-cells are preferred, because they allow field personnel to watch for particulate build-up within the cell. This build-up may affect indicator field parameter values measured within the cell. If the cell needs to be cleaned during purging operations, continue pumping and disconnect cell for cleaning, then reconnect after cleaning and continue monitoring activities. Record start and stop times and give a brief description of cleaning activities.

The flow-through-cell must be designed in a way that prevents gas bubble entrapment in the cell. Placing the flow-through-cell at a 45 degree angle with the port facing upward can help remove bubbles from the flow-through-cell (see Appendix B Low-Flow Setup Diagram). Throughout the measurement process, the flow-through-cell must remain free of any gas bubbles. Otherwise, the monitoring probes may act erratically. When the pump is turned off or cycling on/off (when using a bladder pump), water in the cell must not drain out. Monitoring probes must remain submerged in water at all times.

F. Collect Water Samples

When samples are collected for laboratory analyses, the pump's tubing is disconnected from the "T" connector with a valve and the flow-through-cell. The samples are collected directly from the pump's tubing. Samples must not be collected from the flow-through-cell or from the "T" connector with a valve.

VOC samples are normally collected first and directly into pre-preserved sample containers. However, this may not be the case for all sampling locations; the SAP/QAPP should list the order in which the samples are to be collected based on the project's objective(s). Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

If the pump's flow rate is too high to collect the VOC/dissolved gases samples, collect the other samples first. Lower the pump's flow rate to a reasonable rate and collect the VOC/dissolved gases samples and record the new flow rate.

During purging and sampling, the centrifugal/peristaltic pump tubing must remain filled with water to avoid aeration of the groundwater. It is recommended that 1/4 inch or 3/8 inch (inside diameter) tubing be used to help ensure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, use the following procedure to collect samples: collect non-VOC/dissolved gases samples first, then increase flow rate slightly until the water completely fills the tubing, collect the VOC/dissolved gases samples, and record new drawdown depth and flow rate.

For bladder pumps that will be used to collect VOC or dissolved gas samples, it is recommended that the pump be set to deliver long pulses of water so that one pulse will fill a 40 mL VOC vial.

Use pre-preserved sample containers or add preservative, as required by analytical methods, to the samples immediately after they are collected. Check the analytical methods (e.g. EPA SW-846, 40 CFR 136, water supply, etc.) for additional information on preservation.

If determination of filtered metal concentrations is a sampling objective, collect filtered water samples using the same low flow procedures. The use of an in-line filter (transparent housing preferred) is required, and the filter size (0.45 µm is commonly used) should be based on the sampling objective. Pre-rinse the filter with groundwater prior to sample collection. Make sure the filter is free of air bubbles before samples are collected. Preserve the filtered water sample immediately. Note: filtered water samples are not an acceptable substitute for unfiltered samples when the monitoring objective is to obtain chemical concentrations of total mobile contaminants in groundwater for human health or ecological risk calculations.

Label each sample as collected. Samples requiring cooling will be placed into a cooler with ice or refrigerant for delivery to the laboratory. Metal samples after acidification to a pH less than 2 do not need to be cooled.

G. Post Sampling Activities

If a recording pressure transducer is used to track drawdown, re-measure water level with tape.

After collection of samples, the pump tubing may be dedicated to the well for re-sampling (by hanging the tubing inside the well), decontaminated, or properly discarded.

Before securing the well, measure and record the well depth (to 0.1 ft.), if not measured the day before purging began. Note: measurement of total well depth annually is usually sufficient after the initial low stress sampling event. However, a greater frequency may be needed if the well has a “silting” problem or if confirmation of well identity is needed.

Secure the well.

11.0 DECONTAMINATION

Decontaminate sampling equipment prior to use in the first well, and then following sampling of each subsequent well. Pumps should not be removed between purging and sampling operations. The pump, tubing, support cable and electrical wires which were in contact with the well should be decontaminated by one of the procedures listed below.

The use of dedicated pumps and tubing will reduce the amount of time spent on decontamination of the equipment. If dedicated pumps and tubing are used, only the initial sampling event will require decontamination of the pump and tubing.

Note if the previous equipment blank data showed that contaminant(s) were present after using the below procedure or the one described in the SAP/QAPP, a more vigorous procedure may be needed.

Procedure 1

Decontaminating solutions can be pumped from either buckets or short PVC casing sections through the pump and tubing. The pump may be disassembled and flushed with the decontaminating solutions. It is recommended that detergent and alcohol be used sparingly in the decontamination process and water flushing steps be extended to ensure that any sediment trapped in the pump is removed. The pump exterior and electrical wires must be rinsed with the decontaminating solutions, as well. The procedure is as follows:

Flush the equipment/pump with potable water.

Flush with non-phosphate detergent solution. If the solution is recycled, the solution must be changed periodically.

Flush with potable or distilled/deionized water to remove all of the detergent solution. If the water is recycled, the water must be changed periodically.

Optional - flush with isopropyl alcohol (pesticide grade; must be free of ketones {e.g., acetone}) or with methanol. This step may be required if the well is highly contaminated or if the equipment blank data from the previous sampling event show that the level of contaminants is significant.

Flush with distilled/deionized water. This step must remove all traces of alcohol (if used) from the equipment. The final water rinse must not be recycled.

Procedure 2

Steam clean the outside of the submersible pump.

Pump hot potable water from the steam cleaner through the inside of the pump. This can be accomplished by placing the pump inside a three or four inch diameter PVC pipe with end cap. Hot water from the steam cleaner jet will be directed inside the PVC pipe and the pump exterior will be cleaned. The hot water from the steam cleaner will then be pumped from the PVC pipe through the pump and collected into another container. Note: additives or solutions should not be added to the steam cleaner.

Pump non-phosphate detergent solution through the inside of the pump. If the solution is recycled, the solution must be changed periodically.

Pump potable water through the inside of the pump to remove all of the detergent solution. If the solution is recycled, the solution must be changed periodically.

Pump distilled/deionized water through the pump. The final water rinse must not be recycled.

12.0 FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not compromised the quality of the groundwater samples. All field quality control samples must be prepared the same as regular investigation samples with regard to sample volume, containers, and preservation. Quality control samples include field duplicates, equipment blanks, matrix spike/matrix spike duplicates, trip blanks (VOCs), and temperature blanks.

13.0 FIELD LOGBOOK

A field log shall be kept to document all groundwater field monitoring activities (see Appendix C, example table), and record the following for each well:

Site name, municipality, state.

Well identifier, latitude-longitude or state grid coordinates.

Measuring point description (e.g., north side of PVC pipe).

Well depth, and measurement technique.

Well screen length.

Pump depth.

Static water level depth, date, time and measurement technique.

Presence and thickness of immiscible liquid (NAPL) layers and detection method.

Pumping rate, drawdown, indicator parameters values, calculated or measured total volume pumped, and clock time of each set of measurements.

Type of tubing used and its length.

Type of pump used.

Clock time of start and end of purging and sampling activity.

Types of sample bottles used and sample identification numbers.

Preservatives used.

Parameters requested for analyses.

Field observations during sampling event.

Name of sample collector(s).

Weather conditions, including approximate ambient air temperature.

QA/QC data for field instruments.

Any problems encountered should be highlighted.

Description of all sampling/monitoring equipment used, including trade names, model number, instrument identification number, diameters, material composition, etc.

14.0 DATA REPORT

Data reports are to include laboratory analytical results, QA/QC information, field indicator parameters measured during purging, field instrument calibration information, and whatever other field logbook information is needed to allow for a full evaluation of data usability.

Note: the use of trade, product, or firm names in this sampling procedure is for descriptive purposes only and does not constitute endorsement by the U.S. EPA.

15.0 REFERENCES

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APPENDIX A

PERISTALTIC PUMPS

Before selecting a peristaltic pump to collect groundwater samples for VOCs and/or dissolved gases, (e.g., methane, carbon dioxide, etc.) consideration should be given to the following:

- The decision of whether or not to use a peristaltic pump is dependent on the intended use of the data.
- If the additional sampling error that may be introduced by this device is NOT of concern for the VOC/dissolved gases data's intended use, then this device may be acceptable.
- If minor differences in the groundwater concentrations could affect the decision, such as to continue or terminate groundwater cleanup or whether the cleanup goals have been reached, then this device should NOT be used for VOC/dissolved gases sampling. In these cases, centrifugal or bladder pumps are a better choice for more accurate results.

EPA and USGS have documented their concerns with the use of the peristaltic pumps to collect water sample in the below documents.

- "Suction Pumps are not recommended because they may cause degassing, pH modification, and loss of volatile compounds" *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001, December 1987.
- "The agency does not recommend the use of peristaltic pumps to sample ground water particularly for volatile organic analytes" *RCRA Ground-Water Monitoring Draft Technical Guidance*, EPA Office of Solid Waste, November 1992.
- "The peristaltic pump is limited to shallow applications and can cause degassing resulting in alteration of pH, alkalinity, and volatiles loss", *Low-flow (Minimal drawdown) Ground-Water Sampling Procedures*, by Robert Puls & Michael Barcelona, April 1996, EPA/540/S-95/504.
- "Suction-lift pumps, such as peristaltic pumps, can operate at a very low pumping rate; however, using negative pressure to lift the sample can result in the loss of volatile analytes", USGS Book 9 Techniques of Water-Resources Investigation, Chapter A4. (Version 2.0, 9/2006).

APPENDIX B

SUMMARY OF SAMPLING INSTRUCTIONS

These instructions are for using an adjustable rate, submersible pump or a peristaltic pump with the pump's intake placed at the midpoint of a 10 foot or less well screen or an open interval. The water level in the monitoring well is above the top of the well screen or open interval, the ambient temperature is above 32°F, and the equipment is not dedicated. Field instruments are already calibrated. The equipment is setup according to the diagram at the end of these instructions.

1. Review well installation information. Record well depth, length of screen or open interval, and depth to top of the well screen. Determine the pump's intake depth (e.g., mid-point of screen/open interval).

2. On the day of sampling, check security of the well casing, perform any safety checks needed for the site, lay out a sheet of polyethylene around the well (if necessary), and setup the equipment. If necessary a canopy or an equivalent item can be setup to shade the pump's tubing and flow-through-cell from the sun light to prevent the sun light from heating the groundwater.

3. Check well casing for a reference mark. If missing, make a reference mark. Measure the water level (initial) to 0.01 ft. and record this information.

4. Install the pump's intake to the appropriate depth (e.g., midpoint) of the well screen or open interval. Do not turn-on the pump at this time.

5. Measure water level and record this information.

6. Turn-on the pump and discharge the groundwater into a graduated waste bucket. Slowly increase the flow rate until the water level starts to drop. Reduce the flow rate slightly so the water level stabilizes. Record the pump's settings. Calculate the flow rate using a graduated container and a stop watch. Record the flow rate. Do not let the water level drop below the top of the well screen.

If the groundwater is highly turbid or discolored, continue to discharge the water into the bucket until the water clears (visual observation); this usually takes a few minutes. The turbid or discolored water is usually from the well-being disturbed during the pump installation. If the water does not clear, then you need to make a choice whether to continue purging the well (hoping that it will clear after a reasonable time) or continue to the next step. Note, it is sometimes helpful to install the pump the day before the sampling event so that the disturbed materials in the well can settle out.

If the water level drops to the top of the well screen during the purging of the well, stop purging the well, and do the following:

> Wait for the well to recharge to a sufficient volume so samples can be collected. This may take a while (pump may be removed from well, if turbidity is not a problem). The project manager will need to make the decision when samples should be collected and the reasons recorded in the site's log book. A water level measurement needs to be performed and recorded before samples are collected. When samples are being collected, the water level must not drop below the top of the screen or open interval. Collect the samples from the pump's tubing. Always collect the VOCs and dissolved gases samples first. Normally, the samples requiring a small volume are collected before the large volume samples are collected just in case there is not sufficient water in the well to fill all the sample containers. All samples must be collected, preserved, and stored according to the analytical method. Remove the pump from the well and decontaminate the sampling equipment.

If the water level has dropped 0.3 feet or less from the initial water level (water level measure before the pump was installed); proceed to Step 7. If the water level has dropped more than 0.3 feet, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are be collected.

7. Attach the pump's tubing to the "T" connector with a valve (or a three-way stop cock). The pump's tubing from the well casing to the "T" connector must be as short as possible to prevent the groundwater in the tubing from heating up from the sun light or from the ambient air. Attach a short piece of tubing to the other end of the end of the "T" connector to serve as a sampling port for the turbidity samples. Attach the remaining end of the "T" connector to a short piece of tubing and connect the tubing to the flow-through-cell bottom port. To the top port, attach a small piece of tubing to direct the water into a calibrated waste bucket. Fill the cell with the groundwater and remove all gas bubbles from the cell. Position the flow-through-cell in such a way that if gas bubbles enter the cell they can easily exit the cell. If the ports are on the same side of the cell and the cell is cylindrical shape, the cell can be placed at a 45-degree angle with the ports facing upwards; this position should keep any gas bubbles entering the cell away from the monitoring probes and allow the gas bubbles to exit the cell easily (see Low-Flow Setup Diagram). Note:

make sure there are no gas bubbles caught in the probes' protective guard; you may need to shake the cell to remove these bubbles.

8. Turn-on the monitoring probes and turbidity meter.

9. Record the temperature, pH, dissolved oxygen, specific conductance, and oxidation/reduction potential measurements. Open the valve on the "T" connector to collect a sample for the turbidity measurement, close the valve, do the measurement, and record this measurement. Calculate the pump's flow rate from the water exiting the flow-through-cell using a graduated container and a stop watch, and record the measurement. Measure and record the water level. Check flow-through-cell for gas bubbles and sediment; if present, remove them.

10. Repeat Step 9 every 5 minutes or as appropriate until monitoring parameters stabilized. Note: at least one flow-through-cell volume must be exchanged between readings. If not, the time interval between readings will need to be increased. Stabilization is achieved when three consecutive measurements are within the following limits:

> **Turbidity** (10% for values greater than 5 NTUs; if three Turbidity values are less than 5 NTUs, consider the values as stabilized),
> **Dissolved Oxygen** (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),
> **Specific Conductance** (3%),
> **Temperature** (3%),
> **pH** (± 0.1 unit),
> **Oxidation/Reduction Potential** (±10 millivolts).

If these stabilization requirements do not stabilize in a reasonable time, the probes may have been coated from the materials in the groundwater, from a buildup of sediment in the flow-through-cell, or a gas bubble is lodged in the probe. The cell and the probes will need to be cleaned. Turn-off the probes (not the pump), disconnect the cell from the "T" connector and continue to purge the well. Disassemble the cell, remove the sediment, and clean the probes according to the manufacturer's instructions. Reassemble the cell and connect the cell to the "T" connector. Remove all gas bubbles from the cell, turn-on the probes, and continue the measurements. Record the time the cell was cleaned.

11. When it is time to collect the groundwater samples, turn-off the monitoring probes, and disconnect the pump's tubing from the "T" connector. If you are using a centrifugal or peristaltic pump check the pump's tubing to determine if the tubing is completely filled with water (no air space).

All samples must be collected and preserved according to the analytical method. VOCs and dissolved gases samples are normally collected first and directly into pre-preserved sample containers. However, this may not be the case for all sampling locations; the SAP/QAPP should list the order in which the samples are to be collected based on the project's objective(s). Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

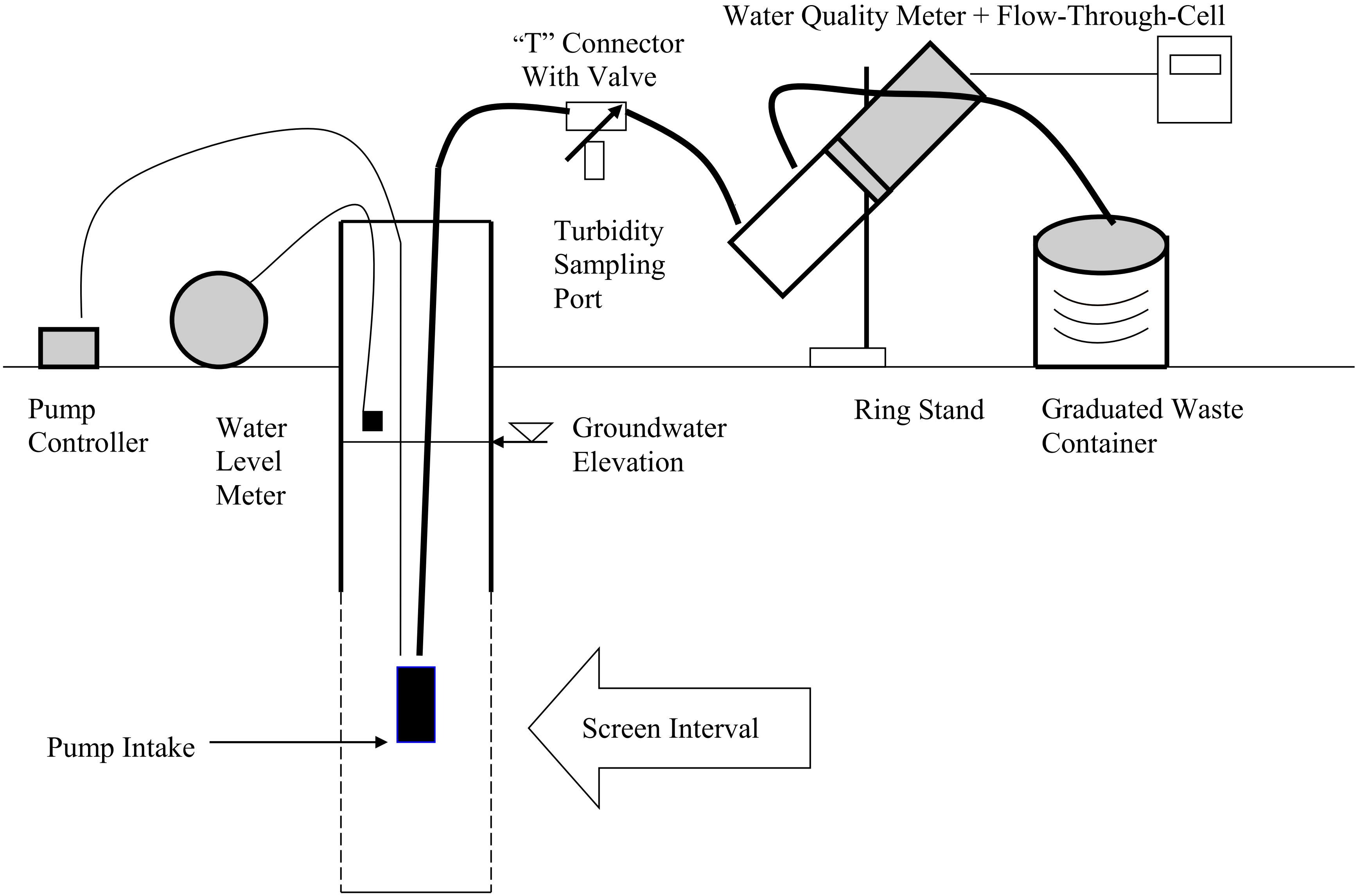
If the pump's tubing is not completely filled with water and the samples are being collected for VOCs and/or dissolved gases analyses using a centrifugal or peristaltic pump, do the following:

> All samples must be collected and preserved according to the analytical method. The VOCs and the dissolved gases (e.g., methane, ethane, ethene, and carbon dioxide) samples are collected last. When it becomes time to collect these samples increase the pump's flow rate until the tubing is completely filled. Collect the samples and record the new flow rate.

12. Store the samples according to the analytical method.

13. Record the total purged volume (graduated waste bucket). Remove the pump from the well and decontaminate the sampling equipment.

Low-Flow Setup Diagram



APPENDIX C

EXAMPLE (Minimum Requirements)

WELL PURGING-FIELD WATER QUALITY MEASUREMENTS FORM

Location (Site/Facility Name)________________________________
Well Number_________________ Date________________________
Field Personnel____
Sampling Organization______________________________________
Identify MP____

Depth to _______/________ of screen
(below MP) top bottom
Pump Intake at (ft. below MP)_________
Purging Device; (pump type)__________
Total Volume Purged ________________

Clock Time 24 HR	Water Depth below MP ft	Pump Dial[1]	Purge Rate ml/min	Cum. Volume Purged liters	Temp. "C	Spec. Cond.[2] µS/cm	pH	ORP[3] mv	DO mg/L	Tur-bidity NTU	Comments

Stabilization Criteria 3% 3% ±0.1 ±10 mv 10% 10%

1. Pump dial setting (for example: hertz, cycles/min, etc).
2. µSiemens per cm(same as µmhos/cm)at 25°C.
3. Oxidation reduction potential (ORP)

Supplement C - NYSDOH Vapor and Air Sampling

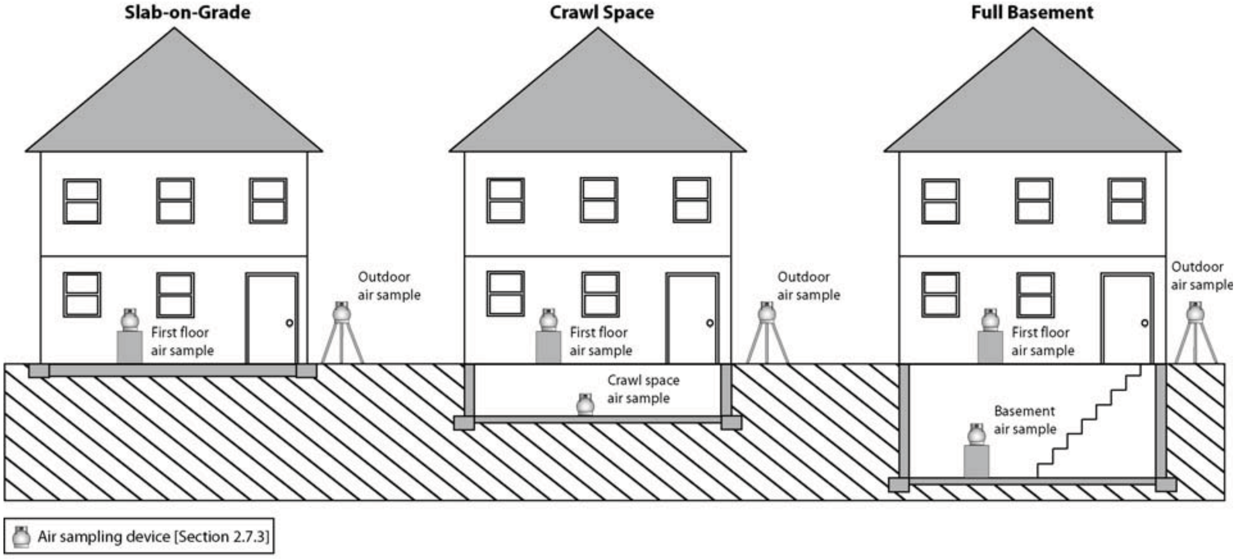


Figure 2.1
Schematic of indoor and outdoor air sampling locations

2.6.4 Outdoor air

Typically, an outdoor air sample is collected outside of each building where an indoor air sample is collected. However, if several buildings are being sampled within a localized area, representative outdoor air samples may be appropriate. For example, one outdoor air sample may be sufficient for three houses being sampled in a cul-de-sac. Outdoor air samples should be collected from a representative upwind location, away from wind obstructions (e.g., trees or bushes), and at a height above the ground to represent breathing zones (3 to 5 feet) [Figure 2.1]. A representative sample is one that is not biased toward obvious sources of volatile chemicals (e.g., automobiles, lawn mowers, oil storage tanks, gasoline stations, industrial facilities, etc.). For buildings with HVAC systems that draw outdoor air into the building, an outdoor air sample collected near the outdoor air intake may be appropriate.

2.7 Sampling protocols

The procedures recommended here may be modified depending on site-specific conditions, the sampling objectives, or emerging technologies and methodologies. Alternative sampling procedures should be described thoroughly and proposed in a work plan submitted for review by the State. The State will review and comment on the proposed procedure and consider the efficacy of the alternative sampling procedure based on the objectives of investigation. In all cases, work plans should thoroughly describe the proposed sampling procedure. Similarly, the procedures that were implemented in the field should be documented and included in the final report of the sampling results.

2.7.1 Soil vapor

Soil vapor probe installations [Figure 2.2] may be permanent, semi-permanent or temporary. In general, permanent or semi-permanent installations are preferred for data consistency reasons and to ensure outdoor air infiltration does not occur. Temporary probes should only be used if measures are taken to ensure that an adequate surface seal is created to prevent outdoor air infiltration and if tracer gas is used at every sampling location. [See Section 2.7.5 for additional information about the use of tracer gas when collecting soil vapor samples.] Soil vapor implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be included in any permanent construction protocol:

a. implants should be installed using an appropriate method based on site conditions (e.g., direct push, manually driven, auger — if necessary to attain the desired depth or if sidewall smearing is a concern, etc.);

b. porous, inert backfill material (e.g., glass beads, washed #1 crushed stone, etc.) should be used to create a sampling zone 1 to 2 feet in length;

c. implants should be fitted with inert tubing (e.g., polyethylene, stainless steel, nylon, Teflon®, etc.) of the appropriate size (typically 1/8 inch to 1/4 inch diameter) and of laboratory or food grade quality to the surface;

d. soil vapor probes should be sealed above the sampling zone with a bentonite slurry for a minimum distance of 3 feet to prevent outdoor air infiltration and the remainder of the borehole backfilled with clean material;

e. for multiple probe depths, the borehole should be grouted with bentonite between probes to create discrete sampling zones or separate nested probes should be installed [Figure 2.2]; and

f. steps should be taken to minimize infiltration of water or outdoor air and to prevent accidental damage (e.g., setting a protective casing around the top of the probe tubing and grouting in place to the top of bentonite, sloping the ground surface to direct water away from the borehole like a groundwater monitoring well, etc.).

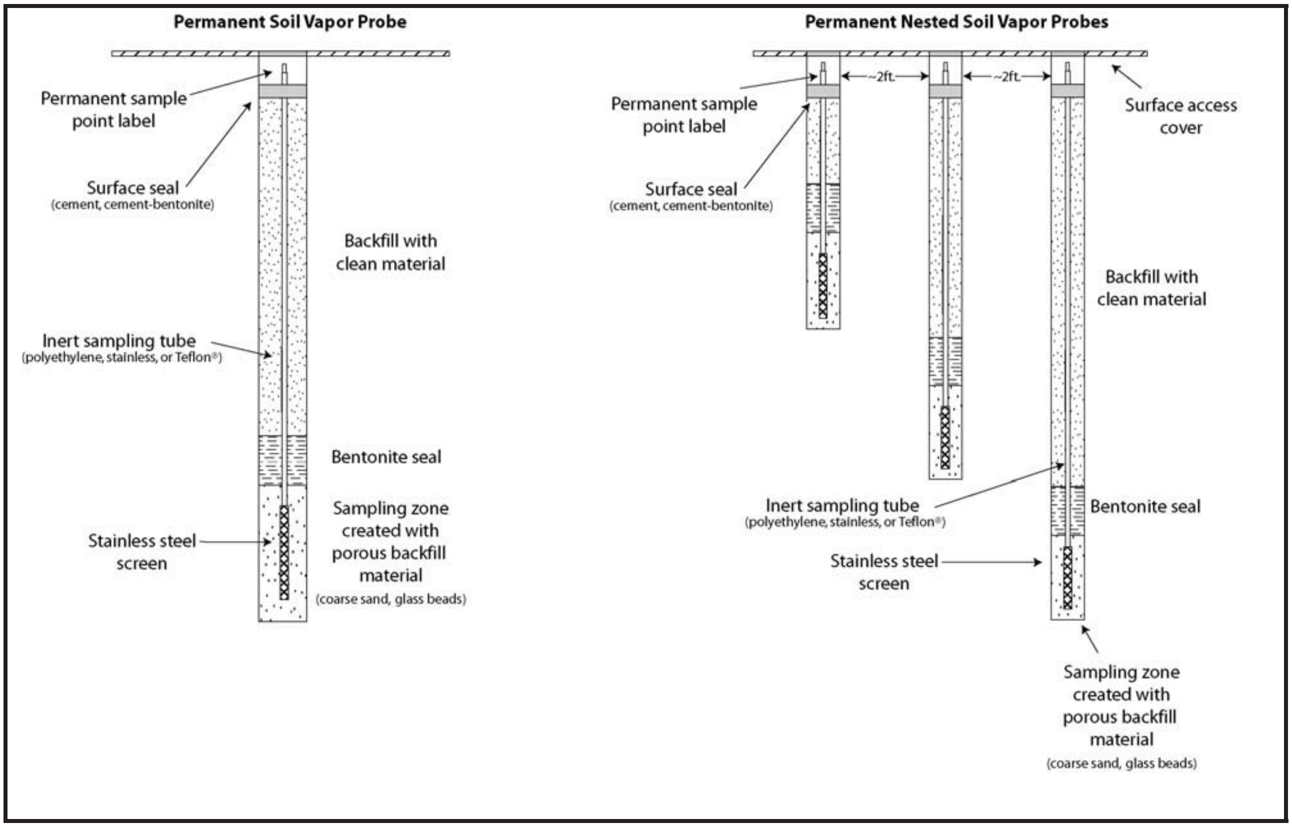


Figure 2.2

Schematics of a generic permanent soil vapor probe and permanent nested soil vapor probes

[Note: Many variations exist and may be proposed in a work plan. Proposed installations should meet the sampling objectives and requirements of the analytical methods.]

To obtain representative samples and to minimize possible discrepancies, soil vapor samples should be collected in the following manner at all locations:

a. at least 24 hours after the installation of permanent probes and shortly after the installation of temporary probes, one to three implant volumes (i.e., the volume of the sample probe and tube) should be purged prior to collecting the samples;

b. flow rates for both purging and collecting should not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling;

c. samples should be collected, using conventional sampling methods, in an appropriate container — one which

    i. meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation),

    ii. is consistent with the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and

    iii. is certified clean by the laboratory;

d. sample size depends upon the volume of that will achieve minimum reporting limits [Section 2.9]; and

e. a tracer gas (e.g., helium, butane, sulfur hexafluoride, etc.) should be used when collecting soil vapor samples to verify that adequate sampling techniques are being implemented (i.e., to verify infiltration of outdoor air is not occurring) [Section 2.7.5].

In some cases, weather conditions may present certain limitations on soil vapor sampling. For example, condensation in the sample tubing may be encountered during winter sampling due to low outdoor air temperatures. Devices, such as tube warmers, may be used to address these conditions. Anticipated limitations to the sampling should be discussed prior to the sampling event so appropriate measures can be taken to address these difficulties and produce representative and reliable data.

When soil vapor samples are collected, the following actions should be taken to document local conditions during sampling that may influence interpretation of the results:

a. if sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified;

b. outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor air sampling locations (if applicable), and compass orientation (north);

c. weather conditions (e.g., precipitation and outdoor temperature) should be noted for the past 24 to 48 hours; and

d. any pertinent observations should be recorded, such as odors and readings from field instrumentation.

Additional information that could be gathered to assist in the interpretation of the results includes barometric pressure, wind speed and wind direction.

The field sampling team should maintain a sample log sheet summarizing the following:

a. sample identification,

b. date and time of sample collection,

c. sampling depth,

d. identity of samplers,

e. sampling methods and devices,

f. purge volumes,

g. volume of soil vapor extracted,

h. if canisters used, the vacuum before and after samples were collected,

i. apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and

j. chain of custody protocols and records used to track samples from sampling point to analysis.

2.7.2 Sub-slab vapor

During colder months, heating systems should be operating to maintain normal indoor air temperatures (i.e., 65 – 75 °F) for at least 24 hours prior to and during the scheduled sampling time. Prior to installation of the sub-slab vapor probe, the building floor should be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.

Sub-slab vapor probe installations [Figure 2.3] may be permanent, semi-permanent or temporary. A vacuum should not be used to remove drilling debris from the sampling port. Sub-slab implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be included in any construction protocol:

a. permanent recessed probes should be constructed with brass or stainless steel tubing and fittings;

b. temporary probes should be constructed with inert tubing (e.g., polyethylene, stainless steel, nylon, Teflon®, etc.) of the appropriate size (typically 1/8 inch to 1/4 inch diameter), and of laboratory or food grade quality;

c. tubing should not extend further than 2 inches into the sub-slab material;

d. porous, inert backfill material (e.g., glass beads, washed #1 crushed stone, etc.) should be added to cover about 1 inch of the probe tip for permanent installations; and

e. the implant should be sealed to the surface with non-VOC-containing and non-shrinking products for temporary installations (e.g., permagum grout, melted beeswax, putty, etc.) or cement for permanent installations.

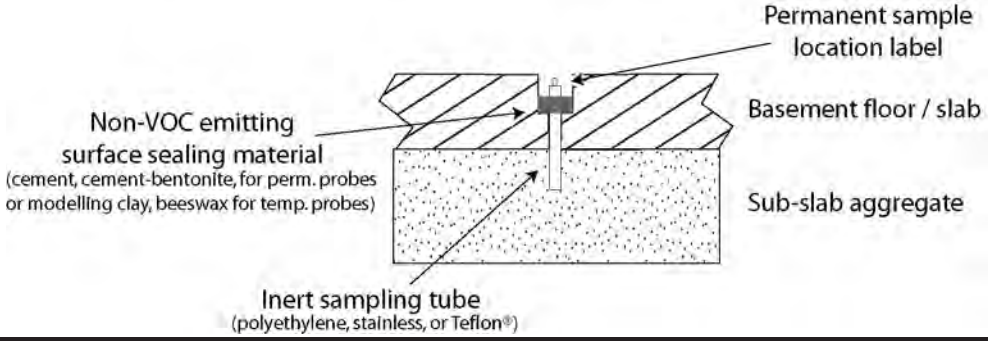


Figure 2.3

Schematic of a generic sub-slab vapor probe

[Note: Many variations exist and may be proposed in a work plan. Proposed installations should meet the sampling objectives and requirements of the analytical methods.]

To obtain representative samples that meet the data quality objectives, sub-slab vapor samples should be collected in the following manner:

a. after installation of the probes, one to three volumes (i.e., the volume of the sample probe and tube) must be purged prior to collecting the samples to ensure samples collected are representative;

b. flow rates for both purging and collecting must not exceed 0.2 liters per minute to minimize ambient air infiltration during sampling; and

c. samples should be collected, using conventional sampling methods, in an appropriate container — one which

   i. meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation),

   ii. is consistent with the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and

   iii. is certified clean by the laboratory;

d. sample size depends upon the volume of that will achieve minimum reporting limits [Section 2.9], the flow rate, and the sampling duration; and

e. ideally, samples should be collected over the same period of time as concurrent indoor and outdoor air samples.

When sub-slab vapor samples are collected, the following actions should be taken to document conditions during sampling and ultimately to aid in the interpretation of the sampling results [Section 3]:

a. historic and current storage and uses of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);

b. the use of heating or air conditioning systems during sampling should be noted;

c. floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), footings that create separate foundation sections, and any other pertinent information should be completed;

d. outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;

e. weather conditions (e.g., precipitation and indoor and outdoor temperature) and ventilation conditions (e.g., heating system active and windows closed) should be reported; and

f. any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, ppbRAE, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

The field sampling team should maintain a sample log sheet summarizing the following:

a. sample identification,
b. date and time of sample collection,
c. sampling depth,
d. identity of samplers,
e. sampling methods and devices,
f. soil vapor purge volumes,
g. volume of soil vapor extracted,
h. if canisters used, vacuum of canisters before and after samples collected,
i. apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
j. chain of custody protocols and records used to track samples from sampling point to analysis.

2.7.3 Indoor air

[Reference: NYSDOH's *Indoor Air Sampling & Analysis Guidance (February 1, 2005)*]

During colder months, heating systems should be operating to maintain normal indoor air temperatures (i.e., 65 – 75 °F) for at least 24 hours prior to and during the scheduled sampling time. If possible, prior to collecting indoor samples, a pre-sampling inspection [Section 2.11.1] should be performed to evaluate the physical layout and conditions of the building being investigated, to identify conditions that may affect or interfere with the proposed sampling, and to prepare the building for sampling. This process is described in Section 2.11.1.

In general, indoor air samples should be collected in the following manner:

a. sampling duration should reflect the exposure scenario being evaluated without compromising the detection limit or sample collection flow rate (e.g., an 8 hour sample from a workplace with a single shift versus a 24 hour sample from a workplace with multiple shifts). To ensure that air is representative of the locations sampled and to avoid undue influence from sampling personnel, samples should be collected for at least 1 hour. If the goal of the sampling is to represent average concentrations over longer periods, then longer duration sampling periods may be appropriate. Typically, 24 hour samples are collected from residential settings;
b. personnel should avoid lingering in the immediate area of the sampling device while samples are being collected;
c. sample flow rates must conform to the specifications in the sample collection method and, if possible, should be consistent with the flow rates for concurrent outdoor air and sub-slab samples; and
d. samples must be collected, using conventional sampling methods, in an appropriate container — one which

- i. meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation),
- ii. is consistent with the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and
- iii. is certified clean by the laboratory.

At sites with tetrachloroethene contamination, passive air monitors that are specifically analyzed for tetrachloroethene (i.e., "perc badges") are commonly used to collect indoor and outdoor air samples. If site characterization activities indicate that degradation products of tetrachloroethene also represent a vapor intrusion concern, perc badges may be used to indicate the likelihood of vapor intrusion (i.e., by using tetrachloroethene as a surrogate) followed, as appropriate, by more comprehensive sampling and laboratory analyses to quantify both tetrachloroethene and its degradation products. Perc badge samples ideally should be collected over a twenty-four hour period, but for no less than eight hours.

The following actions should be taken to document conditions during indoor air sampling and ultimately to aid in the interpretation of the sampling results [Section 3]:

- a. historic and current uses and storage of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);
- b. a product inventory survey documenting sources of volatile chemicals present in the building during the indoor air sampling that could potentially influence the sample results should be completed [Section 2.11.2];
- c. the use of heating or air conditioning systems during sampling should be noted;
- d. floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system supply and return registers, compass orientation (north), footings that create separate foundation sections, and any other pertinent information should be completed;
- e. outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;
- f. weather conditions (e.g., precipitation and indoor and outdoor temperature) and ventilation conditions (e.g., heating system active and windows closed) should be reported; and
- g. any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, ppbRAE, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

The field sampling team should maintain a sample log sheet summarizing the following:

a. sample identification,
b. date and time of sample collection,
c. sampling height,
d. identity of samplers,
e. sampling methods and devices,
f. depending upon the method, volume of air sampled,
g. if canisters are used, vacuum of canisters before and after samples collected, and
h. chain of custody protocols and records used to track samples from sampling point to analysis.

2.7.4 Outdoor air

Outdoor air samples should be collected simultaneously with indoor air samples to evaluate the potential influence, if any, of outdoor air on indoor air quality. They may also be collected simultaneously with soil vapor samples to identify potential outdoor air interferences associated with infiltration of outdoor air into the sampling apparatus while the soil vapor was collected. To obtain representative samples that meet the data quality objectives, outdoor air samples should be collected in a manner consistent with that for indoor air samples (described in Section 2.7.3).

The following actions should be taken to document conditions during outdoor air sampling and ultimately to aid in the interpretation of the sampling results [Section 3]:

a. outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations, the location of potential interferences (e.g., gasoline stations, factories, lawn movers, etc.), compass orientation (north), and paved areas;
b. weather conditions (e.g., precipitation and outdoor temperature) should be reported; and
c. any pertinent observations, such as odors, readings from field instrumentation, and significant activities in the vicinity (e.g., operation of heavy equipment or dry cleaners) should be recorded.

2.7.5 Tracer gas

When collecting soil vapor samples as part of a vapor intrusion evaluation, a tracer gas serves as a quality assurance/quality control measure to verify the integrity of the soil vapor probe seal. Without the use of a tracer, there is no way to verify that a soil vapor sample has not been diluted by outdoor air.

Depending on the nature of the contaminants of concern, a number of different compounds can be used as a tracer. Typically, sulfur hexafluoride (SF_6) or helium are used as tracers because they are readily available, have low toxicity, and can be monitored with portable measurement devices. Butane and propane (or other gases) could also be used as a tracer in some situations. Compounds other than those mentioned here may be appropriate, provided they meet project-specific data quality objectives. Where applicable, steps should be taken to ensure that the gas used by the laboratory to clean the air sampling container is different from the gas used as a tracer during sampling (e.g., helium).

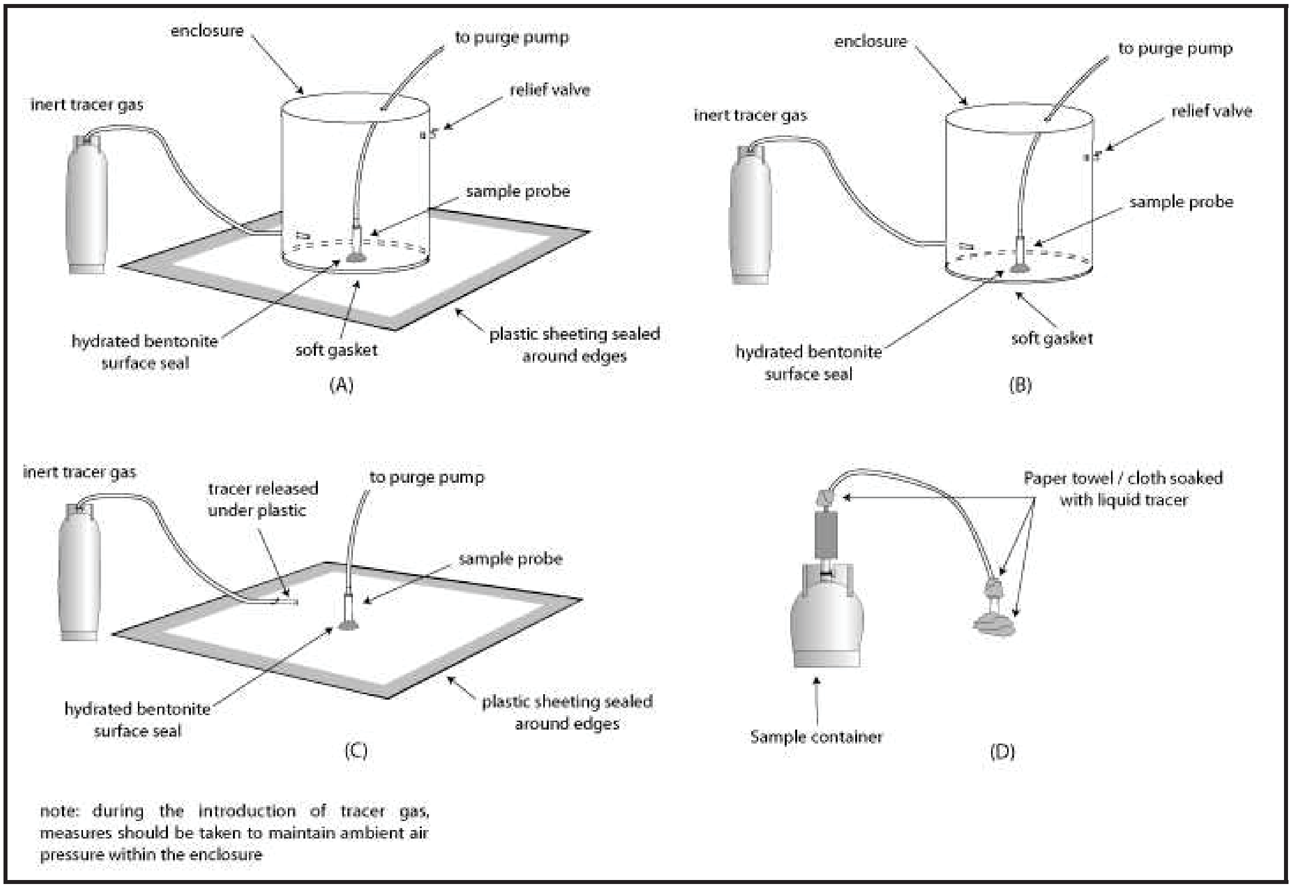
The protocol for using a tracer gas is straightforward: simply enrich the atmosphere in the immediate vicinity of the area where the probe intersects the ground surface with the tracer gas, and measure a vapor sample from the probe for the presence of high concentrations (> 10%) of the tracer. A cardboard box, a plastic pail, or even a garbage bag can serve to keep the tracer gas in contact with the probe during the testing. If there are concerns about infiltration of ambient air through other parts of the sampling train (such as around the fittings, not just at the probe/ground interface), then consideration should be given to ensuring that the tracer gas is in contact with the entire sampling apparatus. In these cases, field personnel may prefer to use a liquid tracer — soaking paper towels with a liquid tracer and placing the towels around the probe/ground interface, around fittings, and/or in the corner of a shroud.

There are two basic approaches to testing for the tracer gas:

1. include the tracer gas in the list of target analytes reported by the laboratory; or
2. use a portable monitoring device to analyze a sample of soil vapor for the tracer prior to and after sampling for the compounds of concern. (Note that the tracer gas samples can be collected via syringe, Tedlar® bag etc. They need not be collected in Summa® canisters or minicans.)

The advantage of the second approach is that the real time tracer sampling results can be used to confirm the integrity of the probe seals prior to formal sample collection.

Figure 2.4 depicts common methods for using tracer gas. In examples a, b and c, the tracer gas is released in the enclosure prior to initially purging the sample point. Care should be taken to avoid excessive purging prior to sample collection. Care should also be taken to prevent pressure build-up in the enclosure during introduction of the tracer gas. Inspection of the installed sample probe, specifically noting the integrity of the surface seal and the porosity of the soil in which the probe is installed, will help to determine the tracer gas setup. Figure 2.4a may be most effective at preventing tracer gas infiltration, however, it may not be appropriate in some situations depending on site-specific conditions. Figures 2.4b and 2.4c may be sufficient for probes installed in tight soils with well-constructed surface seals. Figure 2d provides an example of using a liquid tracer. In all cases, the same tracer gas application should be used for all probes at any given site.



note: during the introduction of tracer gas, measures should be taken to maintain ambient air pressure within the enclosure

Figure 2.4
Schematics of generic tracer gas applications when collecting soil vapor samples

Because minor leakage around the probe seal should not materially affect the usability of the soil vapor sampling results, the mere presence of the tracer gas in the sample should not be a cause for alarm. Consequently, portable field monitoring devices with detection limits in the low ppm range are more than adequate for screening samples for the tracer. If high concentrations (> 10%) of tracer gas are observed in a sample, the probe seal should be enhanced to reduce the infiltration of outdoor air.

Where permanent or semi-permanent sampling probes are used, tracer gas samples should be collected at each of the sampling probes during the initial stages of a soil vapor sampling program. If the results of the initial samples indicate that the probe seals are adequate, reducing the number of locations at which tracer gas samples are employed may be considered. At a minimum, tracer gas samples should be collected with at least 10% of the soil vapor samples collected in subsequent sampling rounds. When using permanent soil vapor probes as part of a long-term monitoring program, annual testing of the probe integrity is recommended. Where temporary probes are used, tracer gas should be used at every sampling location, every time.

Supplement D - Decontamination

1.0 Purpose and Scope

This SOP supplement provides guidance to project personnel for the decontamination of field equipment, but does not specifically address all of the required procedures, and is intended to be used in conjunction with available operating manuals supplied by equipment manufacturers. Decontamination must be performed in accordance with other relevant project-specific documentation, including work plans, sampling and analysis plans, health and safety plans, quality assurance project plans, and additional SOPs, as appropriate.

2.0 General

Decontamination of sampling and heavy equipment, as well as personal protective equipment (PPE), is performed as a quality assurance measure and a safety precaution. Decontamination prevents cross-contamination between samples, minimizes contaminant transport (it is critical that equipment used in one area not serve as a source of contamination of another), and helps to maintain a clean working environment for the safety of field personnel. General decontamination requirements will be specified in project plans. Note: All decontamination procedures must comply with specific requirements when sampling for per- and polyfluoroalkyl substances (PFAS).

Field personnel will review and be familiar with required decontamination procedures, including those for cleaning field equipment, proper storage of cleaned field equipment, and for properly disposing of waste generated from decontamination procedures. Decontamination conducted on site will be performed in a designated, controlled location that will not impact collected samples. Decontamination activities will be appropriately documented in the field notes. Wastes generated in the field will be collected, stored, and properly disposed in accordance with applicable project requirements.

Decontamination consists of physically removing contaminants from the surface of equipment and/or materials potentially exposed to contaminants. A decontamination plan assumes that protective clothing and equipment that leave the exclusion zone are contaminated, and a system is established to wash and rinse non-disposable equipment and dispose of disposable equipment.

Decontamination procedures will vary depending on project-specific requirements as listed in the project-specific work plan, type of equipment, and the required analytical parameters. The effectiveness of the decontamination procedure is verified by collecting and analyzing equipment blank samples (as required).

To minimize or eliminate the need for decontamination, it is recommended that dedicated disposable equipment be used whenever possible.

Document all decontamination activities, and flag equipment with decontamination issues, in fieldwork log books and related fieldwork forms.

3.0 Responsibilities

3.1 Fieldwork Manager

The Fieldwork Manager (FM), in conjunction with the Project Manager (PM), is responsible for overall compliance with SOPs. The FM, or designee, is responsible for ensuring and verifying that all equipment and materials are decontaminated, as required.

3.2 Site Personnel

Site personnel are required to read SOP documentation before engaging in fieldwork activities. The FM will inform personnel who will be responsible for decontamination of specific equipment.

4.0 Procedures

These are standard (typically applicable) operating procedures, which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented. All decontamination procedures are to be modified, as appropriate, when sampling for PFAS (see applicable sampling SOPs).

Decontaminate non-disposable sampling equipment used at the site both before activities begin and after each sample is collected. Decontaminate drilling and excavation equipment both before activities begin and between each investigation location. Take care that materials and solutions used for decontamination procedures are themselves not hazardous or could potentially contaminate samples (e.g., solvents, acids).

4.1 Decontamination Area

A localized decontamination area should be establish where decontamination fluids and soil wastes can be managed and controlled with minimal risk to the surrounding environment. Decontamination should be performed in a non-contaminated area (as possible), that is large enough to allow temporary storage of cleaned equipment and materials before use, as well as to stage drums of decontamination investigation-derived waste (IDW).

In the case of large decontamination areas (e.g., hollow-stem-auger decontamination), line each area with a heavy-gauge plastic sheeting and include a collection system designed to capture potential decontamination IDW. Decontamination areas will, in all cases, be laid out in such a way as to prevent overspray while performing equipment and personnel decontamination.

Smaller decontamination tasks, such as the cleaning of soil or water sampling equipment, and Geoprobe drive rods and barrels, may take place at the sampling location. In this case, all required decontamination supplies and equipment must be brought to the sampling location. This decontamination will use various containment systems to capture the decontamination IDW, which can then be transferred to larger containers as needed.

4.2 Health and Safety Precautions

Decontamination procedures may involve exposure to contaminants in site media and/or dangerous materials used during decontamination (e.g., solvents or acids), and physical hazards associated with the operation of the decontamination equipment. All work should be performed in accordance with the HASP, including decontamination of PPE. Safety Data Sheets for any solvents/chemical stored or used during fieldwork should be available at the site. At a minimum, eye protection, safety shoes, and gloves are to be worn. There are several types of gloves that may be worn, depending on equipment being cleaned, type and extent of equipment contamination, and cleaning solutions or solvents being used. Nitrile gloves (or similar) may be worn when the equipment to be decontaminated is not heavily coated with constituents such as tars/oils. In cases where heavy accumulations of tars/oils are present on the equipment, neoprene or similar chemically compatible gloves are recommended. If a potential for skin contact exists, protective clothing should be worn.

4.3 General Equipment Decontamination Procedures

All sampling equipment must be decontaminated before use to ensure that contaminants have not been introduced to the sample during the sampling process through contact with the sampling device. Monitoring well riser pipes, screens and drilling augers must also be decontaminated, as appropriate, to prevent the introduction of contaminants.

Unless the decontaminated sampling devices that will come in contact with samples are to be used immediately, they should be wrapped in aluminum foil, shiny side out, and stored in a designated “clean” area. Field equipment can also be stored in plastic bags to eliminate the potential for contamination. Larger size equipment, such drill rods, backhoe buckets, etc. need not be wrapped or covered, but must not be stored directly on the ground surface. Field equipment should be inspected and decontaminated prior to use if the equipment has been stored for long periods of time.

4.4 Decontamination Equipment

The following is a list equipment and materials typically needed to perform decontamination:

- Health and safety equipment, including appropriate PPE
- Plastic sheeting (to serve as secondary containment for liquids and protect equipment)
- Brushes and flat-bladed scrapers
- Garden-type water sprayers (without oil-lubricated, moving parts)
- High-pressure washer or portable steam cleaner
- Sump or collection system for contaminated liquid
- Wash basins and buckets
- Spray and rinse bottles
- Potable water, distilled/deionized water (DIW), and laboratory-grade detergent

- Isopropyl alcohol (free of ketones) or methanol (can be wipes or diluted with DIW)
- Airtight, sealable plastic baggies
- Plastic waste bags
- Leak-tight liquid waste containers (55-gallon drums or similar)
- Bulk solid waste containers (55-gallon drums, or similar)

4.5 Specific Decontamination Procedures

For all procedures, decontamination fluids and other wastes may be transferred from smaller to larger containers (e.g., 55-gallon drums or 5-gallon buckets, with tight fitting lids, and transported to the IDW storage facility.

4.5.1 Sampling Equipment

Conduct consistent decontamination of sampling equipment to ensure the quality of the samples collected. Decontaminate all sampling equipment that comes into contact with potentially contaminated samples. Disposable equipment intended for one-time use that is factory-wrapped generally does not need to be decontaminated before use, unless evidence of contamination is present.

Disposable equipment (e.g., water bailers, plastic scoops, VOC sampling syringes) is preferred over reusable equipment; use wherever appropriate. Decontaminate sampling equipment, including split-spoon samplers, Geoprobe Macro-Core cutting shoes, hand augers, reusable bailers, spoons, trowels, and shovels used to collect samples for chemical analyses before sampling at a new sampling location. All decontamination fluids will be captured in a containment system as appropriate.

Take the following steps to decontaminate non-dedicated, non-disposable sampling equipment:

1. Remove as much gross contamination (such as pieces of soil) as possible off equipment at the sampling site.
2. Wash water-resistant equipment thoroughly and vigorously with potable water containing non-phosphate laboratory-grade detergent such as Liquinox®, Alconox®, or equivalent, and using a bristle brush or similar utensil to remove any remaining residual contamination.
3. Rinse equipment thoroughly with potable water.
4. Repeat the first three steps as necessary until all residue is removed.
5. Rinse equipment thoroughly with DIW.
6. If metals are a constituent of interest, rinse with 10% nitric acid and then with DIW.
7. If organics are constituents of interest, rinse with methanol and allow to air dry on a clean surface.

8. Air dry at a location where dust or other fugitive contaminants may not contact the sample equipment. Alternatively, wet equipment maybe dried with a clean, disposable paper towel to assist the drying process. All equipment should be dry before reuse.
9. If the equipment is not used soon after decontamination, it should be covered or wrapped in new, oil-free aluminum foil or new, unused plastic bags to protect the decontaminated equipment from fugitive contaminants before reuse.
10. Store decontaminated equipment at a secure, unexposed location out of the weather and any potential contaminant exposure.

4.5.2 Groundwater Sampling Pumps

[Note: This procedure does not apply to dedicated submersible pumps which have been permanently installed in wells.] Proper decontamination between wells is essential to avoid introducing contaminants from the sampling equipment to another well. If peristaltic pumps are being used, it is necessary only to replace the pump head tubing after sampling each well. If sampling with submersible pumps that come into direct contact with groundwater, the equipment must be decontaminated. The following procedure will be used to decontaminate submersible pumps and non-dedicated tubing before and between sample collection points, as well as the end of each day of use.

Preparation

Pre-clean appropriately sized buckets and prepare cleaning solutions (detergent solution, tap water rinse, distilled/deionized water rinse) and field blank water.

Detergent wash and tap water rinse

a) Put on disposable, powderless gloves. Rest pump in a washbasin or pail partially filled with detergent solution and clean exterior of pump and tubing with a soft brush. Rinse thoroughly with tap water. (DIW can be used instead of tap water, but is less efficient in detergent removal and requires a greater volume of water than tap water).
b) Place pump into bucket, add detergent solution to level above pump intake, and route the intake and discharge ends of pump tubing into the bucket. Begin pumping. Circulate detergent solution for several minutes. If possible, pump detergent solution through tubing at alternating high and low speeds.
c) Change gloves. Manually rinse detergent from pump, tubing and bucket with tap water.
d) Place pump into bucket, add tap water to level above pump intake, and route the intake and discharge ends of pump tubing into the bucket. Begin pumping. Circulate tap water for several minutes. If possible, pump tap water through tubing at alternating high and low speeds. Replace water in bucket and repeat cycle until no sudsing is observed. Change gloves as needed.

DIW Rinse

If a pump will be used to collect inorganic samples, manually rinse pump and tubing with DIW, then place in clean bucket, add DIW to level above pump intake, and route the discharge end of pump tubing outside the bucket. Begin pumping to rinse DIW through the equipment without recirculating. Collect water for use as a field blank, as required, from the pump discharge.

Equipment Storage

1. Place pump into a clean, non-contaminating storage bag and tie the bag shut.
2. Cover the pump reel and tubing with plastic bags or sheeting for transport to the next site.
3. On reaching the next monitoring well, place the pump in the well casing and wipe dry the power and discharge lines with a chemical-free paper towel as the pump is lowered.
4. For long-term storage (longer than 3 days), the pump and exterior and interior of the tubing must be dry before being placed into plastic bags.

4.5.3 Measurement Devices & Monitoring Equipment

For water quality instruments, oil-water interface indicators, water level indicators, continuous water level data loggers, and other field instruments that have the potential to come into contact with site media, at a minimum, wash with dilute laboratory-grade detergent (e.g., Alconox) and double rinse with tap water and DIW before and after each use or by using a similar procedure as discussed in Section 4.4.1. All decontamination fluids will be captured in a containment system as appropriate.

4.5.4 Subsurface Drilling Equipment

Drilling equipment and associated materials (drill bits, augers, and drilling stems) will be decontaminated by the drilling contractor prior to any drilling operations and between borings. These decontamination activities should be performed in the defined decontamination area as described in Section 4.1.

All down-hole Geoprobe tools (drive rods, Macro-Core barrels, etc.) that come in direct contact with potentially contaminated soil or groundwater shall be decontaminated between each sampling location, and may take place at the sampling location using a mobile decontamination platform with a containment system or other means to capture the decontamination IDW.

Decontamination will be performed using the following basic sequence:

1. Remove as much gross contamination as possible off equipment at the sampling site.
2. Wash equipment thoroughly and vigorously with potable water using a high-pressure washer and/or steam cleaner. A bristle brush is also suggested to remove any persistent gross contamination.
3. Air dry at a location where dust or other contaminants may not contact the sample equipment. All equipment should be dry before reuse.
4. Store decontaminated equipment at a location away from any potential exposure from fugitive contamination.

4.5.5 Heavy Equipment

Wash earthwork equipment (such as excavators and back-hoes) with high-pressure potable water, if possible, before leaving a contaminated area using similar steps as outlined in Section 4.4.4, otherwise the equipment may be moved to the decontamination area discussed in Section 4.1. Hand washing with a brush and detergent, followed by a potable water rinse, can also be used. In some instances, tires and tracks of equipment maybe only need to be thoroughly brushed with a dry brush. Take particular care with the components in direct contact with contaminants, such as tires and backhoe buckets.

Any part of earthwork equipment that may come in direct contact with analytical samples (that is, sampling from the excavator bucket) must be thoroughly decontaminated before excavation activities and between sample locations.

4.6 Quality Assurance/Quality Control

To ensure that sampling equipment is cleaned properly and sample cross-contamination does not occur, field rinsate blanks may be collected if required by project plans. A rinsate blank will consist of pouring deionized organic-free water over the specific sampling device or pouring it through the device after it has been cleaned. The rinsate sample is collected in the field under the same conditions as occurred for the sampling activity, and is handled exactly like any other samples collected that day.

Generally, one rinsate blank is collected each day of sampling or at a rate of 1 per 20 for each parameter, whichever is less, for each matrix being sampled or for each type of sampling instrument decontaminated and reused per day. The rinsate samples are analyzed for the specific parameters of concern (for each matrix). Rinsate blanks should be labeled like a routine environmental sample, and laboratory analysis instructions should be included on the chain-of-custody form. Rinsate blanks are not required if dedicated sampling equipment is used. Additional quality assurance samples may be collected if deemed necessary by project specific requirements.

Supplement E - PFAS Sampling Guidance

NEW YORK
STATE OF
OPPORTUNITY.

Department of
Environmental
Conservation

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Under NYSDEC's Part 375 Remedial Programs

April 2023

www.dec.ny.gov

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April 2023

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

ERRATA SHEET for

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Data Assessment and Application to Site Cleanup Page 3	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	3/28/2023
Water Sample Results Page 3	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below.	NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.	3/28/2023
Soil Sample Results Page 3	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values:	NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:	3/28/2023
Protection of Groundwater Page 3	PFOA (ppb) 1.1 PFOS (ppb) 3.7	PFOA (ppb) 0.8 PFOS (ppb) 1.0	3/28/2023

Citation and Page Number	Current Text	Corrected Text	Date
Footnote 2 Page 3	The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	3/28/2023
Testing for Imported Soil Page 4	If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.	3/28/2023
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Soil Sample Results, page 10	"The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase."	"Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. " [Interim SCO Table] "PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP. As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. "	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Testing for Imported Soil Page 11	Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs. If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021
Water Sample Results Page 9	“In addition, further assessment of water may be warranted if either of the following screening levels are met: a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L”	Deleted	6/15/2021

Citation and Page Number	Current Text	Corrected Text	Date
Routine Analysis, Page XX	Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids).	Deleted	5/31/2022
Analysis and Reporting, Page XX	As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.	Deleted	5/31/2022
Routine Analysis, Page XX	LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.	EPA Method 1633 is the procedure to use for environmental samples.	
Soil Sample Results, Page XX	Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6	
Appendix A	"Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1"	"Include in the text ….EPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

Citation and Page Number	Current Text	Corrected Text	Date
Appendix C	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix D	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix G		Updated to include all forty PFAS analytes in EPA Method 533	
Appendix H		Deleted	
Appendix I	Appendix I	Appendix H	
Appendix H	"These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report."	"These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)."	
Appendix H	"The holding time is 14 days…"	"The holding time is 28 days…"	
Appendix H, Initial Calibration	"The initial calibration should contain a minimum of five standards for linear fit…"	"The initial calibration should contain a minimum of six standards for linear fit…"	
Appendix H, Initial Calibration	Linear fit calibration curves should have an R^2 value greater than 0.990.	Deleted	
Appendix H, Initial Calibration Verification	Initial Calibration Verification Section	Deleted	
Appendix H	secondary Ion Monitoring Section	Deleted	
Appendix H	Branched and Linear Isomers Section	Deleted	

April 2023

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

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Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, DER has developed this document which summarizes currently accepted procedures and updates previous DER technical guidance pertaining to PFAS.

Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments, or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

Analysis and Reporting

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third-party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix G) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay).

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

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[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Data Assessment and Application to Site Cleanup

Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	0.8	1.0

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

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[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP certified lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
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- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., washroom sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled “General Fish Handling Procedures for Contaminant Analysis” (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

   1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

   2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

   3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

   3. All personnel (and affiliation) involved in the collection.

   4. Method of collection (gill net, hook and line, etc.)

   5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

   1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

   2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

   3. Date collected.

   4. Sample location (waterway and nearest prominent identifiable landmark).

   5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **<u>The Bureau of Ecosystem Health will supply the bags.</u>** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

    No materials containing Teflon.
    No Post-it notes.
    No ice packs; only water ice or dry ice.
    Any gloves worn must be powder free nitrile.
    No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
    No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
    Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
    Wash hands after handling any food containers or packages as these may contain PFCs. Keep pre-wrapped food containers and wrappers isolated from fish handling.
    Wear clothing washed at least six times since purchase.
    Wear clothing washed without fabric softener.
    Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

page ______ of ______

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name ______________________________ DEC Region ____________

Collections made by (include all crew) ______________________________

Sampling Method: Electrofishing Gill netting Trap netting Trawling Seining Angling Other ______________

Preservation Method: Freezing Other ______________ Notes (SWFDB survey number): ______________

<u>FOR LAB USE ONLY</u>- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, ______________________________, of ____ collected the
(Print Name) (Print Business Address)

following on ____________________, 20____ from ____
(Date) (Water Body)

in the vicinity of ____
(Landmark, Village, Road, etc.)

Town of ____, in _________________________________ County.

Item(s) ____

____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on ____________________________________, 20______.

____ ____________________________
Signature Date

I, __________________________________, received the above mentioned sample(s) on the date specified and assigned identification number(s) ____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

____ ____________________
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	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
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2

Group	Chemical Name	Abbreviation	CAS Number
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

EGLE Michigan Department of Environment, Great Lakes, and Energy

EGLE PFAS SAMPLING QUICK REFERENCE FIELD GUIDE[1]

All Items Used During Sampling Event

● Prohibited
• Items or materials that contain fluoropolymers such as o Polytetrafluoroethylene (PTFE), that includes the trademarks Teflon® and Hostaflon® o Polyvinylidene fluoride (PVDF), that includes the trademark Kynar® o Polycholotrifluoroethylene (PCTFE), that includes the trademark Neoflon ® o Ethylene-tetrafluoro-ethylene (ETFE), that includes the trademark Tefzel® o Fluorinated ethylene propylene (FEP), that includes the trademarks Teflon® FEP and Hostaflon® FEP • Items or materials that contain any other fluoropolymer

Pumps, Tubing, and Sampling Equipment

● Prohibited	🟩 Allowable	▲ Needs Screening[2]
• Items or materials containing any fluoropolymer (potential items include tubing, valves, or pipe thread seal tape)	• High-density polyethylene (HDPE) • Low-density polyethylene (LDPE) tubing • Polypropylene • Silicone • Stainless-steel • Any items used to secure sampling bottles made from: o Natural rubber o Nylon (cable ties) o Uncoated metal springs o Polyethylene	• Any items or materials that will come into direct contact with the sample that have **not** been verified to be PFAS-free o Do not assume that any sampling items or materials are PFAS-free based on composition alone

Sample Storage and Preservation

● Prohibited	🟩 Allowable	▲ Needs Screening[2]
• Polytetrafluoroethylene (PTFE): Teflon® lined bottles or caps	• Glass jars[4] • Laboratory-provided PFAS-Free bottles: o HDPE or polypropylene • Regular wet ice • Thin HDPE sheeting • LDPE resealable storage bags (i.e. Ziploc®) that will not contact the sample media[6]	• Aluminium foil[4] • Chemical or blue ice[5] • Plastic storage bags other than those listed as 🟩 Allowable • Low-density polyethylene (LDPE) bottles

Field Documentation

● Prohibited	🟩 Allowable	▲ Needs Screening[2]
• Clipboards coated with PFAS • Notebooks made with PFAS treated paper • PFAS treated loose paper • PFAS treated adhesive paper products	• Loose paper (non-waterproof, non-recycled) • Rite in the Rain® notebooks • Aluminium, polypropylene, or Masonite field clipboards • Ballpoint pens, pencils, and Fine or Ultra-Fine Point Sharpie® markers	• Plastic clipboards, binders, or spiral hard cover notebooks • All markers not listed as 🟩 Allowable • Post-It® Notes or other adhesive paper products • Waterproof field books

Decontamination

● Prohibited	🟩 Allowable	▲ Needs Screening[2]
• Decon 90® • PFAS treated paper towel	• Alconox®, Liquinox®, or Citranox® • Triple rinse with PFAS-free deionized water • Cotton cloth or untreated paper towel	• Municipal water • Recycled paper towels or chemically treated paper towels

www.michigan.gov/pfasresponse   800-662-9278   Revised 10/17/2018 (rebranded 8/19)

Clothing, Boots, Rain Gear, and PPE

● Prohibited	■ Allowable	▲Needs Screening[2]
• New or unwashed clothing • Anything made of or with: o Gore-Tex™ or other water-resistant synthetics • Anything applied with or recently washed with: o Fabric softeners o Fabric protectors, including UV protection o Insect resistant chemicals o Water, dirt, and/or stain resistant chemicals	• Powderless nitrile gloves • Well-laundered synthetic or 100% cotton clothing, with most recent launderings not using fabric softeners • Made of or with: o Polyurethane o Polyvinyl chloride (PVC) o Wax coated fabrics o Rubber / Neoprene o Uncoated Tyvek®	• Latex gloves • Water and/or dirt resistant leather gloves • Any special gloves required by a HASP • Tyvek® suits, clothing that contains Tyvek®, or coated Tyvek®

Food and Beverages

● Prohibited	■ Allowable
• No food should be consumed in the staging or sampling areas, including pre-packaged food or snacks. ■ If consuming food on-site becomes necessary, move to the staging area and remove PPE. After eating, wash hands thoroughly and put on new PPE.	• Brought and consumed only outside the vicinity of the sampling area: o Bottled water o Hydration drinks (i.e. Gatorade®, Powerade®)

Personal Care Products (PCPs) - for day of sample collection[6]

● Prohibited	■ Allowable	▲Needs Screening[2]
• Any PCPs[6], sunscreen, and insect repellent applied in the sampling area.	PCPs[6], sunscreens, and insect repellents applied in the staging area, away from sampling bottles and equipment followed by thoroughly washing hands: **PCPs[6]:** • Cosmetics, deodorants/antiperspirants, moisturizers, hand creams, and other PCPs[6] **Sunscreens:** • Banana Boat® for Men Triple Defense Continuous Spray Sunscreen SPF 30 • Banana Boat® Sport Performance Coolzone Broad Spectrum SPF 30 • Banana Boat® Sport Performance Sunscreen Lotion Broad Spectrum SPF 30 • Banana Boat® Sport Performance Sunscreen Stick SPF 50 • Coppertone® Sunscreen Lotion Ultra Guard Broad Spectrum SPF 50 • Coppertone® Sport High Performance AccuSpray Sunscreen SPF 30 • Coppertone® Sunscreen Stick Kids SPF 55 • L'Oréal® Silky Sheer Face Lotion 50 • Meijer® Clear Zinc Sunscreen Lotion Broad Spectrum SPF 50 • Meijer® Sunscreen Continuous Spray Broad Spectrum SPF 30 • Meijer® Clear Zinc Sunscreen Lotion Broad Spectrum SPF 15, 30 and 50 • Meijer® Wet Skin Kids Sunscreen Continuous Spray Broad Spectrum SPF 70 • Neutrogena® Beach Defense Water+Sun Barrier Lotion SPF 70 • Neutrogena® Beach Defense Water+Sun Barrier Spray Broad Spectrum SPF 30 • Neutrogena® Pure & Free Baby Sunscreen Broad Spectrum SPF 60+ • Neutrogena® UltraSheer Dry-Touch Sunscreen Broad Spectrum SPF 30 **Insect Repellents:** • OFF® Deep Woods • Sawyer® Permethrin	• Products other than those listed as ■Allowable

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[1] This table is not considered to be a complete listing of prohibited or allowable materials. All materials should be evaluated prior to use during sampling. The manufacturers of various products should be contacted in order to determine if PFAS was used in the production of any particular product.

[2] Equipment blank samples should be taken to verify these products are PFAS-free prior to use during sampling.

[3] **For surface water foam samples:** LDPE storage bags may be used in the sampling of foam on surface waters. In this instance, it is allowable for the LDPE bag to come into direct contact with the sample media.

[4] **For fish and other wildlife samples:** Depending on the project objectives, glass jars and aluminum foil might be used for PFAS sampling. PFAS has been found to bind to glass and if the sample is stored in a glass jar, a rinse of the jar is required during the sample analysis. PFAS are sometimes used as a protective layer for some aluminum foils. An equipment blank sample should be collected prior to any aluminum foil use.

[5] Regular ice is recommended as there are concerns that chemical and blue ice may not cool and maintain the sample at or below 42.8˚F (6°C) (as determined by EPA 40 CFR 136 – NPDES) during collection and through transit to the laboratory.

[6] Based on evidence, avoidance of PCPs is considered to be precautionary because none have been documented as having cross-contaminated samples due to their use. However, if used, application of PCPs must be done at the staging area and away from sampling bottles and equipment, and hands must be thoroughly washed after the use of any PCPs prior to sampling.

●- Prohibited ■- Allowable ▲- Needs Screening

Attachment C: Soil Cleanup Objectives

Department of Environmental Conservation

Division of Environmental Remediation

6 NYCRR PART 375

Environmental Remediation Programs

Subparts 375-1 to 375- 4 & 375-6

Effective December 14, 2006

New York State Department of Environmental Conservation

Subpart 375-6
Remedial Program Soil Cleanup Objectives

375-6.1 Purpose; applicability.

(a) This subpart applies to the development and implementation of the remedial programs for soil and other media set forth in subparts 375-2 through 375-4.

(b) This subpart includes the soil cleanup objective tables developed pursuant to ECL 27-1415(6).

375-6.2 Definitions.

(a) "Contract required quantitation limit" or "CRQL" means the minimum level of quantitation acceptable for Department analytical services contracts. The value represents minimum quantitation limits, not absolute detection limits. The minimum quantitation limit is the lowest level at which the analytical instrument can determine the concentration of a chemical that exists in the sample. The detection limit is the minimum level at which the analytical instrument can confirm the presence of the chemical in the sample. At the detection limit, the analytical instrument can confirm that there is some amount of the chemical in the sample but can not determine the concentration that exists with certainty.

(b) "Technical Support Document" means the "New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document" dated September 2006, which is the document that presents the assumptions, rationale, algorithms and calculations utilized by the Department and the New York State Department of Health to develop the soil cleanup objectives in ECL 27-1415(6).

375-6.3 Unrestricted use soil cleanup objectives.

(a) Applicability. The unrestricted use soil cleanup objectives represent the concentration of a contaminant in soil which, when achieved at a site, will require no use restrictions on the site for the protection of public health, groundwater and ecological resources due to the presence of contaminants in the soil.

(b) Soil cleanup objectives.

(1) The calculated values for the protection of groundwater, ecological resources and public health were considered in developing the unrestricted use soil cleanup objectives. The unrestricted soil cleanup objectives in Table 375-6.8(a) represent the lowest of the three values for protection of groundwater, ecological resources and public health developed as set forth in ECL 27-1415(6).

(2) Unrestricted use, as set forth in subparagraph 375-1.8(g)(1)(i), is achieved when a remedial program for soil meets the unrestricted use soil cleanup objectives in Table 375-6.8(a).

375-6.4 Restricted use soil cleanup objectives for the protection of public health.

(a) Applicability. A protection of public health soil cleanup objective is applicable for the protection of public health at every restricted use site where contamination has been identified in soil above the residential use soil cleanup objectives for a compound included in Table 375-6.8(b), and the Department has determined that remediation is required to protect public health.

(b) Soil cleanup objectives. Protection of public health soil cleanup objectives have been developed for:

(1) Residential use, as set forth in subparagraph 375-1.8(g)(2)(i). The residential use soil cleanup objectives are presented in the protection of public health-residential use column of Table 375-6.8(b).

(2) Restricted-residential use, as set forth in subparagraph 375-1.8(g)(2)(ii). The restricted-residential use soil cleanup objectives are presented in the protection of public health, restricted-residential use column of Table 375-6.8(b).

(3) Commercial use, as set forth in subparagraph 375-1.8(g)(2)(iii). The commercial use soil cleanup objectives are presented in the protection of public health-commercial use column of Table 375-6.8(b).

(4) Industrial use, as set forth in subparagraph 375-1.8(g)(2)(iv). The industrial use soil cleanup objectives are presented in the protection of public health-industrial use column of Table 375-6.8(b).

(c) Selection of the restricted use soil cleanup objectives. In addition to the protection of public health soil cleanup objective for the identified use of the site, protection of groundwater and ecological resources soil cleanup objectives shall be considered where applicable. The contaminant-specific soil cleanup objectives for the soil cleanup component of the remedial program shall be the lowest of the applicable contaminant-specific soil cleanup objectives which are identified for the site as set forth in paragraphs (1) through (3) below.

(1) The protection of groundwater soil cleanup objectives in Table 375-6.8(b) will be applicable to the site and evaluated in determining the soil cleanup objectives for a site as set forth in section 375-6.5.

(2) The protection of ecological resources soil cleanup objectives in Table 375-6.8(b) will be applicable to the site and evaluated in determining the soil cleanup objectives in section 375-6.6

(3) The protection of public health soil cleanup objective for the current, intended and reasonably anticipated future use of the site in Table 375-6.8(b) will be applicable and evaluated in determining the soil cleanup objectives for every site, unless a site-specific soil cleanup objective is proposed.

375-6.5 Soil cleanup objectives for the protection of groundwater.

(a) Applicability. Except as provided in paragraph (1) and (2) below, the protection of groundwater soil cleanup objectives are applicable at restricted use sites where contamination has been identified in on-site soil by the remedial investigation and groundwater standards are, or are threatened to be, contravened by the presence of soil contamination at concentrations above the protection of groundwater soil cleanup objectives.

(1) The protection of groundwater soil cleanup objectives may not be applicable where:

(i) the groundwater standard contravention is the result of an on-site source which is addressed by the remedial program;

(ii) an environmental easement will be put in place which provides for a groundwater use restriction on the site as set forth in paragraph
375-1.8(h)(2);

(iii) the Department determines that contaminated groundwater at the site:

(a) is not migrating, or likely to migrate, off-site; or

(b) is migrating, or is likely to migrate, off-site, however, the remedy includes controls or treatment to address off-site migration; and

(iv) the Department determines the groundwater quality will improve over time.

(2) The protection of groundwater soil cleanup objectives are not applicable if the contravention of groundwater standards at the site is determined to be the result of an off-site source, as set forth in paragraph 375-1.8(d)(2).

(b) Soil cleanup objectives. The protection of groundwater soil cleanup objectives are in Table 375-6.8(b) in the protection of groundwater column.

375-6.6 Soil cleanup objectives for the protection of ecological resources.

(a) Applicability. The soil cleanup objectives for protection of ecological resources must be considered and applied as set forth in this section for the upland soils at sites where terrestrial flora and fauna and the habitats that support them are identified.

(1) Protection of ecological resources soil cleanup objectives apply to sites or portions of sites where the Department determines:

(i) ecological resources at or adjacent to a site, as set forth in subdivision 375-6.6(b):

(a) are present, or will be present under the reasonably anticipated future use of the site; and

(b) constitute an important component of the environment at, or in the vicinity of, the site;

(ii) an impact or threat to the ecological resource has been identified as set forth in subdivision 375-6.6(c); and

(iii) soil contaminant concentrations exceed the protection of ecological resources soil cleanup objectives, as set forth in subdivision 375-6.6(d).

(2) Protection of ecological resources soil cleanup objectives do not and/or will not apply to:

(i) sites or portions of sites where the condition of the land (e.g., paved, covered by impervious surfaces, buildings and other structures) precludes the existence of an ecological resource which constitutes an important component of the environment;

(ii) protection of the aquatic environment; or

(iii) such non-wild biota as:

(1) pets or livestock;

(2) agricultural or horticultural crops; and

(3) landscaping in developed areas.

(b) Identification of ecological resources. The presence of ecological resources shall be determined during the investigation of a site.

(1) The remedial party for a remedial program undertaken pursuant to either subparts 375-2 or 375-4 shall conduct an ecological resource characterization as part of a fish and wildlife impact analysis according to Department guidance to document the presence of fish, wildlife, plants and habitats both on and adjacent to the site.

(2) The remedial party for a remedial program undertaken pursuant to subpart 375-3 shall conduct a resource characterization as part of the qualitative exposure assessment required by ECL 27-1415(2)(b) and in accordance with Department guidance to document the presence of fish, wildlife, plants and habitats both on and adjacent to the site.

(3) The Department shall determine whether the characterization conducted as set forth in paragraphs (1) and (2) above:

(i) has identified ecological resources to be present at or adjacent to a site, or a portion thereof; and

(ii) if such ecological resources constitute an important component of the environment at, or in the vicinity of, the site.

(c) Consideration of impact or threat of impact. If ecological resources that constitute an important component of the environment at, or adjacent to, the site are determined to be present the protection of ecological resources soil cleanup objectives must be considered in the remedial program for the site.

(1) An impact or theat of impact exists when:

(i) a threat to the environment exists, as set forth in subparagraphs 375-2.7(a)(1)(i) to (iv), as a result of contaminants in the soil of the site, unless the Department determines that a more stringent cleanup is necessary to met the requirements of subdivision 375-2.8(a) and paragraph 375-2.8(b)(1); or

(ii) an ecological resource is, or is potentially, impacted by contaminants in the soil of the site.

(d) Soil cleanup objectives. The protection of ecological resources soil cleanup objectives are the same for both unrestricted and restricted use and are incorporated in the soil cleanup objective tables.

(1) For an unrestricted use site, Table 375-6.8(a) presents the lower of the protection of groundwater, ecological resources and unrestricted public health soil cleanup objectives, as calculated and presented in the Technical Support Document.

(2) For a restricted use site, Table 375-6.8(b) includes a protection of ecological resources column, which is applicable to a site regardless of the identified use, as set forth in subdivision (a) above.

(3) Protection of ecological resources soil cleanup objectives were not developed for contaminants identified in Table 375-6.8(b) as “NS”. For such contaminants, the applicant may be required to calculate a protection of ecological resources soil cleanup objective for any site, as set forth in section 375-6.9.

375-6.7 Other considerations and media.

(a) Soil vapor and vapor intrusion.

(1) The soil cleanup objectives presented in this subpart do not account for the impact of concentrations of contaminants in soil relative to soil vapor or vapor intrusion attributable to a remedial site.

(2) The nature and extent of any contamination of the soil vapor media, if present at the site, will be evaluated by the remedial investigation.

(3) The remedy will be protective for soil vapor and vapor intrusion and shall address through appropriate removal or engineering controls the migration of contaminants in soil and groundwater at levels which could impact the indoor air of buildings.

(b) Surface water and sediments.

(1) The soil cleanup objectives presented in this subpart do not account for the impact of contaminants in soil relative to surface water and surface water sediments attributable to a remedial site.

(2) The nature and extent of any contamination of the surface water and sediment, if present at the site, will be evaluated by the remedial investigation.

(3) The remedy for a site will eliminate or mitigate the threat to public health and the environment from contaminated surface water and surface water sediments and shall, to the extent feasible:

(i) remove, contain or treat the source of a discharge of contaminants from the site to the surface water and sediments;

(ii) address through appropriate removal or engineering controls the migration of contaminants in soil and groundwater at levels which could impact the water quality or adversely impact the sediments of a surface water body on or adjacent to the site; and

(iii) remove, contain or treat the impacted surface water and surface water sediments based upon the cleanup objectives developed for the remedial program.

(c) Adjacent residential properties.

(1) The soil cleanup objectives presented for commercial or industrial use in this subpart do not directly account for the impact of concentrations of contaminants in soil relative to adjacent residential properties attributable to a remedial site.

(2) The remedy for a site using the commercial or industrial soil cleanup objectives will be protective of adjacent residential properties and shall address, through appropriate removal or engineering controls, the migration of contaminants in soil which could impact residential properties adjacent to the site.

(d) Soil covers and backfill.

(1) Soil brought to the site for use as a soil cover or backfill must:

(i) be comprised of soil or other unregulated material as set forth in Part 360 of this title;

(ii) not exceed the applicable soil cleanup objectives for the use of the site, as set forth in Tables 375-6.8(a) or (b), as follows:

(a) for unrestricted use sites, as set forth in Table 375-6.8(a);

(b) for residential, restricted-residential, and commercial use sites use the lower of the protection of groundwater or the protection of public health soil cleanup objectives, for the identified use of the site as set forth in Table 375-6.8(b);

(c) for industrial use sites, use the lower of the protection of groundwater or the protection of public health soil cleanup objectives for commercial use as set forth in Table 375-6.8(b);

(d) for restricted use sites where an ecological resource that constitutes an important component of the environment is determined to be present, the protection of ecological resources soil cleanup objective must also be considered, so as not to preclude the growth and development of plants and soil dwelling organisms nor inhibit the activity of burrowing organisms; or

(e) a site specific modification to a soil cleanup objective, as set forth in subdivision 375-6.9(c), may also be utilized in compliance with clauses (ii)*(a)* through *(d)* above.

(2) Analytical data is required to demonstrate that the material complies with the requirements of paragraph (1) above. The number of samples required to confirm compliance will be approved in the work plan. The Department may issue a site specific exemption for the analytical testing requirements, based upon documentation of the origin and composition of the material.

(3) The Department may issue a site specific exemption for one or more of the requirements set forth in paragraph (1) above, based upon site specific conditions, including but not limited to, the following:

(i) the use and redevelopment of the site;

(ii) the depth of placement of the backfill material;

(iii) the depth of placement of the backfill material relative to groundwater;

(iv) the volume of backfill material;

(v) the potential for odor from the backfill material;

(vi) the presence of historic fill in the vicinity of the site;

(vii) a Department issued beneficial use determination, pursuant to Part 360 of this title; or

(viii) background levels of contamination in areas surrounding the site.

375-6.8 Soil cleanup objective tables.

(a) Unrestricted use soil cleanup objectives.

Table 375-6.8(a):Unrestricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Unrestricted Use
Metals		
Arsenic	7440-38-2	13 [c]
Barium	7440-39-3	350 [c]
Beryllium	7440-41-7	7.2
Cadmium	7440-43-9	2.5 [c]
Chromium, hexavalent [e]	18540-29-9	1[b]
Chromium, trivalent [e]	16065-83-1	30 [c]
Copper	7440-50-8	50
Total Cyanide [e, f]		27
Lead	7439-92-1	63 [c]
Manganese	7439-96-5	1600 [c]
Total Mercury		0.18 [c]
Nickel	7440-02-0	30
Selenium	7782-49-2	3.9[c]
Silver	7440-22-4	2
Zinc	7440-66-6	109 [c]
PCBs/Pesticides		
2,4,5-TP Acid (Silvex) [f]	93-72-1	3.8
4,4'-DDE	72-55-9	0.0033 [b]
4,4'-DDT	50-29-3	0.0033 [b]
4,4'-DDD	72-54-8	0.0033 [b]
Aldrin	309-00-2	0.005 [c]
alpha-BHC	319-84-6	0.02
beta-BHC	319-85-7	0.036
Chlordane (alpha)	5103-71-9	0.094

Table 375-6.8(a):Unrestricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Unrestricted Use
delta-BHC [g]	319-86-8	0.04
Dibenzofuran [f]	132-64-9	7
Dieldrin	60-57-1	0.005 [c]
Endosulfan I [d, f]	959-98-8	2.4
Endosulfan II [d, f]	33213-65-9	2.4
Endosulfan sulfate [d, f]	1031-07-8	2.4
Endrin	72-20-8	0.014
Heptachlor	76-44-8	0.042
Lindane	58-89-9	0.1
Polychlorinated biphenyls	1336-36-3	0.1
Semivolatile organic compounds		
Acenaphthene	83-32-9	20
Acenapthylene [f]	208-96-8	100 [a]
Anthracene [f]	120-12-7	100 [a]
Benz(a)anthracene [f]	56-55-3	1[c]
Benzo(a)pyrene	50-32-8	1[c]
Benzo(b)fluoranthene [f]	205-99-2	1[c]
Benzo(g,h,i)perylene [f]	191-24-2	100
Benzo(k)fluoranthene [f]	207-08-9	0.8 [c]
Chrysene [f]	218-01-9	1[c]
Dibenz(a,h)anthracene [f]	53-70-3	0.33 [b]
Fluoranthene [f]	206-44-0	100 [a]
Fluorene	86-73-7	30
Indeno(1,2,3-cd)pyrene [f]	193-39-5	0.5 [c]
m-Cresol [f]	108-39-4	0.33 [b]
Naphthalene [f]	91-20-3	12
o-Cresol [f]	95-48-7	0.33 [b]

Table 375-6.8(a):Unrestricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Unrestricted Use
p-Cresol [f]	106-44-5	0.33 [b]
Pentachlorophenol	87-86-5	0.8 [b]
Phenanthrene [f]	85-01-8	100
Phenol	108-95-2	0.33 [b]
Pyrene [f]	129-00-0	100
Volatile organic compounds		
1,1,1-Trichloroethane [f]	71-55-6	0.68
1,1-Dichloroethane [f]	75-34-3	0.27
1,1-Dichloroethene [f]	75-35-4	0.33
1,2-Dichlorobenzene [f]	95-50-1	1.1
1,2-Dichloroethane	107-06-2	0.02 [c]
cis -1,2-Dichloroethene [f]	156-59-2	0.25
trans-1,2-Dichloroethene [f]	156-60-5	0.19
1,3-Dichlorobenzene [f]	541-73-1	2.4
1,4-Dichlorobenzene	106-46-7	1.8
1,4-Dioxane	123-91-1	0.1 [b]
Acetone	67-64-1	0.05
Benzene	71-43-2	0.06
n-Butylbenzene [f]	104-51-8	12
Carbon tetrachloride [f]	56-23-5	0.76
Chlorobenzene	108-90-7	1.1
Chloroform	67-66-3	0.37
Ethylbenzene [f]	100-41-4	1
Hexachlorobenzene [f]	118-74-1	0.33[b]
Methyl ethyl ketone	78-93-3	0.12
Methyl tert-butyl ether [f]	1634-04-4	0.93
Methylene chloride	75-09-2	0.05

Table 375-6.8(a):Unrestricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Unrestricted Use
n - Propylbenzene [f]	103-65-1	3.9
sec-Butylbenzene [f]	135-98-8	11
tert-Butylbenzene [f]	98-06-6	5.9
Tetrachloroethene	127-18-4	1.3
Toluene	108-88-3	0.7
Trichloroethene	79-01-6	0.47
1,2,4-Trimethylbenzene [f]	95-63-6	3.6
1,3,5-Trimethylbenzene[f]	108-67-8	8.4
Vinyl chloride[f]	75-01-4	0.02
Xylene (mixed)	1330-20-7	0.26

All soil cleanup objectives (SCOs) are in parts per million (ppm).

Footnotes

[a] The SCOs for unrestricted use were capped at a maximum value of 100 ppm. See Technical Support Document (TSD), section 9.3.

[b] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.

[c] For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.

[d] SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.

[e] The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

[f] Protection of ecological resources SCOs were not developed for contaminants identified in Table 375-6.8(b) with “NS”. Where such contaminants appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources SCO according to the TSD.

(b) Restricted use soil cleanup objectives.

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
Metals							
Arsenic	7440-38-2	16[f]	16[f]	16[f]	16[f]	13[f]	16[f]
Barium	7440-39-3	350[f]	400	400	10,000 [d]	433	820
Beryllium	7440-41-7	14	72	590	2,700	10	47
Cadmium	7440-43-9	2.5[f]	4.3	9.3	60	4	7.5
Chromium, hexavalent [h]	18540-29-9	22	110	400	800	1[e]	19
Chromium, trivalent [h]	16065-83-1	36	180	1,500	6,800	41	NS
Copper	7440-50-8	270	270	270	10,000 [d]	50	1,720
Total Cyanide [h]		27	27	27	10,000 [d]	NS	40
Lead	7439-92-1	400	400	1,000	3,900	63[f]	450
Manganese	7439-96-5	2,000[f]	2,000[f]	10,000 [d]	10,000 [d]	1600[f]	2,000[f]
Total Mercury		0.81[j]	0.81[j]	2.8[j]	5.7[j]	0.18[f]	0.73
Nickel	7440-02-0	140	310	310	10,000 [d]	30	130
Selenium	7782-49-2	36	180	1,500	6,800	3.9[f]	4[f]
Silver	7440-22-4	36	180	1,500	6,800	2	8.3
Zinc	7440-66-6	2200	10,000 [d]	10,000 [d]	10,000 [d]	109[f]	2,480
PCBs/Pesticides							
2,4,5-TP Acid (Silvex)	93-72-1	58	100[a]	500[b]	1,000[c]	NS	3.8
4,4’-DDE	72-55-9	1.8	8.9	62	120	0.0033 [e]	17
4,4’-DDT	50-29-3	1.7	7.9	47	94	0.0033 [e]	136
4,4’- DDD	72-54-8	2.6	13	92	180	0.0033 [e]	14
Aldrin	309-00-2	0.019	0.097	0.68	1.4	0.14	0.19
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8	0.04[g]	0.02
beta-BHC	319-85-7	0.072	0.36	3	14	0.6	0.09
Chlordane (alpha)	5103-71-9	0.91	4.2	24	47	1.3	2.9

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
delta-BHC	319-86-8	100[a]	100[a]	500[b]	1,000[c]	0.04[g]	0.25
Dibenzofuran	132-64-9	14	59	350	1,000[c]	NS	210
Dieldrin	60-57-1	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	959-98-8	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan II	33213-65-9	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan sulfate	1031-07-8	4.8[i]	24[i]	200[i]	920[i]	NS	1,000[c]
Endrin	72-20-8	2.2	11	89	410	0.014	0.06
Heptachlor	76-44-8	0.42	2.1	15	29	0.14	0.38
Lindane	58-89-9	0.28	1.3	9.2	23	6	0.1
Polychlorinated biphenyls	1336-36-3	1	1	1	25	1	3.2
Semivolatiles							
Acenaphthene	83-32-9	100[a]	100[a]	500[b]	1,000[c]	20	98
Acenapthylene	208-96-8	100[a]	100[a]	500[b]	1,000[c]	NS	107
Anthracene	120-12-7	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benz(a)anthracene	56-55-3	1[f]	1[f]	5.6	11	NS	1[f]
Benzo(a)pyrene	50-32-8	1[f]	1[f]	1[f]	1.1	2.6	22
Benzo(b)fluoranthene	205-99-2	1[f]	1[f]	5.6	11	NS	1.7
Benzo(g,h,i)perylene	191-24-2	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benzo(k)fluoranthene	207-08-9	1	3.9	56	110	NS	1.7
Chrysene	218-01-9	1[f]	3.9	56	110	NS	1[f]
Dibenz(a,h)anthracene	53-70-3	0.33[e]	0.33[e]	0.56	1.1	NS	1,000[c]
Fluoranthene	206-44-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Fluorene	86-73-7	100[a]	100[a]	500[b]	1,000[c]	30	386
Indeno(1,2,3-cd)pyrene	193-39-5	0.5[f]	0.5[f]	5.6	11	NS	8.2
m-Cresol	108-39-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
Naphthalene	91-20-3	100[a]	100[a]	500[b]	1,000[c]	NS	12

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
o-Cresol	95-48-7	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
p-Cresol	106-44-5	34	100[a]	500[b]	1,000[c]	NS	0.33[e]
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55	0.8[e]	0.8[e]
Phenanthrene	85-01-8	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Phenol	108-95-2	100[a]	100[a]	500[b]	1,000[c]	30	0.33[e]
Pyrene	129-00-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Volatiles							
1,1,1-Trichloroethane	71-55-6	100[a]	100[a]	500[b]	1,000[c]	NS	0.68
1,1-Dichloroethane	75-34-3	19	26	240	480	NS	0.27
1,1-Dichloroethene	75-35-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33
1,2-Dichlorobenzene	95-50-1	100[a]	100[a]	500[b]	1,000[c]	NS	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60	10	0.02[f]
cis-1,2-Dichloroethene	156-59-2	59	100[a]	500[b]	1,000[c]	NS	0.25
trans-1,2-Dichloroethene	156-60-5	100[a]	100[a]	500[b]	1,000[c]	NS	0.19
1,3-Dichlorobenzene	541-73-1	17	49	280	560	NS	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250	20	1.8
1,4-Dioxane	123-91-1	9.8	13	130	250	0.1[e]	0.1[e]
Acetone	67-64-1	100[a]	100[b]	500[b]	1,000[c]	2.2	0.05
Benzene	71-43-2	2.9	4.8	44	89	70	0.06
Butylbenzene	104-51-8	100[a]	100[a]	500[b]	1,000[c]	NS	12
Carbon tetrachloride	56-23-5	1.4	2.4	22	44	NS	0.76
Chlorobenzene	108-90-7	100[a]	100[a]	500[b]	1,000[c]	40	1.1
Chloroform	67-66-3	10	49	350	700	12	0.37
Ethylbenzene	100-41-4	30	41	390	780	NS	1
Hexachlorobenzene	118-74-1	0.33[e]	1.2	6	12	NS	3.2
Methyl ethyl ketone	78-93-3	100[a]	100[a]	500[b]	1,000[c]	100[a]	0.12

Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
Methyl tert-butyl ether	1634-04-4	62	100[a]	500[b]	1,000[c]	NS	0.93
Methylene chloride	75-09-2	51	100[a]	500[b]	1,000[c]	12	0.05
n-Propylbenzene	103-65-1	100[a]	100[a]	500[b]	1,000[c]	NS	3.9
sec-Butylbenzene	135-98-8	100[a]	100[a]	500[b]	1,000[c]	NS	11
tert-Butylbenzene	98-06-6	100[a]	100[a]	500[b]	1,000[c]	NS	5.9
Tetrachloroethene	127-18-4	5.5	19	150	300	2	1.3
Toluene	108-88-3	100[a]	100[a]	500[b]	1,000[c]	36	0.7
Trichloroethene	79-01-6	10	21	200	400	2	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380	NS	3.6
1,3,5- Trimethylbenzene	108-67-8	47	52	190	380	NS	8.4
Vinyl chloride	75-01-4	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	1330-20-7	100[a]	100[a]	500[b]	1,000[c]	0.26	1.6

All soil cleanup objectives (SCOs) are in parts per million (ppm).
NS=Not specified. See Technical Support Document (TSD).

Footnotes

[a] The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

[b] The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

[c] The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

[d] The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

[e] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.

[f] For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for this use of the site.

[g] This SCO is derived from data on mixed isomers of BHC.

[h] The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

[i] This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.

[j] This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts). See TSD Table 5.6-1.

375-6.9 Development or modification of soil cleanup objectives.

(a) Applicability. This section identifies when and the procedures under which a contaminant-specific soil cleanup objective may be developed or modified.

(1) Soil cleanup objectives for contaminants not included in Tables 375-6.8(a) and (b) may be developed by the remedial party or required by the Department.

(2) Soil cleanup objectives for contaminants included in Tables 375-6.8(a) and (b), may be modified based on site-specific data if desired by the remedial party; as set forth in:

(i) subpart 375-3 for Tracks 3 or 4, as set forth in paragraphs 375-3.8(e)(3) or (4), respectively; or

(ii) subparts 375-2 and 375-4, as set forth in subparagraph 375-2.8(b)(1)(iii) and subparagraph 375-4.8(c)(1)(iii).

(3) Protection of ecological resources soil cleanup objectives were not developed for certain contaminants, which are identified in Table 375-6.8(b) as "NS". Where such contaminants:

(i) appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources soil cleanup objective for the contaminant for use in Track 1 and apply such soil cleanup objective where it is lower than the soil cleanup objective set forth in Table 375-6.8(a); or

(ii) are identified as impacting or threatening an ecological resource for a restricted use remedial program the Department may require a protection of ecological resources soil cleanup objective be developed.

(b) New soil cleanup objectives must:

(1) Be developed utilizing the same methodologies that were used by the Department to develop the respective soil cleanup objective, as provided in the Technical Support Document.

(2) Apply the following caps, as set forth in section 9.3 of the Technical Support Document, on any soil cleanup objective included in Tables 375-6.8(a) and (b), with the exception of metals, as set forth in paragraph (3) below, developed for:

(i) unrestricted use, residential use, restricted-residential use and the protection of ecological resources, a maximum value of 100 ppm;

(ii) commercial use, a maximum value of 500 ppm; and

(iii) industrial use and the protection of groundwater a maximum value of 1000 ppm, and

(3) Apply a cap for metals at a maximum value of 10,000 ppm.

(c) Development of unrestricted use soil cleanup objectives. The unrestricted use soil cleanup objective for a compound will be the lowest of the soil cleanup values, calculated as set forth in appendix E of the Technical Support Document, for the protection of groundwater, protection of ecological resources and protection of public health.

(d) Development of restricted use soil cleanup objectives. The protection of:

(1) Groundwater soil cleanup objective will be the values calculated for the protection of groundwater as set forth in appendix E of the Technical Support Document;

(2) Ecological resources soil cleanup objectives will be the values calculated for the protection of ecological resources as set forth in appendix E of the Technical Support Document; and

(3) Public health cleanup objective will be the values calculated for the protection of public health for the identified use of the site, as set forth in appendix E of the Technical Support Document.

(e) Modification of soil cleanup objectives. The contaminant-specific soil cleanup objectives set forth at Tables 675-6.8(a) and (b)[1] may be modified by site specific data as set forth in this subdivision.

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[1] Original should read "Tables 375-6.8(a) and (b)"

(1) Contaminant-specific soil cleanup objectives modified in accordance with this subdivision may be utilized by the remedial party for a site remedial program undertaken pursuant to:

(i) subpart 375-3 in Tracks 3 or 4, as set forth in paragraphs 375-3.8(e)(3) or (4), respectively; or

(ii) subparts 375-2 and 375-4, as set forth in subparagraph 375-2.8(b)(1)(ii) and subparagraph 375-4.8(c)(1)(ii).

(2) For the calculation of a protection of groundwater or ecological resources contaminant -specific soil cleanup objective, the site-specific percentage of total organic carbon in the soil at the site may be substituted in the algorithms provided in appendix E of the Technical Support Document.

(3) For the calculation of a protection of public health contaminant-specific soil cleanup objective, site-specific data may be used to modify two of the five exposure pathways, as follows:

(i) for the particulate inhalation pathway six parameters rely on site-specific data; and

(ii) for the volatile inhalation pathway, four parameters rely on site-specific data.

(4) The algorithms to be used for each protection of public health pathway and details on the parameters which can be substituted are included in appendix E of the Technical Support Document.

(f) Use of soil cleanup objectives developed or modified. Once approved by the Department, contaminant-specific soil cleanup objectives developed or modified as set forth in this section may be utilized by the Department at other sites consistent with paragraphs (1) and (2) below.

(1) Contaminant-specific soil cleanup objectives developed for contaminants not included in Tables 375-6.8(a) and (b), as set forth in subdivision 375-6.9(b) above, will be used as guidance and shall be considered by the Department for inclusion in the Tables in this subpart during any subsequent reevaluation of the soil cleanup objectives, as set forth by ECL 27-1415.

(2) Contaminant-specific soil cleanup objectives modified for site specific parameters, as set forth in subdivision 375-6.9(e) above, may be utilized at sites manifesting similar parameters, if approved by the Department.

CP-51 / Soil Cleanup Guidance

New York State Department of Environmental Conservation

DEC Policy

Issuing Authority: Alexander B. Grannis, Commissioner	
Date Issued: October 21, 2010	**Latest Date Revised:**

I. Summary

This policy provides the framework and procedures for the selection of soil cleanup levels appropriate for each of the remedial programs in the New York State Department of Environmental Conservation (DEC) Division of Environmental Remediation (DER). This policy applies to the Inactive Hazardous Waste Disposal Site Remedial Program, known as the State Superfund Program (SSF); Brownfield Cleanup Program (BCP); Voluntary Cleanup Program (VCP); Environmental Restoration Program (ERP); Spill Response Program - Navigation Law (NL) section 176 (SRP); and the Resource Conservation and Recovery Act (RCRA) Corrective Action Program. It replaces *Technical and Administrative Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels* (January 24, 1994); the *Petroleum Site Inactivation and Closure Memorandum* (February 23, 1998); and Sections III and IV of *Spill Technology and Remediation Series (STARS) #1* (August 1992).

This document is used in conjunction with the applicable statutes, regulations and guidance. Site-specific soil cleanup levels, determined in accordance with this guidance, are only applied after:

- the site, or area of concern, is fully investigated to determine the nature and extent of contamination;
- all sources of contamination are addressed consistent with the hierarchy provided in 6 NYCRR 375-1.8(c) or consistent with the RCRA Corrective Action Program (as appropriate);
- groundwater, if contaminated, has been evaluated for appropriate remedial actions consistent with 6 NYCRR 375-1.8(d) or consistent with the RCRA Corrective Action Program (as appropriate); and
- impacts on adjacent residential properties, surface water, aquatic ecological resources are evaluated, as well as indoor air, soil vapor, vapor intrusion and other appropriate media.

II. Policy

It is DEC's policy, consistent with applicable statutes and regulations, that all remedies will be protective of public health and the environment. DEC's preference is that remedial programs, including the selection of soil cleanup levels, be designed such that the performance standard results in the implementation of a permanent remedy resulting in no future land use restrictions. However, some of

DEC's remedial programs are predicated on future site use. Further, it is not always feasible to return to a condition where no restrictions are required.

The procedures set forth herein are intended for the use and guidance of both DEC and remedial parties to provide a uniform and consistent process for the determination of soil cleanup levels. This guidance is not intended to create any substantive or procedural rights, enforceable by any party in administrative or judicial litigation with DEC. DEC reserves the right to act at variance with these procedures to address site-specific circumstances and to change the procedures in this guidance at any time.

Please note that this guidance focuses only on soil cleanup levels. All remedies must be fully protective of public health and the environment and must prevent further off-site migration to the extent feasible, with special emphasis on preventing or minimizing migration onto adjacent residential properties. A remedial party is required to evaluate and investigate, if necessary, all environmental media including soil, groundwater, surface water, sediments, soil vapor, ambient air, and biota. [See 6 NYCRR 375-1.8(a)(6) or RCRA Corrective Action Program (as appropriate)]. This investigation will determine if any of the referenced media are, or may be, impacted by site contamination. Applicable guidance should be consulted for media other than soil.

Nothing contained in this guidance, in itself, forms the basis for changes to previously selected remedies. However, a change in the site remedy may be considered consistent with *DER-2: Making Changes to Selected Remedies* (April 1, 2008). [See Section VI, Related References.] To the extent that a change to a selected remedy at a site in one of DER's remedial programs is necessary as provided in DER-2, as applicable, the Soil Cleanup Objectives (SCOs) may be considered in the evaluation of appropriate changes to the selected remedy. For sites in other programs, applicable regulations and guidance must be used.

III. Purpose and Background

DEC has a number of different remedial programs that were developed over time based on separate and distinct authorities. These programs use different procedures to determine the extent of soil cleanup necessary to satisfy the remedial program goals. The purpose of this document is to set forth how soil cleanup levels are selected for the different programs.

Legislation establishing New York State's Brownfield Cleanup Program (Article 27, Title 14 of the Environmental Conservation Law [ECL]) required DEC, in consultation with the New York State Department of Health (NYSDOH), to develop an approach for the remediation of contamination at brownfield sites. The resulting regulation includes seven sets of SCOs. Four sets provide for the protection of public health for different land uses (residential, restricted residential, commercial, and industrial); two sets provide for the protection of other resources (groundwater and ecological resources); and one set includes SCOs for protection of public health and the environment for all uses (unrestricted use).

With the promulgation of the SCOs, it is necessary to discuss how the SCOs, and soil cleanup levels generally, are arrived at for a specific site. Some key definitions in understanding how cleanup levels for soil are arrived at follow.

Feasible, which means suitable to site conditions, capable of being successfully carried out with available technology, implementable and cost effective [see 6 NYCRR 375-1.2(s)].

Presumptive remedy, which means a technology or technique where experience has shown the remedy to be a proven solution for specific types of sites and/or contaminant classes [See *DER-15: Presumptive/Proven Remedial Technologies* February 27, 2007. Refer to Section VI, Related References.]

Soil cleanup level, which means the concentration of a given contaminant for a specific site that must be achieved under a remedial program for soil. Depending on the regulatory program, a soil cleanup level may be based on the regulation [6 NYCRR 375-6.8(a) or (b)], modified from the regulatory value based on site-specific differences, or based on other information, including background levels or feasibility. Soil cleanup levels may include:

- SCOs promulgated at 6 NYCRR 375-6;
- Supplemental Soil Cleanup Objectives (SSCOs);
- a "totals" approach for a family of contaminants known as Polycyclic Aromatic Hydrocarbons (PAHs);
- Presumptive remedy for Polychlorinated Biphenyls (PCBs); and
- Nuisance Condition.

Soil Cleanup Objective (SCO), which means the chemical concentrations for soil cleanup of individual chemicals contained in 6 NYCRR 375-6.8(a) or (b). The SCOs were developed using the process outlined in the Technical Support Document (TSD). The SCOs and the SSCOs defined below are applicable statewide and do not account for many site-specific considerations which could potentially result in higher levels. Soil concentrations that are higher than the SCOs and SSCOs are not necessarily a health or environmental concern. When an SCO (or SSCO) is exceeded, the degree of public health or environmental concern depends on several factors, including the magnitude of the exceedance, the accuracy of the exposure estimates, other sources of exposure to the contaminant, and the strength and quality of the available toxicological information on the contaminant.

Supplemental Soil Cleanup Objective (SSCO), which means a) an existing soil cleanup level for a contaminant which had been included in former TAGM 4046 and was not included in 6 NYCRR 375-6; b) has been developed using the same process used for development of the SCOs; and c) new cleanup levels for soil developed by the remedial party following the approach detailed in Appendix E of the TSD. The TSD provides information relative to the development of cleanup objectives for soil that are not set forth in 6 NYCRR 375-6. Cleanup objectives that have been established at the direction of DEC or the election of remedial parties are included in Table 1.

Technical Support Document (TSD), which refers to the document dated December 2006 detailing the development of the SCOs that were promulgated in 6 NYCRR 375-6. It provides the technical background and provides a detailed discussion of the considerations for development of the SCOs for the different land uses and exposure pathways. The TSD is available on DEC's website [see Section VI, Related References].

The purpose of this guidance is NOT to focus on media other than soil. Accordingly, the remedial program may require remedial activities to address media other than soil (e.g., groundwater, surface water, sediment, and vapor). Applicable guidance should be consulted for media other than soil. This guidance is to be used in conjunction with the applicable statutes, regulations and guidance. Site-specific soil cleanup levels, determined in accordance with this guidance, are only applied after:

- the site, or area of concern, is fully investigated to determine the nature and extent of contamination;
- all sources of contamination are addressed consistent with the hierarchy provided in 6 NYCRR 375-1.8(c) or consistent with the RCRA Corrective Action Program (as appropriate);
- groundwater, if contaminated, has been evaluated for appropriate remedial actions consistent with 6 NYCRR 375-1.8(d) or consistent with the RCRA Corrective Action Program (as appropriate); and
- an evaluation of impacts on adjacent residential properties, surface water, aquatic ecological resources, as well as indoor air, soil vapor, vapor intrusion and other appropriate media.

IV. Responsibility

The responsibility for maintaining and updating this policy lies with DER. DEC staff are responsible for implementing this policy, with input (as applicable) from NYSDOH.

V. Procedures

A. General Approaches to the Selection of Soil Cleanup Levels

The determination of soil cleanup levels for a site is dependent on:

1. The regulatory program pursuant to which the site is being addressed;
2. Whether the groundwater beneath or down gradient of the site is, or may become contaminated with site-related contaminants;
3. Whether ecological resources constitute an important component of the environment at or adjacent to a site, and which are, or may be, impacted by site-related contaminants; and
4. Other impacted environmental media such as surface water, sediment, and soil vapor.

After fully evaluating the nature and extent of soil contamination associated with a site, the soil cleanup levels will be based on one, or a combination of, the following four approaches.

Approach 1: **Utilize the Unrestricted Use Soil Cleanup Objectives** [see 6 NYCRR Table 375-6.8(a)]. Under this approach, the soil cleanup levels will be established consistent with the SCOs set forth in 6 NYCRR Table 375-6.8(a). For contaminants of concern which are not included in the rule, DEC may direct development of a soil cleanup level which is protective of public health and the environment without restrictions following the procedure outlined in Appendix E of the TSD. Under this approach, the unrestricted SCOs are applied throughout the soil matrix to the top of bedrock (including the saturated zone).

Approach 2: **Utilize the Restricted Use Soil Cleanup Objectives** [see 6 NYCRR Table 375-6.8(b)]. Under this approach, soil cleanup levels will be established consistent with the SCOs set forth in 6 NYCRR Table 375-6.8(b) selecting the lowest SCO in the categories described in A through C below. Generally, after source removal, the soil cleanup levels do not need to be achieved to more than 15 feet below ground surface or to the top of bedrock, whichever is shallower.

A. Select the applicable land use category for the protection of public health (residential, restricted residential, commercial or industrial);

B. Determine if the SCOs for the protection of groundwater are applicable (see Section V.D); and

C. Determine if the SCOs for the protection of ecological resources are applicable (see Section V.C).

Approach 3: **Limited Site-Specific Modifications to Soil Cleanup Objectives.** This approach allows for consideration of site-specific information to modify the SCOs promulgated in 6 NYCRR Tables 375-6.8 (a) and (b) following the approach detailed in Appendix E of the TSD. The equations and basic methodology specified for calculating the 6 NYCRR 375-6.8 (a) and (b) values may not be modified under this approach. However, in instances where site-specific parameters were used in the calculation of the SCOs, site data different from the assumptions used to calculate the SCOs may be used to modify the soil cleanup levels for a specific site. These instances are very limited and occur only in certain pathways that are listed below.

- Protection of groundwater pathway
- Particulate inhalation pathway
- Volatile inhalation pathway
- Protection of ecological resources pathway

It should be noted that even if site-specific data modifies these pathways, it may not result in modifying the SCOs because the lowest value from all applicable pathways is used to determine each SCO. The inhalation pathway is very seldom the controlling pathway in the determination of the protection of public health. The specific parameters that can be modified are identified in Appendix E of the TSD (e.g., inhalation dispersion terms, fraction of organic carbon in soil, etc.).

The remedial party should consider the cost of collecting the data necessary to support a request to modify the SCOs with the potential for deriving a higher SCO that provides an appropriate level of protection. The remedial party may be required to submit additional data to support the use of modified SCOs. Once DEC approves one or more modified SCOs, they are applied in the manner described under Approach 2.

Approach 4: **Site-Specific Soil Cleanup Objectives.** Under this approach, the remedial party may propose site-specific cleanup levels or approaches for soil which are protective of public health and the environment based on other information. This approach sets forth a flexible framework to develop soil cleanup levels by allowing the remedial party to conduct a more detailed evaluation of site information in an effort to calculate protective soil cleanup levels or approaches unique to a site. Under this approach, the remedial party may propose a remedy that does not include specific soil cleanup levels (e.g., excavate the top 6 feet in an area extending 75 feet in all directions from boring B12); modify the input parameters used in the SCO calculations; use site data to improve or confirm predictions of exposures to receptors to contaminants of concern; analyze site-specific risks using risk assessments; use toxicological information available from alternate sources; or consider site background and historic fill. Data supporting these site-specific adjustments or use of alternate methodologies must also be provided to DEC for review and approval to ensure that the resulting soil cleanup levels are protective.

The Approach 4 framework leaves DEC with discretion to determine whether a different approach is appropriate for the site and, if a different approach is to be used, the proper method of implementation. The remedial party should consider the cost of collecting the data necessary to develop site-specific soil cleanup levels (or approaches) with the potential for deriving a soil cleanup level which is higher than a particular SCO and which provides an appropriate level of protection. The remedial party may also be required to submit additional data to support the use of methodologies in the calculation of site-specific soil cleanup levels or to support the proposed approach.

B. Application of Soil Cleanup Levels for the Specific Remedial Programs: Soil cleanup levels are determined on a site-specific basis depending on the program under which the site is being remediated. In some cases (e.g., BCP Track 1 or Track 2), the soil cleanup levels are the SCOs taken directly from 6 NYCRR 375-6. In other cases, soil cleanup levels may be derived from the Part 375 SCOs but modified based on other information. In yet other cases, the soil cleanup levels may have no relationship or connection to the SCOs, but rather be developed in accordance with DEC-approved methodologies or approaches.

1. <u>Inactive Hazardous Waste Disposal Site Remedial Program (State Superfund Program)</u>: The goal of the remedial program for a specific site is to restore that site to pre-disposal conditions, to the extent feasible. The unrestricted use SCOs are considered to be representative of pre-disposal conditions unless an impact to ecological resources has been identified (see 6 NYCRR 375-2.8(b)(2)). However, it must be recognized that achievement of this goal may not be feasible in every case. At a minimum, all remedies must be protective of public health and the environment. The following procedure is used to determine the most feasible remedy.

(a) The remedial party shall evaluate, and if feasible, implement a cleanup utilizing Approach 1 (application of unrestricted SCOs).

(b) Where DEC determines that achieving unrestricted SCOs is not feasible as documented in a feasibility study, the remedial party may evaluate alternatives to remediate the site to the greatest extent feasible (see *DER-10: Technical Guidance for Site Investigation and Remediation*, Chapter 4.3). [See Section VI, Related References.] In this event, the remedial party may propose soil cleanup levels in accordance with any of the general approaches. However, when considering restricted use soil cleanup levels, the remedial party should apply the least restrictive use category feasible. For purposes of this discussion, residential use is the least restrictive use and industrial use is the most restrictive category. This process starts with consideration of residential use, followed by restricted residential use, commercial use, and then industrial use. The evaluation proceeds through the different land uses until a feasible remedy is found. This evaluation is not bound to the SCOs in regulation or SSCOs set forth in this guidance but may result in a site-specific soil cleanup level that is between the SCOs or soil cleanup level for two different land uses (e.g., above the restricted residential SCO and below the commercial SCO).

2. Brownfield Cleanup Program The remedy shall be fully protective of public health and the environment, including, but not limited to, groundwater according to its classification pursuant to ECL 17-0301, drinking water, surface water, air (including indoor air), sensitive populations (including children), and ecological resources (including fish and wildlife). Soil cleanup levels corresponding to the cleanup track under which the site is being remediated are required to be met. The four cleanup tracks are:

> **Track 1**: Cleanups pursuant to this track must achieve unrestricted use of the site. This track requires that the remedial party implement a cleanup utilizing Approach 1. Institutional and engineering controls are allowed only for periods of less than five years (defined as short-term controls) except in the limited instance where a volunteer has conducted remedial activities resulting in a bulk reduction in groundwater contamination to asymptotic levels.
>
> **Track 2** : Cleanups pursuant to this track may consider the current, intended, or reasonably anticipated future use in determining the appropriate cleanup levels for soil. This track requires that the remedial party implement a cleanup that achieves the SCOs in the tables in 6 NYCRR 375-6.7(b) for the top 15 feet of soil (or bedrock if less than 15 feet). This track follows approach 2. Institutional and engineering controls are allowed for soil (for the top 15 feet of soil or bedrock if less than 15 feet) for less than five years (defined as short-term controls). Institutional and engineering controls which limit site use and the use of onsite groundwater can be used without regard to duration. Track 2 cleanups at restricted residential, commercial or industrial use sites require site management plans to ensure that material removed from the site (post remedial action) is managed appropriately and to ensure that any buffer zone protecting adjacent residential use sites or ecological resources is maintained.
>
> **Track 3**: Cleanups pursuant to this track may consider the current, intended, or reasonably anticipated use in determining the appropriate cleanup levels for soil. This track requires that the remedial party implement a cleanup utilizing Approach 3 for those SCOs which the remedial party seeks to modify an established SCO. Institutional and engineering controls are allowed for soil (for the top 15 feet of soil or bedrock if less than 15 feet) for less than 5 years (defined as short-term controls). Institutional and engineering controls which limit site use and the use of on-site groundwater can be used without regard to duration. Track 3 cleanups at restricted residential, commercial or industrial use sites require site management plans to ensure that material removed from the site (post remedial action)is managed appropriately and to ensure that any buffer zone protecting adjacent residential use sites or ecological resources is maintained.
>
> **Track 4**: Cleanups pursuant to this track may consider the current, intended, or reasonably anticipated use in determining the appropriate cleanup levels for soil. This track allows for the development of site-specific soil cleanup levels below the cover system in accordance with Approach 4. Track 4 remedies must address all sources as a component of the remedy. Short- and long-term institutional and engineering controls are allowed to achieve protection of public health and the environment. The remedy under Track 4 must provide a cover system over exposed residual soil contamination. Soils which are not otherwise covered by structures such as buildings, sidewalks or pavement (i.e., exposed surface soils) must be covered with soil that complies with the use-based SCOs in 6 NYCRR Table 375-6.8(b) levels for the top one foot (non-residential uses) or top two feet (restricted residential use).

3. Environmental Restoration Program: The goal of the program for a specific site is to select a remedy that is protective of public health and the environment, including, but not limited to, groundwater according to its classification pursuant to ECL 17-0301, drinking water, surface water and air (including indoor air), sensitive populations (including children) and ecological resources (including fish and wildlife). At a minimum, the remedy selected shall eliminate or mitigate all significant threats to public health and to the environment presented by contaminants disposed at the site through the proper application of scientific and engineering principles. Soil cleanup levels may be developed in accordance with Approaches 1 – 4 without restriction.

4. Voluntary Cleanup Program: The goal of the program for a specific site is to select a remedy that is protective of public health and the environment for the contemplated use. The soil cleanup levels may be developed in accordance with Approaches 1 – 4 without restriction.

5. Petroleum Spill Response Program: The goal of the Petroleum Spill Response Program is to achieve pre-spill conditions [6 NYCRR 611.6(a)(4)]. Remedial activities under this program shall be undertaken relative to the petroleum contamination that was released along with any co-mingled contamination from other sources. The remedial party shall achieve, to the extent feasible, the unrestricted SCOs for petroleum-related contaminants listed in 6 NYCRR Table 375-6.8(a). For petroleum contaminants not included in 6 NYCRR Table 375-6.8(a) (discussed in Section E below), the remedial party shall apply, to the extent feasible, the soil cleanup levels provided in Table 1. For ease of implementation, two lists of petroleum contaminants (Gasoline and Fuel Oil, Tables 2 and 3) are attached. The tables combine the applicable petroleum-related SCOs from 6 NYCRR 375-6.8(a) and the applicable petroleum related SSCOs from Table 1. Where DEC determines that it is not feasible to achieve the soil cleanup levels as set forth in this paragraph, the remedial party may propose soil cleanup levels in accordance with any of the general approaches. However, when considering restricted use soil cleanup levels, the remedial party should apply the least restrictive use category feasible.

For purposes of this discussion, residential use is the least restrictive use, and industrial use is the most restrictive category. This process starts with consideration of residential use, followed by restricted residential use, commercial use, and then industrial use. The evaluation proceeds through the different land uses until a feasible remedy is found. If the protection of groundwater or ecological SCOs apply, the lower of the applicable protection of the public health SCO or the applicable protection of groundwater or ecological SCO should be achieved to the extent feasible. This evaluation is not bound to the SCOs in regulation or the SSCOs set forth in this guidance but may result in a site-specific soil cleanup level that is between the SCOs or soil cleanup level for two different land uses (e.g., above the restricted residential SCO and below the commercial SCO).

6. RCRA Corrective Action Program: The RCRA program was promulgated to regulate facilities that actively manage hazardous waste. DER administers the RCRA Corrective Action Program, with a goal of achieving soil cleanup levels at Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) that eliminate risks to public health and the environment (i.e., clean the site to unrestricted use) or control said risks (i.e., clean the site or unit(s) to the lowest possible soil cleanup objective, regardless of site use), to the extent feasible. This goal takes into account that certain units at the facility may be permitted to manage hazardous waste under New York State's Hazardous Waste Management (HWM) regulations (6 NYCRR Part 373). The requirements of active HWM facilities, as well as the site's history, will be considered when soil cleanup levels are determined. Selected remedies must be protective of public health and the environment. Soil cleanup levels will be selected using the following procedure.

(a) The remedial party shall evaluate, and if feasible, implement a cleanup utilizing Approach 1. Under this approach, the unrestricted SCOs apply to the entire soil matrix to the top of bedrock. For contaminants not listed in 6 NYCRR 375-6, a new or existing SSCO may be used.

(b) If DEC determines that achieving unrestricted SCOs is not feasible, the remedial party may evaluate other alternatives to remediate the site. In this event, the remedial party may propose soil cleanup levels in accordance with any of the general approaches. However, when considering restricted use soil cleanup levels, the remedial party shall apply the use category which is both feasible and least restricted. For purposes of this discussion, residential use is the least restricted category and industrial use is the most restricted category. A soil cleanup level between two different land uses (e.g., residential and restricted residential) may be determined to be feasible, and if selected, must be achieved.

Any soil cleanup levels specified in regulation (i.e., 6 NYCRR 373-2.6(b)-(k) for "regulated units" as defined in 6 NYCRR 373-2.6 (a)(1)(ii)) or in a DEC enforceable document (Part 373 permits, Consent Orders, etc.) shall take precedence over the soil cleanup levels which could be established through use of this document.

C. Determination of Whether Ecological Resources SCOs Apply to a Site: SCOs developed to protect ecological resources (ESCOs) are incorporated in the Unrestricted Use SCO in 6 NYCRR Table 375-6.8(a) and are included as a separate category in 6 NYCRR Table 375-6.8(b). For contaminants of concern which do not have a calculated ESCO in regulation, DEC may direct the remedial party to develop a soil cleanup level which is protective of ecological resources where appropriate, based on the process outlined in Appendix E of the TSD.

The presence of ecological resources and any impact to those resources will be assessed during the remedial investigation. For sites where there is the potential for an ecological resource impact to be present, or where it is likely to be present, an assessment of fish and wildlife resource impacts will be performed. For sites in DER's SSF, BCP, VCP and ERP, the assessment will be performed in accordance with DEC's guidance, *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites*, October, 1994, as described in DER-10, Section 3.10. For sites in the RCRA Corrective Action Program, the assessment will be performed using the above referenced fish and wildlife impact analysis document as guidance, and by consulting with appropriate personnel in DEC's Division of Fish, Wildlife and Marine Resources.

Soil cleanup levels which are protective of ecological resources must be considered and applied, as appropriate, for the upland soils (not sediment) at sites where DEC determines, based on the foregoing analysis, that:

- ecological resources are present, or will be present, under the reasonably anticipated future use of the site, and such resources constitute an important component of the environment at, or adjacent to, the site;

- an impact or threat of impact to the ecological resource has been identified; and

- contaminant concentrations in soil exceed the ESCOs as set forth in 6 NYCRR 375-6.8(b) or the Protection of Ecological Resources SSCOs contained in this document.

Sites or portions thereof that will be covered by buildings, structures or pavement are not subject to the ESCOs. Further, ecological resources do not include pets, livestock, agricultural or horticultural crops, or landscaping in developed areas. (See 6 NYCRR 375-6.6 for more detail.)

D. Determination of Whether Protection of Groundwater SCOs Apply: SCOs developed to protect groundwater are incorporated in the Unrestricted Use SCOs in 6 NYCRR Table 375-6.8(a) and are included as a separate category in 6 NYCRR Table 375-6.8(b). For contaminants of concern which do not have a protection of groundwater SCO, DEC may direct the remedial party to develop a soil cleanup level which is protective of groundwater using the process in Appendix E of the TSD.

1. Except as provided for in (2) below, the protection of groundwater SCOs will be applicable where:

   (i) contamination has been identified in on-site soil by the remedial investigation; and
   (ii) groundwater standards are, or are threatened to be, contravened by the presence of soil contamination at concentrations above the protection of groundwater SCOs.

2. DEC may provide an exception to the applicability of the protection of groundwater SCOs, as set forth in 6 NYCRR 375-6.5(a)(1), when (i), (ii), and (iii) exist and either (iv) or (v) also apply, as described below.

   (i) The groundwater standard contravention is the result of an on-site source which is addressed by the remedial program.
   (ii) An environmental easement or other institutional control will be put in place which provides for a groundwater use restriction.
   (iii) DEC determines that contaminated groundwater at the site:
      (a) is not migrating, nor is likely to migrate, off-site; or
      (b) is migrating, or is likely to migrate, off-site; however, the remedy includes active groundwater management to address off-site migration.
   (iv) DEC determines the groundwater quality will improve over time.
   (v) The groundwater contamination migrating from the site is the result of an off-site source of contamination, and site contaminants are not contributing consequential amounts to the groundwater contamination.

3. In determining whether to provide the exemption set forth in subparagraph 2 above, DEC will consider:

   (i) all of the remedy selection criteria at 6 NYCRR 375-1.8(h) or in the RCRA Corrective Action program;
   (ii) the amount of time that the groundwater will need to be actively managed for the protection of public health and the environment; and
   (iii) the potential impact that groundwater contamination may have on media not specifically addressed by the SCOs (e.g., vapor intrusion, protection of surface water, and protection of aquatic ecological resources).

E. Supplemental Soil Cleanup Objectives: SSCOs are either existing cleanup levels in Table 1 or are new soil cleanup levels developed by the remedial party as part of its remedial program. These SSCOs are in addition to the SCOs that are included in Part 375.

Existing SSCOs: The Table 1 list of SSCOs includes contaminants from former TAGM 4046 that were not included in 6 NYCRR 375-6.8 and soil cleanup levels developed using the process detailed in Appendix E of the TSD but not promulgated. For those contaminants which were part of the former TAGM 4046, soil cleanup levels exist for the protection of public health (based on ingestion) and for the protection of groundwater. In some cases, to be determined on a site-by-site basis, evaluation of other factors is likely needed for the protection of public health, especially when the use of a site includes residential use.

These other factors include other exposure pathways (e.g., homegrown vegetable ingestion, inhalation and dermal contact), potential non-site exposures to the contaminant and current toxicological data on the contaminant. In these instances, DEC (in consultation with NYSDOH) will determine if the additional factors have been adequately addressed. The SSCOs identified in Table 1 (subject to the limitation described above) may be used as if they were included in Part 375. A remedial party is not required to use the SSCOs set forth in Table 1. In lieu of applying an SSCO, the remedial party may elect to develop a soil cleanup level (using the process described in Appendix E of the TSD and discussed below.) Table 1 also includes SSCOs that were developed for some pathways using the same process detailed in the TSD. A remedial party may elect to use those SSCOs directly or confirm that the calculated value for that pathway is correct.

New SSCOs: The remedial party may elect to, or DEC may direct a remedial party to, develop a contaminant-specific SCO for any contaminant not included in 6 NYCRR Tables 375-6.8(a) or (b). Generally, DEC will request that an SCO be developed only where the contaminant is a predominant contaminant of concern (COC) at the site and is not otherwise being addressed to DEC’s satisfaction as part of the proposed remedy. This could happen, for example, when a remedial party is seeking a Track 1 cleanup and non-SCO/SSCO contaminants are present and may not be satisfactorily addressed by the remedial activities addressing the SCOs or SSCOs. Guidance on the process for developing new SCOs is provided in Appendix E of the TSD. DEC will include all newly developed soil cleanup levels, developed and approved pursuant to this paragraph in a revised Table 1. The developed SSCO must:

1. be developed utilizing the same methodologies that were used by DEC to develop SCOs that are set forth in Part 375; and

2. apply the maximum acceptable soil concentrations (caps), as set forth in section 9.3 of the TSD.

F. Use of SCOs and SSCOs as a Screening Tool: The SCOs and SSCOs may be used to identify areas of soil contamination and to determine the extent of soil contamination. As noted in Section V.K, consideration of other media is required to determine if remedial action is needed.

1. At sites or areas of concern where contaminant concentrations are equal to or below the unrestricted SCOs in 6 NYCRR Table 375-6.8(a), no action or study is warranted because of soil contamination.

2. The exceedance of one or more applicable SCOs or SSCOs, (which is the lower of protection of public health, protection of groundwater, or protection of ecological resources soil cleanup objectives as described in Section III below), alone does not trigger the need for remedial action, define "unacceptable" levels of contaminants in soil, or indicates that a site qualifies for any DEC remedial program (e.g., BCP, SSF). As noted in the definition of SCO above, SCOs and SSCOs are applicable statewide and do not account for many site-specific considerations which could potentially result in higher levels. Therefore, soil concentrations that are higher than the applicable SCOs or SSCOs are not necessarily health or environmental concerns.

3. When an applicable SCO or SSCO is exceeded, the degree of public health or environmental concern depends on several factors, including:

   - magnitude of the exceedance;
   - accuracy of the exposure estimates;
   - other sources of exposure to the contaminant; and
   - strength and quality of the available toxicological information on the contaminant.

G. Soil Cleanup Levels for Nuisance Conditions: Experience has shown that contaminants in soil that meets the DEC-approved soil cleanup levels can exhibit a distinct odor or other type of nuisance (e.g., staining). This is true even though the contaminants will not leach from the soil (e.g., certain soils with more insoluble substances at higher concentrations). When DEC determines that soil remaining after the remedial action will result in the continuation of a nuisance (e.g., odors, staining, etc), DEC will require that additional remedial measures be evaluated, and may require additional remedial actions be taken to address the nuisance condition.

H. Subsurface Soil Cleanup for Total Polycyclic Aromatic Hydrocarbons: For non-residential use sites (i.e., commercial or industrial use sites) where the ESCOs are not applicable, DEC may approve a remedial program which achieves a soil cleanup level of 500 parts per million (ppm) for total PAHs for all subsurface soil. The 500 ppm soil cleanup level is in lieu of achieving all of the PAH-specific SCOs in 6 NYCRR 375-6. For purposes of this provision, subsurface soil shall mean the soil beneath permanent structures, pavement, or similar cover systems; or at least one foot of soil cover (which must meet the applicable SCOs). Institutional controls (e.g., an environmental easement) along with a site management plan will be required when this soil cleanup level is employed at a site. This cleanup level is determined to be feasible and protective based on DEC's experience in its various remedial programs. This approach has existed in TAGM 4046 since it was first issued in 1992.

I. Soil Cleanup for PCBs: DEC may approve a remedial program which achieves a soil cleanup level for PCBs as set forth herein:

1. **For Non-BCP sites:** An acceptable presumptive remedy for soil where neither the unrestricted SCOs nor the ESCOs are applied in the remedial program may include a soil cleanup level for PCBs of 1 ppm in the surface soils and 10 ppm in subsurface soils.

2. **For BCP sites:** An acceptable presumptive remedy for soil may include a soil cleanup level for PCBs of 1 ppm (the applicable SCO) in the surface soils and 10 ppm in subsurface in limited circumstances as follows:

- cleanup track is Track 4;
- site use will be restricted residential, commercial or industrial; and
- ESCOs do not apply.

3. **At industrial use sites,** a level of 25 ppm for PCBs provided that access is limited and individual occupancy is restricted to less than an average of 6.7 hours per week.

For purposes of this provision, subsurface soil shall mean:

- soil beneath permanent structures, pavement, or similar cover systems;
- soil beneath 1 foot of soil cover for commercial and industrial uses; or
- soil beneath 2 feet of soil cover for residential and restricted residential uses.

Institutional controls (i.e., an environmental easement), along with a site management plan, will be required when this soil cleanup level is employed at a site. As with all presumptive remedies, just because a remedy is presumptive does not mean that it will work at every site. For example, this presumptive remedy for PCBs in soil is not applicable at most landfills. This cleanup level is determined to be feasible and protective based on DEC's experience in its various remedial programs. Further, this approach has existed in TAGM 4046 since it was first issued in 1992.

J. Sampling and Compliance with Soil Cleanup Levels: The number of samples to determine if the SCOs have been achieved should be sufficient to be representative of the area being sampled. See attached Table 4 for suggested sampling frequency and subdivision 5.4(e) of DER-10 for details. This frequency can be used for confirmatory samples or for backfill. It is DEC's goal that all confirmatory samples demonstrate that the remedy has achieved the DEC-approved soil cleanup levels. However, recognizing the heterogeneity of contaminated sites and the uncertainty of sampling and analysis, DEC project manager has limited discretion to determine that remediation is complete where some discrete samples do not meet the soil cleanup levels established for a site. See DER-10 for more information regarding the determination that remediation is complete.

K. Other Considerations: All remedies must be fully protective of public health and the environment and prevent off-site migration to the extent feasible with special emphasis for the prevention or minimization of migration onto adjacent residential properties or into ecological resources. A remedial party is required to investigate all environmental media including soil, groundwater, surface water, sediments, soil vapor, indoor air, and biota. (See 6 NYCRR 375-1.8(a)(6) or RCRA Corrective Action Program). This investigation will determine if any of the referenced media are, or may be, impacted by site contamination. However, the SCOs do not directly address these other media. DEC may require remedial actions to address such media and impacts, including but not limited to the application of lower soil cleanup levels or buffer zones where it determines, based on the investigation, that any of these media are, or may be, impacted by site contamination.

VI. Related References:

- ♦ Environmental Conservation Law, Article 27 Titles 3, 5, 9, 13 and 14.

- ♦ Article 12 of the Navigation Law, Section 178.

- 6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

- 6 NYCRR Subparts 373-1, 373-2 and 373-3, Requirements for Hazardous Waste Management Facilities. September 6, 2006.

- 6 NYCRR Part 611, Environmental Priorities and Procedures in Petroleum Cleanup and Removal. November 5, 1984 (amended).

- Development of Soil Cleanup Objectives: Technical Support Document. New York State Department of Environmental Conservation. December 14, 2006.

- Supplemental Guidance to RAGS: Calculating the Concentration Term. United States Environmental Protection Agency. Publication 9285.7-081. May 1992.

- New York State Guidelines for Urban Erosion and Sediment Control. 1997.

- Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites. New York State Department of Environmental Conservation. October 1994.

- Program Policy DER-2, *Making Changes to Selected Remedies*. New York State Department of Environmental Conservation. April 1, 2008.

- Program Policy DER-10, *Technical Guidance for Site Investigation and Remediation*. New York State Department of Environmental Conservation. May 3, 2010.

- Program Policy DER-15, *Presumptive/Proven Remedial Technologies*. New York State Department of Environmental Conservation. February 27, 2007.

TABLES

1 - Supplemental Soil Cleanup Objectives
2 - Soil Cleanup Levels for Gasoline Contaminated Soils
3 - Soil Cleanup Levels for Fuel Oil Contaminated Soils
4 - Recommended Number of Soil Samples for Soil Imported to or Exported From a Site

Table 1

Supplemental Soil Cleanup Objectives
(ppm)

Contaminant	CAS Number	Residential	Restricted Residential	Commercial	Industrial	Protection of Ecological Resources	Protection of Ground-water
METALS							
Aluminum	7429-90-5					10,000 [a,b]	
Antimony	7440–36-0					12[c]	
Boron	7440-42-8					0.5	
Calcium	7440-70-2					10,000 [a,b]	
Cobalt	7440-48-4	30				20	
Iron	7439-89-6	2,000					
Lithium	7439-93-2					2	
Molybdenum	7439-98-7					2	
Technetium	7440-26-8					0.2	
Thallium	7440-28-0					5 [c]	
Tin	7440-31-5					50	
Uranium	7440-61-1					5	
Vanadium	7440-62-2	100 [a]				39[b]	
PESTICIDES							
Biphenyl	92-52-4					60	
Chlordecone (Kepone)	143-50-0					0.06	
Dibenzofuran	132-64-9						6.2
2,4-D (2,4-Dichloro-phenoxyacetic acid)	94-75-7	100 [a]					0.5
Furan	110-00-9					600	
Gamma Chlordane	5103-74-2	0.54					14
Heptachlor Epoxide	1024-57-3	0.077					0.02
Methoxychlor	72-43-5	100 [a]				1.2	900

Contaminant	CAS Number	Residential	Restricted Residential	Commercial	Industrial	Protection of Ecological Resources	Protection of Ground-water
Parathion	56-38-2	100 [a]					1.2
2,4,5-T	93-76-5	100 [a]					1.9
2,3,7,8-TCDD	1746-01-6					0.000001	
2,3,7,8-TCDF	51207-31-9					0.000001	
SEMIVOLATILE ORGANIC COMPOUNDS							
Aniline	62-53-3	48	100[a]	500[a]	1000[a]		0.33[b]
Bis(2-ethylhexyl) phthalate	117-81-7	50				239	435
Benzoic Acid	65-85-0	100[a]					2.7
Butylbenzyl-phthalate	85-68-7	100 [a]					122
4-Chloroaniline	106-47-8	100 [a]					0.22
Chloroethane	75-00-3						1.9
2-Chlorophenol	95-57-8	100 [a]				0.8	
3-Chloroaniline	108-42-9					20	
3-Chlorophenol	108-43-0					7	
Di-n-butyl-phthalate	84-74-2	100 [a]				0.014	8.1
2,4-Dichlorophenol	120-83-2	100 [a]				20	0.40
3,4-Dichlorophenol	95-77-2					20	
Diethylphthalate	84-66-2	100 [a]				100	7.1
Di-*n*-hexyl-phthalate	84-75-3					0.91	
2,4-Dinitrophenol	51-28-5	100 [a]				20	0.2
Dimethylphthlate	131-11-3	100 [a]				200	27
Di-n-octylphthlate	117-84-0	100 [a]					120
1,2,3,6,7,8-HCDF	57117-44-9					0.00021	
Hexachloro-benzene	118-74-1	0.41					1.4
2,6-Dinitrotoluene	606-20-2	1.03					1.0
Isophorone	78-59-1	100 [a]					4.4

Contaminant	CAS Number	Residential	Restricted Residential	Commercial	Industrial	Protection of Ecological Resources	Protection of Ground-water
4-methyl-2-pentanone	108-10-1						1.0
2-methyl-naphthalene	91-57-6	0.41					36.4
2-Nitroaniline	88-74-4						0.4
3-Nitroaniline	99-09-2						0.5
Nitrobenzene	98-95-3	3.7	15	69	140	40	0.17[b]
2-Nitrophenol	88-75-5					7	0.3
4-Nitrophenol	100-02-7					7	0.1
Pentachloroaniline	527-20-8					100	
2,3,5,6-Tetrachloroaniline	3481-20-7					20	
2,3,4,5-Tetrachlorophenol	4901-51-3					20	
2,4,5-Trichloroaniline	636-30-6					20	
2,4,5-Trichlorophenol	95-95-4	100 [a]				4	0.1
2,4,6-Trichlorophenol	88-06-2					10	
VOLATILE ORGANIC COMPOUNDS							
2-Butanone	78-93-3	100 [a]					0.3
Carbon Disulfide	75-15-0	100 [a]					2.7
Chloroacetamide	79-07-2					2	
Dibromochloro-methane	124-48-1					10	
2,4-Dichloro aniline	554-00-7					100	
3,4-Dichloroaniline	95-76-1					20	
1,2-Dichloropropane	78-87-5					700	
1,3-Dichloropropane	142-28-9						0.3
2,6-Dinitrotoluene	606-20-2	1.03					0.17[b]
Ethylacetate	141-78-6					48	

Contaminant	CAS Number	Residential	Restricted Residential	Commercial	Industrial	Protection of Ecological Resources	Protection of Ground-water
4-methyl-2-pentanone	108-10-1						1.0
113 Freon (1,1,2- TFE)	76-13-1	100 [a]					6
isopropylbenzene	98-82-8	100 [a]					2.3
p-isopropyltoluene	99-87-6						10
Hexachlorocyclo-pentadiene	77-47-4					10	
Methanol	67-56-1					6.5	
N-nitrosodiphenyl-amine	86-30-6					20	
Pentachloro-benzene	608-93-5					20	
Pentachloronitro-benzene	82-68-8					10	
Styrene	100-42-5					300	
1,2,3,4-Tetrachlorobenzene	634-66-2					10	
1,1,2,2-Tetrachloroethane	79-34-5	35					0.6
1,1,2,2-Tetrachloroethylene	127-18-4					2	
1,2,3-Trichlorobenzene	87-61-6					20	
1,2,4-Trichlorobenzene	120-82-1					20	3.4
1,2,3-Trichloropropane	96-18-4	80					0.34

[a] SCOs for organic contaminants (volatile organic compounds, semivolatile organic compounds, and pesticides) are capped at 100 ppm for residential use, 500 ppm for commercial use, 1000 ppm for industrial use. SCOs for metals are capped at 10,000 ppm.

[b] Based on rural background study

[c] SCO limited by contract required quantitation limit.

Table 2

Soil Cleanup Levels for Gasoline Contaminated Soils

Contaminant	CAS Registry Number	Soil Cleanup Level (ppm)
Benzene	71-43-2	0.06
n-Butylbenzene	104-51-8	12.0
sec-Butylbenzene	135-98-8	11.0
Ethylbenzene	100-41-4	1.0
Isopropylbenzene	98-82-8	2.3
p-Isopropyltoluene	99-87-6	10.0
Methyl-Tert-Butyl-Ether	1634-04-4	0.93
Naphthalene	91-20-3	12.0
n-Propylbenzene	103-65-1	3.9
Tert-Butylbenzene	98-06-6	5.9
Toluene	108-88-3	0.7
1,2,4-Trimethylbenzene	95-63-6	3.6
1,3,5-Trimethylbenzene	108-67-8	8.4
Xylene (Mixed)	1330-20-7	0.26

Table 3

Soil Cleanup Levels for Fuel Oil Contaminated Soil

Contaminant	CAS Registry Number	Soil Cleanup Level (ppm)
Acenaphthene	83-32-9	20
Acenaphthylene	208-96-8	100
Anthracene	120-12-7	100
Benz(a)Anthracene	56-55-3	1.0
Dibenzo(a,h)Anthracene	53-70-3	0.33
Benzene	71-43-2	0.06
n-Butylbenzene	104-51-8	12.0
sec-Butylbenzene	135-98-8	11.0
Tert-Butylbenzene	98-06-6	5.9
Chrysene	218-01-9	1.0
Ethylbenzene	100-41-4	1.0
Fluoranthene	206-44-0	100
Benzo(b)Fluoranthene	205-99-2	1.0
Benzo(k)Fluoranthene	207-08-9	0.8
Fluorene	86-73-7	30
Isopropylbenzene	98-82-8	2.3
p-Isopropyltoluene	99-87-6	10.0
Naphthalene	91-20-3	12.0
n-Propylbenzene	103-65-1	3.9
Benzo(g,h,i)Perylene	191-24-2	100
Phenanthrene	85-01-8	100
Pyrene	129-00-0	100
Benzo(a)Pyrene	50-32-8	1.0
Indeno(1,2,3-cd)Pyrene	193-39-5	0.5
1,2,4-Trimethylbenzene	95-63-6	3.6
1,3,5-Trimethylbenzene	108-67-8	8.4
Toluene	108-88-3	0.7
Xylene (Mixed)	1330-20-7	0.26

Table 4

Recommended Number of Soil Samples for Soil Imported To or Exported From a Site

Contaminant	**VOCs[a]**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	Each composite sample for analysis is created from 3-5 discrete samples from representative locations in the fill.
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➢ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER.[b]		

[a] VOC samples cannot be composited. Discrete samples must be taken to maximize the representativeness of the results.

[b] For example, a 3,000 cubic yard soil pile to be sampled and analyzed for VOCs would require 11 discrete representative samples. The same pile to be sampled for SVOCs would require 4 composite samples with each composite sample consisting of 3-5 discrete samples.

Attachment D: Resumes

Daniel A. Bellucci, P.E.

27 Belcrest Road • West Hartford, CT 06107 • (845) 803-4347 • bellucciengineeringpllc@gmail.com

Education & Certifications

B.S. Environmental Engineering University of New Hampshire 2011
Professional Engineer (Environmental) MA, NY
40 Hour HAZWOPER Training Certification- 29 CFR 1910.120
Understanding the MCP Course – UMass Lowell (Spring 2019)
ASTM E 1527 Phase I Environmental Site Assessment (ESA) Training, 2012
National Groundwater Association - Certified Well Driller (CWD)
Dig Safe Certified Excavator in Safe Digging Practices, 2019-2024

Employment History

Environmental Engineer, P.E Bellucci Engineering, PLLC 2019 to Present

- Principal Engineer specializing in Brownfield Cleanup Program (BCP) site investigation, remediation and closure.

Environmental Engineer, P.E. EBI Consulting, Site Investigation and Remediation (SIR) Group, Burlington, MA (October 2012 to July 2019)

- Project Management including site investigation proposal preparation, management of junior field staff and client correspondence, project invoicing (fixed fee)
- Extensive field experience conducting hundreds of Phase II Subsurface Investigations throughout Eastern US
- Sub-slab depressurization system pilot testing, design, installation, system startup and ongoing operation, maintenance and sampling
- Field and project management experience associated with the following: soil, groundwater, soil vapor, and surface water sampling / monitoring, UST closure, monitoring well elevation surveys, monitoring well installation and abandonments, operation and maintenance of groundwater pump and treat systems; construction site air monitoring, soil management plans, site plan creation using AutoCAD
- Annual US Airforce base stormwater and wastewater sampling
- Broad spectrum of Real Estate Due Diligence projects including Phase I Environmental Site Assessments (ESAs), State File Reviews, Telecommunications ESAs, Environmental Protection Plans, Soil Management Plans, Release Abatement Measure Plans and Spill Prevention Control and Countermeasure Plans

Environmental Engineer HydroEnvironmental Solutions Inc., Somers, NY (November 2011 to October 2012)

- Oversight and project management of remediation projects including petroleum release sites, industrial redevelopment soil characterization and disposal, and construction dewatering discharge permitting
- Detailed field reporting, soil and water sampling and analysis of laboratory data
- Operator: Geoprobe^R Direct Push macro core sampling drill rig
- Invoice review, cost estimates, spill closure report compilation, review and output
- O&M of pumps, carbon filtration units, and oil/water separators
- Spill Prevention, Control and Countermeasure Plan compilation and review

Field Technician Tri-State Environmental Services Inc., Hawthorne, NY (September 2011 to November 2011)

- Hazardous materials handling, transportation, and disposal procedures

Owner/ Partner Core Down Drilling, LLC 2012 to Present

Related Educational Experience

- Senior Research Presentation on Microbial Degradation of PCB's in the Hudson River
- Advanced Water Treatment Facility Full Scale Team Design
- Membrane filtration design to optimize pathogen removal prior to disinfection, decreasing disinfection byproducts

Engineering & Business Software Experience

AutoCAD, Adobe, Win Log/ Strata Explorer, Sales Force/ Financial Force, Parcel, Microsoft

References furnished upon request

RICHARD HOOKER, PH.D.

GALLAGHER BASSETT | TECHNICAL SERVICES

CURRENT POSITION: MANAGER, ENVIRONMENTAL CONSULTING

PROFESSIONAL SUMMARY

Richard Hooker serves as Senior Project Manager for investigative and remedial projects including NYSDEC and OER Brownfields sites, Phase II investigations, and environmental management of construction projects. He also prepares and evaluates interdisciplinary, comprehensive environmental impact assessment reviews (NEPA, SEQR and CEQR) and has a particular expertise in noise issues. Mr. Hooker develops investigative and remedial work plans, health and safety plans, performs fieldwork, and prepares technical reports. He works with regulatory authorities and subcontractors including construction personnel, waste repositories and haulage contractors, laboratories and drillers. His responsibilities include: designing noise studies, investigating site histories, and document reviews, cost benefit analysis of remedial alternatives, overseeing excavations and in situ remediation, sampling, sample data evaluation, report preparation, and obtaining regulatory closure. He has extensive experience of sampling and sample collection protocols for soil, vapor, indoor air, sediment, and groundwater and has worked to remediate a wide range of environmental contaminants including petroleum, heavy metals, PCBs, and solvents.

Mr. Hooker holds a Ph.D. from the University of St. Andrews, St. Andrews, Scotland and a BA from Staffordshire University, Stoke-on-Trent, England. Prior to relocating to the Hudson Valley, he served as an Assistant Professor at the University of Glasgow, Scotland.

PROFESSIONAL EXPERIENCE

3475 Third Avenue, Bronx, NY—Investigated and remediated this former manufacturing facility to NYSDEC Brownfields to Track 1 cleanup standards. This site was the first project in the OER Jumpstart program established to assist cleanup on government supported affordable and supportive housing projects in NYC. Under this program OER sponsored enrollment in the NYS Brownfield Cleanup Program. Work on this trailblazing project required liaising with OER and NYSDEC Region 2 to ensure documentation met the requirements of both agencies. Certificate of Completion secured in 2016.

Former A.C. Dutton Lumber Yard, Dutchess County, NY—Documented hazardous concentrations of arsenic and chromium in soils and concrete surfaces at this NYSDEC Brownfields site contaminated by the historical pressure treatment of lumber. Developed a Workplan for site remediation and directed environmental restoration activities, including: characterization, excavation and removal of hazardous soils, scarification concrete warehouse floors, removal aboveground and underground chemical and petroleum storage tanks.

Crannell Square, Dutchess County, NY —oversaw the investigation and remediation of this Track 1 BCP site.

EDUCATION:

- Ph.D., University of St. Andrews, Scotland
- BA, Staffordshire University, England

SCOTT SPITZER

GALLAGHER BASSETT | TECHNICAL SERVICES

CURRENT POSITION: DIRECTOR OF ENVIRONMENTAL INVESTIGATIONS

PROFESSIONAL SUMMARY

Scott Spitzer serves as Director of Environmental Investigations, overseeing the technical elements of Phase I and Phase II technical environmental investigations and remedial projects, including Brownfield sites. Mr. Spitzer supervises all GBTS field staff and reviews all documents prepared by GBTS to ensure consistency and technical accuracy.

His responsibilities associated with the preparation of site assessments include: investigating site histories, conducting facility inspections, reviewing regulatory agency records, documenting facility compliance with relevant State and Federal regulations, and preparing reports. As project manager for complex technical environmental investigations (including sites currently on the NYSDEC Registry of Inactive Hazardous Waste Sites), Mr. Spitzer is involved with: coordinating subcontractors; overseeing fieldwork; designing and implementing material, soil, and water sampling plans, preparing technical reports and interfacing with regulatory agency personnel.

Mr. Spitzer has 15 years' experience in the preparation of Phase I, Phase II and Brownfields investigations and in the management of complex remediation projects. He is knowledgeable in both New York State and Federal environmental regulations and has an understanding of a broad range of remedial technologies. Mr. Spitzer studied environmental science at SUNY Purchase and holds a BS in Biology from SUNY at Stony Brook, Stony Brook, New York.

PROFESSIONAL EXPERIENCE

Former NuHart Plastics Manufacturing Site, Brooklyn, NY: GBTS conducted a complex remedial investigation of a NYSDEC Class 2 Inactive Hazardous Waste Disposal ("Superfund") site, where a plume of liquid phthalates and chlorinated solvents had impacted groundwater. Extensive sampling was conducted of both on- and off-site soil, soil vapor and groundwater, and phthalates were removed from recovery wells as an interim remedial measure. A Remedial Investigation Report was completed, allowing the site owner to move create a Remedial Design Document.

Sakmann Restaurant Corporation Site, Fort Montgomery, NY: Conducted Phase I Environmental Site Assessment and Phase II Subsurface Investigations for former filling station and automotive repair garage contaminated by solvent and waste-oil discharges to an on-site drywell. Designed and implemented a sampling plan for soils impacted by chlorinated hydrocarbons, petroleum, and metals. Created Work Plan (in coordination with the NYSDEC Voluntary Cleanup Program) for remediation of on-site contamination and long-term sampling of on-site groundwater monitoring wells.

EDUCATION:

- BS, Biology, SUNY at Stony Brook, NY

ERICK SALAZAR

GALLAGHER BASSETT | TECHNICAL SERVICES

CURRENT POSITION: ASSISTANT PROJECT MANAGER

PROFESSIONAL SUMMARY

Erick Salazar serves as Assistant Project Manager for environmental site assessments and Phase II technical environmental investigations. His responsibilities include: investigating site histories, conducting facility inspections, reviewing regulatory agency records, documenting facility compliance with relevant State and Federal regulations, and preparing reports. He assists with Phase II technical environmental investigations and fieldwork including implementation of community air monitoring plans (CAMP), collecting soil and water samples and tank removal oversight.

Mr. Salazar has experience in the implementation of CAMP monitoring, personal sampling for lead and dust of workers, coordinating pre-demolition C&D waste inventory as part of Sandy relief work on Staten Island, and providing oversight of site remedial activities on rural properties.

PROFESSIONAL EXPERIENCE

Mr. Salazar has experience in the implementation of CAMP monitoring, personal sampling for lead and dust of workers, coordinating pre-demolition C&D waste inventory as part of Sandy relief work on Staten Island, and providing oversight of site remedial activities on rural properties.
Mr. Salazar's experience with Health and Safety services include:

- Complete OSHA training and three years' experience of Sites handling regulated materials as well as hazardous and non-hazardous wastes.
- Preparation of Environmental Health & Safety Plan for (EHASP) for debris removal and soil sampling project in Ulster County, New York.
- Assistance in the preparation of EHASPs for NYSDEC sites in Dutchess and Westchester Counties.
- Implementation of CAMP at sites in Dutchess, Ulster, Bronx and Queens Counties, including preparation of status reports, preparation of incident reports, and communication with involved regulatory agencies.
- Collection/analysis of media samples (air, water and soil) per requirements of the EHASP and/or remedial work plans.

EDUCATION:

- BS, Biology, State University at New Paltz, NY

REGISTRATIONS / CERTIFICATIONS:

- OSHA, 40-hr Hazardous Waste Operations & Emergency Response Health & Safety Certification
- OSHA, 10-hr General Construction Industry Training & Certification

Attachment E: Laboratory Documents

PFAS Field Sampling Guidelines for Groundwater and Soil

For Waters: 2 x 125 mL Bottles per sample filled to the neck of the bottle

PLEASE READ THESE INSTRUCTIONS PRIOR TO CONDUCTING SAMPLING

Sampling for PFAS for determination using EPA 537m can be challenging due to the prevalence of these compounds in consumer products. The following guidelines reflect current knowledge and are recommended when conducting sampling.

Consider Sampling for PFAS First...

Sample containers for other methods may have PFAS present on their sampling containers which could cross-contaminate your sample(s). We are analyzing down to the low parts-per-trillion (ppt) range so cross-contamination prevention is an important consideration.

SAMPLING

All Sampling done with Nitrile Gloves, provided by YORK

SAMPLE CONTAINERS

All sample containers - PP ONLY (Target list of 21 PFAS) Caps are unlined and made of PP (no Teflon® lined caps) Bottles are Batch Certified to be Target PFAS-free (< Reporting Limit)

FIELD EQUIPMENT

-Must not contain Teflon® (aka PTFE) or LDPE materials

-All sampling materials must be made from stainless steel, HDPE, acetate, silicone, or polypropylene

-No waterproof field notebooks can be used

-No plastic clipboards, binders, or the like

-No adhesives (e.g.Post-It® Notes, Duct tape) can be used

-Sharpies and permanent markers not allowed; regular ball point pens are acceptable

-Aluminum foil must not be used

-Keep PFAS samples in separate cooler, away from sampling containers that may contain PFAS

-Coolers filled with regular ice only - Do not use chemical (blue) ice packs

EQUIPMENT DECON

-"PFAS-free" water (e.g. Poland Spring*)-on-site for decontamination

-Only Alconox and Liquinox can be used for decontamination

* *Poland Spring has been demonstrated to be PFAS -free when freshly opened*

FIELD SAMPLING CLOTHING CONSIDERATIONS

Do not use fabric softener on clothing to be worn in field

Do not used cosmetics, moisturizers, hand cream, or other related products the morning of sampling

Do not use sunscreen or insect repellants

No materials containing Tyvek®

All safety boots made from polyurethane and PVC

No clothing or boots containing Gore-Tex®

Wet weather gear made of polyurethane and PVC only

FOOD CONSIDERATIONS

No food or drink when PFAS Sampling with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area.

SAMPLE CONTAINER HANDLING

-For **AQUEOUS** Samples: Each sample set contains 2 x 125 mL containers. <u>Fill each container to the neck</u>

-For **SOILS**-1 x 250 mL container, FILL HALF WAY ONLY

-No preservative is necessary for this appliction at this time.

-Place closed, labeled Sample bottles into ZipLock bag.

-Dispose of Nitrile gloves in provided waste bag.

-Place in separate cooler from other samples, WET ICE only

-Follow instructions on next page for more detail.

-If you have a Quality Assurance Project Plan follow that guidance

PFAS -Recommended Field Sampling Guidelines

PLEASE READ INSTRUCTIONS ENTIRELY PRIOR TO SAMPLING EVENT

Sampler should wash hands before wearing nitrile gloves in order to limit contamination during sampling. Each sample set* requires a set of containers to comply with the method as indicated below. **Sample set is composed of samples collected from the same sample site and at the same time.* **A pair of Nitrile gloves is included with each sample Zip-lock bag/bottle set. One Field Blank set per day is provided.**

Note: PP is Polypropylene

Sample Containers	Bottle Type	Preservation
2 Sampling Containers - Empty- per sample-Waters **SOILS- 1 Container-fill only half way**	125 mL PP container-Waters 250 mL PP for Soils	None, Cool <6C
1 PP Bottle with PFAS-free Water for Field Blank	125 mL PP container	None, Cool <6C
1 Field Blank (FRB) - Empty-per sampling day	125 mL PP container	None, Cool <6C
2 - Empty PP bottles for MS/DUP when needed (Soils MS/DUP come from same Bottle)	125 mL PP container	None, Cool <6C

NOTE: Sampling containers for WATERS must be filled to the neck. **SOILS, fill bottle only 1/2 full**

FIELD BLANK and MS/DUP Bottles are labeled with NEON GREEN LABELS

Field blanks are required per sampling event day and the containers have been provided. Follow the instructions below.

Field Blank Instructions:

1. Locate the PFAS Field Blank bottle (empty, labeled) supplied The PFAS Field Blank Water container is pre-filled at YORK with PFAS-free water to transfer to the empty PFAS Field Blank bottle.
2. Locate the empty container labeled "Field Blank" with Neon green labels
3. Open both containers and proceed to transfer contents of the "PFAS FIELD BLANK WATER" container into the "PFAS FIELD BLANK" Bottle
4. Field Blanks to be analyzed must be listed on the Chain-of-Custody.
5. Both the empty Field Blank water container and the filled Field Blank container must be returned to YORK along with the samples taken.

Matrix Spike/ Matrix Dup Instructions: Note: Soil MS/MSD can be from the same container as the sample

1. Locate the PFAS MS and DUP bottles (empty, labeled-NEON GREEN) supplied -normally 1 set per 20 field samples
2. Transfer chosen Field MS /Dup as a normal sample and indicate sample ID on container and on Chain-of-Custody

Sampling Instructions: ALL SAMPLE BOTTLES HAVE NEON YELLOW LABELS

1. Do not overfill or rinse the container. Any sample(s) for Matrix Spike and Matrix Duplicates are treated similarly.
2. Close containers securely. Label legibly and place containers in ZipLoc® bags, and in a separate cooler (no other container types).
3. Ensure Chain-of-Custody and all sample labels contain required information. Place all samples in separate coolers (separate from other samples for different parameters). Place wet ice (bagged) on samples for return to YORK.
Samples should be kept at 4°C ±2. Samples must not exceed 10°C during first 48 hours after collection. **Hold time is 14 days.**

PFAS Target compounds and Reporting Limits

Analytical Method Information

Printed: 05/23/2023 9:34 am

PFAS, EPA 1633 Target List in Soil (EPA 1633 Draft 2)

Preservation: Cool 4°C

Container: 10_250mL Plastic Cool to 4° C **Amount Required:** 250 mL **Hold Time:** 28 days

					----Matrix Spike----		--Blank Spike / LCS--	
Analyte	**MDL**	**Reporting Limit**	**Surrogate %Rec**	**Duplicate RPD**	**%Rec**	**RPD**	**%Rec**	**RPD**
Perfluorobutanesulfonic acid (PFBS)	0.111	0.177 ug/kg		30	25-150	35	50-150	30
Perfluorohexanoic acid (PFHxA)	0.0530	0.200 ug/kg		30	25-150	35	50-150	30
Perfluoroheptanoic acid (PFHpA)	0.105	0.200 ug/kg		30	25-150	35	50-150	30
Perfluorohexanesulfonic acid (PFHxS)	0.179	0.183 ug/kg		30	25-150	35	50-150	30
Perfluorooctanoic acid (PFOA)	0.172	0.200 ug/kg		30	25-150	35	50-150	30
Perfluorooctanesulfonic acid (PFOS)	0.167	0.186 ug/kg		30	25-150	35	50-150	30
Perfluorononanoic acid (PFNA)	0.189	0.200 ug/kg		30	25-150	35	50-150	30
Perfluorodecanoic acid (PFDA)	0.191	0.200 ug/kg		30	25-150	35	50-150	30
Perfluoroundecanoic acid (PFUnA)	0.198	0.200 ug/kg		30	25-150	35	50-150	30
Perfluorododecanoic acid (PFDoA)	0.163	0.200 ug/kg		30	25-150	35	50-150	30
Perfluorotridecanoic acid (PFTrDA)	0.125	0.200 ug/kg		30	25-150	35	50-150	30
Perfluorotetradecanoic acid (PFTA)	0.103	0.200 ug/kg		30	25-150	35	50-150	30
N-MeFOSAA	0.148	0.200 ug/kg		30	25-150	35	50-150	30
N-EtFOSAA	0.194	0.200 ug/kg		30	25-150	35	50-150	30
Perfluoropentanoic acid (PFPeA)	0.109	0.400 ug/kg		30	25-150	35	50-150	30
Perfluoro-1-octanesulfonamide (FOSA)	0.146	0.200 ug/kg		30	25-150	35	50-150	30
Perfluoro-1-heptanesulfonic acid (PFHpS)	0.155	0.200 ug/kg		30	25-150	35	50-150	30
Perfluoro-1-decanesulfonic acid (PFDS)	0.191	0.193 ug/kg		30	25-150	35	50-150	30
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.595	0.760 ug/kg		30	25-150	35	50-150	30
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.755	0.768 ug/kg		30	25-150	35	50-150	30
Perfluoro-n-butanoic acid (PFBA)	0.109	0.800 ug/kg		30	25-150	35	50-150	30
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	0.139	0.356 ug/kg		30	25-150	30	50-150	30
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	0.193	0.400 ug/kg		30	25-150	30	50-150	30
Perfluoro-4-oxapentanoic acid (PFMPA)	0.0620	0.400 ug/kg		30	25-150	30	50-150	30
Perfluoro-5-oxahexanoic acid (PFMBA)	0.0960	0.400 ug/kg		30	25-150	30	50-150	30
Perfluoro-1-pentanesulfonate (PFPeS)	0.157	0.188 ug/kg		30	25-150	30	50-150	30
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	0.595	0.750 ug/kg		30	25-150	30	50-150	30
HFPO-DA (Gen-X)	0.608	0.800 ug/kg		30	25-150	30	50-150	30
11CL-PF3OUdS	0.311	0.756 ug/kg		30	25-150	30	50-150	30
9CL-PF3ONS	0.246	0.748 ug/kg		30	25-150	30	50-150	30
ADONA	0.174	0.756 ug/kg		30	25-150	30	50-150	30
Perfluorododecanesulfonic acid (PFDoS)	0.169	0.194 ug/kg		30	25-150	30	50-150	30
Perfluoro-1-nonanesulfonic acid (PFNS)	0.124	0.192 ug/kg		30	25-150	30	50-150	30
3-Perfluoropropyl propanoic acid (FPrPA)	0.634	1.00 ug/kg		30	25-150	30	50-150	30
3-Perfluoropentyl propanoic acid (FPePA)	2.10	5.00 ug/kg		30	25-150	30	50-150	30
3-Perfluoroheptyl propanoic acid (FHpPA)	1.50	5.00 ug/kg		30	25-150	30	50-150	30
N-MeFOSE	0.611	2.00 ug/kg		30	25-150	30	50-150	30
N-MeFOSA	0.180	0.200 ug/kg		30	25-150	30	50-150	30
N-EtFOSE	0.697	2.00 ug/kg		30	25-150	30	50-150	30
N-EtFOSA	0.198	0.200 ug/kg		30	25-150	30	50-150	30
Surr: M3PFBS			25-150					

PFAS, EPA 1633 Target List in Soil (EPA 1633 Draft 2) (Continued)

					----Matrix Spike----		--Blank Spike / LCS--	
Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	%Rec	RPD	%Rec	RPD
Surr: M5PFHxA			25-150					
Surr: M4PFHpA			25-150					
Surr: M3PFHxS			25-150					
Surr: Perfluoro-n-[13C8]octanoic acid (M8PFOA)			25-150					
Surr: M6PFDA			25-150					
Surr: M7PFUdA			25-150					
Surr: Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)			25-150					
Surr: M2PFTeDA			10-150					
Surr: Perfluoro-n-[13C4]butanoic acid (MPFBA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)			25-150					
Surr: Perfluoro-n-[13C5]pentanoic acid (M5PFPeA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)			10-150					
Surr: d3-N-MeFOSAA			25-150					
Surr: d5-N-EtFOSAA			25-150					
Surr: M2-6:2 FTS			25-200					
Surr: M2-8:2 FTS			25-200					
Surr: M9PFNA			25-150					
Surr: M2-4:2 FTS			25-150					
Surr: d-N-MeFOSA			25-150					
Surr: d-N-EtFOSA			25-150					
Surr: M3HFPO-DA			25-150					
Surr: d9-N-EtFOSE			25-150					
Surr: d7-N-MeFOSE			25-150					
M3PFBA								
MPFDA								
MPFHxA								
MPFHxS								
MPFNA								
MPFOA								
MPFOS								
Perfluoro-n-[13C9]nonanoic acid (M9PFNA)-EIS								
Perfluoro-n-[13C8]octanoic acid (M8PFOA)-EIS								
Perfluoro-n-[13C54]pentanoic acid (M5PFPeA)-EIS								
Perfluoro-n-[13C4]butanoic acid (MPFBA)-EIS								
Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)-EIS								
Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)-EIS								
Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)-EIS								
M7PFUdA-EIS								
M6PFDA-EIS								
M5PFHxA-EIS								
M4PFHpA-EIS								
M3PFHxS-EIS								
M3PFBS-EIS								
M3-HFPO-DA-EIS								
M2PFTeDA-EIS								

Analytical Method Information

(Continued)

PFAS, EPA 1633 Target List in Soil (EPA 1633 Draft 2) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
M2-8-2FTS-EIS								
M2-6-2FTS-EIS								
M2-4-2FTS-EIS								
d9-NEtFOSE-EIS								
d7-NMeFOSE-EIS								
d5-NEtFOSA-EIS								
d5-N-EtFOSAA-EIS								
d3-NMeFOSA-EIS								
d3-N-MeFOSAA-EIS								

Analytical Method Information

(Continued)

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PFAS, EPA 1633 Target List in Water (EPA 1633 Draft 2)

Preservation: Cool 4°C

Container: 10_250mL Plastic Cool to 4° C **Amount Required:** 250 mL **Hold Time:** 28 days

					----Matrix Spike----		--Blank Spike / LCS--	
Analyte	**MDL**	**Reporting Limit**	**Surrogate %Rec**	**Duplicate RPD**	**%Rec**	**RPD**	**%Rec**	**RPD**
Perfluorobutanesulfonic acid (PFBS)	0.470	1.77 ng/L		30	25-150	35	50-150	30
Perfluorohexanoic acid (PFHxA)	0.350	2.00 ng/L		30	25-150	35	50-150	30
Perfluoroheptanoic acid (PFHpA)	0.710	2.00 ng/L		30	25-150	35	50-150	30
Perfluorohexanesulfonic acid (PFHxS)	0.680	1.83 ng/L		30	25-150	35	50-150	30
Perfluorooctanoic acid (PFOA)	0.420	2.00 ng/L		30	25-150	35	50-150	30
Perfluorooctanesulfonic acid (PFOS)	0.820	1.86 ng/L		30	25-150	35	50-150	30
Perfluorononanoic acid (PFNA)	0.520	2.00 ng/L		30	25-150	35	50-150	30
Perfluorodecanoic acid (PFDA)	0.750	2.00 ng/L		30	25-150	35	50-150	30
Perfluoroundecanoic acid (PFUnA)	1.13	2.00 ng/L		30	25-150	35	50-150	30
Perfluorododecanoic acid (PFDoA)	0.880	2.00 ng/L		30	25-150	35	50-150	30
Perfluorotridecanoic acid (PFTrDA)	0.740	2.00 ng/L		30	25-150	35	50-150	30
Perfluorotetradecanoic acid (PFTA)	0.690	2.00 ng/L		30	25-150	35	50-150	30
N-MeFOSAA	0.790	2.00 ng/L		30	25-150	35	50-150	30
N-EtFOSAA	1.03	2.00 ng/L		30	25-150	35	50-150	30
Perfluoropentanoic acid (PFPeA)	0.230	4.00 ng/L		30	25-150	35	50-150	30
Perfluoro-1-octanesulfonamide (FOSA)	0.880	2.00 ng/L		30	25-150	35	50-150	30
Perfluoro-1-heptanesulfonic acid (PFHpS)	0.910	1.91 ng/L		30	25-150	35	50-150	30
Perfluoro-1-decanesulfonic acid (PFDS)	1.32	1.93 ng/L		30	25-150	35	50-150	30
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	1.06	7.60 ng/L		30	25-150	35	50-150	30
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	2.05	7.68 ng/L		30	25-150	35	50-150	30
Perfluoro-n-butanoic acid (PFBA)	0.330	8.00 ng/L		30	25-150	35	50-150	30
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	0.500	3.56 ng/L		30	25-150	30	50-150	30
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	2.14	4.00 ng/L		30	25-150	30	50-150	30
Perfluoro-4-oxapentanoic acid (PFMPA)	0.250	4.00 ng/L		30	25-150	30	50-150	30
Perfluoro-5-oxahexanoic acid (PFMBA)	0.370	4.00 ng/L		30	25-150	30	50-150	30
Perfluoro-1-pentanesulfonate (PFPeS)	0.760	1.88 ng/L		30	25-150	30	50-150	30
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	1.79	7.50 ng/L		30	25-150	30	50-150	30
HFPO-DA (Gen-X)	3.23	8.00 ng/L		30	25-150	30	50-150	30
11CL-PF3OUdS	1.38	7.56 ng/L		30	25-150	30	50-150	30
9CL-PF3ONS	0.700	7.48 ng/L		30	25-150	30	50-150	30
ADONA	0.530	7.56 ng/L		30	25-150	30	50-150	30
Perfluorododecanesulfonic acid (PFDoS)	0.930	1.94 ng/L		30	25-150	30	50-150	30
Perfluoro-1-nonanesulfonic acid (PFNS)	0.860	1.92 ng/L		30	25-150	30	50-150	30
3-Perfluoropropyl propanoic acid (FPrPA)	2.03	5.00 ng/L		30	25-150	30	50-150	30
3-Perfluoropentyl propanoic acid (FPePA)	7.33	25.0 ng/L		30	25-150	30	50-150	30
3-Perfluoroheptyl propanoic acid (FHpPA)	9.47	25.0 ng/L		30	25-150	30	50-150	30
N-MeFOSE	3.99	20.0 ng/L		30	25-150	30	50-150	30
N-MeFOSA	1.58	2.00 ng/L		30	25-150	30	50-150	30
N-EtFOSE	3.99	20.0 ng/L		30	25-150	30	50-150	30
N-EtFOSA	1.80	2.00 ng/L		30	25-150	30	50-150	30
Surr: M3PFBS			25-150					

Analytical Method Information

(Continued)

PFAS, EPA 1633 Target List in Water (EPA 1633 Draft 2) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Surr: M5PFHxA			25-150					
Surr: M4PFHpA			25-150					
Surr: M3PFHxS			25-150					
Surr: Perfluoro-n-[13C8]octanoic acid (M8PFOA)			25-150					
Surr: M6PFDA			25-150					
Surr: M7PFUdA			25-150					
Surr: Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)			25-150					
Surr: M2PFTeDA			10-150					
Surr: Perfluoro-n-[13C4]butanoic acid (MPFBA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)			25-150					
Surr: Perfluoro-n-[13C5]pentanoic acid (M5PFPeA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)			10-150					
Surr: d3-N-MeFOSAA			25-150					
Surr: d5-N-EtFOSAA			25-150					
Surr: M2-6:2 FTS			25-200					
Surr: M2-8:2 FTS			25-200					
Surr: M9PFNA			25-150					
Surr: M2-4:2 FTS			25-150					
Surr: d-N-MeFOSA			25-150					
Surr: d-N-EtFOSA			25-150					
Surr: M3HFPO-DA			25-150					
Surr: d9-N-EtFOSE			25-150					
Surr: d7-N-MeFOSE			25-150					
M3PFBA								
MPFDA								
MPFHxA								
MPFHxS								
MPFNA								
MPFOA								
MPFOS								
Perfluoro-n-[13C9]nonanoic acid (M9PFNA)-EIS								
Perfluoro-n-[13C8]octanoic acid (M8PFOA)-EIS								
Perfluoro-n-[13C54]pentanoic acid (M5PFPeA)-EIS								
Perfluoro-n-[13C4]butanoic acid (MPFBA)-EIS								
Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)-EIS								
Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)-EIS								
Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)-EIS								
M7PFUdA-EIS								
M6PFDA-EIS								
M5PFHxA-EIS								
M4PFHpA-EIS								
M3PFHxS-EIS								
M3PFBS-EIS								
M3-HFPO-DA-EIS								
M2PFTeDA-EIS								

Analytical Method Information

(Continued)

PFAS, EPA 1633 Target List in Water (EPA 1633 Draft 2) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
M2-8-2FTS-EIS								
M2-6-2FTS-EIS								
M2-4-2FTS-EIS								
d9-NEtFOSE-EIS								
d7-NMeFOSE-EIS								
d5-NEtFOSA-EIS								
d5-N-EtFOSAA-EIS								
d3-NMeFOSA-EIS								
d3-N-MeFOSAA-EIS								

Laboratory Standard Operating Procedure

Determination of PFAS in Aqueous and Solid matrices by Isotope Dilution Analysis by HPLC/MS-MS (EPA 1633 Draft 2)

Standard Operating Procedure

Determination of Target Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous and Solid matrices by Isotope Dilution Analysis by HPLC/MS-MS
According to EPA Method 1633 Draft 2

Approvals

Laboratory Director/QA Officer ____________________
Krys Trafalski

Vice President/Chief Scientific Officer ____________________
Robert Bradley

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Controlled Copy No. PFAS_LCMSMS1633, Rev 1.0-____

Issued to: NA

1. SCOPE AND APPLICATION

This method is used to identify and quantitate specific PFAS compounds in extracts of non-potable water and solid (soil/sediment) samples using HPLC/MS-MS (high pressure liquid chromatography/tandem mass spectrometry. Currently the compounds (40) that are measured by this methodology are listed in the Table 1.0 below.

Table 1.0-Target PFAS

Perfluoroalkyl carboxylic acids		
Perfluorobutanoic acid	PFBA	375-22-4
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorononanoic acid	PFNA	375-95-1
Perfluorodecanoic acid	PFDA	335-76-2
Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluorotetradecanoic acid	PFTeDA	376-06-7
Perfluoroalkyl sulfonic acids Acid Form		
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluoropentansulfonic acid	PFPeS	2706-91-4
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorononanesulfonic acid	PFNS	68259-12-1
Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Fluorotelomer sulfonic acids		
1*H*,1*H*, 2*H*, 2*H*-Perfluorohexane sulfonic acid	4:2FTS	757124-72-4
1*H*,1*H*, 2*H*, 2*H*-Perfluorooctane sulfonic acid	6:2FTS	27619-97-2
1*H*,1*H*, 2*H*, 2*H*-Perfluorodecane sulfonic acid	8:2FTS	39108-34-4
Perfluorooctane sulfonamides		
Perfluorooctanesulfonamide	PFOSA	754-91-6
N-methyl perfluorooctanesulfonamide	NMeFOSA	31506-32-8
N-ethyl perfluorooctanesulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids		
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols		
N-methyl perfluorooctanesulfonamidoethanol	NMeFOSE	24448-09-7
N-ethyl perfluorooctanesulfonamidoethanol	NEtFOSE	1691-99-2
Per- and Polyfluoroether carboxylic acids		
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
4,8-Dioxa-3*H*-perfluorononanoic acid	ADONA	919005-14-4
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
Ether sulfonic acids		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9
Perfluoro(2-ethoxyethane)sulfonic acid	PFEESA	113507-82-7
Fluorotelomer carboxylic acids		
3-Perfluoropropyl propanoic acid	3:3FTCA	356-02-5
2*H*,2*H*,3*H*,3*H*-Perfluorooctanoic acid	5:3FTCA	914637-49-3
3-Perfluoroheptyl propanoic acid	7:3FTCA	812-70-4

The estimated reporting limits (MRL) based upon the preparation/analysis parameters herein at the time of this revision are approximately 2.0-20.0 ng/L (ppt) for aqueous samples and 0.5-5.0 ug/kG for solids . The linear range for these PFAS can be extended by dilution. These MRLs are based upon a volume of 0.250L-0.500L extracted for aqueous samples and 2-5 g. for solids.

This method is “performance-based,” which means that modifications may be made without additional EPA review to improve performance (e.g., overcome interferences, or improve the sensitivity, accuracy, or precision of the results) *provided that* all performance criteria in this method are met. Requirements for establishing equivalency are in Section 9.1.2 and include 9.1.2.2c. For CWA uses, additional flexibility is described at 40 CFR 136.6. Changes in performance, sensitivity, selectivity, precision, recovery, etc., that result from modifications within the scope of 40 CFR Part 136.6, and Section 9.0 of this method must be documented, as well as how these modifications compare to the specifications in this method. Changes outside the scope of 40 CFR Part 136.6 and Section 9.0 of this method may require prior review or approval.

2. SUMMARY

Environmental samples are prepared and extracted using method-specific procedures. Sample extracts are subjected to cleanup procedures designed to remove interferences. Analyses of the sample extracts are conducted by LC-MS/MS in the multiple reaction monitoring (MRM) mode. Sample concentrations are determined by isotope dilution or extracted internal standard quantification (see Section 10.3) using isotopically labeled compounds added to the samples before extraction

2.1 Extraction

2.1.1 Aqueous samples are spiked with isotopically labeled standards, extracted using solid-phase extraction (SPE) cartridges and undergo cleanup using carbon before analysis.

2.1.2 Solid samples are spiked with isotopically labeled standards, extracted into basic methanol, and cleaned up by carbon and SPE cartridges before analysis.

2.2 Analysis

2.2.1 Extracts are then analyzed by HPLC-MS/MS in the MRM mode. Extracts contain Non-extracted Internal Standards (NIS) to monitor instrument performance and used for quantitative analysis.

2.2.2 Individual PFAS analytes are identified through peak analysis of the quantification and confirmation ions (Precursor and product ions) where applicable.

2.2.3 The concentration of each analyte is calculated using the isotope dilution technique. This approach corrects the target analytes for surrogate analog recoveries and these surrogates are essentially extracted internal standards (EIS). For QC purposes, the percent recoveries of the isotope dilution analogues are calculated using the integrated peak areas of isotope performance standards, which are added to the final extract and function as traditional internal standards (non-extracted internal standards), exclusively applied to the isotope dilution analogues.

3. DEFINITIONS

3.1 ANALYSIS BATCH – A set of samples that is analyzed on the same instrument during a 24-hour period, including no more than 20 Field Samples, that begins and ends with the analysis of the appropriate Continuing Calibration Check (CCC) standards. Additional CCCs may be required depending on the length of the analysis batch and/or the number of Field Samples.

3.2 CALIBRATION STANDARD (CAL) – A solution of the method analytes, isotope dilution analogues, and isotope performance standards (Internal standards) prepared from the Primary Dilution Standards and stock standards. The calibration standards are used to calibrate the instrument response with respect to analyte concentration.

3.3 CONTINUING CALIBRATION VERIFICATION (CCV) – A calibration standard containing the method analytes, internal standard(s) and surrogate(s). The CCV is analyzed periodically to verify the accuracy of the existing calibration for those analytes.

3.4 EXTRACTION BATCH – A set of up to 20 Field Samples (not including QC Samples) extracted together by the same person(s) during a work day using the same lot of SPE devices, solvents, surrogate, internal standard and fortifying solutions. Required QC samples include Method blank, and Matrix spike/duplicate pair.

3.5 FIELD DUPLICATES – Separate samples collected at the same time and sampling location, shipped and stored under identical conditions. Method precision, including the contribution from sample collection procedures, is estimated from the analysis of Field Duplicates. Field Duplicates are used to prepare matrix spike/matrix spike duplicate QC samples.

3.6 FIELD BLANK (FBLK) – An aliquot of reagent water that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FBLK is to determine if method analytes or other interferences are introduced into the sample from shipping, storage, and the field environment.

3.7 ISOTOPE DILUTION ANALOGUES - Isotopically labeled analogues of the method analytes that are added to the sample prior to extraction in a known amount. Note: Not all target PFAS currently have an isotopically labeled analogue. In these cases, an alternate isotopically labeled analogue is used as detailed in our SOP and in the reference method.

3.8 ISOTOPE DILUTION TECHNIQUE - An analytical technique for measuring analyte concentration using the ratio of the peak area of the native analyte to that of an isotopically labeled analogue, added to the original sample in a known amount and carried through the entire analytical procedure.

3.9 ISOTOPE PERFORMANCE STANDARDS (Internal Standards) - Quality control compounds that are added to all standard solutions and extracts in a known amount and used to measure the relative response of the isotopically labelled analogues that are components of the same solution. For this method, the isotope performance standards are three isotopically labeled analogues of the method analytes. The isotope performance standards are indicators of instrument performance and are used to calculate the recovery of the isotope dilution analogues through the extraction procedure. In this method, the isotope performance standards are not used in the calculation of the recovery of the native analytes.

3.10 METHOD BLANK – An aliquot of reagent water to which known quantities of the method analytes and isotope dilution analogues are added. The results of the MBLK verify method performance in the absence of sample matrix.

3.11 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) – Aliquots of field samples that have been fortified with a known concentration of target compounds, prior to sample preparation and extraction, and analyzed to measure the effect of matrix interferences. The use of MS/MSD samples is generally not required in isotope dilution methods because the labeled compounds added to every sample provide more performance data than spiking a single sample in each preparation batch.

3.12 LIMIT OF QUANTITATION (LOQ) – The smallest concentration that produces a quantitative result with known and recorded precision and bias. The LOQ shall be set at or above the concentration of the lowest initial calibration standard (the lowest calibration standard must fall within the linear range). Determined by matrix through the entire preparation and analysis process.

3.13 METHOD DETECTION LIMIT (MDL) – The minimum measured concentration of a substance that can be reported with 99% confidence that the measured analyte concentration is distinguishable from method blank results (40 CFR 136, Appendix B).

3.14 MINIMUM LEVEL OF QUANTITATION (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence. It may be equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed. Alternatively, the ML may be established by multiplying the MDL (pooled or unpooled, as appropriate) by 3.18 and rounding the result to the number nearest to 1, 2, or 5 x 10n, where n is zero or an integer (see 68 FR 11770).

3.15 PRECURSOR ION – For the purpose of this method, the precursor ion is the deprotonated molecule ([M-H]-) of the method analyte (with the exception of HFPO-DA, in which the precursor ion is formed by decarboxylation). In MS/MS, the precursor ion is mass selected and fragmented by collisionally activated dissociation to produce distinctive product ions of smaller *m/z*.

3.16 PRIMARY DILUTION STANDARD (PDS) SOLUTION – A solution containing the analytes prepared in the laboratory from stock standard solutions and diluted as needed to prepare calibration solutions and other needed analyte solutions.

3.17 PRODUCT ION – For the purpose of this method, a product ion is one of the fragment ions produced in MS/MS by collisionally activated dissociation of the precursor ion.

3.18 INITIAL CALIBRATION VERIFICATION (ICV) – A calibration standard prepared independently from the primary calibration solutions. For this method, the ICV is a repeat of the entire dilution scheme starting with the same stock materials (neat compounds or purchased stock solutions) used to prepare the primary calibration solutions. Independent sources and separate lots of the starting materials are not required, provided the laboratory has obtained the purest form of the starting materials commercially available. The purpose of the ICV is to verify the integrity of the primary calibration standards.

3.19 QUANTITATIVE STANDARD - A quantitative standard of assayed concentration and purity traceable to a Certificate of Analysis.

3.20 STOCK STANDARD SOLUTION - A concentrated solution containing one or more method analytes prepared in the laboratory using assayed reference materials or purchased from a reputable commercial source with a Certificate of Analysis.

3.21 TECHNICAL GRADE STANDARD – As defined for this method, a technical-grade standard includes a mixture of the branched and linear isomers of a method analyte. For the purposes of this method, technical-grade standards are used to identify retention times of branched and linear isomers of method analytes.

3.22 ANALYTE – A PFAS compound included in this method. The analytes are listed in Table 1.

3.23 CALIBRATION STANDARD (CS) – A solution prepared from a secondary standard and/or stock solutions and used to calibrate the response of the LC-MS/MS instrument.

3.24 CONTINUING CALIBRATION VERIFICATION (CCV) STANDARD – The mid-point calibration standard that is used to verify calibration.

3.25 CFR – Code of Federal Regulations

3.26 EXTRACTED INTERNAL STANDARD (EIS) QUANTIFICATION – The response of the target compound is compared to the response of the labeled analog of another compound in the same LOC.

3.27 INSTRUMENT SENSITIVITY CHECK – solution used to check the sensitivity of the instrument. The solution contains the native compounds at the concentration of the LOQ.

3.28 IPR – INITIAL PRECISION AND RECOVERY; four aliquots of a reference matrix spiked with the analytes of interest and labeled compounds and analyzed to establish the ability of the laboratory to generate acceptable precision and recovery. An IPR is performed prior to the first time this method is used and any time the method or instrumentation is modified

3.29 OPR - ONGOING PRECISION AND RECOVERY- – Ongoing precision and recovery standard (OPR); a method blank spiked with known quantities of analytes. The OPR is analyzed exactly like a sample. Its purpose is to assure that the results produced by the laboratory remain within the limits specified in this method for precision and recovery. Applies to OPR and LLOPR (low level OPR at **2x** the LOQ level).

3.30 SPE – SOLID PHASE EXTRACTION; a technique in which an analyte is extracted from an aqueous solution or a solid extract by passage over or through a material capable of reversibly adsorbing the analyte. Also termed liquid-solid extraction.

4. INTERFERENCES

LC-MS/MS data from blanks, samples, and spikes must be evaluated for interferences. If any interferences are present, take corrective action if necessary. Do not use aluminum foil because PFAAs can be potentially transferred from the aluminum foil to the glassware. Only aluminum foil rinsed with LC/MS grade methanol can be used where necessary.

4.1 PFAS have been used in a wide variety of manufacturing processes, and laboratory supplies should be considered potentially contaminated until they have been tested and shown to be otherwise. The materials and supplies used during the method validation process have been tested and shown to be clean. These items are listed in the Reagents section.

4.2 Method interferences may be caused by contaminants in solvents, reagents (including DI water), sample bottles and caps, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in the chromatograms. All items such as these must be routinely demonstrated to be free from interferences (less than 1/2 the Reporting Limit), under the conditions of the analysis by analyzing Method Blanks. Subtracting blank values from sample results is not permitted.

4.3 PTFE products can be a source of PFAS (PFOA) contamination. The use of PTFE in the procedure should be avoided. Polypropylene (PP) or polyethylene (PE, HDPE) products may be used in place of PTFE products to minimize PFOA contamination.

4.3.1 Standards and samples are injected from polypropylene autosampler vials with polypropylene or polyolefin snap caps, once. Multiple injections may be performed on Primers when conditioning the instrument for analysis.

4.3.2 Random evaporation losses have been observed with the polypropylene caps causing high Internal Std. recovery after the vial was punctured and sample re-injected. For this reason, it is best to inject standards and samples once in the analytical sequence, then recap with polyolefin caps for storage.

4.3.2 Teflon-lined screw caps have detected PFAS at low concentrations. Repeated injection from the same teflon-lined screw cap have detected PFNA at increasing concentration as each repeated injection was performed, therefore, it is best to use polypropylene snap caps.

4.3.3 Aqueous samples should not come in contact with any glass containers or pipettes as PFAS analytes can potentially adsorb to glass surfaces. Standards dissolved in organic solvent may be purchased in glass ampoules. These standards in organic solvent are acceptable and subsequent transfers may be performed using glass syringes and pipets. Following extraction, the eluate must be collected in a polypropylene tube prior to concentration to dryness. Concentration to dryness in glass tubes may cause poor recovery.

4.4 LC/MS grade methanol must be used for all steps where methanol is used in this method. HPLC grade methanol has been demonstrated to be acceptable if tested prior to use.

4.5 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature of the sample.

4.5.1 Co-extracted Organic Material - Under normal LC conditions matrix effects due to co-extracted organic material enhanced the ionization of 4:2 FTS appreciably. Total organic carbon (TOC) is a good indicator of humic content of the sample.

4.5.2 Solid phase extraction cartridges may be a source of interferences. The analysis of field and laboratory reagent blanks can provide important information regarding the presence or absence of such interferences. SPE cartridges should be sealed while in storage to prevent ambient contamination of the SPE sorbent.

4.6 Contamination by carryover can occur whenever a high-concentration and low concentration samples are sequentially analyzed. To reduce carryover, the sample syringe in automatically rinsed with solvent between injections. These operations are programmed into the LC multi-sampler system.

4.7 Volumetric glassware and syringes are difficult to clean after being used for solutions containing high levels of PFOA. These items should be labeled for use only with similarly concentrated solutions or verified clean prior to re-use. To the extent possible, disposable labware is used.

4.8 Both branched and linear PFAS isomers can potentially be found in the environment. Linear and branched isomers are known to exist for PFOS, PFOA, PFHxS, and PFBS, based upon the scientific literature. We have also seen branched isomers for PFHpA, NMeFOSAA, NEtFOSAA and PFNA. If multiple isomers are present for one of these PFAS they likely are adjacent peaks that completely resolve or not, but usually with a deflection point resolved during peak integration. The later of these peaks matches the retention time of its labeled linear analog. In general, earlier peaks are the branched isomers and are not the result of peak splitting.

Currently, all these species are available as linear isomers. Some available branched and linear reference standards of the technical mixtures for these specific PFAS are used to ensure that all appropriate peaks are included during peak integration. These species currently include PFOA, PFHxS, NMeFOSAA, and NEtFOSAA. These branched isomers elute before the linear isomer and are integrated and reported as total for those species. Others are also included at this time such as those listed in section 7.3.4.

4.9 In an attempt to reduce PFOS bias, it is required that *m/z* 499>80 transition be used as the quantitation transition.

5. SAMPLE HANDLING

5.1 **Aqueous Samples** - samples are collected by our clients in 250 or 500ml HDPE bottles with unlined HDPE or polypropylene caps and filled to the neck. Each sample submitted should be submitted in triplicate-with one used for determination of Suspended solids and possible pre-screening. Sub-sampling should be avoided whenever possible. When historical data are available indicating high levels of PFAS, sub-sampling may be an advisable option.

5.2 **Soil Samples** – samples are collected in wide mouth 125 or 250 mL HDPE bottles with PP unlined caps.

5.3 SAMPLE SHIPMENT AND STORAGE/HOLDING TIMES – Maintain all aqueous samples protected from light at 0 - 6 ºC from the time of collection until shipped to the laboratory. Samples must be shipped as soon as practical with sufficient ice to maintain the sample temperature below 6 ºC during transport. Sample are to be received by the laboratory within 48 hours of collection. The laboratory must confirm that the sample temperature is 0 - 6 ºC upon receipt. Once received by the laboratory, the samples may be stored at ≤ -20 ºC, or at 0 - 6 ºC, until sample preparation. However, the allowable holding time for samples depends on the storage temperature, as described below:

5.3.1 Aqueous samples may be held in the laboratory for up to 90 days from collection, when stored at ≤ -20 ºC and protected from the light. When stored at 0 - 6 ºC and protected from the light, aqueous samples may be held for up to **28 days**, with the caveat that issues were observed with certain perfluorooctane sulfonamide ethanols and perfluorooctane sulfonamidoacetic acids after **7 days**. These issues are more likely to elevate the observed concentrations of other PFAS compounds via the transformation of these precursors if they are present in the sample.

5.3.2 Solid samples (soils and sediments) may be held for up to 90 days, if stored in the dark at either 0 - 6 ºC or ≤ -20 ºC, with the caveat that samples may need to be extracted as soon as possible if NFDHA is an important analyte.

5.4 **SAMPLE EXTRACT HOLDING TIMES** – Store sample extracts in the dark at less than 0 - 4 ºC until analyzed. If stored in the dark at less than 0 - 4 ºC, sample extracts may be stored for up to 90 days, with the caveat that issues were observed for some ether sulfonates after 28 days. These issues may elevate the observed concentrations of the ether sulfonates in the extract over time. Samples may need to be extracted as soon as possible if NFDHA is an important analyte.

6. APPARATUS AND MATERIALS (as listed or demonstrated equivalents)

6.1 250-500 mL polypropylene bottles with polypropylene caps. VWR Scientific or equivalent: Part no. 414004-125, 12 pk. Alternate: White PP unlined lid L238WH and 16oz. clarified PP single wall jar 70-400 neck, item J066-Containers and Packaging.com or equivalent.

6.2 Transport Tube: Virgin Polypropylene, White, Plastic, 10 mL Capacity, 16 mm OD, 93 mm Overall Lg, Self-Standing, 250 PK, Item 710Z420, Gamut.com (Grainger), with PP cap or equivalent.

6.3 Graduated cylinders, 50, 100, 250, 500 and 1000mL, Polypropylene, VWR Scientific or equivalent

6.4 Analytical Balance, 0.0001g., checked for accuracy each day of use with Class S weights, certified annually by an outside service

6.5 Extract concentrators: Organomation Model N-EVAP 112, 24 position concentrator with water batch control and nitrogen supply controls or equivalent

6.6 3.1 Micron in-line filters, Promochrom only

6.7 1.0-2.0 mL polypropylene snap cap vials, Agilent part no. 5182-0567 or equivalent

6.8 Snap caps, polypropylene or olefin, 11 mm, 11/9k, Agilent Part no. 5182-0542

6.9 Solid Phase Extraction Tubes: for EPA 1633: WAX (weak anion exchange mixed mode polymeric sorbent – Phenomenex No. 8B-S038-HCH 200 mg or Waters Oasis 150 mg Cat. # 186002493. Must have a pKa > 8 to remain positively charged during the extraction. Alternate is Agilent Bond Elute WAX 200 mg-cat. No. 5610-2151

6.10 Syringes, Hamilton or equivalent 5.0 uL, 10 uL 25 uL, 100 uL, 250 uL, 500 uL, teflon free

6.11 Solid Phase Extraction System-automated-Promochrom 8 position autosampler system for 6 mL capacity SPE tubes. System retrofit to remove all PTFE components and replaced with PEEK tubing or PFAS free tubing. Automated bottle rinsing feature required with 3.1 um in line PP filters

6.12 Nitrogen Evaporation System- TurboVap nitrogen evaporation system operated at less than 55C.

6.13 LC/MS-MS system- Agilent 1260 or 1290 HPLC system interfaced to an Agilent 6470A or 6460C Triple Quadrupole system. The instrument control and qualitative/quantitative software is Mass Hunter versions B.8.0 and B.9.0 or later.

6.13.1 HPLC System-Agilent 1260 or 1290 Infinity II

6.13.1.1 The Agilent 1260 or 1290 Infinity II HPLC system is configured with temperature controlled column oven compartment. 4 column configuration, temperature controlled (refrigerated) auto sampler compartments, injection valve, proportioning valves, variable flow controls and variable injection capabilities.

6.13.1.2 The delay column (PFAS and other interference removal) is an Agilent Eclipse Plus C18, 4.6mm x 50 mm, 3.5 um-Part no. 959943-902 or equivalent.

6.13.1.3 The analytical column is a Restek Raptor C18 part no. 9304252 50mm x 2.1 mm ID, 1.8 u particle size or equivalent

6.13.2 Agilent LC/MS-MS- Agilent 6470AAR/6460C

6.14.2.1 Agilent model 6470AAR/6460C triple Quadrupole system with Agilent Jet Stream ESI source. UHP nitrogen is used as cell gas and High purity nitrogen is delivered for the sheath gas from a Peak Scientific nitrogen generator system.

6.14 Vortex Mixer- Benchmark Industries or equivalent

6.15 Variable Speed shaker table, 18” x 12”- Orbital Shaker- Jiangau Tenlin Instr. Co., Ltd., Model no. TLSK-III 20-230 RPM, 0-999 min, or equivalent
6.16 Centrifuge, 50 mL, Premiere Model XC-2450 Series Centrifuge 6 x 50 mL, 3500 RPM max., or equivalent
6.17 Mechanical Pipettors- 10-100 uL; 100-1000 uL; 1000-5000 uL-4 E’S Scientific or equivalent, calibrated quarterly.
6.18 Vortex Mixer- Benchmark Industries or equivalent

6.19 pH paper, short range 6-8 and full range with 0.5 pH readability- VWR Scientific or equivalent
6.20 15 mL PP or HDPE Centrifuge tubes, Corning Part no. 430791
6.21 3 mL Disposable Transfer pipets, PE, VWR part no. 16001-176
6.22 1.0 mL polypropylene snap cap vials, Agilent part no. 5182-0567
6.23 Snap caps, polypropylene, 11 mm, 11/9k, Agilent Part no. 5182-0542
6.24 2mL self standing PP microcentrifuge snap cap tubes, SKS Scientific part no. 0747-17

6.25 Collection tubes, 15 mL graduated PP or HDPE Centrifuge tubes, Corning Part no. 430791
6.26 Disposable 10 mg scoops, PP
6.27 Ultrasonic mixer
6.28 10 mL disposable syringes, PP or HDPE, luer fitting
6.29 13mm or 25 mm 0.2 um Nylon membrane filters, PALL Acrodisc or equivalent

7. REAGENTS AND STANDARDS-as listed or equivalents

7.1 ALL REAGENTS and STANDARDS MUST BE LOGGED INTO THE ELEMENT LIMS SYSTEM. This includes lot numbers, expiration, open and prepared dates, receipt date, Certification/traceability documents from supplier(s) if provided and preparer.

7.2 SOLVENTS and REAGENTS-all as listed or equivalents

7.2.1 Methanol, hypergrade for LC/MS. (Merck) from Sigma Aldrich Part no. 1060354000 or equivalent (HPLC Plus grade is an acceptable alternate)

7.2.2 Water, hypergrade for LC/MS. (Merck) from Sigma Aldrich Part no. 1153334000 or equivalent (HPLC plus grade is an acceptable alternate). Alternatively, York PFAS free water demonstrated ion and PFAS free can be used.

7.2.3 Acetic Acid, glacial. ACS grade or equivalent.

7.2.4 Ammonium Hydroxide, conc. Cert. ACS grade, 28-30% in water, Sigma Aldrich part no.1054231000, or equivalent

7.2.5 Methanolic Potassium Hydroxide (0.05 M) – add 3.3 g of KOH to 1L MeOH

7.2.6 Sodium Hydroxide, pellets, ACS grade- Sigma Aldrich part no. 221465-500G, or equivalent

7.2.7 Potassium Hydroxide, pellets, ACS grade

7.2.8 Ammonium Acetate – ACS grade or better, Ammonium Acetate, HPLC or cert. ACS grade. Sigma Aldrich Part no. 73594-100-G-F or equivalent.

7.2.9 Ammonium Acetate 5 mM for HPLC in aqueous solution: HPLC gradient A-- Weigh 0.3854 g (+ 0.0005) Ammonium Acetate and add to 1 liter hypergrade Water. Mix until dissolved then sonicate for 5 mins. To remove air bubbles. Stability - 2 weeks.

7.2.10 **Methanolic Ammonium Hydroxide 0.3 %** - take 2.5 mL of conc. ammonium hydroxide into 247 mL MeOH (measure the 247 mL in a PP graduated cylinder-they are under QQ1 somewhere). Use a mechanical pipet to add the 2.5 mL (not strictly quantitative FYI)-**Make 4 bottles of this**. *Used for soil extractions*.- 1 month life

7.2.11 **Methanolic Ammonium Hydroxide 1.0 %** - take 8.25 mL of conc. ammonium hydroxide into 242 mL MeOH (measure the 242 mL in a PP graduated cylinder-they are under QQ1 somewhere). Use a mechanical pipet to add the 8.25 mL (not strictly quantitative FYI)- **Make 4 bottles of this** -*used in Promochrom*-1 month life.

7.2.12 **Aqueous Ammonium Hydroxide 3%-** take 24.8 mL of ammonium hydroxide and add to 242 mL PFAS free water. 3 month life- *used for pH adjustment*

7.2.13 **Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid** – add ammonium hydroxide (3.3 mL, 30%), reagent water (1.7 mL) and acetic acid (0.625 mL) to methanol (92 mL), store at room temperature, replace after 1 month. **This solution is used to prepare the instrument blank, calibration stds and is used to dilute the extracts of samples that exceed the calibration range.**

7.2.14 **Formic Acid 0.1M-aqueous** – add 873 uL formic acid into 250 mL PFAS free water- **Make 2 bottles of this**-*used to prepare 7 below.* 2 year life

7.2.15 **Formic Acid, 0.3M**-aqueous- add 2.62 mL (2619 uL) into 250 mL PFAS free water- **Make 4 bottles of this** -*used in Promochrom*-2 year life

7.2.16 **Formic Acid methanolic 1:1, 0.1M formic acid**- mix equal volumes of Methanol and 0.1 M formic acid- **Make 4 bottles of this** -*used in Promochrom*-2 year life

7.2.17 **Formic Acid 5% aqueous**- add 12.5 mL Formic acid into 250 mL PFAS free water. *Used for pH adjustment.* 2 year life

7.3 Stock Standards

Stock Standards are purchased in mid to high concentration levels from Wellington Laboratories, Inc. Guelph, ONT, CA. Currently, Wellington is the preferred supplier of these materials. As a second source verification, prepare a mid-level from the stock independently from the preparation used for initial calibration. Document this preparation in Element. See Attachments 1,2, and 3 for detailed information.

7.3.1 Internal Standards (7-Non-Extracted –NIS)) used for the method are MPFOA, MPFOS, M3PFBA, MPFDA, MPFHxA, MPFHxS and MPFNA.

These are purchased at 250 - 1000 ng/mL depending upon the ISTD in a mixture. This mixture is purchased from Wellington Labs in 1.2 mL volumes with the following **part no.: MPFAC-HIF-IS**. Stored at 4C or less unopened this solution has a 5 year life. Once opened, the life is one year from open date.

7.3.2 Isotopic Surrogate Analogs (24 isotopes) are purchased for the method described from Wellington Labs at 250-5000 ng/mL levels, depending upon the isotope. The part no. is **MPFAC-HIF-ES**.

7.3.3 Stock Standard mixtures of both linear and branched isomers of the EPA 1633 - 40 list are purchased from Wellington Labs at varying concentrations in 5 different mixtures under part nos. PFAC-MXJ, PFAS-MXI, PFAC-MXH, PFAC-MXG, PFAC-MXF.

7.3.4 Qualitative branched isomers mix- individual available branched and linear mixes for the following PFAS are used daily to allow for qualitative knowledge of the PFAS branched isomers so they are integrated/included in quantitative analysis: T-PFOA, lp-PFNA, br-FOSA, br-NEtFOSA, br-NMeFOSA, br-NEtFOSE and br-NMeFOSE. These are purchased at 50,000 ng/mL levels from Wellington Labs-the names above are the Catalogue nos. These have a five year life at stock concentrations.

Make a 100 ng/mL Intermediate mix by adding 2.0 uL of the individual stocks up to 1.0 mL with MeOH.

Make a working solution by taking 200 uL of the 100 ng/mL intermediate into 750 uL of cal matrix solution (7.2.13) and add 50 uL of 1:10 EIS mix.

Transfer 300 uL to an autosampler vials, add 3 uL of ISTD working mix, cap, vortex and store until needed. Life is 1 year.

The summary below details the procurement requirements for this method - All from Wellington Laboratories, Inc.:

Description	Part nos.	Comes in
40 Compound Target 1633 list targets	PFAC-MXJ PFAS-MXI PFAC-MXH PFAC-MXG PFAC-MXF	4 Days – 1.2 mL
Isotopic Surrogates-24	MPFAC-HIF-ES	4 Days – 1.2 mL
EPA 1633 - 7 Internal Stds	MPFAC-HIF-IS	4 Days – 1.2 mL

7.4 Preparation of Standards

7.4.1 Preparation of Working Standards and Intermediates from STOCK Materials

All stock standards are prepared by the vendor in methanol containing a bit of sodium hydroxide to prevent losses of target PFAS compounds due to potential esterification in methanolic solution. The stocks come prepared with 4 molar equivalents (a 3x excess) of sodium hydroxide for stocks at the 50 ug/mL levels. This insures their stability with respect to potential loss due to esterification. The basic solution insures that any acidic sites on the glass ampules or acidic impurities in the methanol are neutralized to prevent ester formation and forms the sodium salt of the PFAS to stabilize it.

When preparing any intermediate level standards, the dilution must be prepared in alkaline methanol to prevent the above from occurring.

In order to do this, prepare a 5.0 mM NaOH in Hypergrade Methanol (or LC/MSMS grade) by dissolving 0.02 g. of sodium hydroxide into 100 mL of MeOH. This has a 2 week life.

For intermediate standards that are made to 10 mL final volume, add 100 uL of 5.0 mM NaOH/MeOH as part of the preparation. This results in a final concentration of NaOH at 0.05 mM.

For intermediate standards prepared to a final volume of 1.0 mL. add 10 uL of the 5.0 mM NaOH/MeOH.

For working calibration standards/CCV/SCV made to 500 uL final volume, using the mixture detailed in section 7.1.13 (MeOH/Water/acetic acid/ammonium hydroxide). This approximates the matrix of the final extracts for analysis.

7.4.2 Storage and Handling of Standards

All working standards should be stored at either room temperature or 4C provided the containers are sealed properly.

Stock Standards may be stored at 4-10 deg. C but before using must sit to allow equilibration to room temperature followed by either vigorous vortex mixing or sonication for 3-5 mins.

7.4.3 Detailed Standards Preparation Procedure-EPA 1633

7.4.4 Internal Standards-*See Attachment 1*

Internal Standards are purchased as a **stock mixture** at 250-1000 ng/mL

These as transferred to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry.

7.4.4.1 Working level of Non-Extracted Internal Standard (NIS) –make a 1:1 dilution of the stock by taking 500 uL of the Stock and adding 500 uL MeOH.

Use as is by adding 3 uL to 300 uL volumes for QC, samples or calibration.

7.4.5 Isotopic Surrogates (Extracted Internal Standards)- *See Attachment 2*

7.4.5.1 Stock Surrogates are purchased as a mixture at 250-5000 ng/mL. These are transferred to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry.

Option 1- Use Stock as received and add 25 uL to all samples/QC to be extracted

Option 2- Prepare **2** mL of Working EIS by preparing a 1:2 dilution to yield 125-2500 ng/mL for use as follows:
Take 1000 uL of the Surrogate Stock, plus 25 uL of 5 mM NaOH/MeOH and 975 uL MeOH to give 2.0 mL final volume**. 50 uL are added to ALL preparation blanks, samples and QC**. This is sufficient for approx. 40 x 50 uL additions to all blanks, QC and samples.

This corresponds to adding 5 to 100 ng of EIS compounds to the initial samples and QC. The final volume of extractions will typically be 5.0 ml so this yields 1-20 ng/mL of the isotope EISs in the final extract for analysis.

For calibration, the Stock mix at 250-5000 ng/mL is used by adding 100 uL up to 1.0 mL final volume to yield 25/500 ng/mL in each calibration level as directed in the calibration section 7.4.7.1.

7.4.6 Target Analytes- EPA 1633- *See Attachment 3*

The target analytes for this method are purchased commercially from Wellington Labs under the 5 part nos. described in Section 7.3.3 which contains the method target analytes only at varying concentrations. These mixtures are transferred from their glass ampules to snap cap vials that have been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry. Again these are the nominal concentrations and the actual anion concentrations for those present as salts are listed in the documentation and are reflected in both Mass Hunter and Element.

Preparation of a 1.0 mL volume of a 10 x intermediate of each of the 5 mixes for Calibration. Some of the higher levels on the curve use aliquots of the stock as shown in Figure 2.

Scale the volume accordingly if less is desired. Note that the EPA 1633 mixes come 1.2 mL per vial so this recipe may consume one vial quickly.

7.4.6.1 OPR and LLOPR - these are a mid-level blank spike and low level blank spike (at 2x the LOQ). These are prepared as follows from the EPA 1633 Target mixtures (5 components) by taking 200 uL of each STOCK into a snap cap vial giving 1.0 mL final volume.

1. Element ID Y22B199- PFAC-MXF mix 200 uL
2. Element ID Y22B200- PFAC-MXG mix 200 uL
3. Element ID Y22B201- PFAC-MXH mix 200 uL
4. Element ID Y22B204- PFAC-MXI mix 200 uL
5. Element ID Y22B205- PFAC-MXJ mix 200 uL

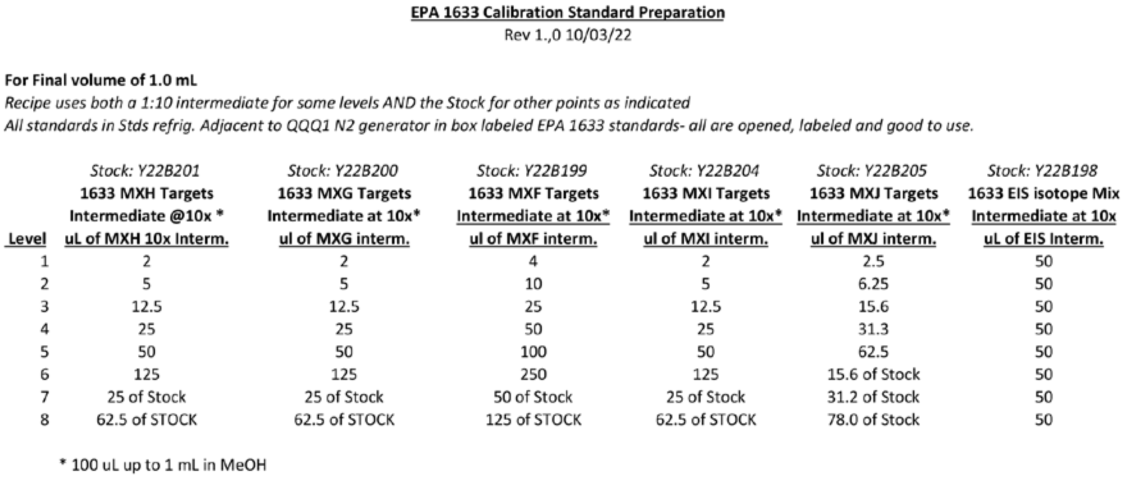
For OPR (BS) at mid-level add 100 uL to each matrix for the batch OPR and for the **LLOPR add 20 uL** of the spike mix and process through all steps of the specific matrix preparation.

7.4.7 Calibration

Calibration of the LC-MSMS systems is done by an eight level calibration covering the range 0.2 to 1650 ng/mL, nominal. Various PFAS species are present as salts and at differing concentrations and these are reflected in Mass Hunter and Element as their actual concentrations. Six to eight levels are prepared depending upon the analyte. These levels are prepared as directed below using the internal standards, surrogates and target analytes from above.
This is made to a final volume of 1000 uL in the matrix described in section 7.1.13 (MeOH/Water/acetic acid/ammonium hydroxide)

This preparation excludes the ISTD in the initial preparation. After preparation as directed, withdraw 300 uL of each level into a 500 uL PP vial and add 3 uL of ISTD before analysis, cap and vortex to mix.
These are stored at <10C and are stable for 6 months when prepared as directed.

7.4.7.1 Calibration Curve Preparation - Based upon a final volume of 1.0 mL in CAL Matrix Solution*
See Attachment 4 for details.



EPA 1633 Calibration Standard Preparation

Rev 1.,0 10/03/22

For Final volume of 1.0 mL

Recipe uses both a 1:10 intermediate for some levels AND the Stock for other points as indicated

All standards in Stds refrig. Adjacent to QQQ1 N2 generator in box labeled EPA 1633 standards- all are opened, labeled and good to use.

Level	*Stock: Y22B201* **1633 MXH Targets Intermediate @10x * uL of MXH 10x Interm.**	*Stock: Y22B200* **1633 MXG Targets Intermediate at 10x* ul of MXG interm.**	*Stock: Y22B199* **1633 MXF Targets Intermediate at 10x* ul of MXF interm.**	*Stock: Y22B204* **1633 MXI Targets Intermediate at 10x* ul of MXI interm.**	*Stock: Y22B205* **1633 MXJ Targets Intermediate at 10x* ul of MXJ interm.**	*Stock: Y22B198* **1633 EIS isotope Mix Intermediate at 10x uL of EIS Interm.**
1	2	2	4	2	2.5	50
2	5	5	10	5	6.25	50
3	12.5	12.5	25	12.5	15.6	50
4	25	25	50	25	31.3	50
5	50	50	100	50	62.5	50
6	125	125	250	125	15.6 of Stock	50
7	25 of Stock	25 of Stock	50 of Stock	25 of Stock	31.2 of Stock	50
8	62.5 of STOCK	62.5 of STOCK	125 of STOCK	62.5 of STOCK	78.0 of Stock	50

* 100 uL up to 1 mL in MeOH

*CAL MATRIX: Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid – Prepared by adding ammonium hydroxide (3.3 mL, 30%), reagent water (1.7 mL) and acetic acid (0.625 mL) to methanol (92 mL), store at room temperature, replace after 1 month. This solution is used to prepare the instrument blank and is used to dilute the extracts of samples that exceed the calibration range.

Amount of CAL Matrix to make up to 1.0 mL Final volumes:

CAL LEVEL	uL of CAL Matrix
1	937.5
2	918.8
3	871.9
4 *	793.7
5	637.5
6	309.0
7	843.8
8	609.5

INTERNAL STANDARD MIX (non-extracted IS-NIS). Mix 500 uL of STOCK ISTD at 250-1000 ng/mL with 500 uL of Methanol. This results in 125-500 ng/mL Intermediate ISTD. See 7.4.4.1.

Add 3.0 uL to 300 uL of each level 1-8 in a 500 uL PP autosampler vials and cap with polyolefin cap, vortex to mix and run. Add 3 uL to 300 uL of all sample/QC extracts before analysis.

*Level 4 is also used as the CCV for each analysis sequence run initially, then after every 10 samples and at the end of the sequence. Multiple vials should be prepared for this level.

7.4.8 Checking the Efficacy of the Surrogate/Spike Mixes

On a monthly basis the surrogate (EIS) and spike mixes from the vials used for spiking are assayed to ensure stability. These are prepared for the analysis by taking 3.0 uL of the surrogate (EIS) mix and 3 uL of the Spike mix into 294 uL MeOH/Water/Acetic Acid/Ammonium hydroxide from 7.1.13, then add 3 uL of NIS (ISTD). This yields a 1:100 dilution of the EIS and Spike mixes. Use 100 as the dilution factor in the Mass Hunter worklist.

7.4.9 Second Source - Initial Calibration Verification (ICV)

Currently, the EPA method 1633 does not require a second source ICV. Rather, the initial calibration is verified by preparing a Level 5 -5.0 ng/mL (nominal) calibration standard independently from calibration standard preparation. This serves as the ICV.

8. PROCEDURE

8.1 Preventative and Routine Maintenance

HPLC/MS/MS Preventative Maintenance	
As Needed: Change pump seals. Change in-line filters in autosampler (HPLC). Check/replace in-line frit if excessive pressure or poor performance. Replace column if no change following in-line frit change. Clean needle. Replace or clean Capillary Replace fused silica tube in ESI interface. Clean lenses. Clean skimmer. Ballast rough pump 30 minutes. Check Nozzle flow pattern	**Daily (When in use)** Check solvent reservoirs for sufficient level of solvent. Verify that pump is primed, operating pulse free. (ripple < 1%) Check needle wash reservoir for sufficient solvent. Verify capillary heater temperature functioning. Verify vaporizer heater temperature. Verify rough pump oil levels. Verify turbo-pump functioning. Verify nitrogen pressure for auxiliary and sheath gasses. Possible Checktune
Semi-Annually Replace oil mist and odor elements. Replace activated alumina filter if applicable	**Annually** Vacuum system components including fans and fan covers. Clean/replace fan filters, if applicable.

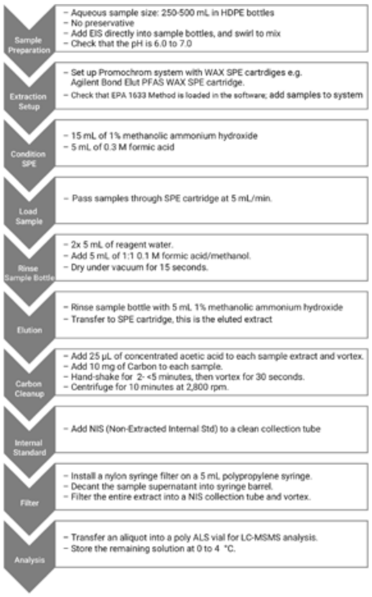
8.2 Sample Preparation (Extraction, Clean-up and Concentration)-Aqueous Matrices

A summary of the steps for the steps related to aqueous samples are shown in Figure 1.0 and in the summary below.

1. Determine % Suspended Solids – 10.0 mLs ± 0.02 mL through a tared 0.2 um PP filter. Dry filter ≥ 12 hours @ 105C, cool in dessicator. Calc % TSS
2. Check pH with short range pH paper to insure pH = 6.5 ± 0.5. Adjust if necessary with either 5% aqueous formic acid to lower pH or with 3% aqueous ammonium hydroxide to raise pH.
3. Weigh sample bottle as is to ± 0.1 g.-remove cap first since that will not be weighed later since autosampler caps are used
4. Homogenize sample by inversion 3-4 x-place full volume on Promochrom System using WAX SPE cartridges.

5. Set up MBLK, OPR at 2x LOQ (low LCS) and mid-level OPR (mid-level LCS)-spike with 10 uL of Spike mix for LLOPR and 100 uL of spike mix for mid-OPR.
6. Spike all with 25 uL EIS solution (isotopic surrogates)
7. Follow Promochrom method for EPA 1633
8. Initiate SPE program EPA1633AQ on the Promochrom system
9. Once the program is finished there will be 5 ml in the collection tube. If less, make up to exactly 5.0 mL with MeOH.
10. Remove the sample bottle from the Promochrom system and weigh the empty bottle. That will determine the weight (volume for water) assume 1g. = 1.0 mL. Enter this value into the element bench sheet and the initial volume.
11. Add 25 uL of concentrated acetic acid to each collection tube and vortex to mix.
12. Add 10 mg of activated carbon to all samples and QC. Hand mix and vortex mix for no more than 2 minutes
13. Centrifuge at 2800 rpm for approx. 10 minutes.
14. Filter the final volume through 0.2 um nylon filter using a syringe.
15. If the client provides only 250 mL of sample, in order to meet reporting limits, it may be required to concentrate the unfiltered extract by a factor of at least 2 on a TurboVap at 1.2 Liters/min with nitrogen at <55ºC.. For example if final volume is 5.0 mL, concentrate to 2.0 mL final volume (2.5 x concentration). If 500 ml provided, skip this step.
16. Enter the final volume achieved into the bench sheet in Element.
17. Transfer a portion of the final extract to a 2 mL snap cap, labeled.
18. Take a 300 uL portion of the extract into a 500 uL PP autosampler vial, add 3 uL of NIS (non-extracted internal std.). Cap, vortex, store at <6ºC.
19. Sample is ready for analysis.

Figure 1.0 Aqueous Sample Preparation Steps



Sample Preparation
- Aqueous sample size: 250-500 mL in HDPE bottles
- No preservative
- Add EIS directly into sample bottles, and swirl to mix
- Check that the pH is 6.0 to 7.0

Extraction Setup
- Set up Promochrom system with WAX SPE cartrdiges e.g. Agilent Bond Elut PFAS WAX SPE cartridge.
- Check that EPA 1633 Method is loaded in the software; add samples to system

Condition SPE
- 15 mL of 1% methanolic ammonium hydroxide
- 5 mL of 0.3 M formic acid

Load Sample
- Pass samples through SPE cartridge at 5 mL/min.

Rinse Sample Bottle
- 2x 5 mL of reagent water.
- Add 5 mL of 1:1 0.1 M formic acid/methanol.
- Dry under vacuum for 15 seconds.

Elution
- Rinse sample bottle with 5 mL 1% methanolic ammonium hydroxide
- Transfer to SPE cartridge, this is the eluted extract

Carbon Cleanup
- Add 25 µL of concentrated acetic acid to each sample extract and vortex.
- Add 10 mg of Carbon to each sample.
- Hand-shake for 2- <5 minutes, then vortex for 30 seconds.
- Centrifuge for 10 minutes at 2,800 rpm.

Internal Standard
- Add NIS (Non-Extracted Internal Std) to a clean collection tube

Filter
- Install a nylon syringe filter on a 5 mL polypropylene syringe.
- Decant the sample supernatant into syringe barrel.
- Filter the entire extract into a NIS collection tube and vortex.

Analysis
- Transfer an aliquot into a poly ALS vial for LC-MSMS analysis.
- Store the remaining solution at 0 to 4 °C.

8.2.1 To measure sample initial volume for aqueous samples, remove the cap and weight the bottle and record the weight in the sample weight. For MBLK, LLOPR and OPR use 250-500 mL volumes). After SPE processing, be sure the empty bottle is dry and weight to determine the amount of sample in grams (essentially equal to volume in mL). Use that number for the initial volume in Element LIMS.

8.2.2 For every 20 field samples (Field blanks are considered field samples in as they are treated as such), a blank (MBLK), blank spikes, (2 levels-LLOPR and OPR as BS1 and BS2 respectively. A matrix spike is not necessary since isotope dilution is used. If an MS/MSD is required by a specific project, spike 100 uL of the mid-level BS mix (OPR).

8.2.3 All polypropylene equipment including graduated cylinders and sample transfer lines/reservoirs should be washed prior to using with extraction solvent (Methanol).

8.2.4 Add 25 uL of EIS (isotopic surrogates) (250/5000 ng/mL) to each sample and QC sample, recap and invert to mix well.

8.2.5 Add, 5ul (low level spike), 50 uL (mid-level spike)

8.2.6 Using the Promochrom automated system, run a cleaning run. Be sure the reservoirs of LC/MS grade methanol and HPLC plus grade water or equivalent are full. Prime all lines and align all components.

8.2.7. Load in the EPA1633 method and adjust the sample volume to 10 ml more than the highest volume container measured by visual comparison to a calibrated bottle of the same size.

8.2.8 The SPE method solvents for extractions are as follows:

- Solvent 1 = MeOH
- Solvent 2 = H_2O
- Solvent 3 = 0.3 M Formic acid,
- Solvent 4 = 1:1 0.1M Formic Acid/MeOH,
- Solvent 5 = MeOH with 1% ammonium hydroxide ("Basic MeOH")
  W1 = Aqueous waste, W2 = Organic waste

8.2.9 Place labeled 15 mL graduated collection vessels in the sample collection tray and use Element labels to identify the vials at this point. Print 2 sets of labels for each since they will be used after the concentration step as well. These are graduated.

8.2.10 Connect the bottles to the automated system.

8.2.12 Initiate the EPA1633Aq SPE Extraction Program. Each run is approximately 1 hour 45 minutes.

8.2.13 **Evaporation Options**-Aqueous Samples

N-EVAP systems

8.2.13.1 The resulting 5 mL extracts are not further concentrated unless Work Plan reporting limits need to be lower than standard RLs. When this is required by the Work Plan, the extracts and QC are transferred to the N-EVAP concentrator systems operated at 50-55 degrees C (never more than 55C) in their original collection vials. The nitrogen flow is initiated at 1.2 ml/min and adjusted on each individual sample to provide a gentle stream causing a slight disturbance at the surface of the methanol extracts.

8.2.13.2 As this evaporation proceeds the walls of each vessel are rinsed with methanol when the volume is approximately 2.5 mls and then again when the volume is reduced to just below 2.0 mL. Then Bring up the final volume to 2.5 mL. This is a 2x concentration when needed.

8.2.14 Swirl final extract, make up to 2.0 mL with methanol. Using a disposable polypropylene pipet, carefully transfer to a 2 mL PP snap cap vial.

8.2.15 Withdraw an aliquot of 300 uL into a 500 uL autosampler vial (PP) and add 3.0 uL of ISTD (NIS) mix. .

8.2.16 Cap with polyolefin flexible caps and vortex to mix.

8.2.17 Store Extracts at <6ºC until analysis.

8.3 Sample Preparation (Extraction, Clean-up and Concentration)-Soil Matrices

1. Determine % solids: use 5 grams; dry at 110C ≥ 12 hours.
2. Mix sample with a stainless steel spatula to homogenize-exclude Sticks, vegetation, rocks and the like.
3. Remove 5.0 g. from the homogenized sample container. Add to a tared 50 mL centrifuge tube. Determine the weight ± 0.01 g.
4. Prepare QC using clean matrix (Ottawa Sand) wetted with 1 mL PFAS free water in 50 mL centrifuge tubes
5. For all samples, QC blanks and LCSs (LLOPR and ML OPR) and a 25 uL aliquot of EIS onto the soil. The current Element standard ID is Y22J305. For the OPRs add appropriate amount of spike solution (10 uL for LLOPR and 100 uL for OPR. The current Element Std ID is Y22J304.
6. Swirl the samples to mix then let sit for 30 minutes.
7. Add 10 mL of 0.3% methanolic ammonium hydroxide to each centrifuge tube.
8. Vortex to mix then shake on the shaker table for 30 minutes.
9. Next, centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes.
10. Transfer the supernatant liquid to a clean 50 mL centrifuge tube
11. Add 15 mL of 0.3% methanolic ammonium hydroxide to each of the original centrifuge tubes.
12. Vortex to mix then shake on the shaker table for 30 minutes
13. Next, centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes.
14. Transfer the supernatant liquid to the centrifuge tubes from 10.0 above
15. Add another 5 mL of 0.3% methanolic ammonium hydroxide to each of the original centrifuge tubes.
16. Vortex to mix then shake on shaker table for 30 minutes
17. Next, centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes.
18. Transfer the supernatant liquid to the centrifuge tubes from 10.0 above
19. Add 10 mg of activated carbon to the combined extract using a 10 mg scoop and hand swirl for 2 minutes (never more than 5 minutes of losses of Target PFAS will occur)
20. Centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes
21. Immediately Decant into a 50 mL centrifuge tube.
22. Place in Turbovap or on the N-EVAP system and concentrate at 55 deg. C to a final volume of approx..7 mL at a nitrogen flow of 1.2 ml/min.
23. Add 35-40 mL of PFAS free water to the tube and vortex to mix.
24. Check the pH= 6.5 ± 0.5 if not adjust accordingly using 5% formic acid to lower pH or 3% aqueous ammonium hydroxide to raise pH rto within this range.

25. Set up the soil EPA 1633 method on the Promochrom be sure volume is set to 50 ml for sample size.
26. Place samples and QC centrifuge tubes on the autosampler
27. Once the program is finished, note the final volume and use that in the Element benchsheet as final volume. Should be 5.0 mL. If less make up to 5.0 mL with MeOH.
28. Add 25 uL of concentrated acetic acid to each collection tube and vortex to mix.
29. Add 10 mg of carbon to all samples and QC and mix for 2 minutes (no more than 5 minutes).
30. Immediately centrifuge at 2800 rpm for 10 minutes.
31. Filter the extract through a 0.2 um nylon membrane using a syringe and filter into a 2 mL snap cap vial.
32. When ready for analysis, remove 300 uL of extract and transfer to a 500 uL autosampler vial. Add 3 uL of NIS (internal standard), vortex to mix. Cap with polyolefin flexible caps and vortex to mix.
33. Store Extracts at <6°C until analysis
34. Samples/QC are now ready for analysis.

8.4 Sample Analysis--Running Samples/QC - Acquisition Method

The acquisition method is detailed in Attachment 4 (HPLC) and Attachment 5 (MS/MS) of this SOP. The method is a HPLC with dynamic MRM method with precursor and product ions with specific acquisition parameters to maximize sensitivity and specificity. This list may be modified to add other PFAS target analytes as necessary.

8.3.1 The triple Quadrupole (QQQ) system must be optimized for each target analyte (including surrogates and internal standards) using the Mass Hunter Optimizer program. This program determines the most abundant precursor and product ions for each compound and their abundances. These data are then used to build an MRM (multiple reaction monitor) method for acquisition. This is done initially or after any major maintenance procedures are performed to the triple quadrupole system. A high level standard is used for this in the $[M-H]^-$ mode or M-COOH for HFPO-DA.

8.3.2 The QQQ is checked for tuning on a weekly basis (if necessary) before analysis using the Tune context by selecting the CHECKTUNE radio button. This is done only in negative ion mode since that what we are operating under. If the Checktune fails, run the Autotune program-note: this takes approx. 45 mins. in negative mode. After autotune or any tuning adjustment, a re-calibration of the instrument is required.

8.3.3 Before any QC or samples can be run, the HPLC must be allowed to purge for at least thirty minutes. This purge must be done using the initial mobile phase conditions used in the method must be allowed to run for 15 minutes or until pressure has stabilized (ripple must be < 1%)

8.3.4 An instrument sequence (Worklist) is then made. It should begin with a blank, a primer (5 ng/mL) followed by a blank with ISTD to establish system cleanliness.

8.3.5 After a successful initial calibration has been completed, the analytical sequence for a batch of samples analyzed during the same time period is as follows. Standards and sample extracts must be brought to room temperature and vortexed prior to aliquoting into an instrument vial in order to ensure homogeneity of the extract.

8.3.6 **Analysis Sequence**

1. Instrument Blank *
2. Instrument Sensitivity Check –**LOQ Standard Level (SEQ-CAL 1) S/N > 3:1**
3. Calibration Verification Standard (CCV)
4. Qualitative Identification Standards –Branched PFAS
   PFOA, PFNA, PFOSA, NMeFOSA, NEtFOSA, NEtFOSE, and NMeFOSE.
5. Instrument Blank (SEQ-CCB)*
6. Method Blank (Batchxxxx-BLK1)
7. Low-level OPR (LLOPR) (Batchxxxx-BS1)
8. OPR (Batchxxxx-BS2)
9. Field Samples (10 or fewer)
10. Calibration Verification Standard (SEQ-CCVn)
11. Instrument Blank (SEQ-CCBn)*
12. Field Samples (10 or fewer)
13. Calibration Verification Standard (SEQ-CCVn)
14. Instrument Blank (SEQ-CCBn)*

* Contains solvent system for calibration, NIS and EIS

8.3.7 The run can end with a script to put the instrument into standby mode.

8.4 Daily Sample Preparation/Analysis Sequence

- Prepare extracts for analysis by placing a 300 ul aliquot of sample extract containing 3 uL of internal standards into a PP auto-sampler vial. Apply Polyolefin cap.
- Confirm that the samples loaded on the auto-sampler were entered correctly in the injection log. Make any necessary corrections.
- Run instrument CCV checks at the RL (0.25-0.5 ng/mL), then at a mid level and high level rotating every ten samples (5, 25 ng/mL) and ending with a mid level CCV.
- Enter the Worklist (injection sequence) into the instrument software and load samples onto the auto-sampler in the order shown above in Section 8.3.6

8.5 Data Review

The Agilent Mass Hunter Quantitation program is used to review all data. All identifications are based upon acceptable ion ratios for the abundance of both precursor and product ions along with retention time information. All positive detections of target PFAS must be less that the high point conc. of the Cal. Curve.

8.5.1 Since certain PFAS species are manufactured by different processes the presence of branched as well as linear isomers may be found. In order to properly quantitate these species, the analyst must sum the related branched and linear isomers. This affects the following species: PFOS, PFHxS, PFOA, PFNA, PFOSA, NMeFOSA, NEtFOSA, NEtFOSE, and NMeFOSE.

8.5.2 Any detection greater than the upper limit of the calibration curve requires dilution into the upper half of the curve, where possible.

9. CALIBRATION

9.1 Initial Calibration

The initial calibration covers the range 0.20 ng/mL to 1560 ng/mL nominal conc. or higher depending upon the linearity of the PFAS species. After acquisition, the data are quantitated in Mass Hunter and the default calibration model for target compounds is generated using Quadratic regression, FORCED through the origin where applicable. All same level species (EIS) used average response factor model. Depending upon the response and accuracy at each level as shown in the Mass Hunter program, use Linear, Forced, weighted (1/x) or quadratic, Forced, with or without weighting to achieve the best fit which is based upon the best accuracy on a compound by compound basis. In any case, the correlation coefficient must be greater than 0.990. Average response factor RSD should be ≤ 20% where used.

9.1.1 The calibration levels as shown in Section 7.6.3 use 8 levels. All points are included in the calibration with exception of some species that saturate at levels 7 and 8.

9.2 ICV/SCV

An independently prepared Initial Calibration Verification must be run immediately following initial calibration. The concentration of this standard should be in the middle of the calibration range (e.g. 5.0 ng/mL) and prepared from a separate preparation as that of the calibration. Unless project-specific data quality objectives are required, the values from the second-source check should be ± 30% of the expected concentration.

Corrective Action: Quantitative sample analyses should not proceed for a failing ICV. Recalibrate and re-run the ICV if necessary.

9.3 Continuing Calibration Verification

The first CCV is at a mid-level and run every 10 client samples including a closing CCV.

The mid-Level CCV must be ± 30% of the true value.

Corrective Action: If any of the required calibration check criteria fail, the system must be evaluated and any appropriate instrument repair or maintenance must be performed. Sample data are unacceptable and must be rerun. Reinjection the standard may be done. If the calibration check standard still fails, the system must be recalibrated.

10. Quality Control

10.1 Initial Demonstration of Capability (IDOC)

10.1.1 The initial demonstration requirement of EPA 1633 must be acceptable before analysis of samples may begin. To establish the ability to generate acceptable precision and recovery, the laboratory must perform the following operations for each sample matrix type to which the method will be applied by that laboratory.

The IDOC includes the following key elements:

- Initial Demonstration of Precision and Recovery (IPR)
- MDL determination

10.1.2 Initial Demonstration of Precision and Recovery-IPR

- Extract, concentrate, and analyze four aliquots of aqueous and soil matrices spiked with 100 uL of the native spike solution OPR Mix Y22J304, 50 µL of the EIS solution no. Y22J305. At least one method blank, matching the matrix being analyzed, must be prepared with the IPR batches by matrix. All sample processing steps that are used for processing samples, including preparation and extractions, cleanup and concentration, must be included in this test.

- Using results of the set of four analyses, compute the average percent recovery (R) of the extracts and the relative standard deviation (RSD) of the concentration for each target and EIS compound.
- For each native and isotopically labeled compound, compare RSD and % recovery with the corresponding limits for initial precision and recovery in Table 5. If RSD and R for all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and samples may begin. *Note these acceptance criteria are not finalized and are based upon a single lab validation. Data for this table are derived from the single-laboratory validation study, and are only provided as examples for this draft method. The data will be updated to reflect the inter-laboratory study results in a subsequent revision. Therefore, these criteria will change after inter-laboratory validation. Several sections of this method state that Table 5 criteria are required, this is standard language that will be applicable when the method is finalized.*

10.1.3 MDL Determination

MDL Determination –In order to perform the MDL study, 7 total extractions are performed on 3 different days (Extraction day 1= 3 LRBs and 3 LFBs); Extraction day 2 is 2 of each, and Extraction day 3 is also 2 of each).

The levels extracted represent approx. 3-5 x the expected LOQ.

Once extracted, the analyses are conducted on 3 separate days (we use only QQQ2 for EPA 1633 so all runs are on that system). The MDL is determined according to the EPA MDL protocol defined in Definition and Procedure of the Determination of the Method Detection Limit, Revision 2 Dec. 2016 as detailed below:

Make all computations as specified in the analytical method and express the final results in the method-specified reporting units.

Calculate the sample standard deviation (SD) of the replicate spiked sample measurements and the sample standard deviation of the replicate method blank measurements from all instruments to which the MDL will be applied.

Compute the MDLs (the MDL based on spiked samples) as follows:

MDL_s = 3.143 x SD (for seven replicates; SD = Standard Deviation)

Compute the MDLb (MDL based on method blanks-LRBs) as follows:

- If none of the blanks give numerical results then the MDLb does not apply
- If only some of the blanks (but not all) give a result, set the MDLb to the highest result found

- If ALL method blanks show a detections then use the following calculation to determine MDLb:

MDLb = Average of Blank Detections + (3.143 x Std. Dev.)

Calculate the final MDL by selecting the greater of MDLs or MDLb.

10.2 On-going QC Requirements

Preparation Batches are defined at the sample preparation step. Batches should be kept together through the whole analytical process as far as possible, but it is not mandatory to analyze prepared extracts on the same instrument or in the same sequence.

The quality control batch is a set of up to 20 samples of the same matrix processed using the same procedure and reagents within the same time period. The quality control batch may contain a matrix spike/matrix spike duplicate (MS/MSD), two laboratory control sample (LCS-LLOPR and OPR) and a method blank. Laboratory generated QC samples (Blank, LLOPR, OPR, MS/MSD) do not count toward the maximum 20 samples in a batch. Field QC samples are included in the batch count. In some cases, at client request, the MS/MSD may be replaced with a matrix spike and sample duplicate.

10.2.1 METHOD BLANK - One method blank must be extracted with every prep batch of similar matrix, not to exceed twenty (20) samples. For aqueous samples the matrix is Lab reagent water. For Soils the method blank matrix is Ottawa sand. Criteria:

- The method blank must not contain any analyte at or above 1/2 the LOQ (Reporting Limit).
- Re-extraction and reanalysis of samples associated with an unacceptable method blank is required when reportable concentrations are determined in the samples.

10.2.2 LABORATORY CONTROL SAMPLES (LCS- also called OPR and LLOPR) must be extracted with every process batch of similar matrix, not to exceed twenty (20) samples. The LCS is an aliquot of laboratory matrix (e.g. water for aqueous spiked with analytes of known identity and concentration and isotopic surrogate analogs. The OPRs must be processed in the same manner and at the same time as the associated samples. Recovery for Aqueous low level OPR target analytes is 40-150% until more data are derived. For all other Aqueous OPR levels recovery targets are 50-150%. These data are based upon EPA 1633 draft ranges that will change and are not used for acceptance/rejection but are reported until such time that fully validated acceptance ranges are provided in the final version of the method.

10.2.3 Matrix spike/Matrix spike duplicate (MS/MSD or MS/MSD). These are not typically required since each sample contains isotopic PFAS analogues that correct for any matrix effects. If the client requests them, then they are processed accordingly but are not a requirement of this method. If done they are by matrix, not to exceed twenty (20) samples. An MS/MSD pair is aliquots of a selected field sample spiked with analytes of known identity and concentration. The MS/MSD pair must be processed in the same manner and at the same time as the associated samples. Spiked analytes with recoveries or precision outside of the Laboratory control limits are flagged accordingly. Until enough statistical data per matrix is available, no criteria are offered. If a specific QA Project Plan has required limits, this is preempted. Any outliers must be qualified accordingly.

10.2.4 Initial calibration verification (ICV) –A second source standard is not required for this method. A second independently prepared mid-level standard is prepared and used for this purpose and analyzed after the ICAL. The concentration should be at the mid range of the curve and must recover within 70-130 % of expected value.

Corrective actions for the ICV include:

- Rerun the ICV
- Remake or acquire a new ICV.
- Evaluate the instrument conditions.
- Evaluate the initial calibration standards.
- Rerun the initial calibration.

10.2.5 Internal Standard- The Non-extracted Internal Standard (NIS) is added to each field and QC sample prior to analysis. The IS response (peak area) must not deviate by more than 50-200% from the mean response (peak area) of the initial calibration. If the areas are low for all the field samples and QC samples in the batch, it suggests a loss of instrument sensitivity, while low areas in only some field or QC samples suggests a possible bad injection.

Corrective action includes:

- Reinject the questionable samples
- Verifying the CCV NIS areas are compliant with the range, if so, this suggests either matrix effects and may require a small dilution to mitigate interference if only some of the NIS compounds are affected
- Qualify affected data

10.3 Initial Demonstration of Capability (IDC)

Initial Demonstration of Capability involves the following processes listed ion Table 1.0 as follows.

Table 1.0 - Initial Demonstration of Capability (IDC)

Requirement	Specification and Frequency	Acceptance Criteria
Initial Demonstration of Precision and Recovery (IPR)	Extract, concentrate, and analyze four aliquots of the matrix (aqueous and soil) spiked with target native standard solution, EIS solution and finally the NIS (ISTD). Extract a method blank of each matrix with each matrix IPR batch. All steps that are used for processing samples, including preparation and extraction must be included.	Using results of the set of four analyses, compute the average percent recovery (R) of the extracts and the relative standard deviation (RSD) of the concentration for each target and EIS compound.
		For each native and isotopically labeled compound, compare RSD and % recovery with the corresponding limits for initial precision and recovery in Table 5. If RSD and R for all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and samples may begin.
Method Detection Limit (MDL)	Method detection limit (MDL) - Each laboratory must also establish MDLs for all the analytes using the MDL procedure at 40 CFR Part 136, Appendix B. An MDL determination must be performed for all target compounds.	The minimum level of quantification (ML) can be calculated by multiplying the MDL by 3.18 and rounding to the nearest integer
Calibration Verification (ICV or SCV) *Section 9.1.5*	Analyze a mid-level ICV, each time a new calibration is performed or at a minimum, quarterly. The ICV must be an independent dilution beginning with the common starting materials used for ICAL. No 2nd source is required due to availability.	Results must be 70-130% of true value.

10.4 QC Requirements

Ongoing QC requirements are detailed in Table 3.0 as follows.

Table 3.0 QC Requirements

Summary of Quality Control		
Method Reference	**Requirement**	**Specification and Frequency**
Section 10.1	Mass Calibration	Annually and on as-needed basis
Section 10.1.7	Mass Calibration Verification	After mass calibration
Section 10.3	Initial Calibration (ICAL)	Minimum 6 calibration standards for linear model and 7 calibration standards for non-linear models.
Sections 10.2.2, 14.4	Retention Time (RT) window	After ICAL and at the beginning of analytical sequence
Sections 7.3.1, 9.4	Extracted Internal Standard (EIS) Analytes	All CAL standards, batch QC and field samples

Sections 7.3.2	Non-extracted Internal Standards (NIS)	All CAL standards, batch QC and field samples
Sections 7.3.4, 10.3.1, 13.3	Instrument Sensitivity Check (ISC)	Daily, prior to analysis
Section 14.2	Calibration Verification (CV) (CCV)	At the beginning and every 10 samples and at the end
Section 14.6	Instrument Blank	Daily prior to analysis and after high standards
Sections 9.1.3, 9.5, 14.7	Method Blank (MB)	One per preparation batch
Section 14.5	Ongoing Precision Recovery (OPR)	One per preparation batch
Section 11.0	Limit of Quantitation Verification (LLOPR)	Prior to analyzing samples
Section 11.0	Matrix Spike (MS/MSD)	One per preparation batch (if required) Normally not needed, since Isotope dilution is employed

11.0 DATA REVIEW, CALCULATIONS AND REPORTING

Samples concentrations are determined using either or linear regression or quadratic regression FORCED through the origin. Weighted (1/x or $1/x^2$) may assist with low level accuracy and is recommended where necessary. All calibration curves have greater than 6 points. Any target analyte exceeding the calibration range will require dilution.

11.1 Data interpretation

All sample data calculations are performed by the Agilent Mass Hunter software in ng/mL and then final data are calculated taking into account final extract volumes and the initial sample volumes extracted which are entered into the Element bench sheet.

11.2 Linear and Branched Isomers are addressed in Section 8.5 and are reported for the noted species as Total which is a sum of the linear and branched isomers for affected species.

11.3 All Data are uploaded into Element LIMS and all final concentration calculations and associated recoveries are detailed. All pdfs of Mass Hunter Quant reports are uploaded to the Element Raw_Data drive for association with ICALs and all batch and analysis sequence runs. Data are set to Analyzed status once uploaded and initially reviewed, then locked.

11.4 The Data are then evaluated using the York Qualinator ™ data review tool which evaluates all data CCVs, QC, ISTDS, Recoveries, etc. and automatically assigns outlier qualifiers for review and acceptance by the reviewer. The accepted data are then uploaded to Element and final reviewed in Laboratory Data Entry/Review module. Once reviewed, the status is set to Reviewed indicating the data are ready to be Reported by the Reporting Group.

12. HEALTH AND SAFETY

12.1 General safety considerations and requirements are detailed in the York Laboratory Safety and Health Standard Operating Procedure No. Safety011600.

Specific safety rules applying to the conduct of this analysis requiring the following:

- When handling standards and samples, latex gloves are required.
- Also, when handling neat materials, a fume hood and safety glasses are required.
- When handling samples, gloves and glasses are required.
- Highly odorous samples must be handled in a fume hood.
- Refer to SDSs for specific safety/health information.

12.2 The analysts must exercise normal care and be supervised and trained to work in an analytical chemistry laboratory. The analysts will be handling fragile glassware, needles, syringes, volatile and flammable chemicals, toxic chemicals and corrosive chemicals.

- No smoking or open flames are allowed.
- No food or food products may be brought into the laboratory.

Solvents should not be left uncovered on the laboratory benches.
All solvent transfers should be done in the hoods.

Hood doors must be kept in the position which yields approx. 100 fpm face velocity.
Solvent evaporation must be done in the hood with exhaust elevated and in the rear.

Waste containers that had solvents must be vented to a hood until all solvents have evaporated.

Safety glasses are provided and must be worn at all times in the laboratory.
Gloves are provided and must be worn when working with chemicals.
Laboratory coats are provided and should be worn to protect the analysts' clothes.
Syringes and needles must be kept in their original cases when not in use.
Care must be exercised in using and handling syringes to avoid injury.
Report any sticking with a needle immediately to your supervisor.

12.3 Specific Safety Concerns

12.3.1 Preliminary toxicity studies indicate that PFAS could have significant toxic effects. In the interest of keeping exposure levels as low as reasonably achievable, PFAS must be handled in the laboratory as hazardous and toxic chemicals.

12.3.2 Exercise caution when using syringes with attached filter disc assemblies. Application of excessive force has, upon occasion, caused a filter disc to burst during the process.

12.3.3 Laboratory procedures such as repetitive use of pipets, repetitive transferring of extracts and manipulation of filled separatory funnels and other glassware represent a significant potential for repetitive motion or other ergonomic injuries. Laboratory associates performing these procedures are in the best position to realize when they are at risk for these types of injuries.

12.3.4 Eye protection, laboratory coat, and nitrile gloves must be worn while handling samples, standards, solvents, and reagents. Disposable gloves that have been contaminated will be removed and discarded; other gloves will be cleaned immediately.

12.3.5 Perfluorocarboxylic acids are acids and are not compatible with strong bases.

12.3.6 Primary Materials Used- The following is a list of the materials used in this method, which have a serious or significant hazard rating. NOTE: This list does not include all materials used in the method. The table contains a summary of the primary hazards listed in the SDS for each of the materials listed in the table. A complete list of materials used in the method can be found in the reagents and materials section. Employees must review the information in the SDS for each material before using it for the first time or when there are major changes to the SDS.

Methanol	-Flammable Poison -Irritant	200 ppm (TWA)	A slight irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Symptoms of overexposure may include headache, drowsiness and dizziness. Methyl alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur; symptoms may parallel inhalation exposure. Irritant to the eyes.

Acetic Acid, Glacial	-Flammable liquid and vapor. -Irritation	10 ppm TWA; 25 mg/m3 TWA	**Eye:** Causes severe eye irritation. Contact with liquid or vapor causes severe burns and possible irreversible eye damage. **Skin:** Causes skin burns. May be harmful if absorbed through the skin. Contact with the skin may cause blackening and hyperkeratosis of the skin of the hands. **Ingestion:** May cause severe and permanent damage to the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause polyuria, oliguria (excretion of a diminished amount of urine in relation to the fluid intake) and anuria (complete suppression of urination). Rapidly absorbed from the gastrointestinal tract. **Inhalation:** Effects may be delayed. Causes chemical burns to the respiratory tract. Exposure may lead to bronchitis, pharyngitis, and dental erosion. May be absorbed through the lungs. **Chronic:** Chronic exposure to acetic acid may cause erosion of dental enamel, bronchitis, eye irritation, darkening of the skin, and chronic inflammation of the respiratory tract. Acetic acid can cause occupational asthma. One case of a delayed asthmatic response to glacial acetic acid has been reported in a person with bronchial asthma. Skin sensitization to acetic acid is rare, but has occurred.
Ammonium Hydroxide, conc. 28-30%	- Inhalation hazard - Skin Corrosion -Eye Damage and Irritation	OSHA PEL: 35 mg/m3 ; 50 ppm OSHA TWA: 18 mg/m3; 25 ppm	Ammonia is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. May cause severe chemical burns to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure. The extent of injury produced by exposure to ammonia depends on the duration of the exposure, the concentration of the liquid or vapor and the depth of inhalation. Exposure Routes: Inhalation (vapors), skin and/or eye contact (vapors, liquid), ingestion (liquid).
Formic Acid, conc.	-Flammable liquid and vapor -Harmful if swallowed -Causes severe skin burns and eye damage -Toxic if inhaled -May cause respiratory irritation	OSHA TWA: 5 ppm or 9 mg/m3 OSHA PEL: 10 ppm	Formic acid is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. May cause severe chemical burns to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure. The extent of injury produced by exposure to ammonia depends on the duration of the exposure, the concentration of the liquid or vapor and the depth of inhalation. Exposure Routes: Inhalation (vapors), skin and/or eye contact (vapors, liquid), ingestion (liquid).

13. WASTE MANAGEMENT/POLLUTION PREVENTION

Neat Materials

Waste management procedures require the prudent use of neat materials. The ordering of neat standards and materials must be done to minimize unused material which would result in storage or handling of excess material. Quantities ordered should be sufficient to provide for necessary standards with consideration to shelf life. When ordering a unique material for a standard, be sure to order the smallest practical quantity.

Solvents

The solvents used at York for this procedure include isopropanol and Methanol. These solvents are used for sample extraction or LC cleanup, all amounts are either consumed during concentration or placed in one liter amber jars in the hood areas for evaporation. Any remaining solvent/water is transferred to a drum designated for solvent waste.

Acids and Bases

The acids and bases used for this procedure include: Acetic Acid and Formic Acid. The bases used are Ammonium hydroxide, sodium hydroxide and potassium hydroxide. Store concentrated base and acids separately whether waste or neat material.

Samples

Unused or remaining water samples are returned to the sample control room for continued storage for proper disposal by the sample control group.

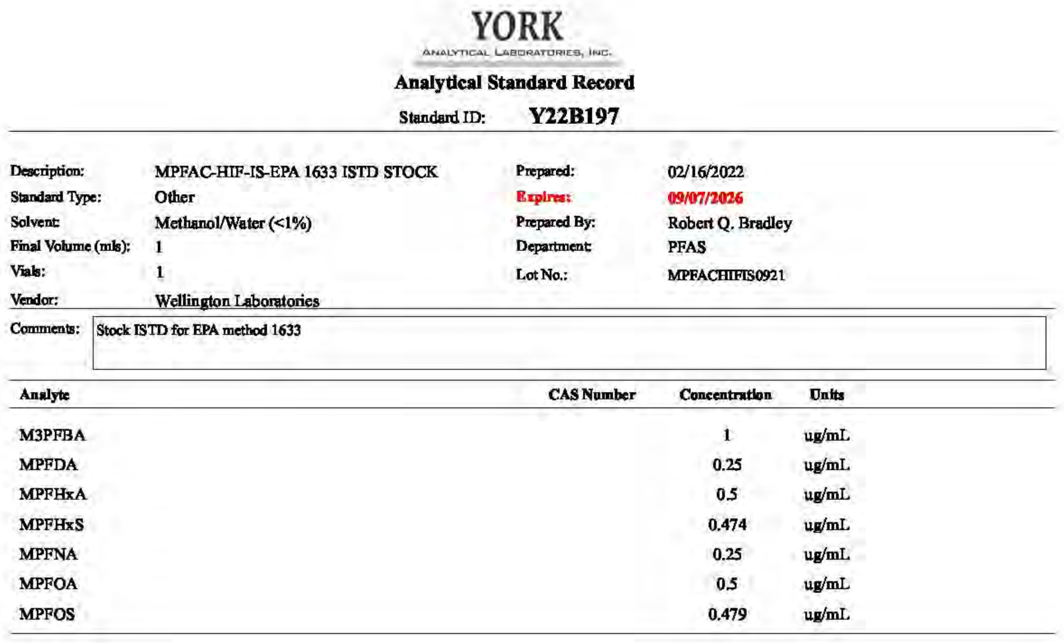
14. REFERENCES

1. EPA METHOD 1633 Draft 2 June, 2022- Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS; EPA 821-D-22-001

15. REVISION HISTORY

Revision 1.0	10/24/2022	First issue.
Revision 1.1	02/10/2023	Modified LLOPR in Section 7.4.6.1 to reflect 2x the MRL

Attachment 1 – Non-Extracted Internal Standards (NIS)



YORK
ANALYTICAL LABORATORIES, INC.

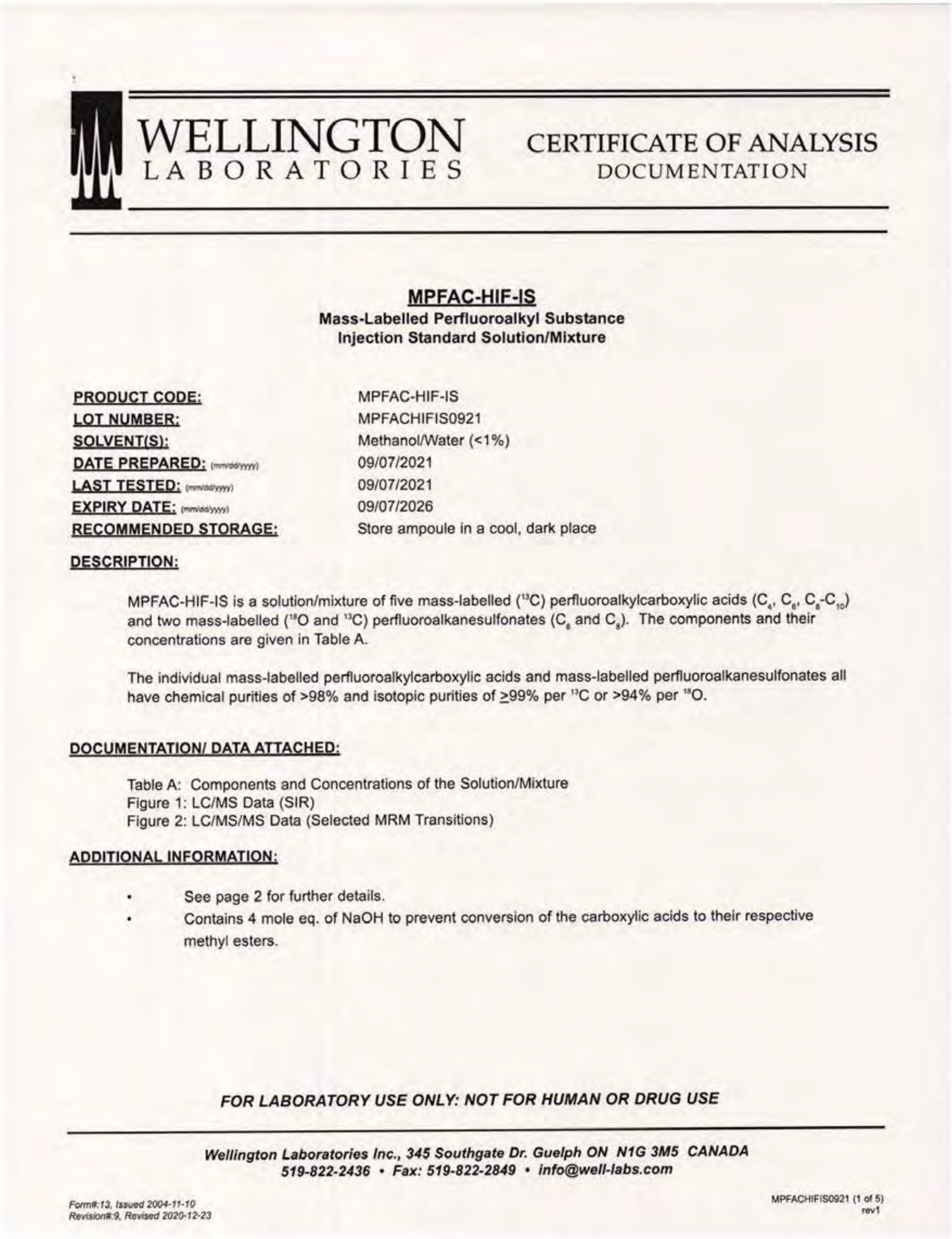
Analytical Standard Record

Standard ID: **Y22B197**

Description:	MPFAC-HIF-IS-EPA 1633 ISTD STOCK	**Prepared:**	02/16/2022
Standard Type:	Other	**Expires:**	09/07/2026
Solvent:	Methanol/Water (<1%)	**Prepared By:**	Robert Q. Bradley
Final Volume (mls):	1	**Department:**	PFAS
Vials:	1	**Lot No.:**	MPFACHIFIS0921
Vendor:	Wellington Laboratories		

Comments: Stock ISTD for EPA method 1633

Analyte	CAS Number	Concentration	Units
M3PFBA		1	ug/mL
MPFDA		0.25	ug/mL
MPFHxA		0.5	ug/mL
MPFHxS		0.474	ug/mL
MPFNA		0.25	ug/mL
MPFOA		0.5	ug/mL
MPFOS		0.479	ug/mL



WELLINGTON LABORATORIES **CERTIFICATE OF ANALYSIS DOCUMENTATION**

MPFAC-HIF-IS

Mass-Labelled Perfluoroalkyl Substance
Injection Standard Solution/Mixture

PRODUCT CODE:	MPFAC-HIF-IS
LOT NUMBER:	MPFACHIFIS0921
SOLVENT(S):	Methanol/Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	09/07/2021
LAST TESTED: (mm/dd/yyyy)	09/07/2021
EXPIRY DATE: (mm/dd/yyyy)	09/07/2026
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

MPFAC-HIF-IS is a solution/mixture of five mass-labelled (^{13}C) perfluoroalkylcarboxylic acids (C_4, C_6, C_8-C_{10}) and two mass-labelled (^{18}O and ^{13}C) perfluoroalkanesulfonates (C_6 and C_8). The components and their concentrations are given in Table A.

The individual mass-labelled perfluoroalkylcarboxylic acids and mass-labelled perfluoroalkanesulfonates all have chemical purities of >98% and isotopic purities of $\geq$99% per ^{13}C or >94% per ^{18}O.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA
Testing Accreditation No. A1226

ANAB
ANSI National Accreditation Board
ACCREDITED
REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc.,
please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFIS0921 (2 of 5)
rev1

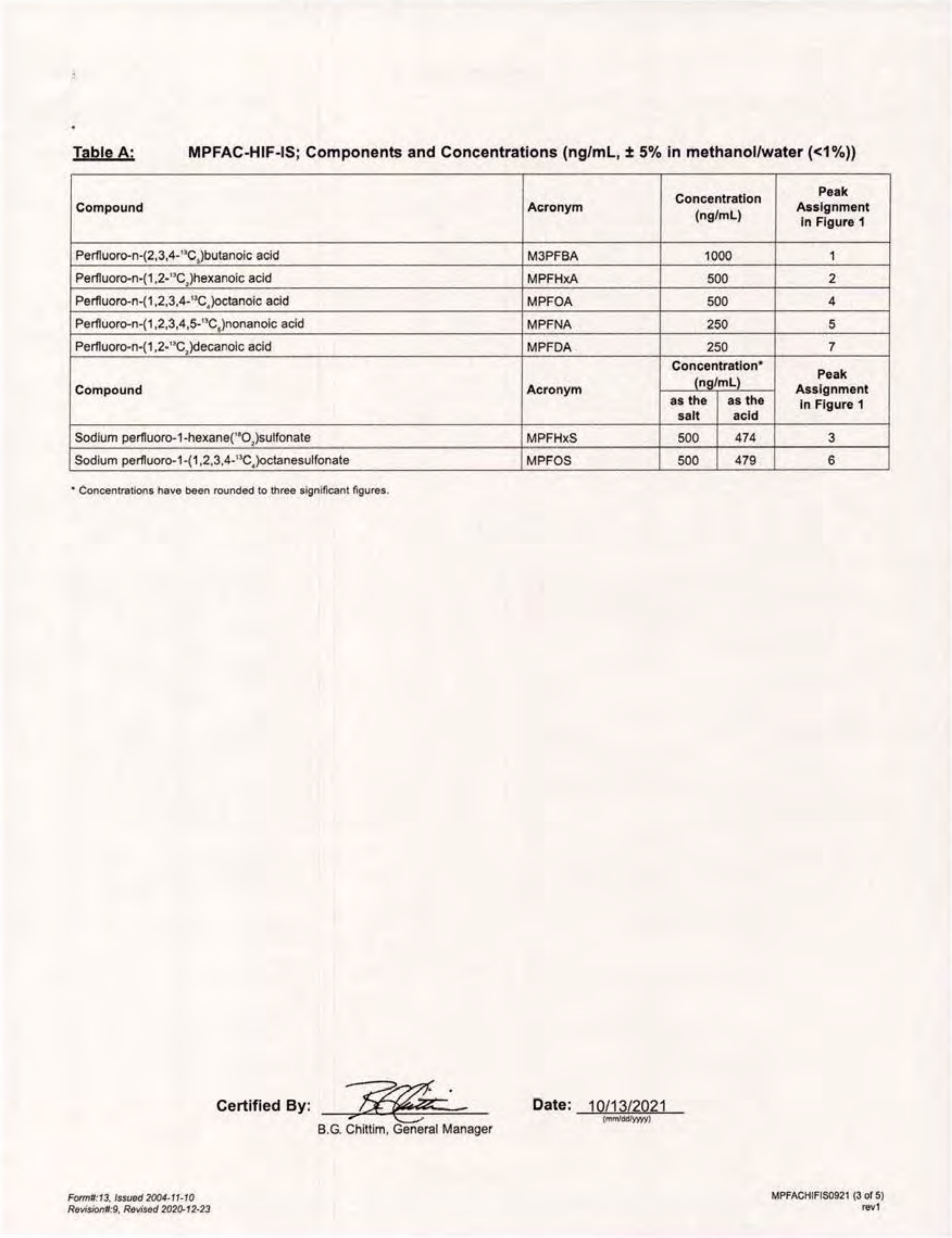


Table A: **MPFAC-HIF-IS; Components and Concentrations (ng/mL, ± 5% in methanol/water (<1%))**

Compound	Acronym	Concentration (ng/mL)		Peak Assignment in Figure 1
Perfluoro-n-(2,3,4-$^{13}C_3$)butanoic acid	M3PFBA	1000		1
Perfluoro-n-(1,2-$^{13}C_2$)hexanoic acid	MPFHxA	500		2
Perfluoro-n-(1,2,3,4-$^{13}C_4$)octanoic acid	MPFOA	500		4
Perfluoro-n-(1,2,3,4,5-$^{13}C_5$)nonanoic acid	MPFNA	250		5
Perfluoro-n-(1,2-$^{13}C_2$)decanoic acid	MPFDA	250		7
Compound	**Acronym**	**Concentration* (ng/mL)**		**Peak Assignment in Figure 1**
		as the salt	**as the acid**	
Sodium perfluoro-1-hexane($^{18}O_2$)sulfonate	MPFHxS	500	474	3
Sodium perfluoro-1-(1,2,3,4-$^{13}C_4$)octanesulfonate	MPFOS	500	479	6

* Concentrations have been rounded to three significant figures.

Certified By: B.G. Chittim, General Manager **Date:** 10/13/2021 (mm/dd/yyyy)

Form#:13, Issued 2004-11-10
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rev1

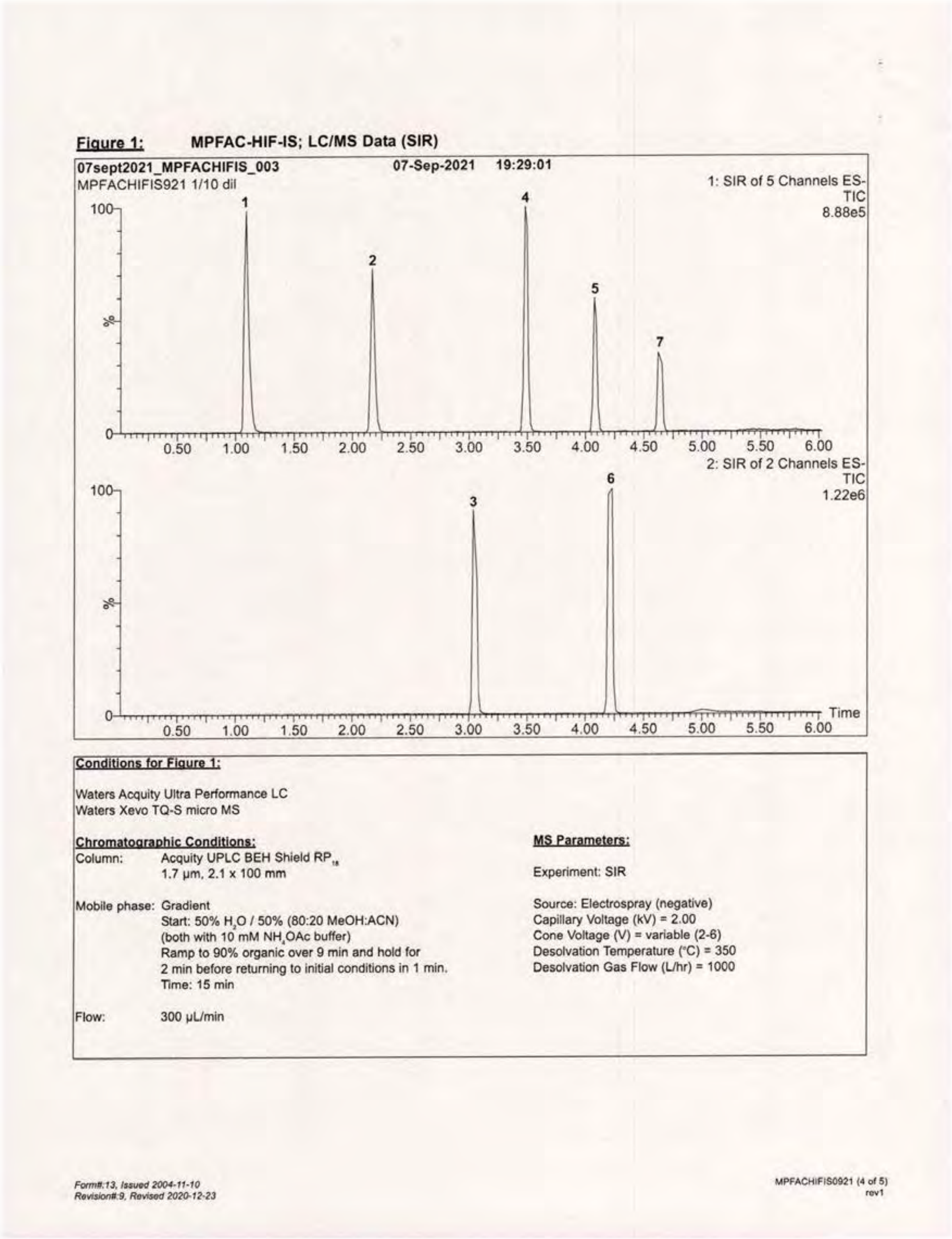

Figure 1: **MPFAC-HIF-IS; LC/MS Data (SIR)**

Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP$_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (2-6)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

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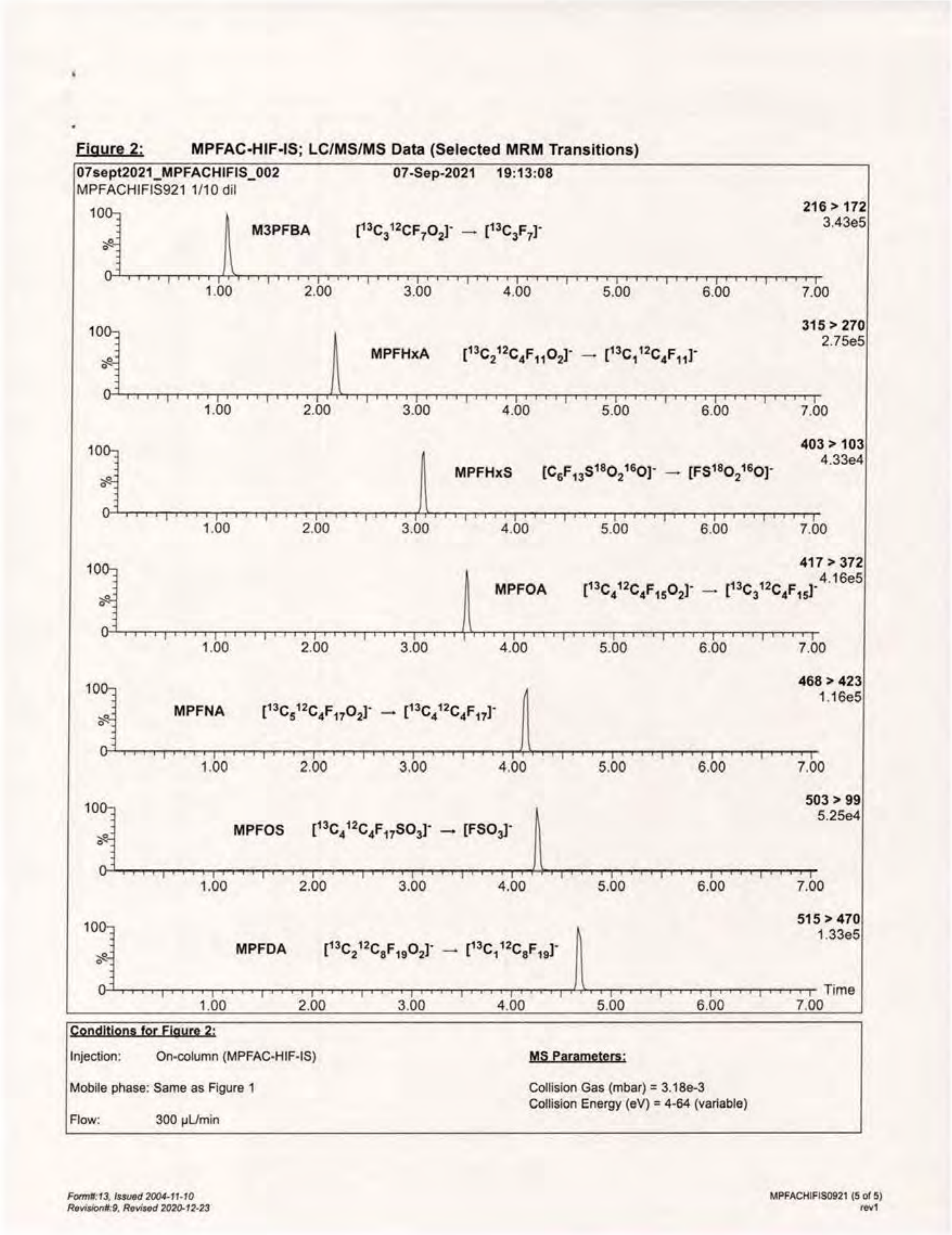

Figure 2: **MPFAC-HIF-IS; LC/MS/MS Data (Selected MRM Transitions)**

07sept2021_MPFACHIFIS_002 **07-Sep-2021 19:13:08**
MPFACHIFIS921 1/10 dil

Conditions for Figure 2:

Injection: On-column (MPFAC-HIF-IS)

Mobile phase: Same as Figure 1

Flow: 300 μL/min

MS Parameters:

Collision Gas (mbar) = 3.18e-3
Collision Energy (eV) = 4-64 (variable)

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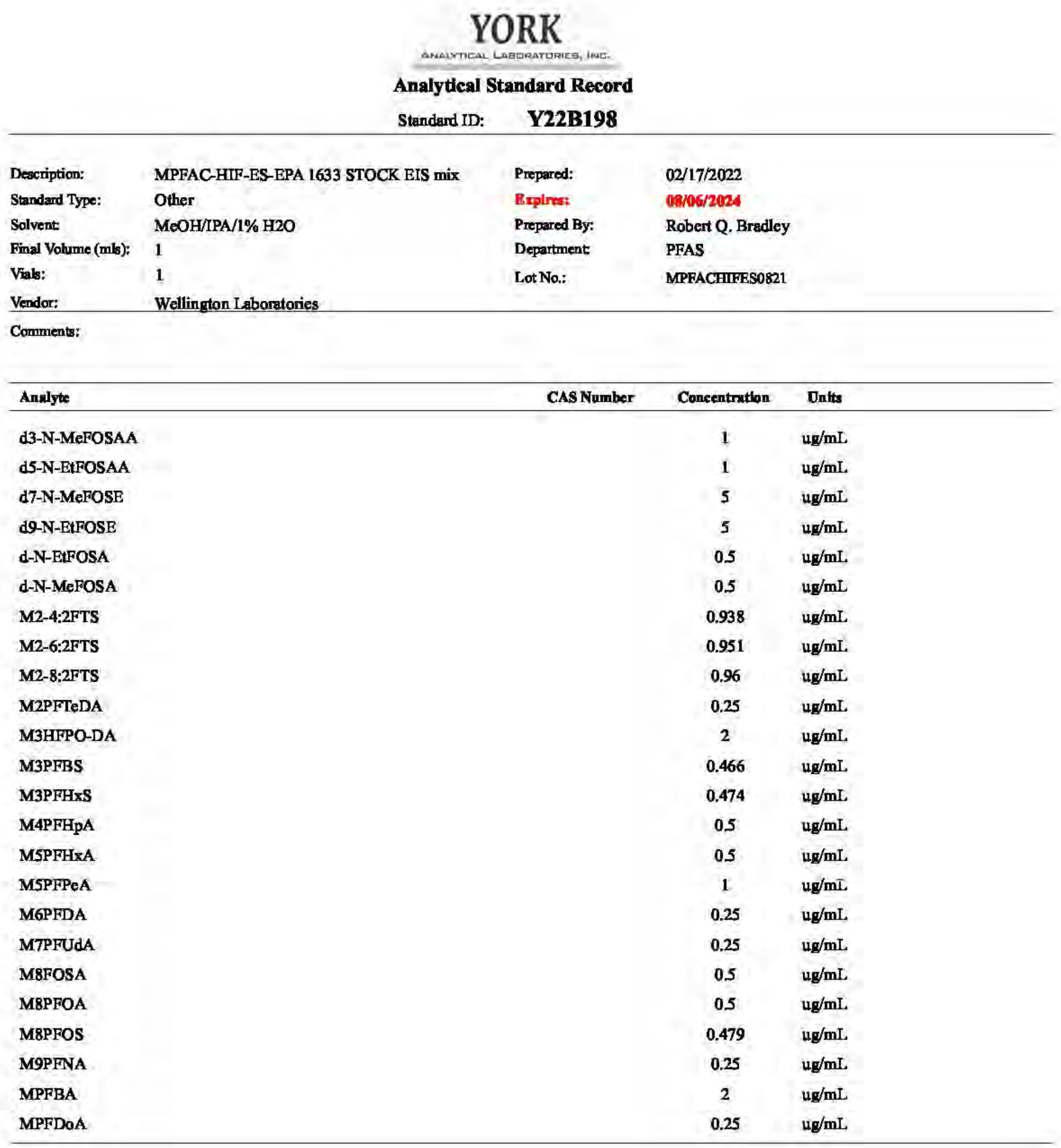
Attachment 2 – Extracted Internal Standards (EIS)



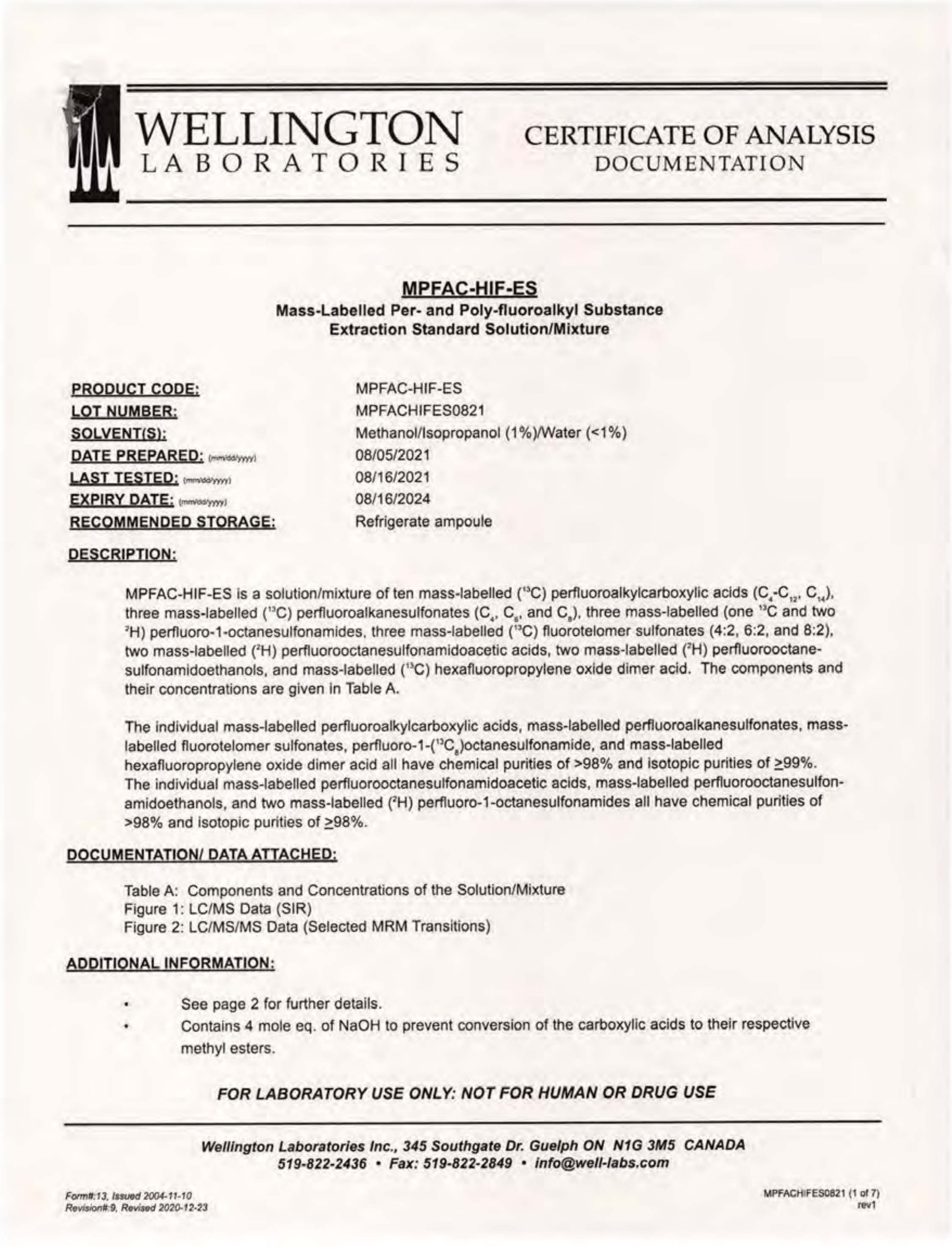
YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: Y22B198

Description:	MPFAC-HIF-ES-EPA 1633 STOCK EIS mix	**Prepared:**	02/17/2022
Standard Type:	Other	**Expires:**	08/06/2024
Solvent:	MeOH/IPA/1% H2O	**Prepared By:**	Robert Q. Bradley
Final Volume (mls):	1	**Department:**	PFAS
Vials:	1	**Lot No.:**	MPFACHIFES0821
Vendor:	Wellington Laboratories		
Comments:			

Analyte	CAS Number	Concentration	Units
d3-N-MeFOSAA		1	ug/mL
d5-N-EtFOSAA		1	ug/mL
d7-N-MeFOSE		5	ug/mL
d9-N-EtFOSE		5	ug/mL
d-N-EtFOSA		0.5	ug/mL
d-N-MeFOSA		0.5	ug/mL
M2-4:2FTS		0.938	ug/mL
M2-6:2FTS		0.951	ug/mL
M2-8:2FTS		0.96	ug/mL
M2PFTeDA		0.25	ug/mL
M3HFPO-DA		2	ug/mL
M3PFBS		0.466	ug/mL
M3PFHxS		0.474	ug/mL
M4PFHpA		0.5	ug/mL
M5PFHxA		0.5	ug/mL
M5PFPeA		1	ug/mL
M6PFDA		0.25	ug/mL
M7PFUdA		0.25	ug/mL
M8FOSA		0.5	ug/mL
M8PFOA		0.5	ug/mL
M8PFOS		0.479	ug/mL
M9PFNA		0.25	ug/mL
MPFBA		2	ug/mL
MPFDoA		0.25	ug/mL



WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

MPFAC-HIF-ES

Mass-Labelled Per- and Poly-fluoroalkyl Substance Extraction Standard Solution/Mixture

PRODUCT CODE:	MPFAC-HIF-ES
LOT NUMBER:	MPFACHIFES0821
SOLVENT(S):	Methanol/Isopropanol (1%)/Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	08/05/2021
LAST TESTED: (mm/dd/yyyy)	08/16/2021
EXPIRY DATE: (mm/dd/yyyy)	08/16/2024
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

MPFAC-HIF-ES is a solution/mixture of ten mass-labelled (^{13}C) perfluoroalkylcarboxylic acids (C_4-C_{12}, C_{14}), three mass-labelled (^{13}C) perfluoroalkanesulfonates (C_4, C_6, and C_8), three mass-labelled (one ^{13}C and two ^{2}H) perfluoro-1-octanesulfonamides, three mass-labelled (^{13}C) fluorotelomer sulfonates (4:2, 6:2, and 8:2), two mass-labelled (^{2}H) perfluorooctanesulfonamidoacetic acids, two mass-labelled (^{2}H) perfluorooctanesulfonamidoethanols, and mass-labelled (^{13}C) hexafluoropropylene oxide dimer acid. The components and their concentrations are given in Table A.

The individual mass-labelled perfluoroalkylcarboxylic acids, mass-labelled perfluoroalkanesulfonates, mass-labelled fluorotelomer sulfonates, perfluoro-1-($^{13}C_8$)octanesulfonamide, and mass-labelled hexafluoropropylene oxide dimer acid all have chemical purities of >98% and isotopic purities of ≥99%. The individual mass-labelled perfluorooctanesulfonamidoacetic acids, mass-labelled perfluorooctanesulfonamidoethanols, and two mass-labelled (^{2}H) perfluoro-1-octanesulfonamides all have chemical purities of >98% and isotopic purities of ≥98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (1 of 7)
rev1

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

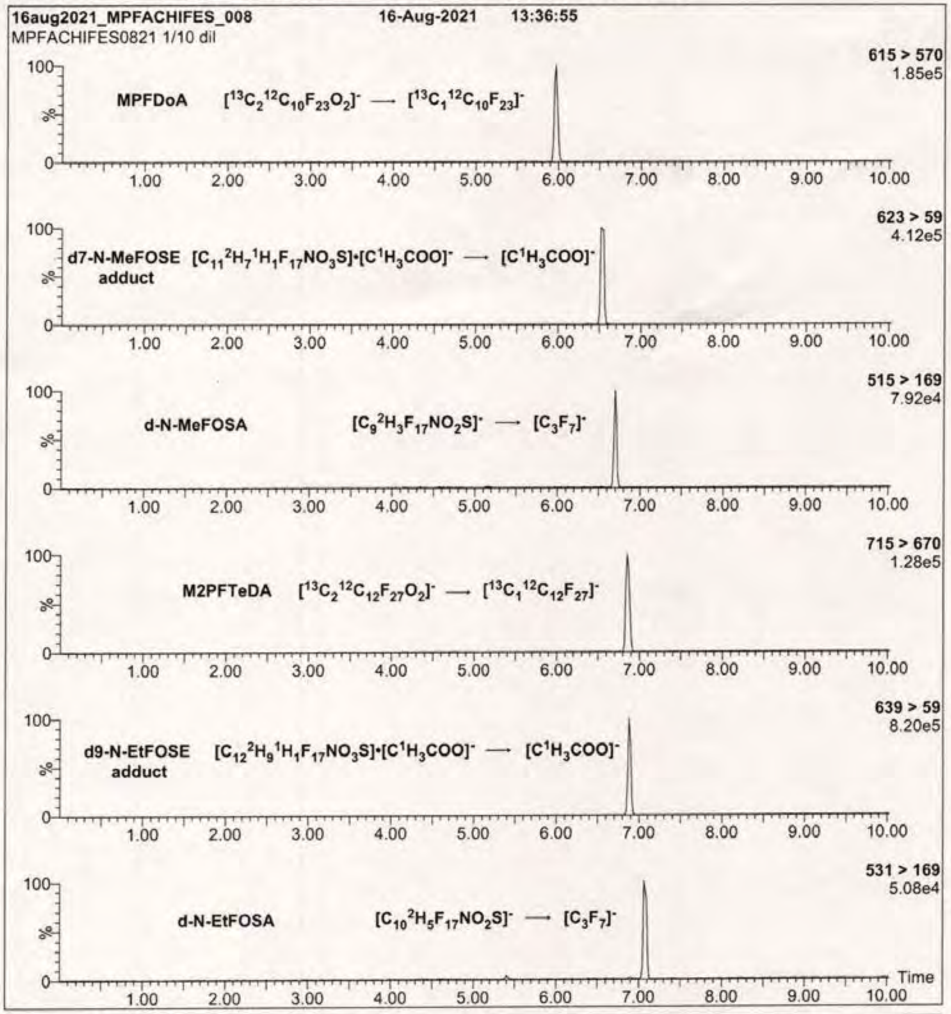
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 2: **MPFAC-HIF-ES; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (MPFAC-HIF-ES)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:

Collision Gas (mbar) = 3.41e-3
Collision Energy (eV) = 4-64 (variable)

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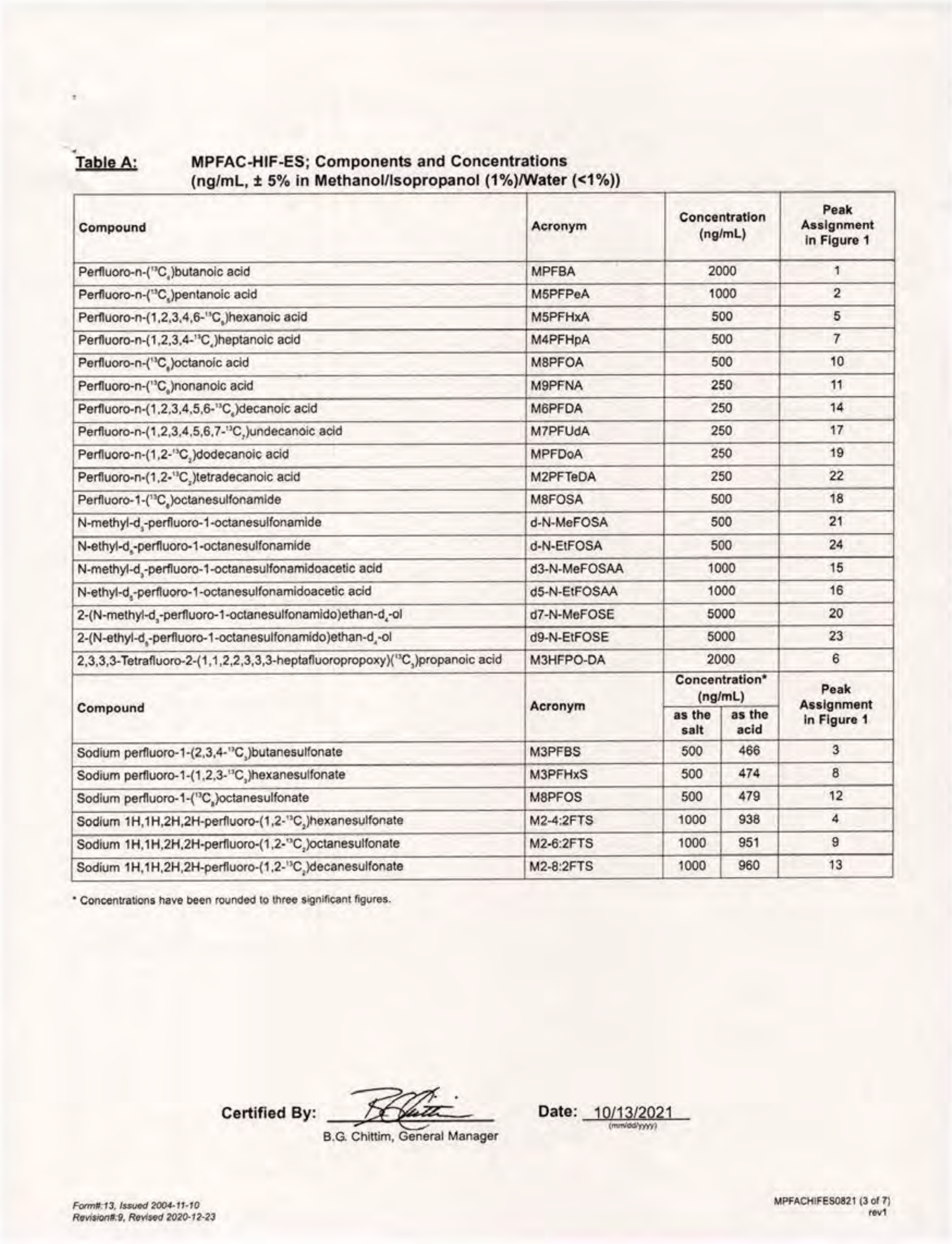

Table A: **MPFAC-HIF-ES; Components and Concentrations (ng/mL, ± 5% in Methanol/Isopropanol (1%)/Water (<1%))**

Compound	Acronym	Concentration (ng/mL)		Peak Assignment in Figure 1
Perfluoro-n-($^{13}C_4$)butanoic acid	MPFBA	2000		1
Perfluoro-n-($^{13}C_5$)pentanoic acid	M5PFPeA	1000		2
Perfluoro-n-(1,2,3,4,6-$^{13}C_5$)hexanoic acid	M5PFHxA	500		5
Perfluoro-n-(1,2,3,4-$^{13}C_4$)heptanoic acid	M4PFHpA	500		7
Perfluoro-n-($^{13}C_8$)octanoic acid	M8PFOA	500		10
Perfluoro-n-($^{13}C_9$)nonanoic acid	M9PFNA	250		11
Perfluoro-n-(1,2,3,4,5,6-$^{13}C_6$)decanoic acid	M6PFDA	250		14
Perfluoro-n-(1,2,3,4,5,6,7-$^{13}C_7$)undecanoic acid	M7PFUdA	250		17
Perfluoro-n-(1,2-$^{13}C_2$)dodecanoic acid	MPFDoA	250		19
Perfluoro-n-(1,2-$^{13}C_2$)tetradecanoic acid	M2PFTeDA	250		22
Perfluoro-1-($^{13}C_8$)octanesulfonamide	M8FOSA	500		18
N-methyl-d_3-perfluoro-1-octanesulfonamide	d-N-MeFOSA	500		21
N-ethyl-d_5-perfluoro-1-octanesulfonamide	d-N-EtFOSA	500		24
N-methyl-d_3-perfluoro-1-octanesulfonamidoacetic acid	d3-N-MeFOSAA	1000		15
N-ethyl-d_5-perfluoro-1-octanesulfonamidoacetic acid	d5-N-EtFOSAA	1000		16
2-(N-methyl-d_3-perfluoro-1-octanesulfonamido)ethan-d_4-ol	d7-N-MeFOSE	5000		20
2-(N-ethyl-d_5-perfluoro-1-octanesulfonamido)ethan-d_4-ol	d9-N-EtFOSE	5000		23
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)($^{13}C_3$)propanoic acid	M3HFPO-DA	2000		6
Compound	**Acronym**	**Concentration* (ng/mL)**		**Peak Assignment in Figure 1**
		as the salt	**as the acid**	
Sodium perfluoro-1-(2,3,4-$^{13}C_3$)butanesulfonate	M3PFBS	500	466	3
Sodium perfluoro-1-(1,2,3-$^{13}C_3$)hexanesulfonate	M3PFHxS	500	474	8
Sodium perfluoro-1-($^{13}C_8$)octanesulfonate	M8PFOS	500	479	12
Sodium 1H,1H,2H,2H-perfluoro-(1,2-$^{13}C_2$)hexanesulfonate	M2-4:2FTS	1000	938	4
Sodium 1H,1H,2H,2H-perfluoro-(1,2-$^{13}C_2$)octanesulfonate	M2-6:2FTS	1000	951	9
Sodium 1H,1H,2H,2H-perfluoro-(1,2-$^{13}C_2$)decanesulfonate	M2-8:2FTS	1000	960	13

* Concentrations have been rounded to three significant figures.

Certified By: B.G. Chittim, General Manager

Date: 10/13/2021 (mm/dd/yyyy)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

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rev1

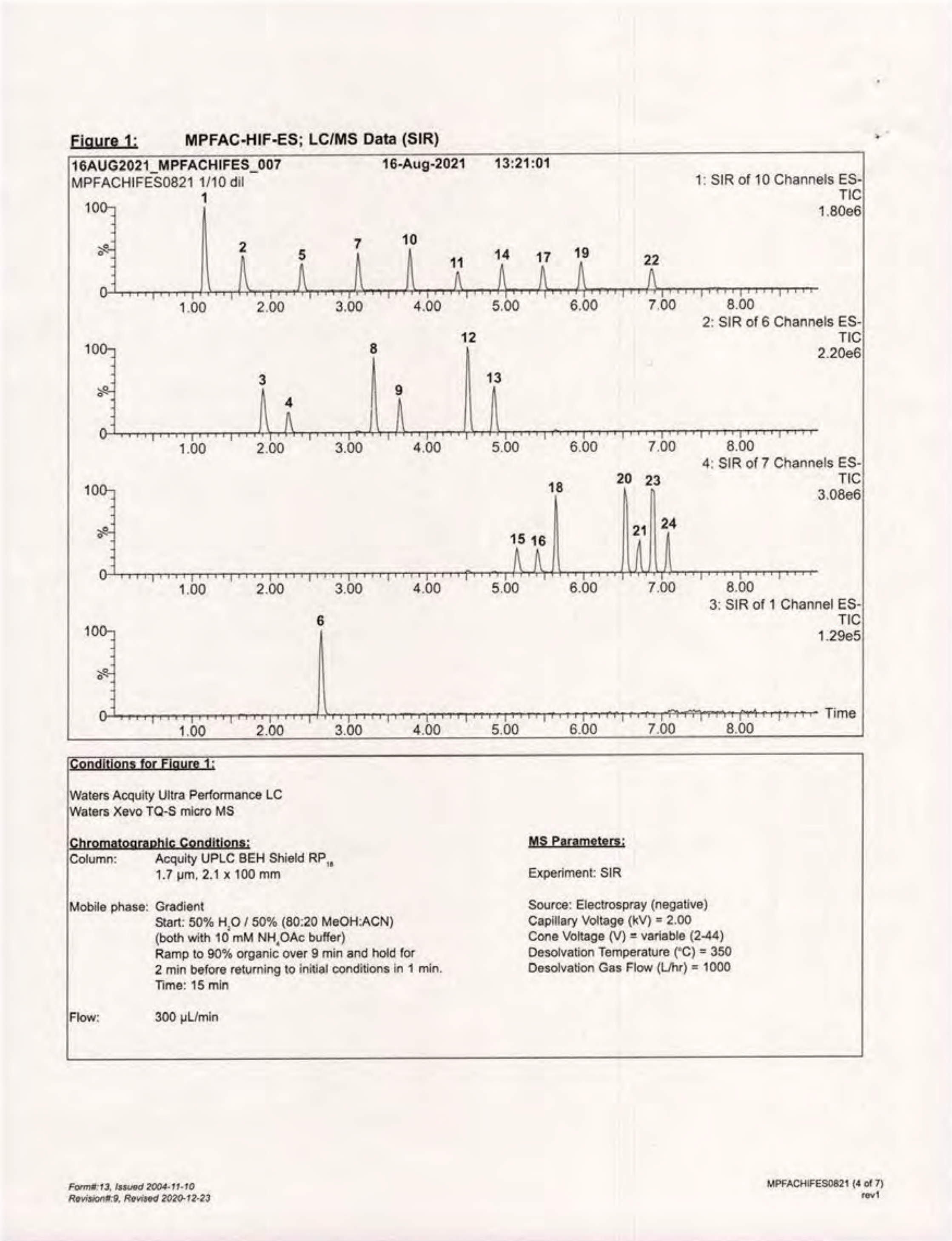

Figure 1: **MPFAC-HIF-ES; LC/MS Data (SIR)**

Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (2-44)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

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Revision#:9, Revised 2020-12-23

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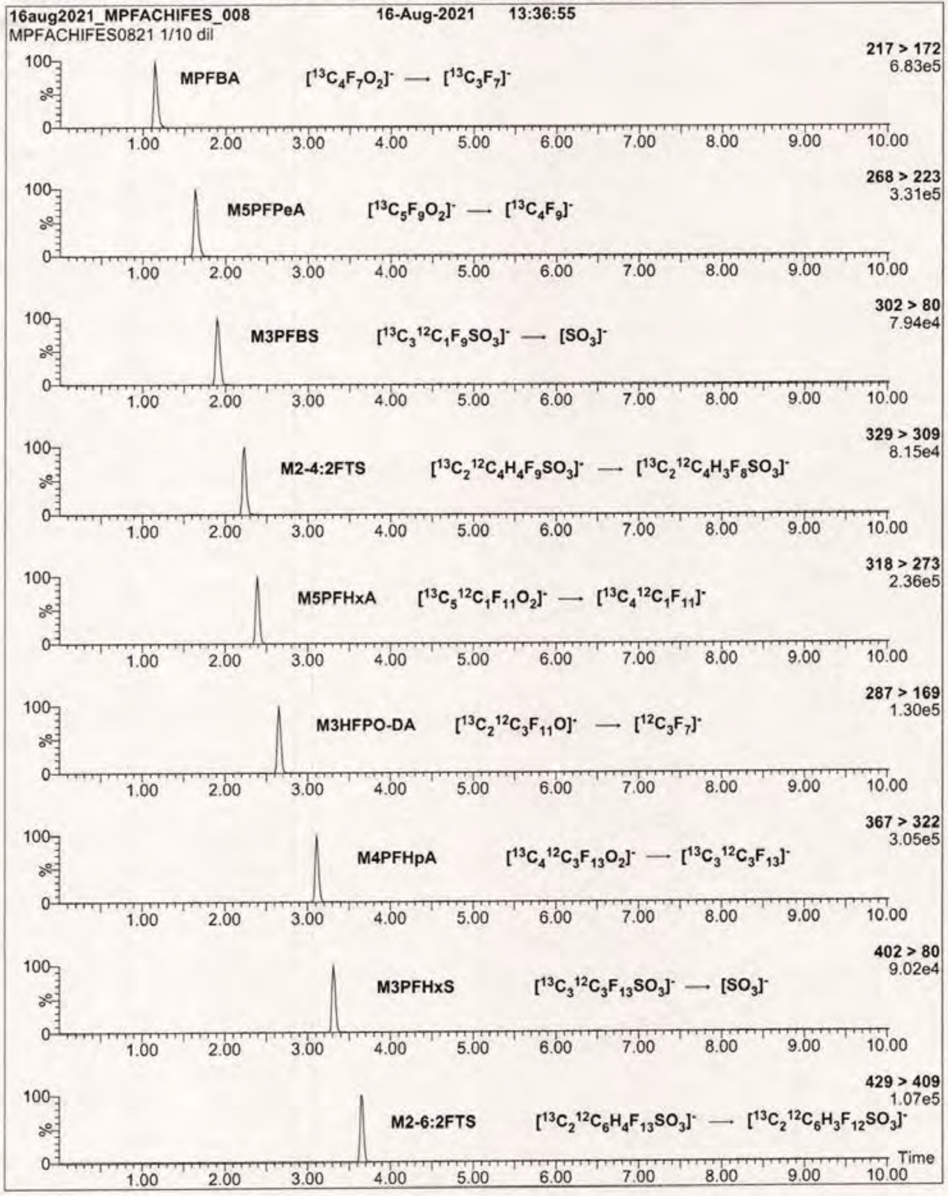
Figure 2: MPFAC-HIF-ES; LC/MS/MS Data (Selected MRM Transitions)



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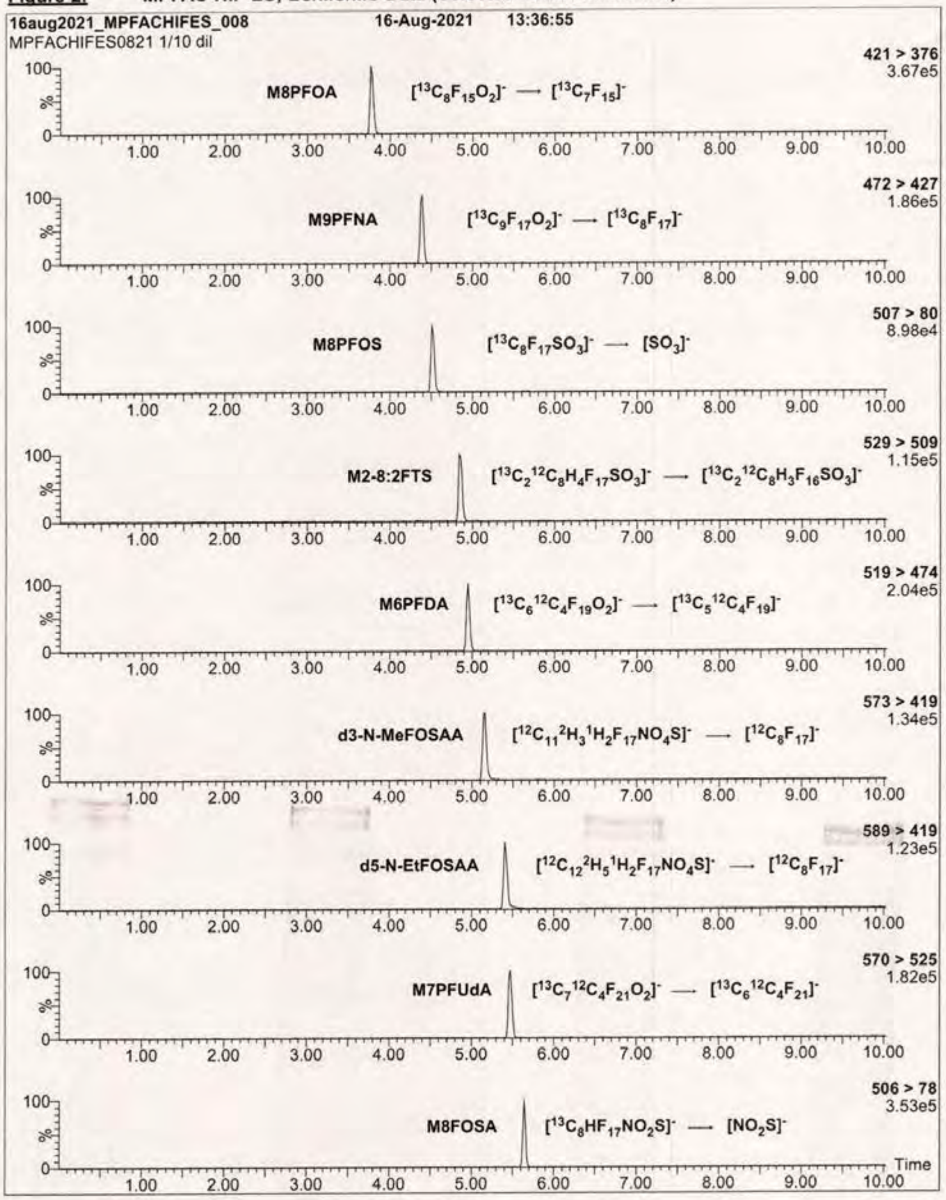
rev1

Figure 2: **MPFAC-HIF-ES; LC/MS/MS Data (Selected MRM Transitions)**

16aug2021_MPFACHIFES_008 16-Aug-2021 13:36:55
MPFACHIFES0821 1/10 dil



Form#:13, Issued 2004-11-10
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rev1

Attachment 3 – Target Analyte Mixtures

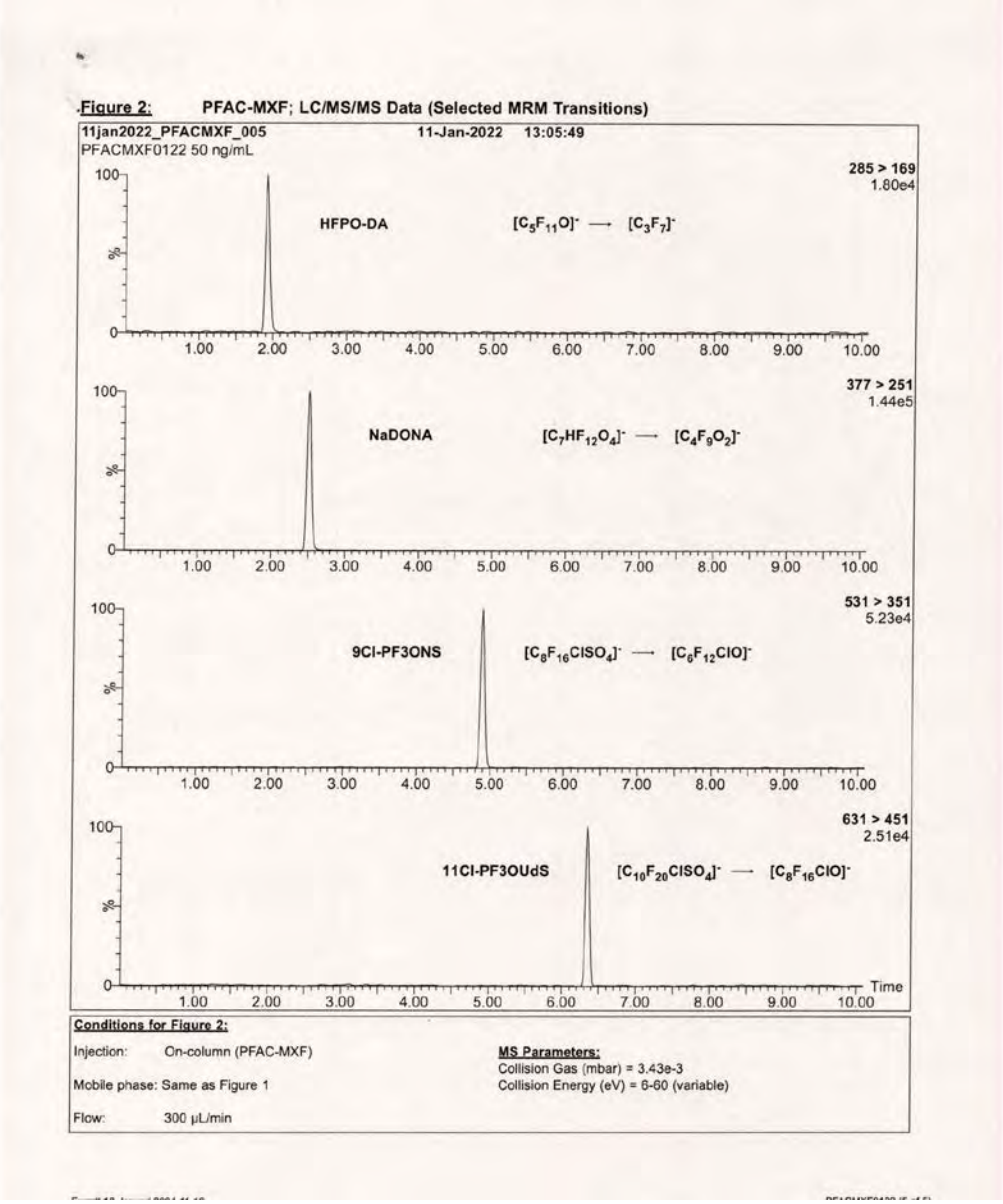


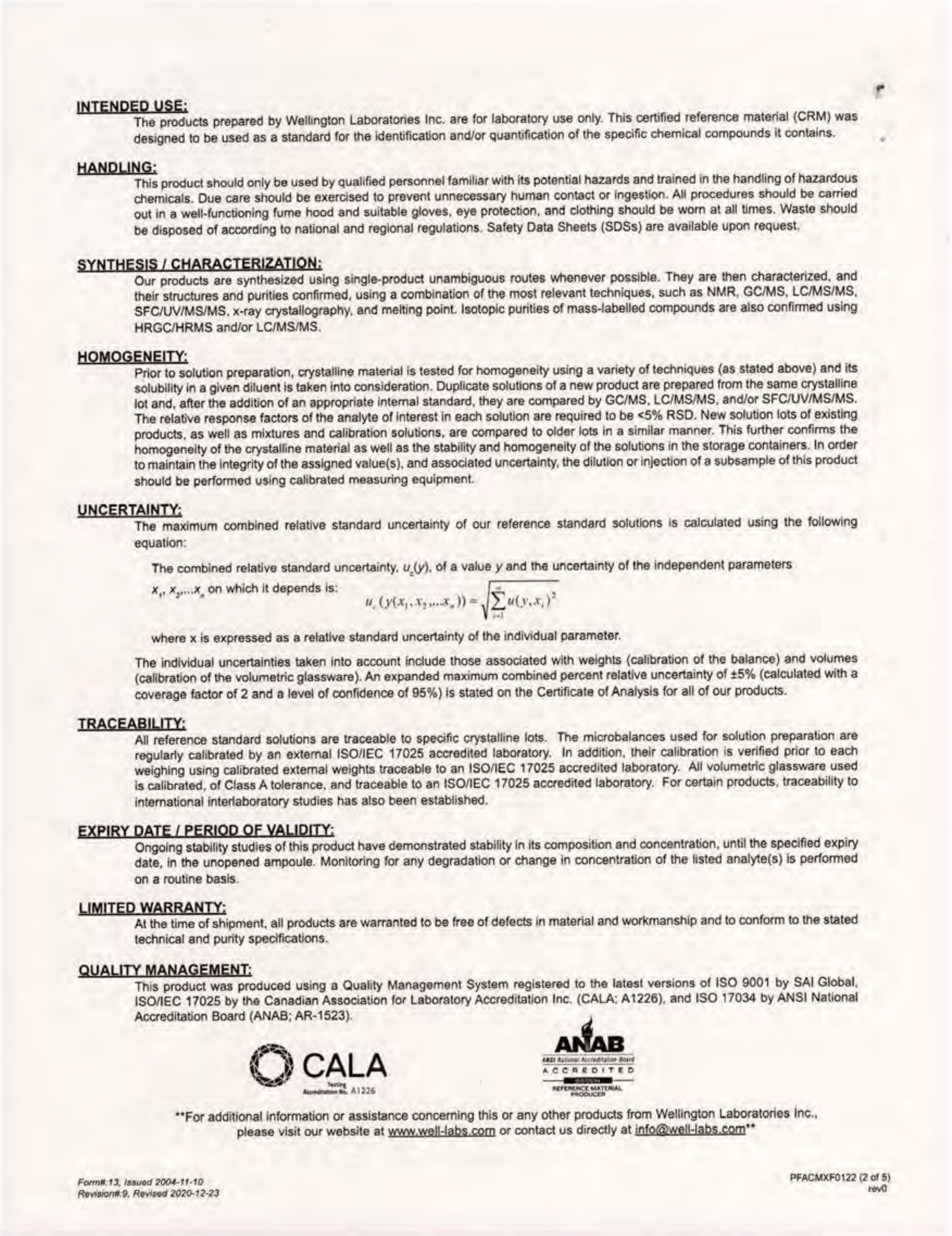
Figure 2: PFAC-MXF; LC/MS/MS Data (Selected MRM Transitions)

11jan2022_PFACMXF_005 11-Jan-2022 13:05:49
PFACMXF0122 50 ng/mL

Conditions for Figure 2:

Injection: On-column (PFAC-MXF)
Mobile phase: Same as Figure 1
Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 6-60 (variable)



INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

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Revision#:9, Revised 2020-12-23

PFACMXF0122 (2 of 5)
rev0

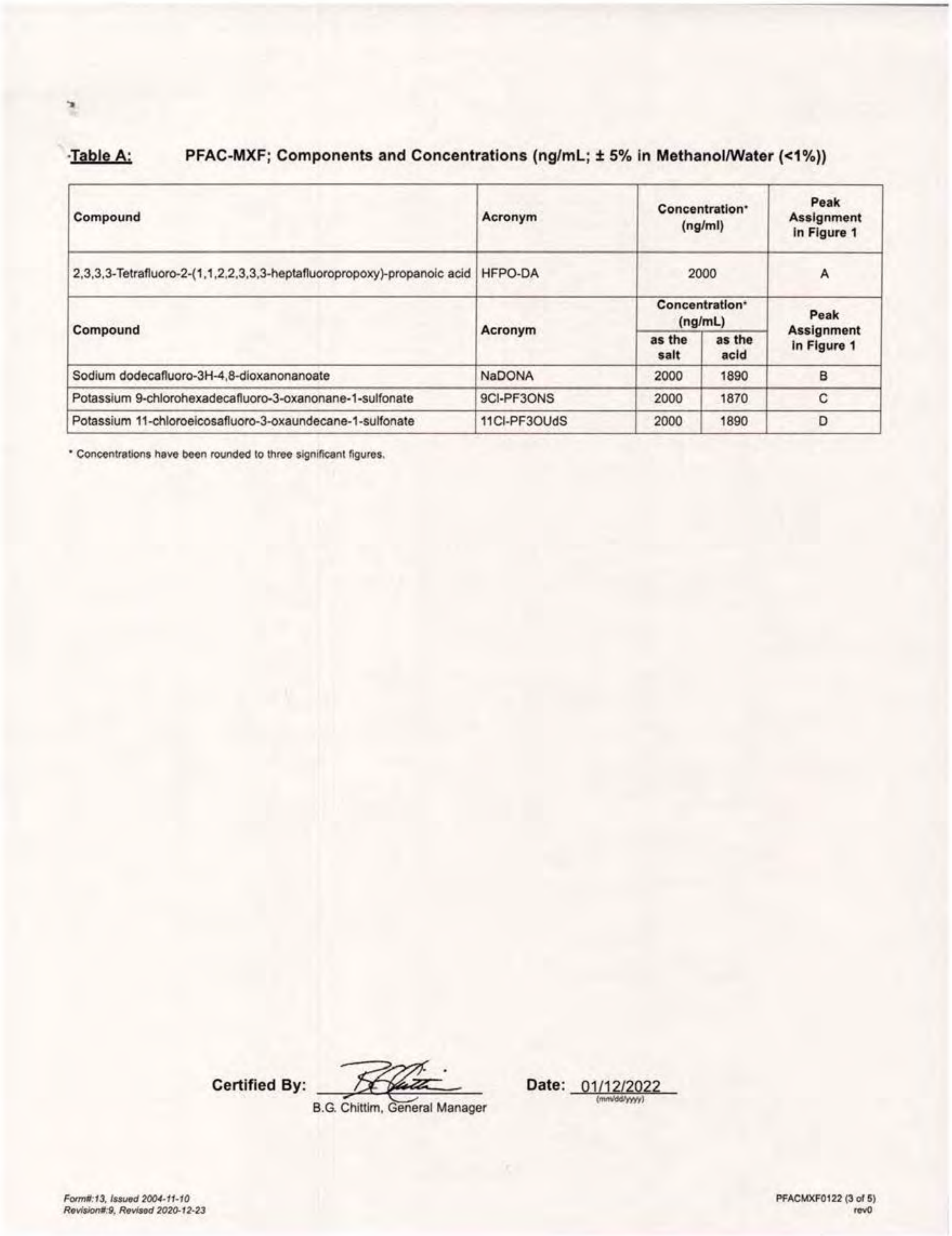


Table A: **PFAC-MXF; Components and Concentrations (ng/mL; ± 5% in Methanol/Water (<1%))**

Compound	Acronym	Concentration* (ng/ml)	Peak Assignment in Figure 1
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	HFPO-DA	2000	A

Compound	Acronym	Concentration* (ng/mL) as the salt	Concentration* (ng/mL) as the acid	Peak Assignment in Figure 1
Sodium dodecafluoro-3H-4,8-dioxanonanoate	NaDONA	2000	1890	B
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	2000	1870	C
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	2000	1890	D

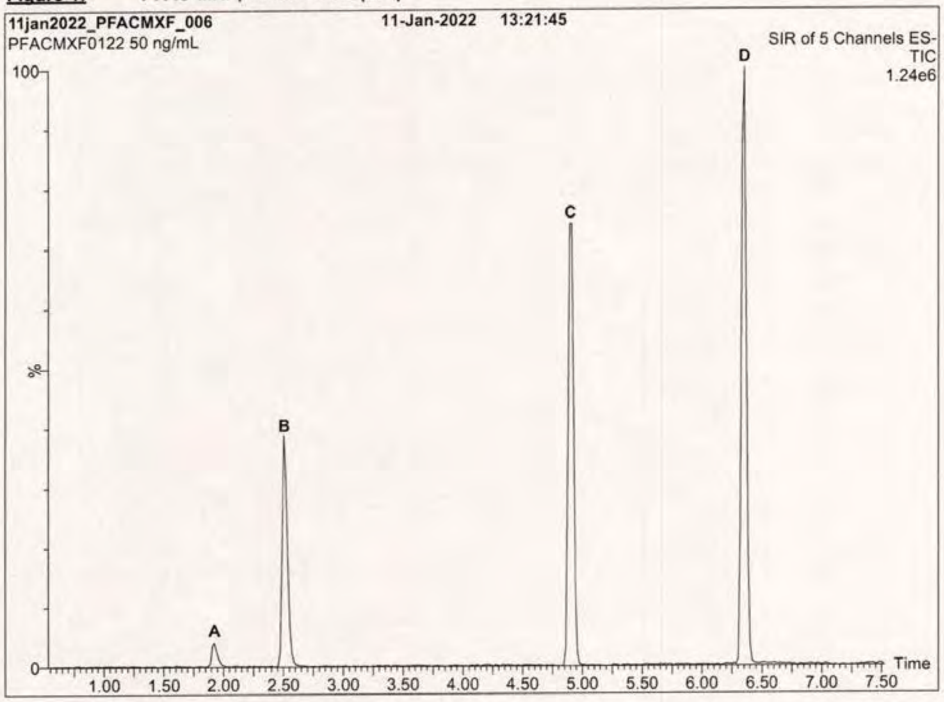
* Concentrations have been rounded to three significant figures.

Certified By: B.G. Chittim, General Manager **Date:** 01/12/2022 (mm/dd/yyyy)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXF0122 (3 of 5)
rev0

Figure 1: **PFAC-MXF; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

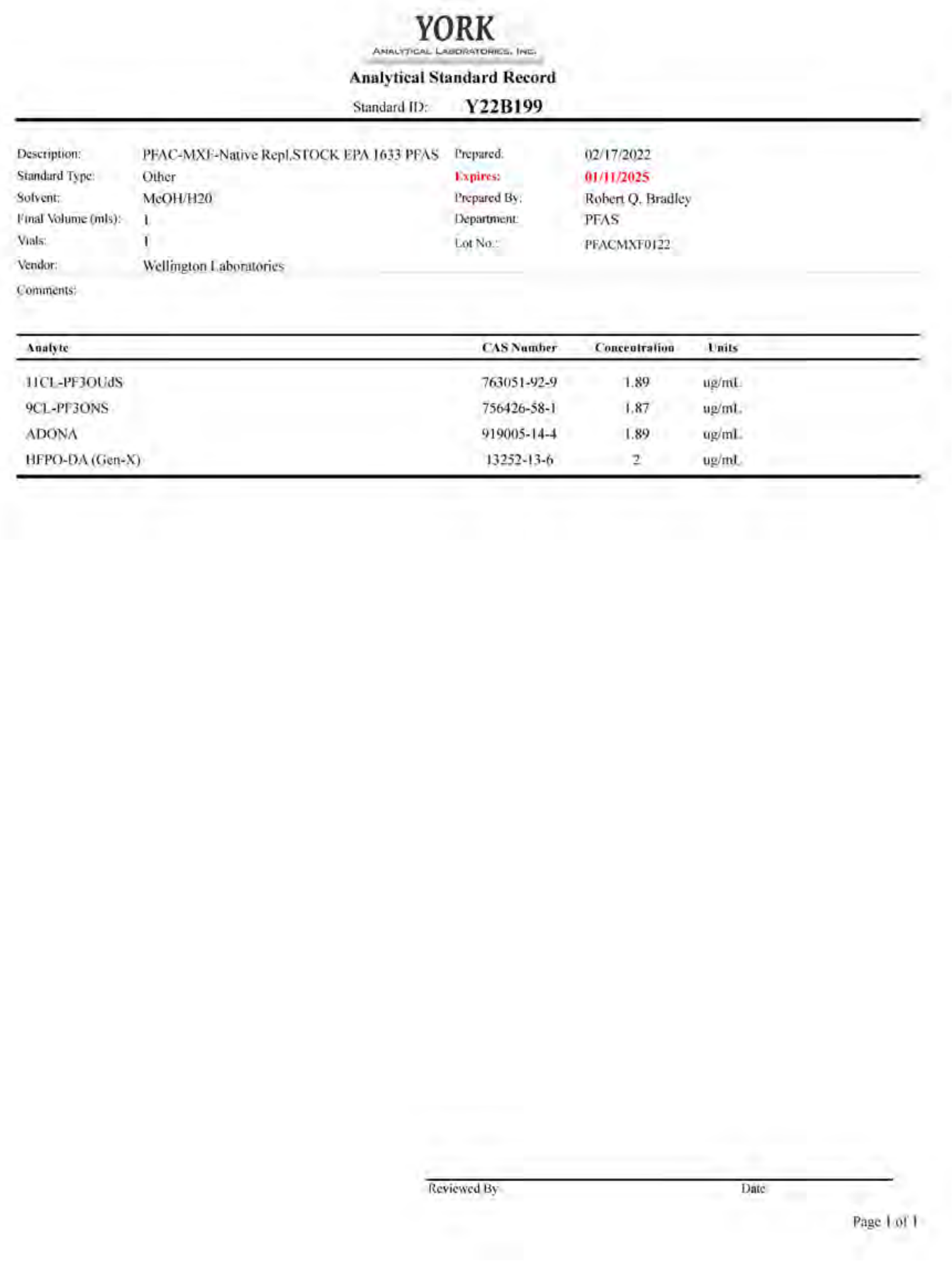
Mobile phase: Gradient
Start: 45% H_2O / 55% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 2 min
before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (15-74)
Desolvation Temperature (°C) = 325
Desolvation Gas Flow (L/hr) = 1000



YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B199**

Description:	PFAC-MXF-Native Repl.STOCK EPA 1633 PFAS	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**01/11/2025**
Solvent:	MeOH/H20	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXF0122
Vendor:	Wellington Laboratories		
Comments:			

Analyte	**CAS Number**	**Concentration**	**Units**
11CL-PF3OUdS	763051-92-9	1.89	ug/mL
9CL-PF3ONS	756426-58-1	1.87	ug/mL
ADONA	919005-14-4	1.89	ug/mL
HFPO-DA (Gen-X)	13252-13-6	2	ug/mL

Reviewed By: Date:

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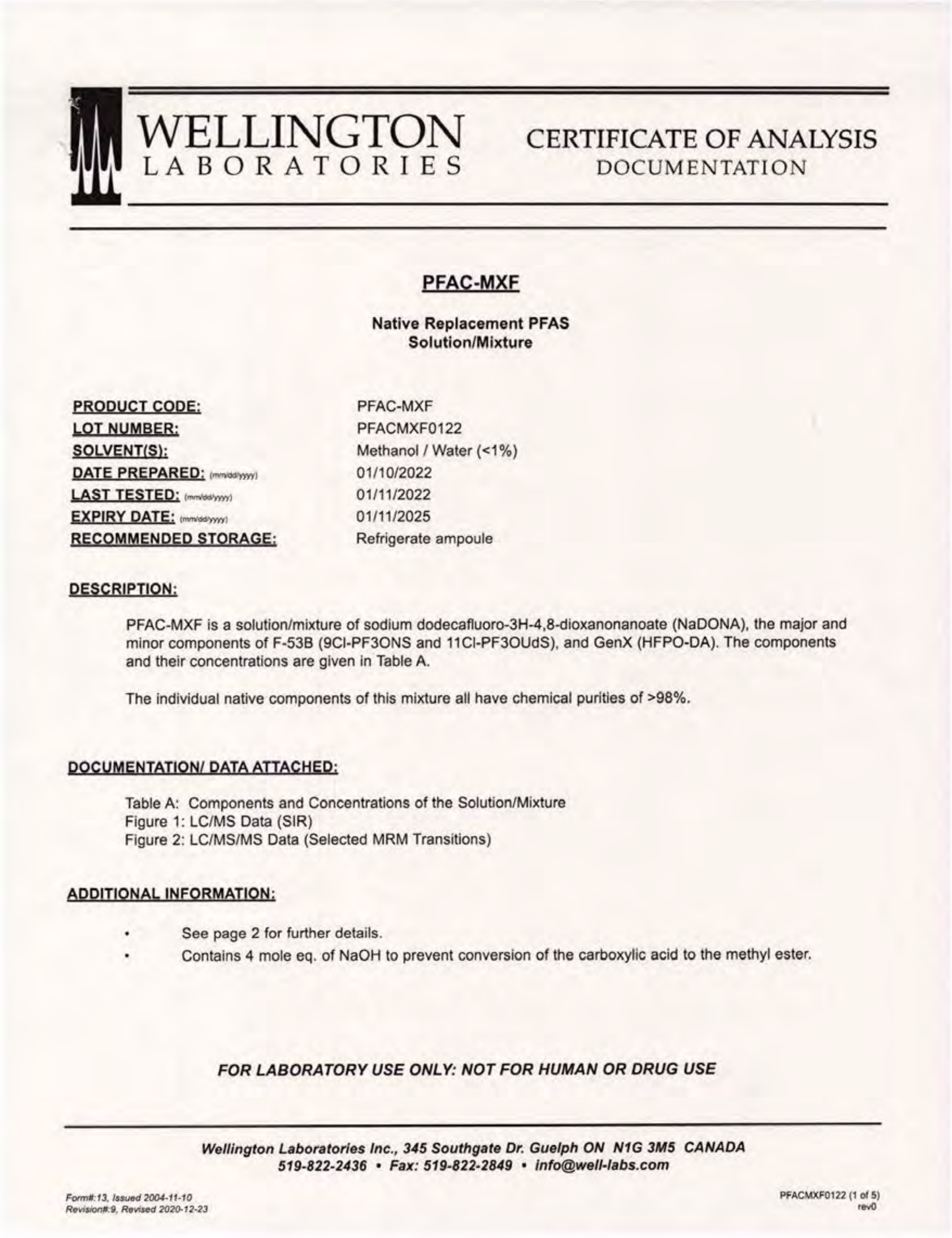

WELLINGTON LABORATORIES **CERTIFICATE OF ANALYSIS DOCUMENTATION**

PFAC-MXF

Native Replacement PFAS
Solution/Mixture

PRODUCT CODE:	PFAC-MXF
LOT NUMBER:	PFACMXF0122
SOLVENT(S):	Methanol / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	01/10/2022
LAST TESTED: (mm/dd/yyyy)	01/11/2022
EXPIRY DATE: (mm/dd/yyyy)	01/11/2025
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-MXF is a solution/mixture of sodium dodecafluoro-3H-4,8-dioxanonanoate (NaDONA), the major and minor components of F-53B (9Cl-PF3ONS and 11Cl-PF3OUdS), and GenX (HFPO-DA). The components and their concentrations are given in Table A.

The individual native components of this mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

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Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXF0122 (1 of 5)
rev0

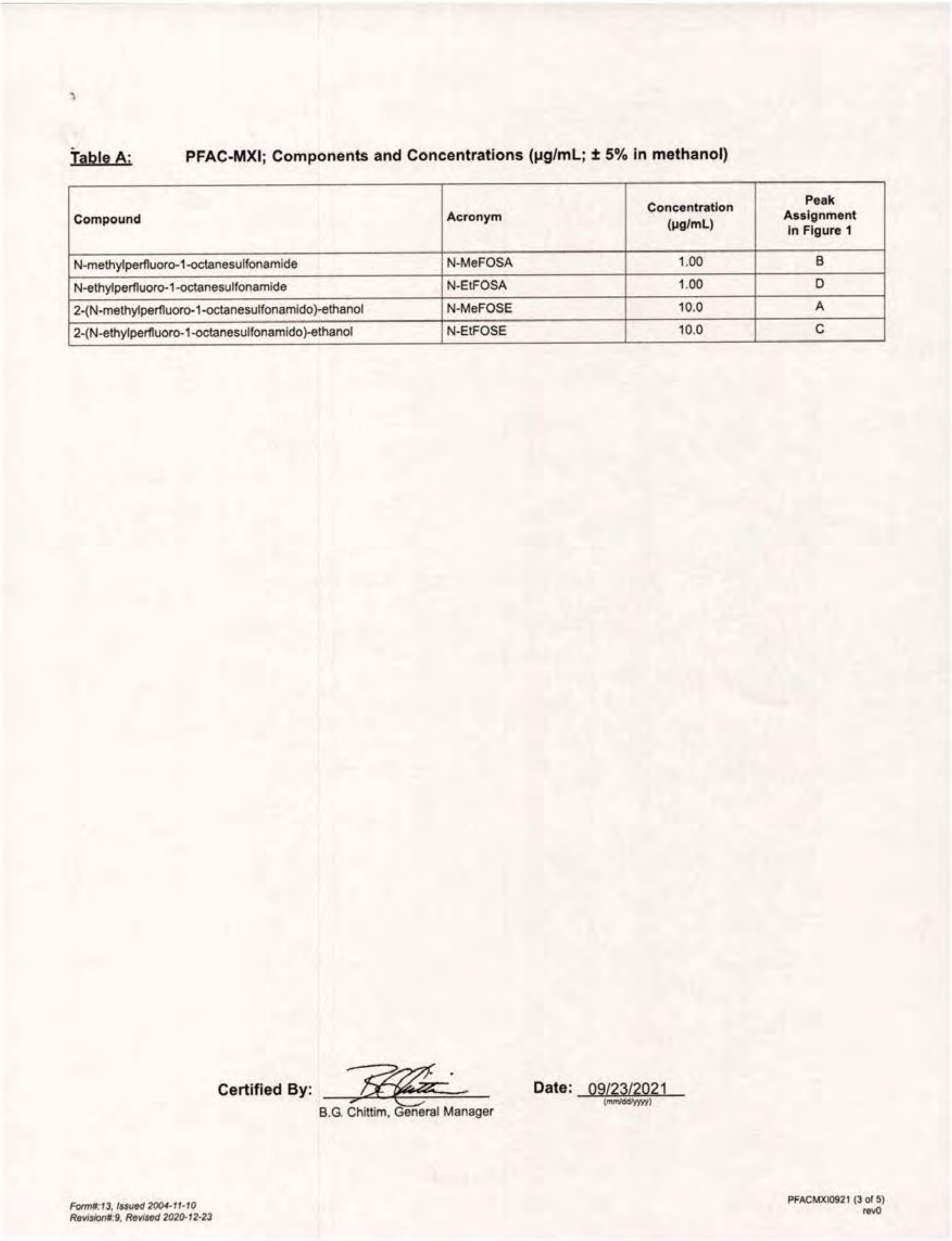

Table A: **PFAC-MXI; Components and Concentrations (µg/mL; ± 5% in methanol)**

Compound	Acronym	Concentration (µg/mL)	Peak Assignment in Figure 1
N-methylperfluoro-1-octanesulfonamide	N-MeFOSA	1.00	B
N-ethylperfluoro-1-octanesulfonamide	N-EtFOSA	1.00	D
2-(N-methylperfluoro-1-octanesulfonamido)-ethanol	N-MeFOSE	10.0	A
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol	N-EtFOSE	10.0	C

Certified By: ____________ **Date:** 09/23/2021
B.G. Chittim, General Manager (mm/dd/yyyy)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXI0921 (3 of 5)
rev0

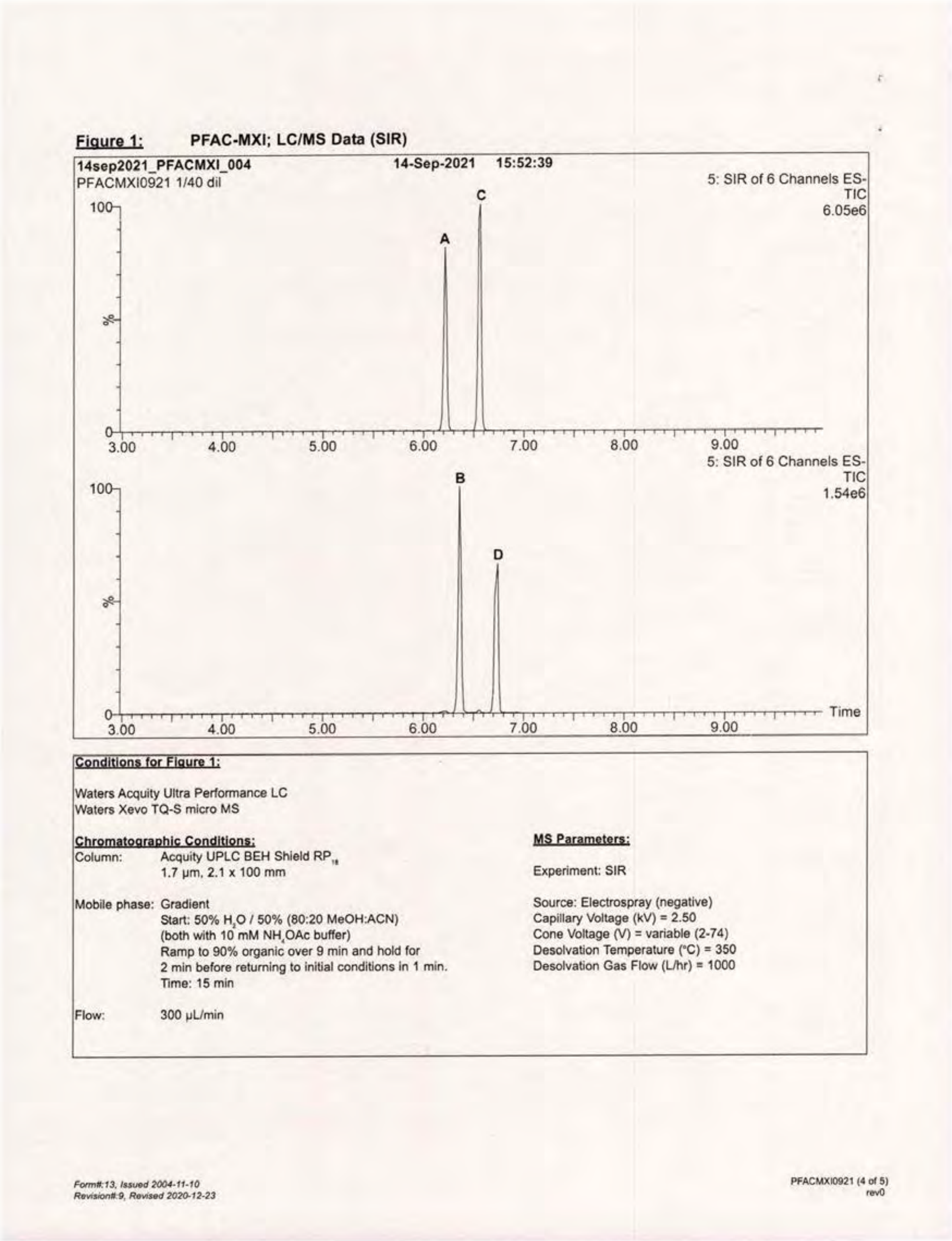

Figure 1: **PFAC-MXI; LC/MS Data (SIR)**

14sep2021_PFACMXI_004 **14-Sep-2021** **15:52:39**
PFACMXI0921 1/40 dil

Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = variable (2-74)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
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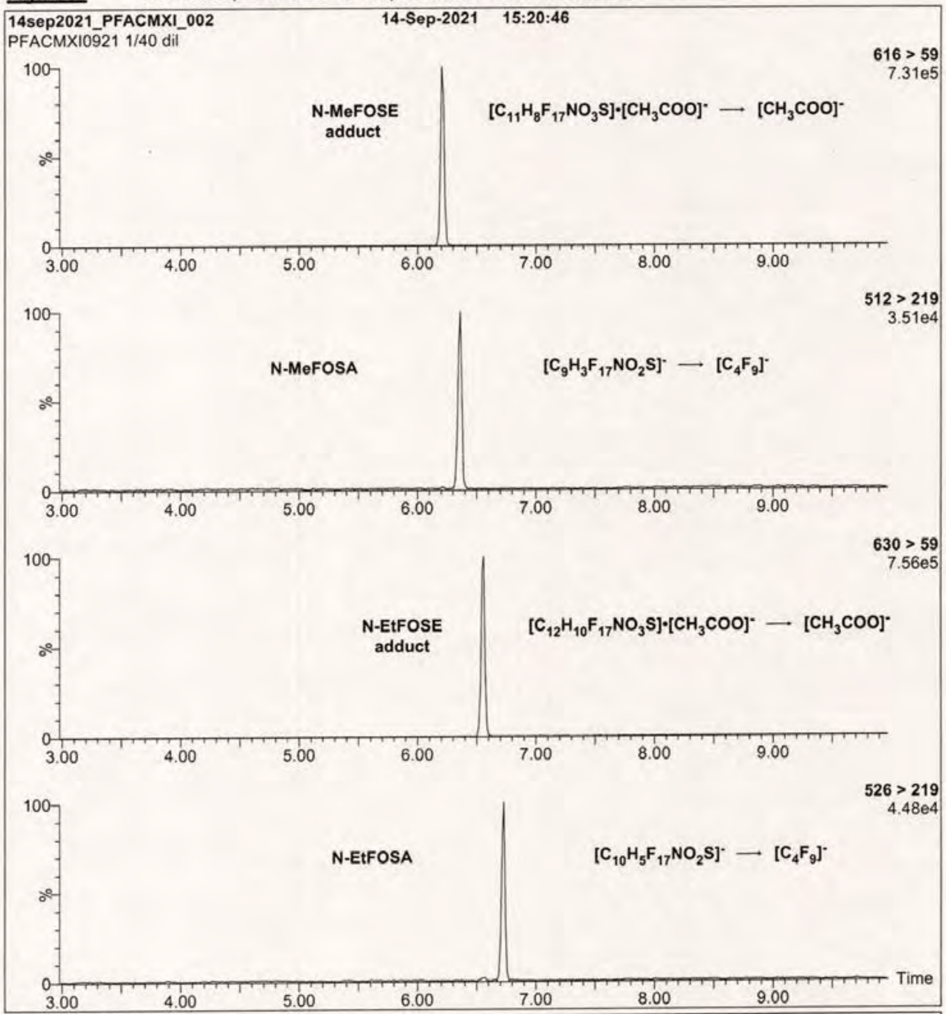
PFACMXI0921 (4 of 5)
rev0

Figure 2: **PFAC-MXI; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXI)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 6-60 (variable)

Form#:13, Issued 2004-11-10
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PFACMXI0921 (5 of 5)
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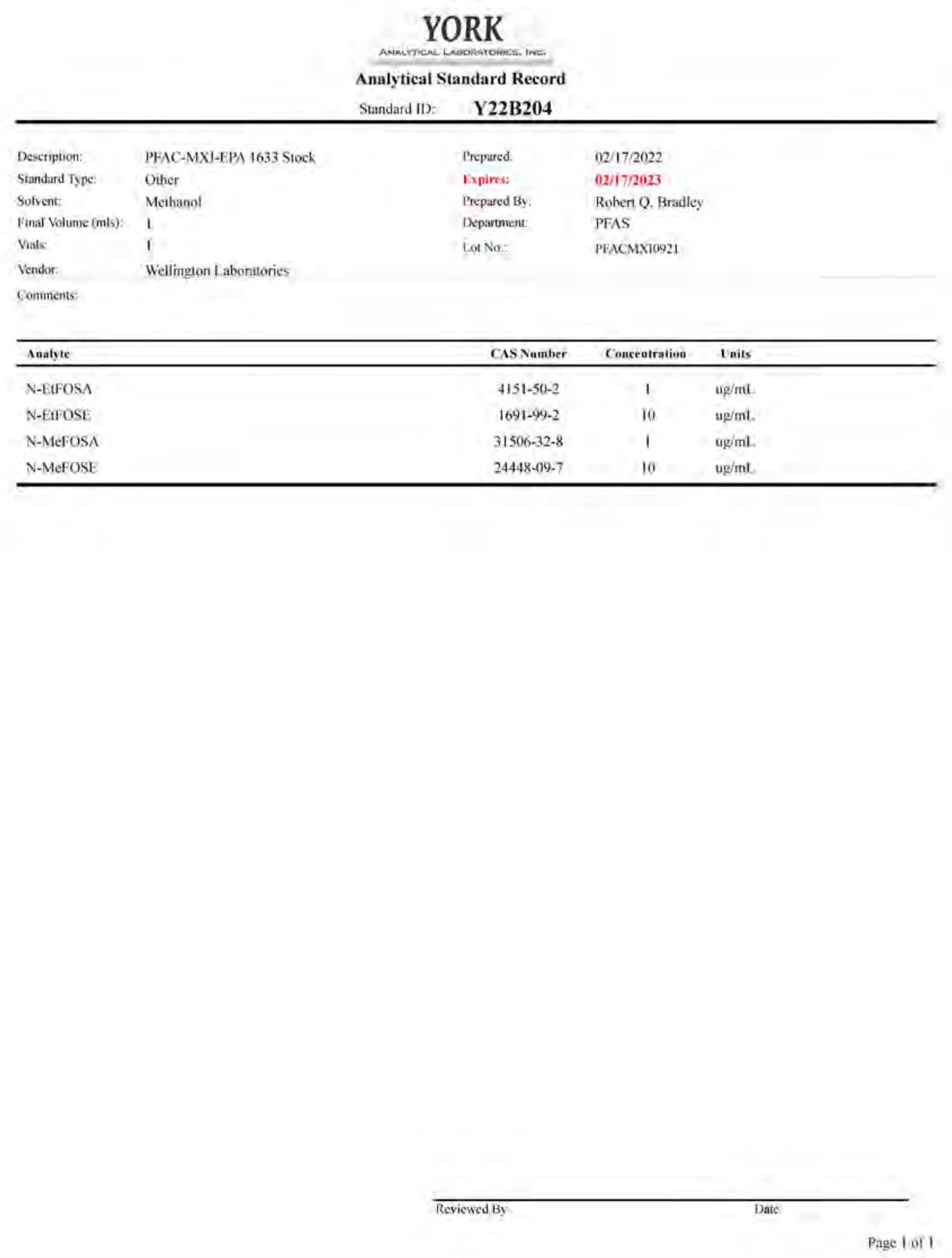

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B204**

Description:	PFAC-MXI-EPA 1633 Stock	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**02/17/2023**
Solvent:	Methanol	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXI0921
Vendor:	Wellington Laboratories		
Comments:			

Analyte	CAS Number	Concentration	Units
N-EtFOSA	4151-50-2	1	ug/mL
N-EtFOSE	1691-99-2	10	ug/mL
N-MeFOSA	31506-32-8	1	ug/mL
N-MeFOSE	24448-09-7	10	ug/mL

Reviewed By: Date:

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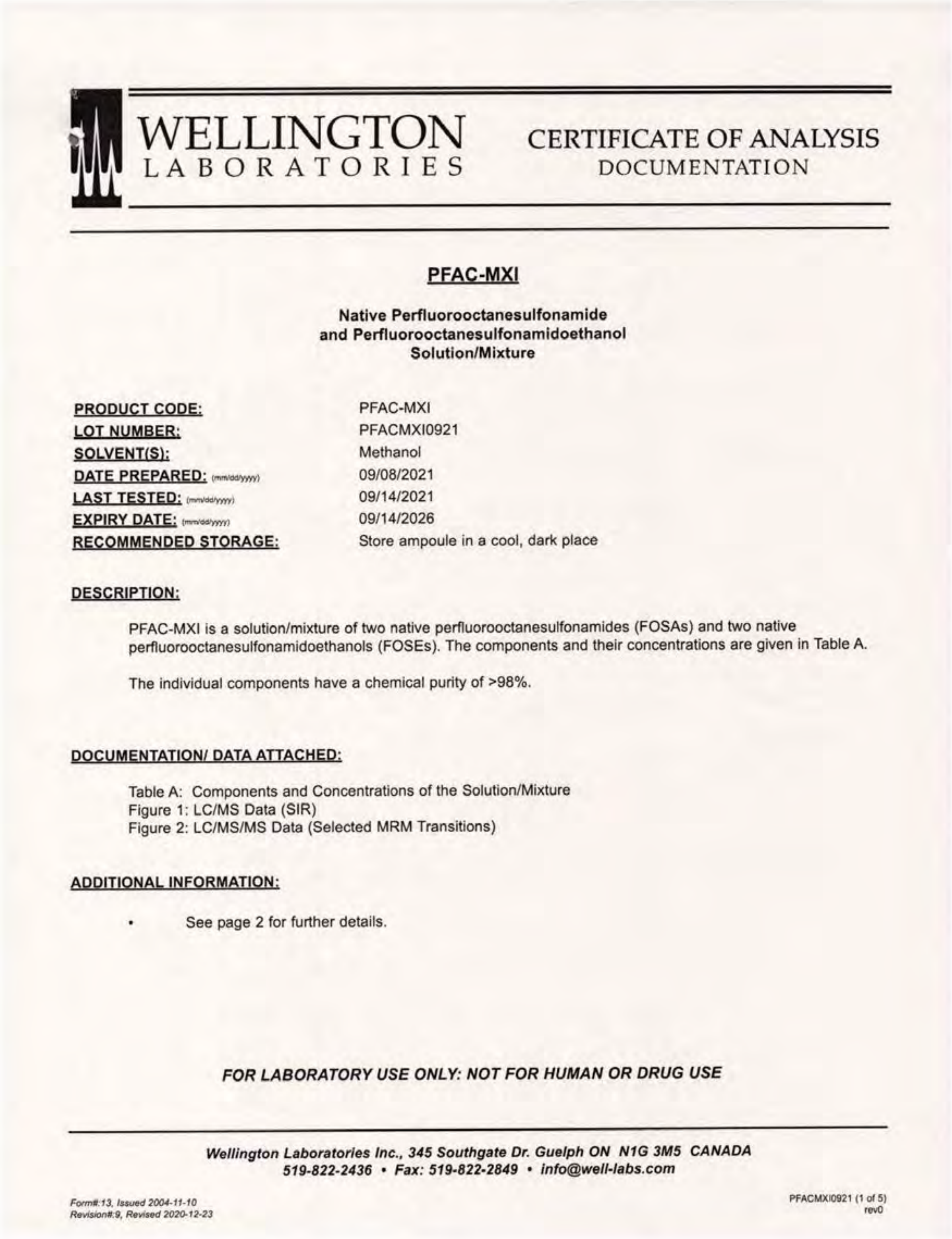

WELLINGTON LABORATORIES **CERTIFICATE OF ANALYSIS DOCUMENTATION**

PFAC-MXI

Native Perfluorooctanesulfonamide and Perfluorooctanesulfonamidoethanol Solution/Mixture

PRODUCT CODE:	PFAC-MXI
LOT NUMBER:	PFACMXI0921
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	09/08/2021
LAST TESTED: (mm/dd/yyyy)	09/14/2021
EXPIRY DATE: (mm/dd/yyyy)	09/14/2026
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

PFAC-MXI is a solution/mixture of two native perfluorooctanesulfonamides (FOSAs) and two native perfluorooctanesulfonamidoethanols (FOSEs). The components and their concentrations are given in Table A.

The individual components have a chemical purity of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

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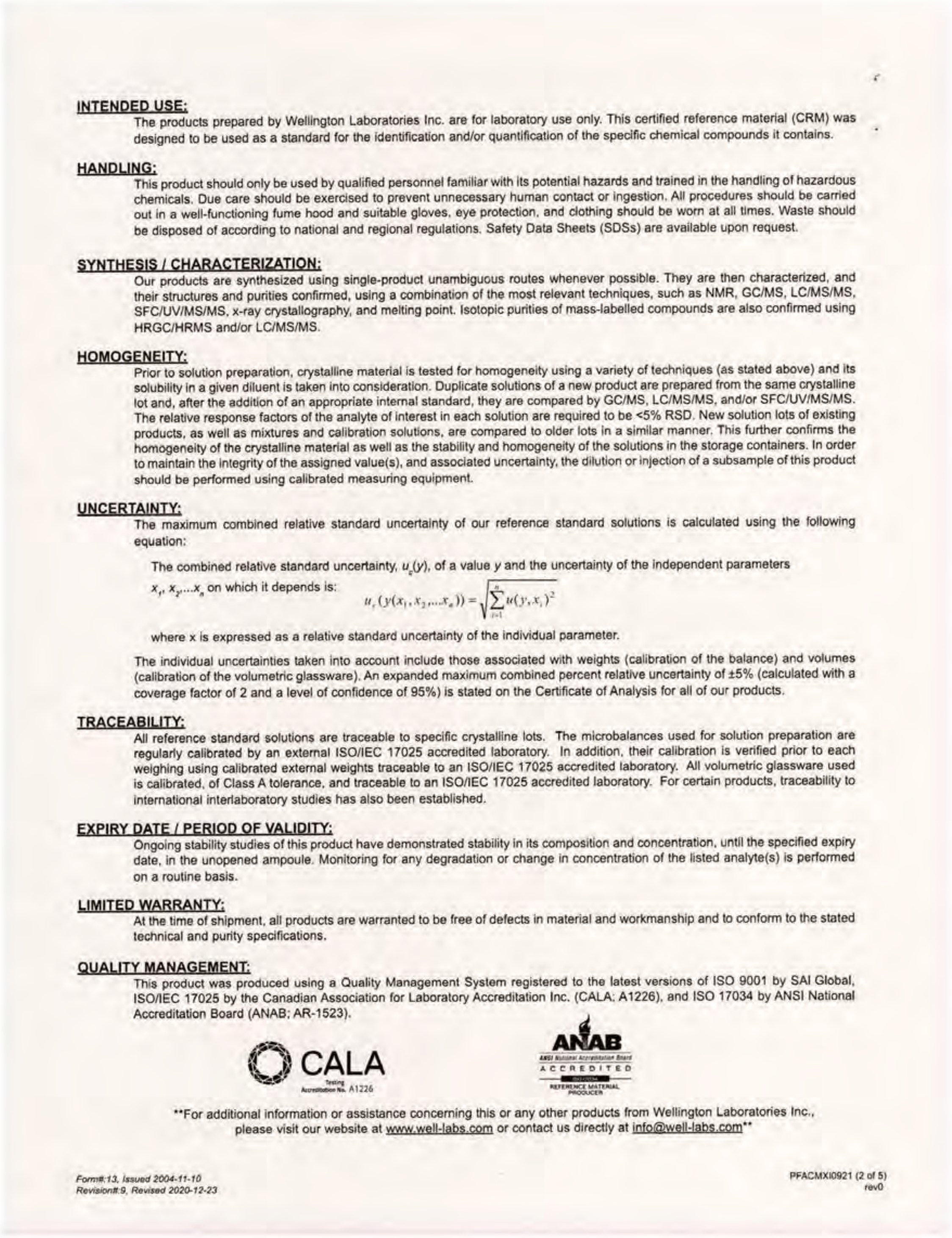
Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXI0921 (1 of 5)
rev0



INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA
Testing
Accreditation No. A1226

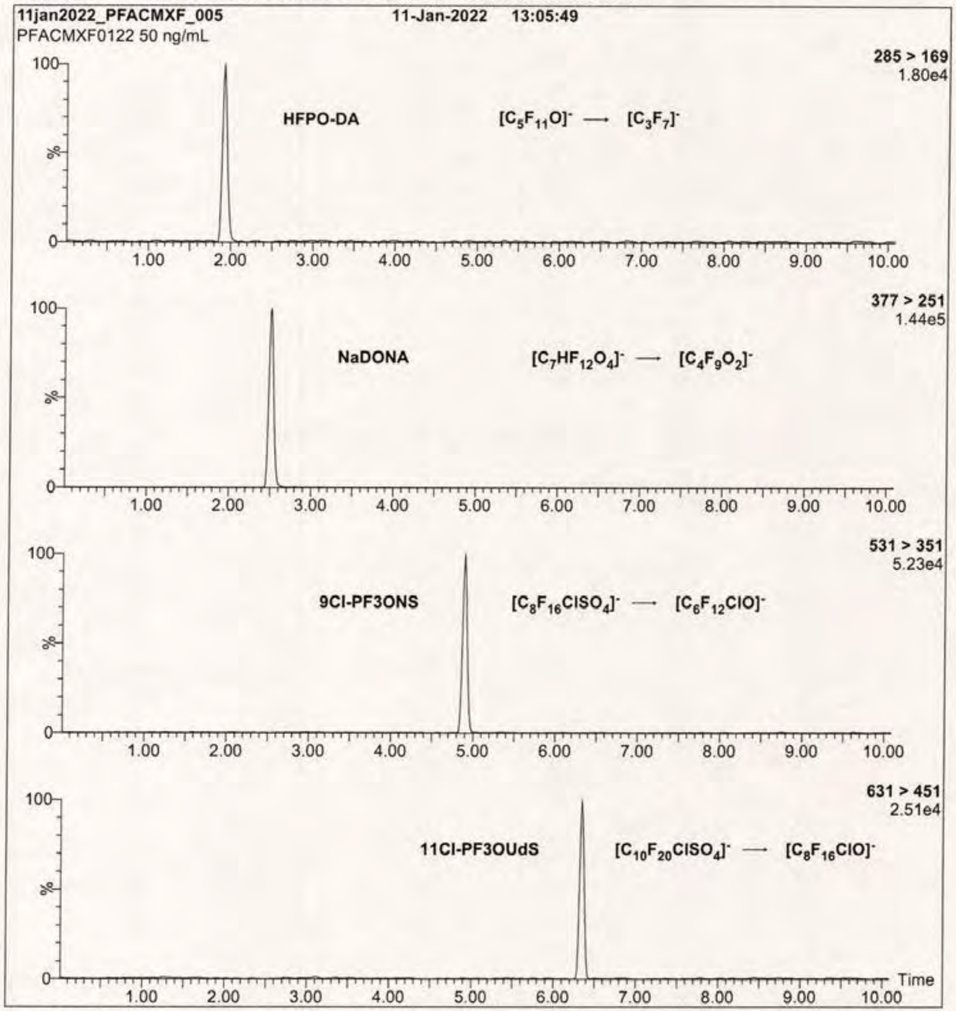
ANAB
ANSI National Accreditation Board
ACCREDITED
REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXI0921 (2 of 5)
rev0

Figure 2: **PFAC-MXF; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXF)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 6-60 (variable)

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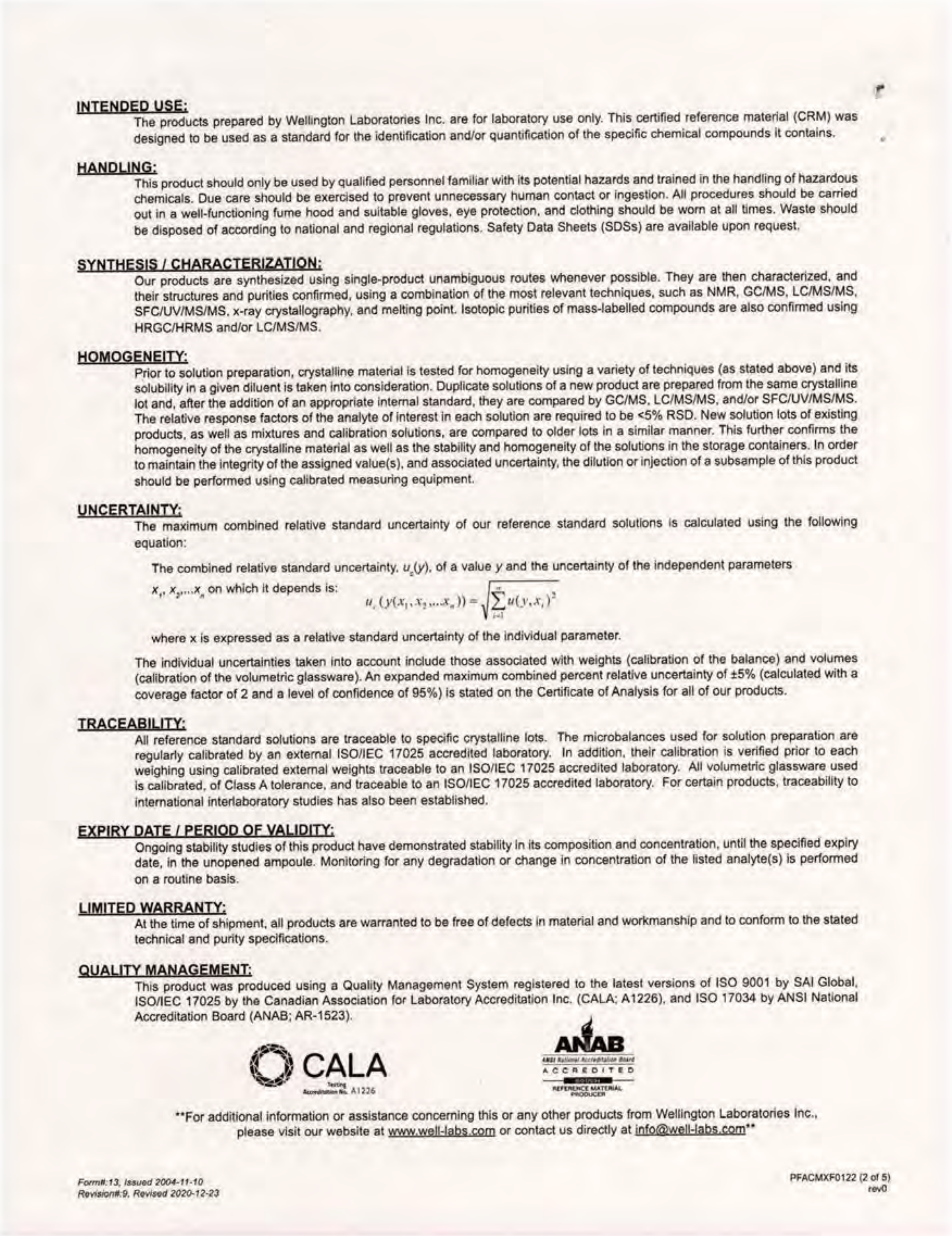

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED REFERENCE MATERIAL PRODUCER

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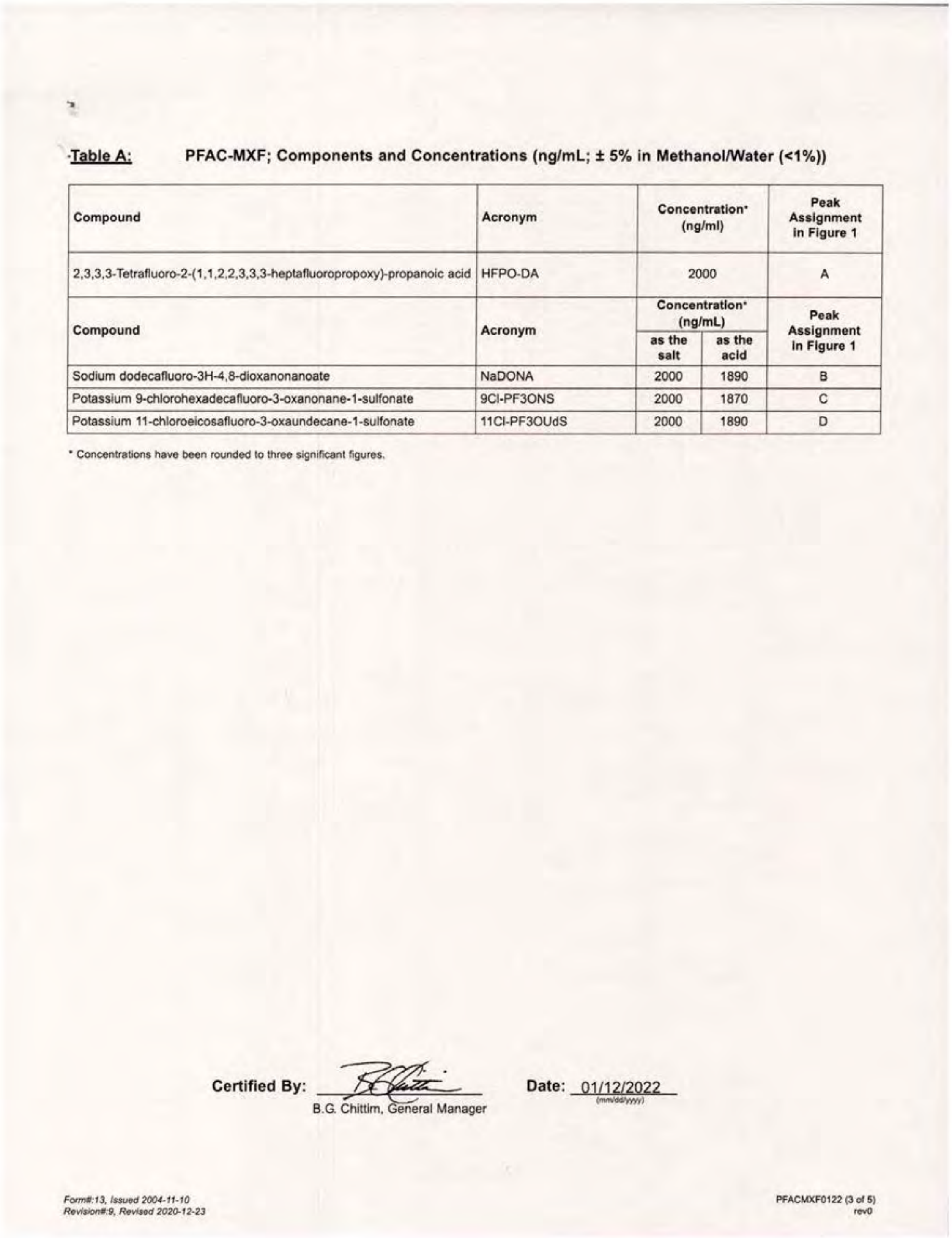

Table A: **PFAC-MXF; Components and Concentrations (ng/mL; ± 5% in Methanol/Water (<1%))**

Compound	Acronym	Concentration* (ng/ml)	Peak Assignment in Figure 1
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	HFPO-DA	2000	A

Compound	Acronym	Concentration* (ng/mL)		Peak Assignment in Figure 1
		as the salt	as the acid	
Sodium dodecafluoro-3H-4,8-dioxanonanoate	NaDONA	2000	1890	B
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	2000	1870	C
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	2000	1890	D

* Concentrations have been rounded to three significant figures.

Certified By: B.G. Chittim, General Manager **Date:** 01/12/2022 (mm/dd/yyyy)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

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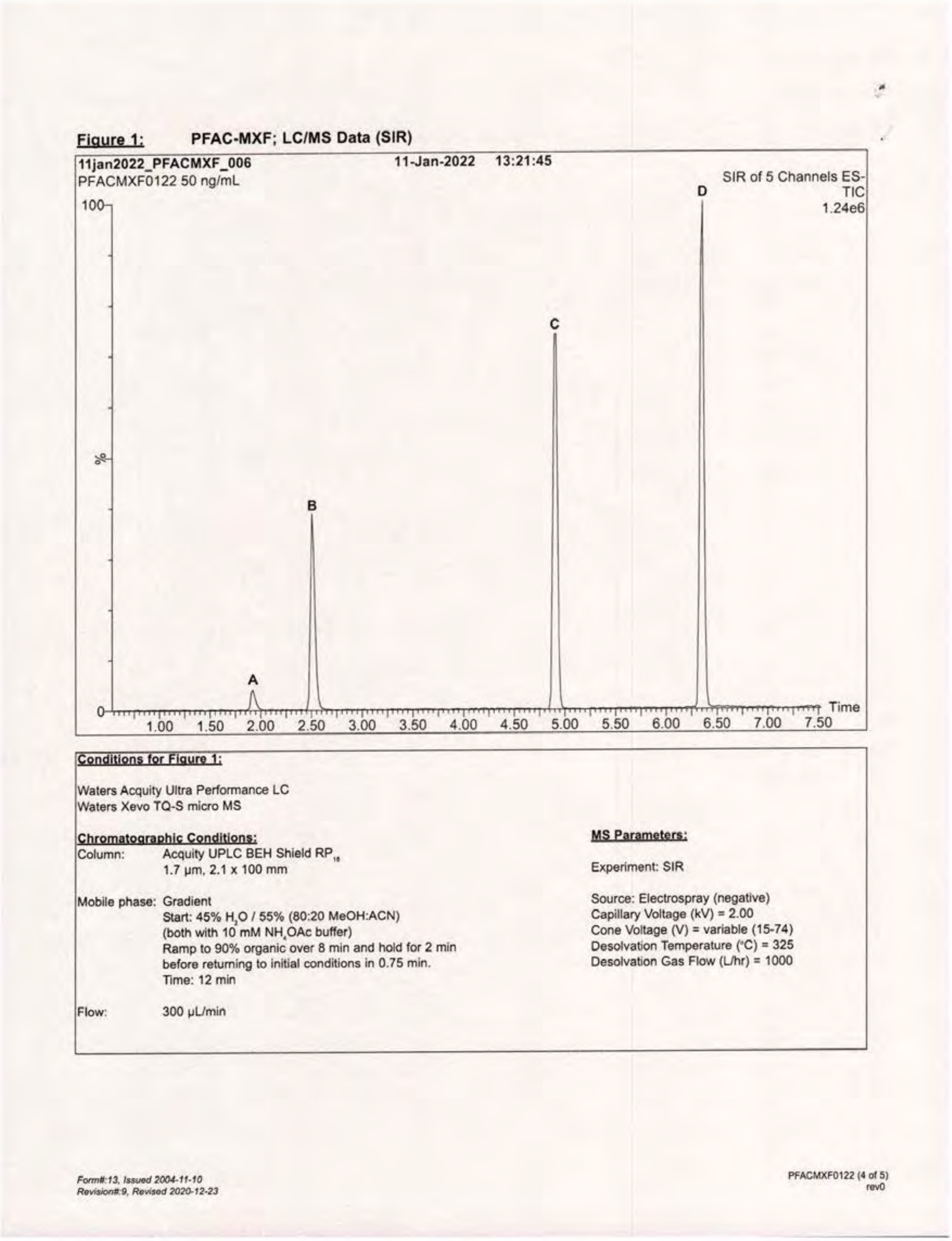

Figure 1: **PFAC-MXF; LC/MS Data (SIR)**

Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column:	Acquity UPLC BEH Shield RP_{18} 1.7 µm, 2.1 x 100 mm
Mobile phase:	Gradient Start: 45% H_2O / 55% (80:20 MeOH:ACN) (both with 10 mM NH_4OAc buffer) Ramp to 90% organic over 8 min and hold for 2 min before returning to initial conditions in 0.75 min. Time: 12 min
Flow:	300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (15-74)
Desolvation Temperature (°C) = 325
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

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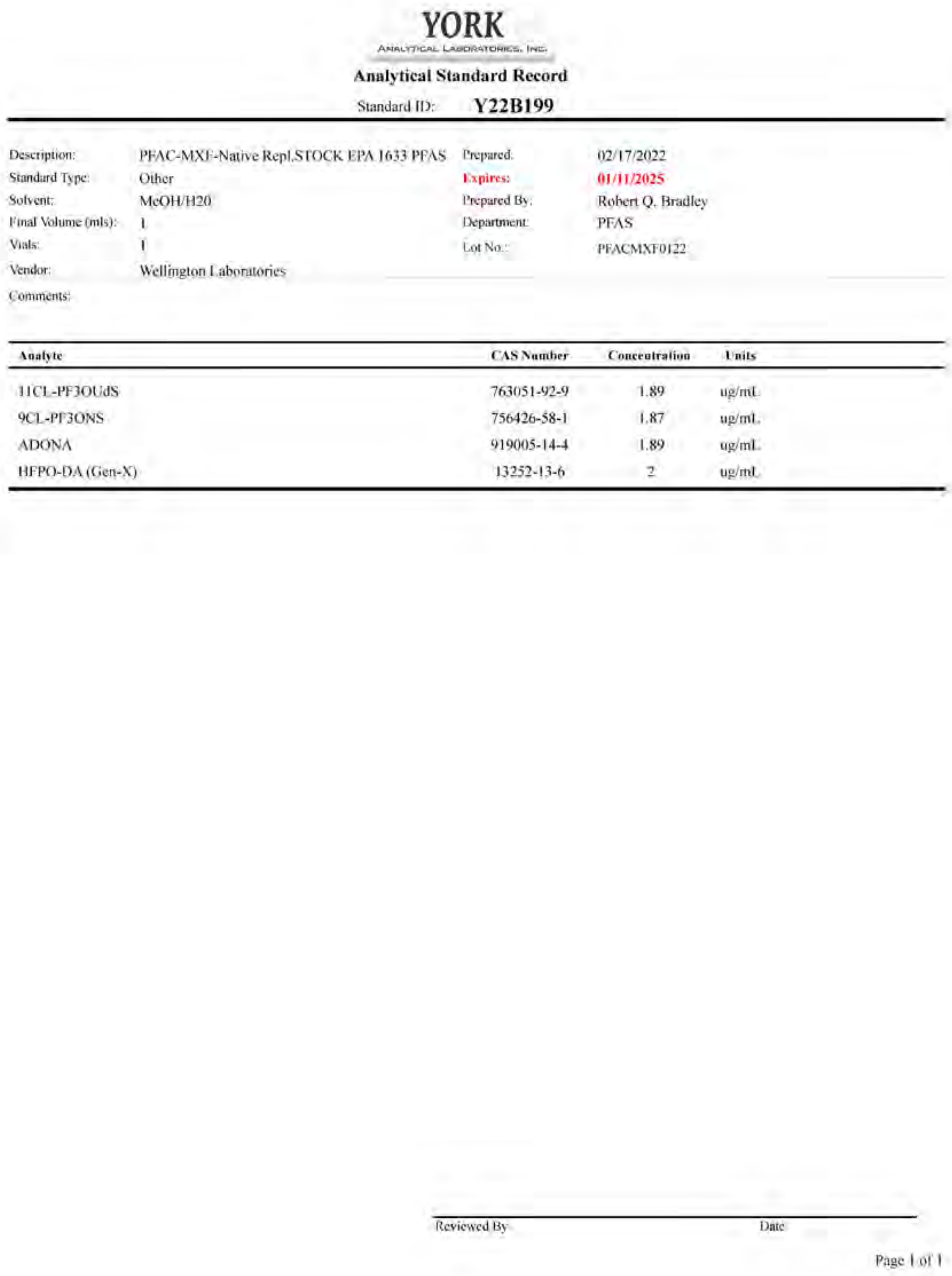
rev0



YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B199**

Description:	PFAC-MXF-Native Repl.STOCK EPA 1633 PFAS	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**01/11/2025**
Solvent:	MeOH/H20	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXF0122
Vendor:	Wellington Laboratories		
Comments:			

Analyte	**CAS Number**	**Concentration**	**Units**
11CL-PF3OUdS	763051-92-9	1.89	ug/mL
9CL-PF3ONS	756426-58-1	1.87	ug/mL
ADONA	919005-14-4	1.89	ug/mL
HFPO-DA (Gen-X)	13252-13-6	2	ug/mL

Reviewed By: Date:

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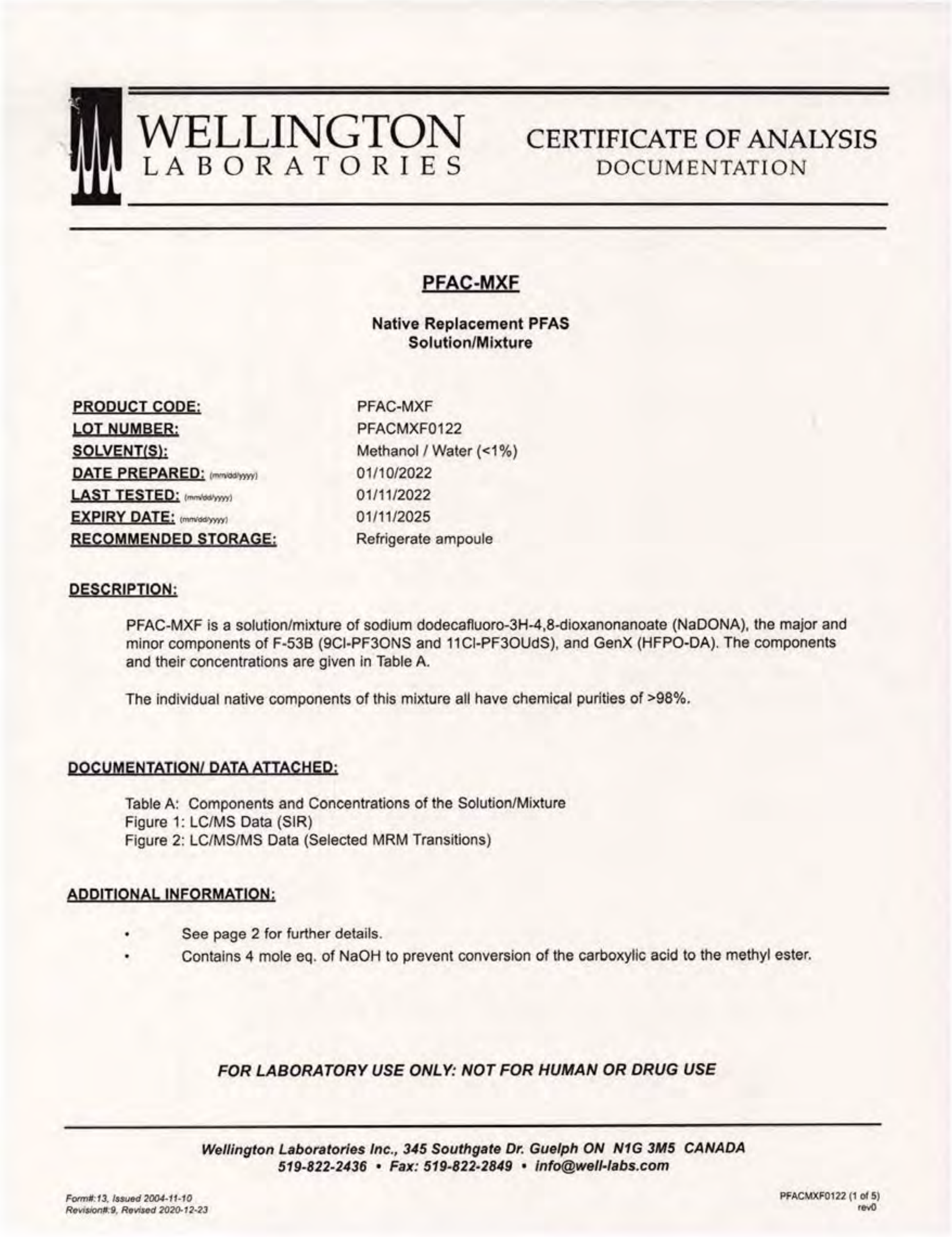

WELLINGTON
LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXF

Native Replacement PFAS
Solution/Mixture

PRODUCT CODE:	PFAC-MXF
LOT NUMBER:	PFACMXF0122
SOLVENT(S):	Methanol / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	01/10/2022
LAST TESTED: (mm/dd/yyyy)	01/11/2022
EXPIRY DATE: (mm/dd/yyyy)	01/11/2025
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-MXF is a solution/mixture of sodium dodecafluoro-3H-4,8-dioxanonanoate (NaDONA), the major and minor components of F-53B (9Cl-PF3ONS and 11Cl-PF3OUdS), and GenX (HFPO-DA). The components and their concentrations are given in Table A.

The individual native components of this mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

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519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXF0122 (1 of 5)
rev0

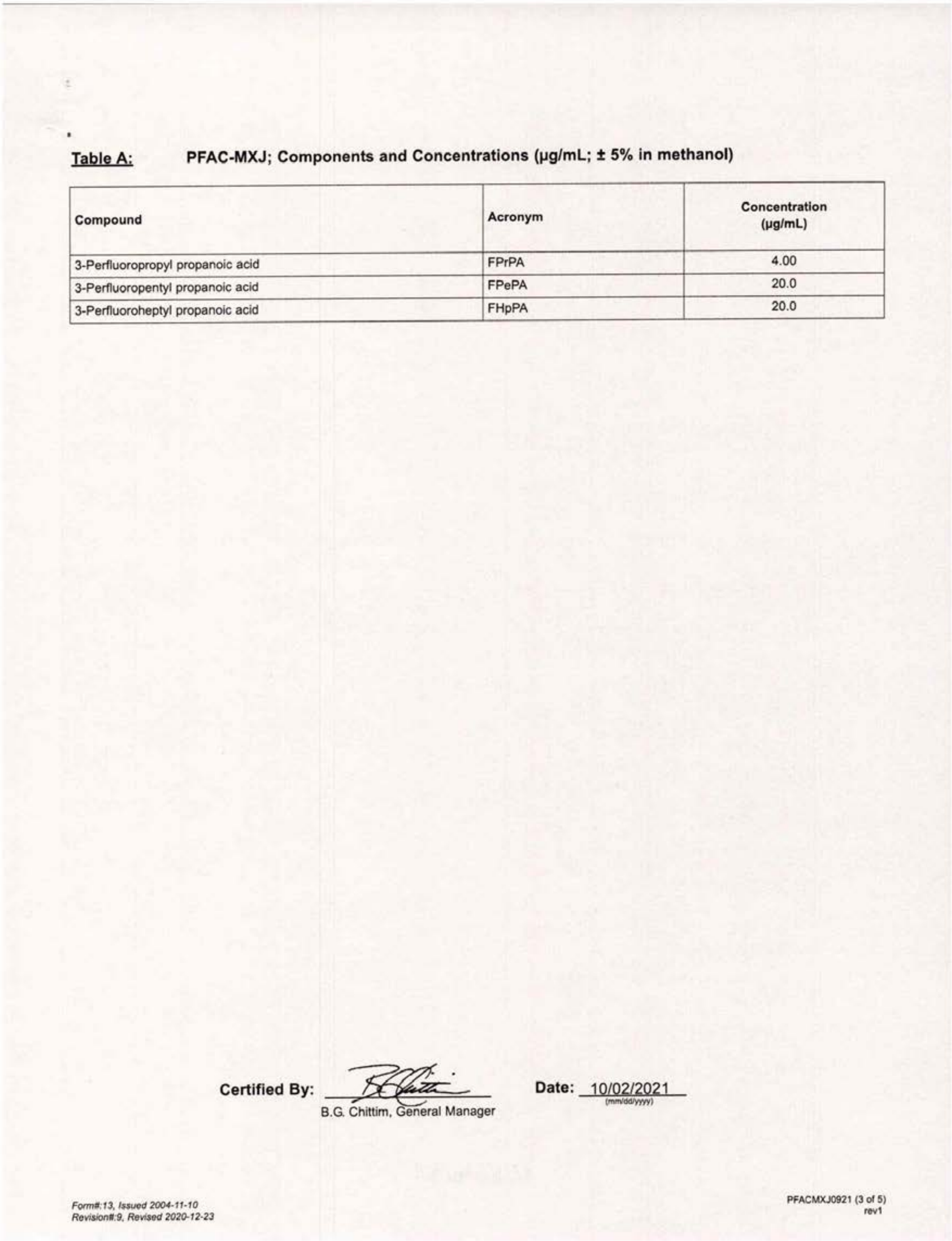

Table A: **PFAC-MXJ; Components and Concentrations (µg/mL; ± 5% in methanol)**

Compound	Acronym	Concentration (µg/mL)
3-Perfluoropropyl propanoic acid	FPrPA	4.00
3-Perfluoropentyl propanoic acid	FPePA	20.0
3-Perfluoroheptyl propanoic acid	FHpPA	20.0

Certified By: B.G. Chittim, General Manager

Date: 10/02/2021 (mm/dd/yyyy)

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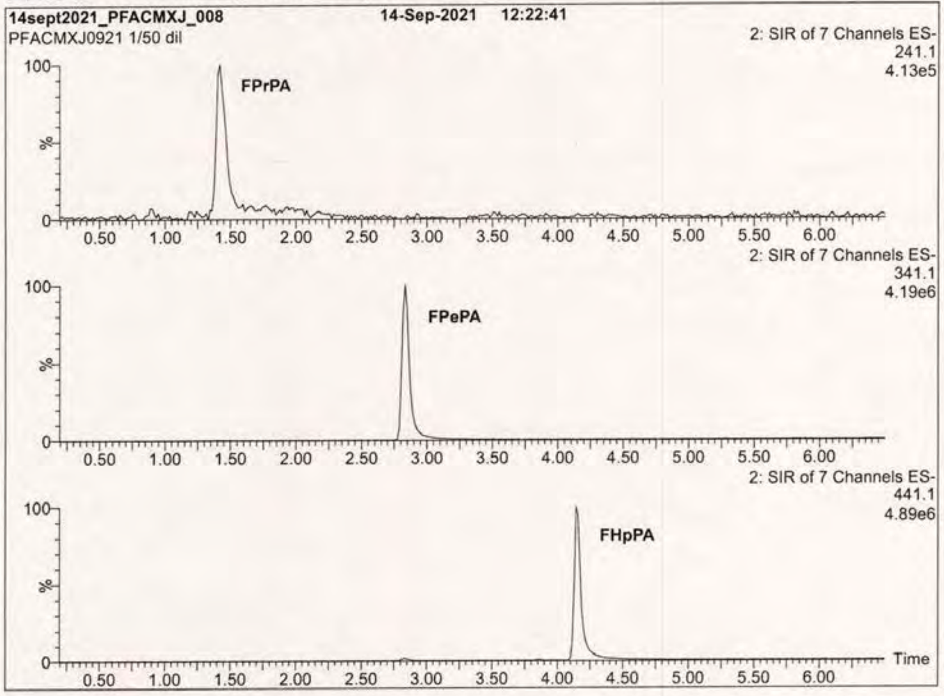
rev1

Figure 1: **PFAC-MXJ; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = variable (2-74)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

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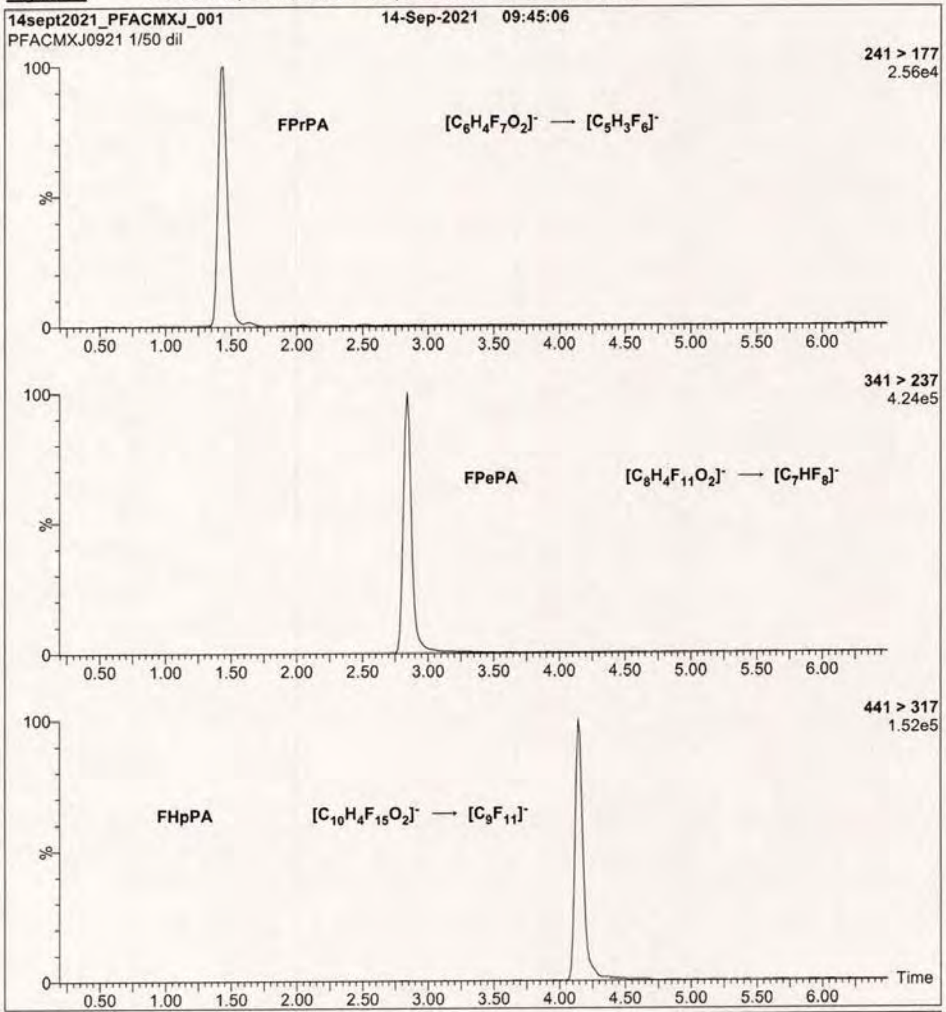
Figure 2: **PFAC-MXJ; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXJ)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 6-60 (variable)

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YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B205**

Description:	PFAC-MXJ-EPA 1633 Stock mix	**Prepared:**	02/17/2022
Standard Type:	Other	**Expires:**	09/14/2026
Solvent:	Methanol	**Prepared By:**	Robert Q. Bradley
Final Volume (mls):	1	**Department:**	PFAS
Vials:	1	**Lot No.:**	PFACMXJ0921
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
3-Perfluoroheptyl propanoic acid (FHpPA	812-70-4	20	ug/mL
3-Perfluoropentyl propanoic acid (FPePA)	914637-49-3	20	ug/mL
3-Perfluoropropyl propanoic acid (FPrPA)	356-02-2	4	ug/mL

Reviewed By **Date**

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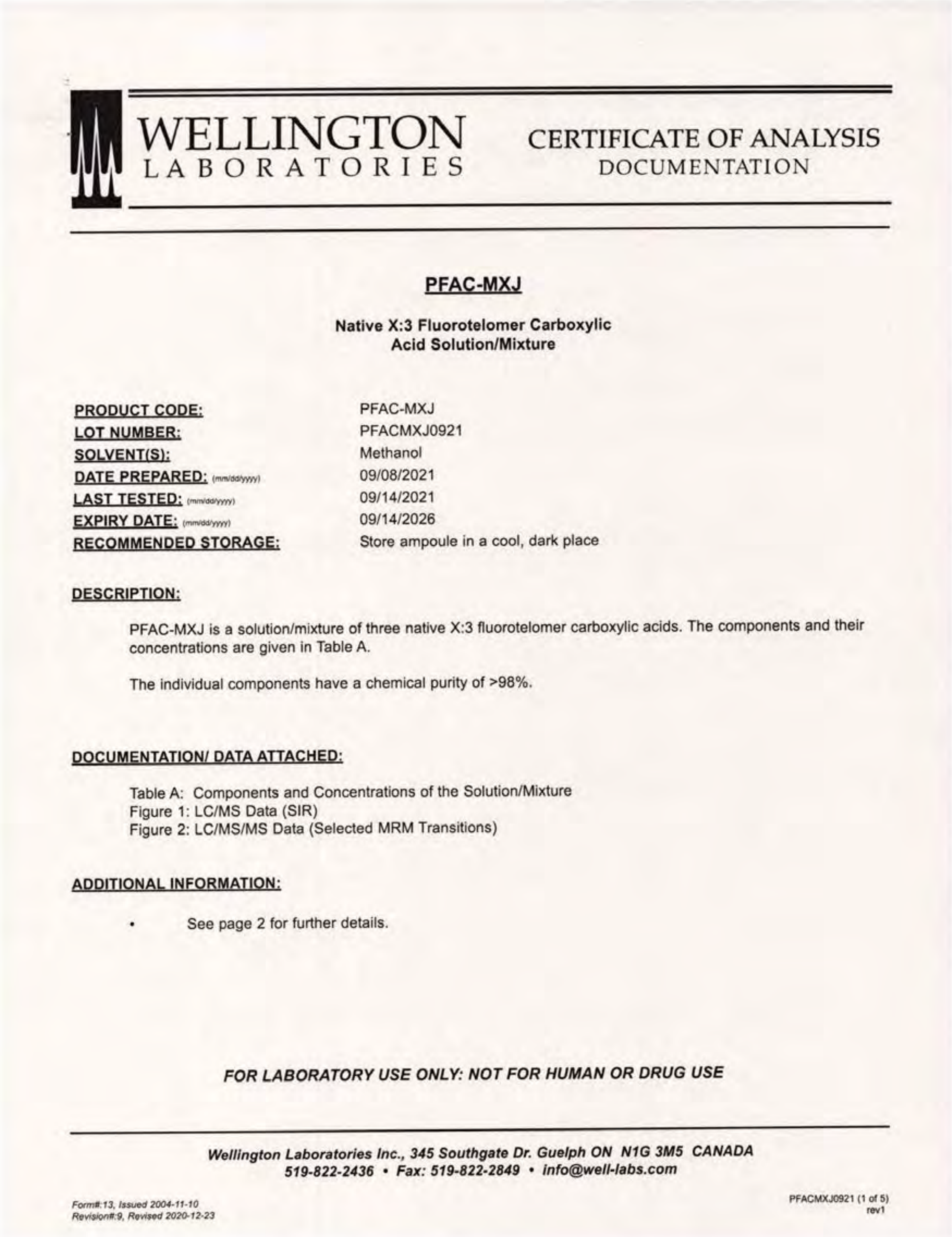

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PFAC-MXJ

Native X:3 Fluorotelomer Carboxylic Acid Solution/Mixture

PRODUCT CODE:	PFAC-MXJ
LOT NUMBER:	PFACMXJ0921
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	09/08/2021
LAST TESTED: (mm/dd/yyyy)	09/14/2021
EXPIRY DATE: (mm/dd/yyyy)	09/14/2026
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

PFAC-MXJ is a solution/mixture of three native X:3 fluorotelomer carboxylic acids. The components and their concentrations are given in Table A.

The individual components have a chemical purity of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

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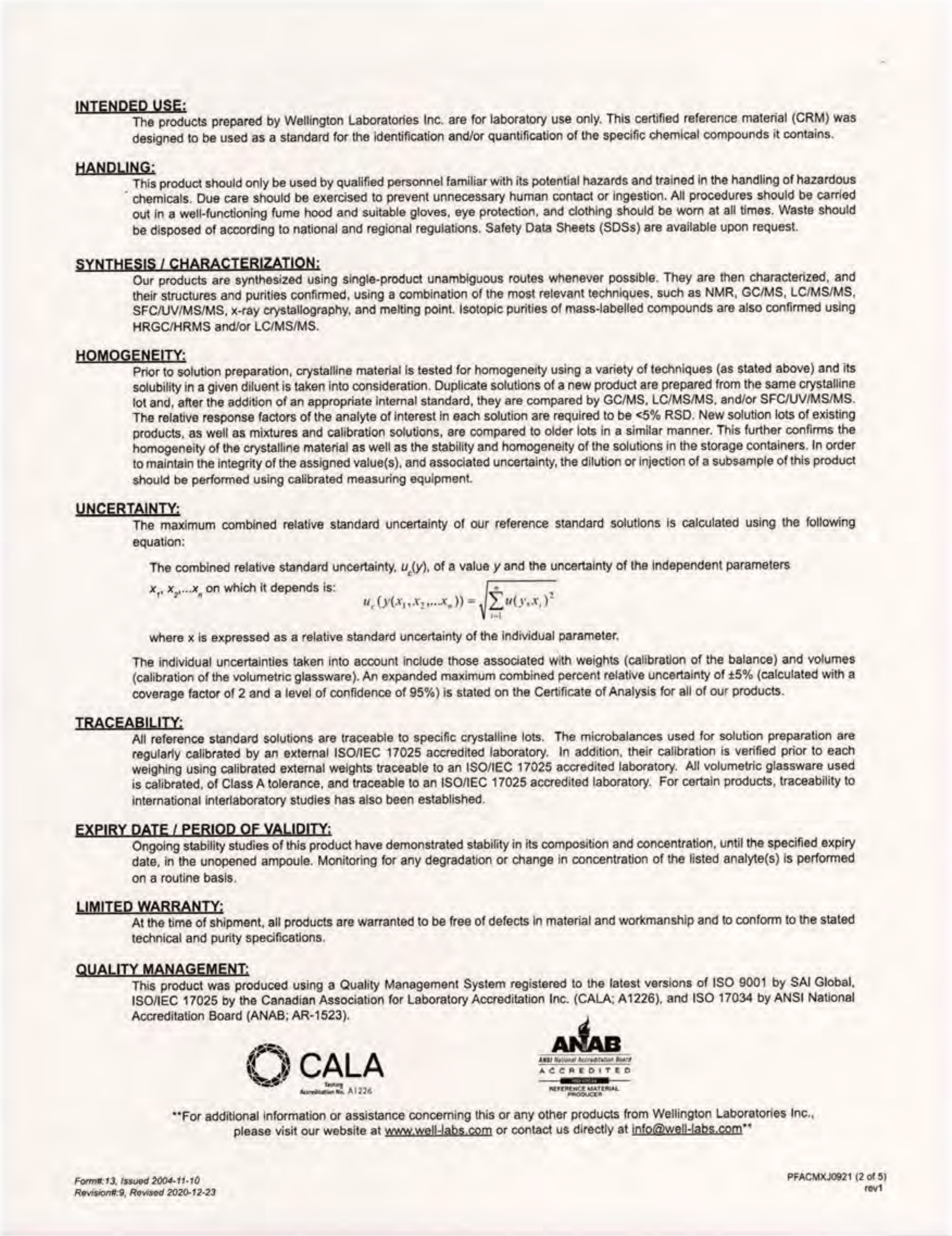

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1,x_2,\ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y,x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA
Testing Accreditation No. A1226

ANAB
ANSI National Accreditation Board
ACCREDITED
REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

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Figure 2: **PFAC-MXH; LC/MS/MS Data (Selected MRM Transitions)**

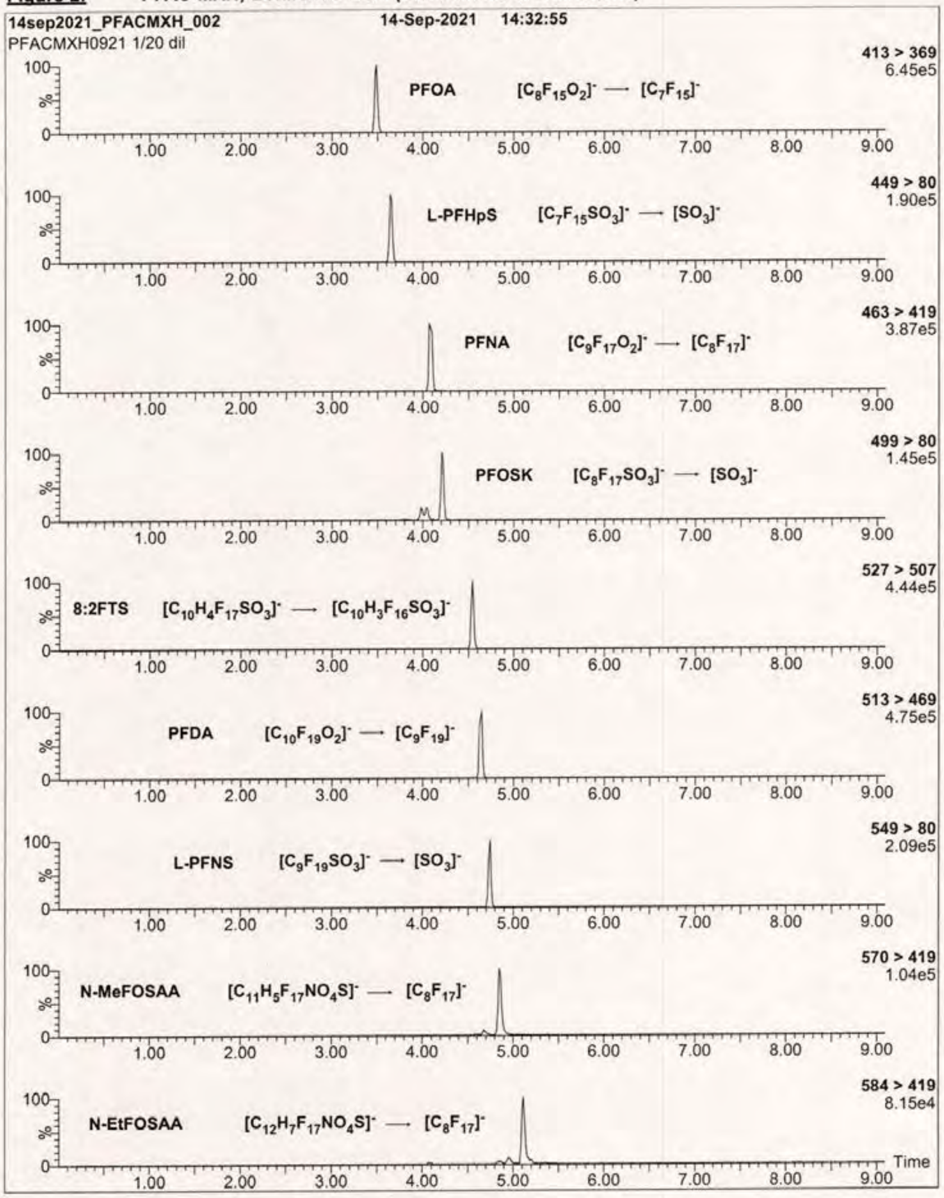

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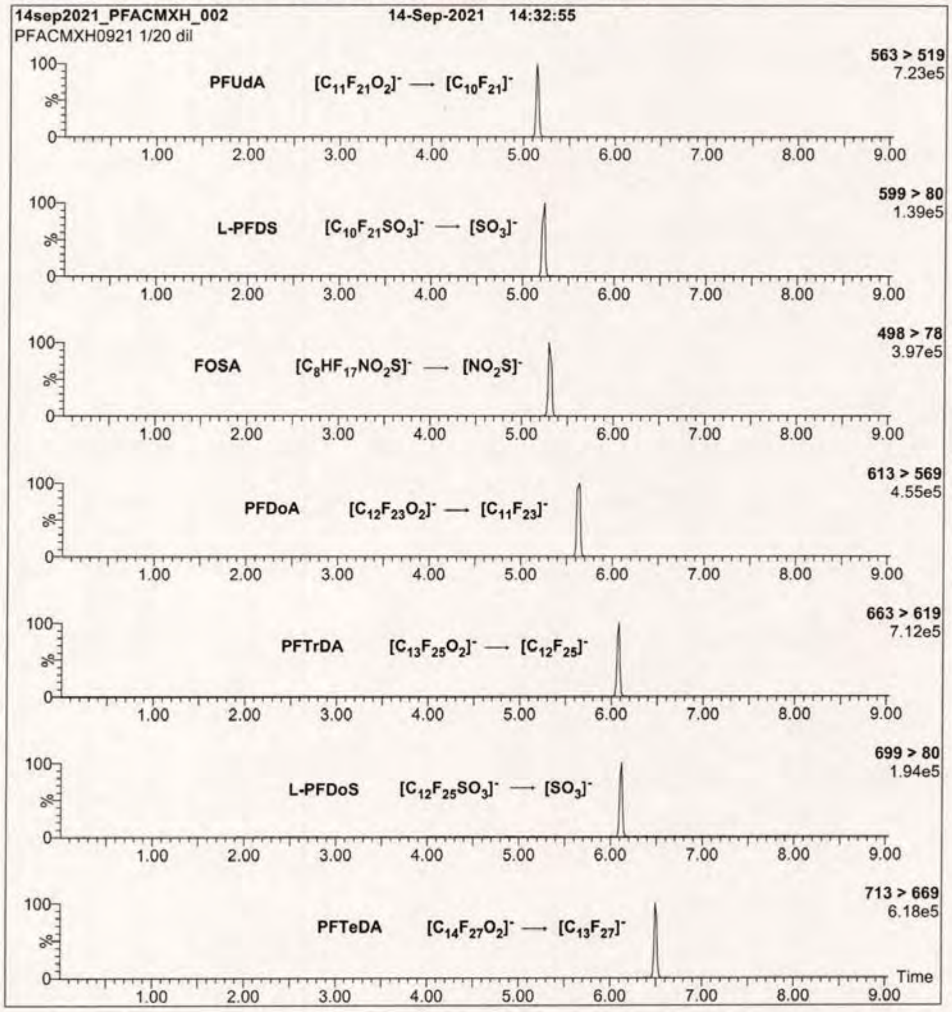
Figure 2: **PFAC-MXH; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXH)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 6-60 (variable)

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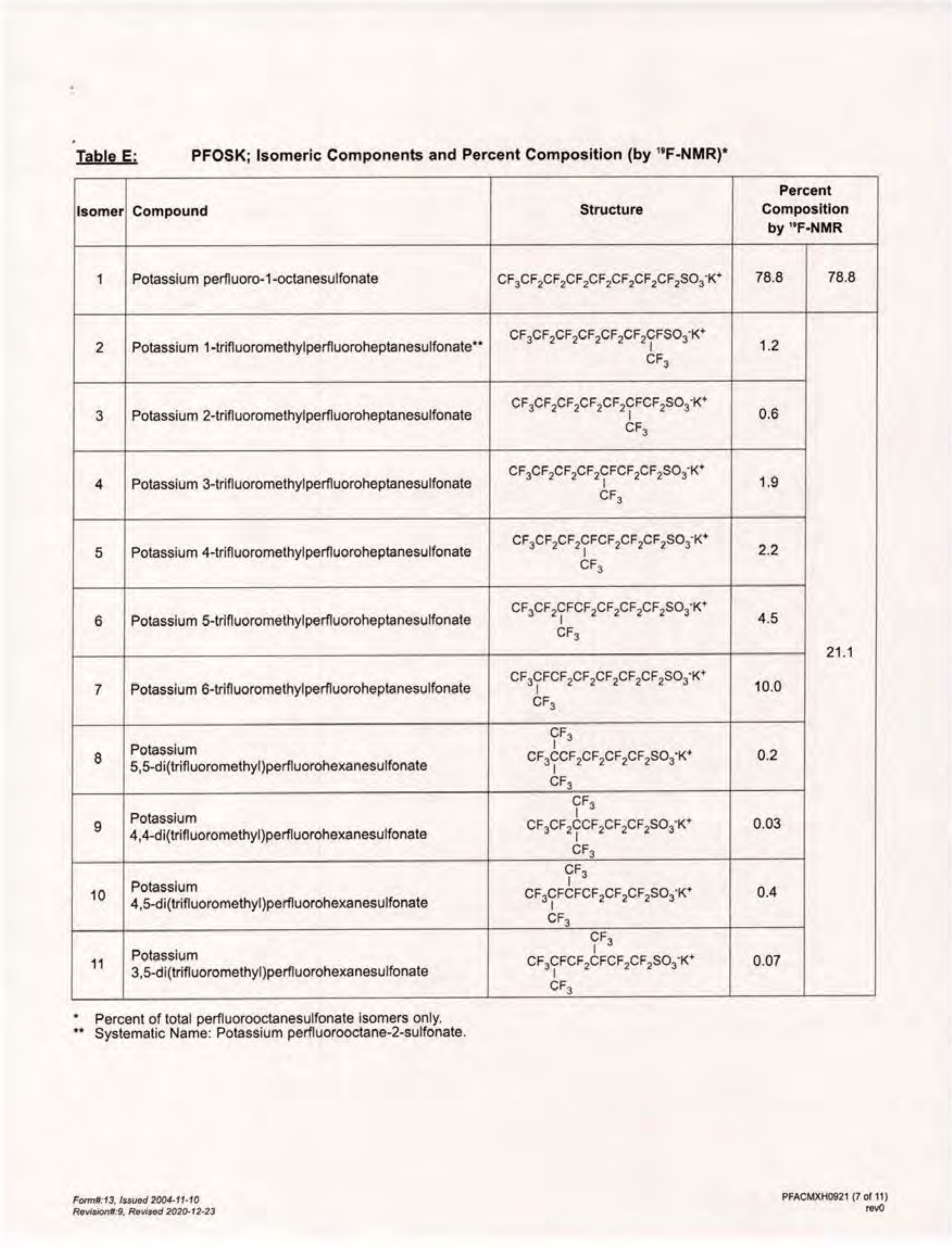

Table E: **PFOSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-octanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	78.8	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	$CF_3CF_2CF_2CF_2CF_2CF_2\underset{\substack{\vert\\ CF_3}}{C}FSO_3^-K^+$	1.2	21.1
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF_2\underset{\substack{\vert\\ CF_3}}{C}FCF_2SO_3^-K^+$	0.6	
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2\underset{\substack{\vert\\ CF_3}}{C}FCF_2CF_2SO_3^-K^+$	1.9	
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2\underset{\substack{\vert\\ CF_3}}{C}FCF_2CF_2CF_2SO_3^-K^+$	2.2	
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2\underset{\substack{\vert\\ CF_3}}{C}FCF_2CF_2CF_2CF_2SO_3^-K^+$	4.5	
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	$CF_3\underset{\substack{\vert\\ CF_3}}{C}FCF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	10.0	
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3\overset{\substack{CF_3\\ \vert}}{\underset{\substack{\vert\\ CF_3}}{C}}CF_2CF_2CF_2CF_2SO_3^-K^+$	0.2	
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF_2\overset{\substack{CF_3\\ \vert}}{\underset{\substack{\vert\\ CF_3}}{C}}CF_2CF_2CF_2SO_3^-K^+$	0.03	
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3\underset{\substack{\vert\\ CF_3}}{C}F\overset{\substack{CF_3\\ \vert}}{C}FCF_2CF_2CF_2SO_3^-K^+$	0.4	
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3\underset{\substack{\vert\\ CF_3}}{C}FCF_2\overset{\substack{CF_3\\ \vert}}{C}FCF_2CF_2SO_3^-K^+$	0.07	

* Percent of total perfluorooctanesulfonate isomers only.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

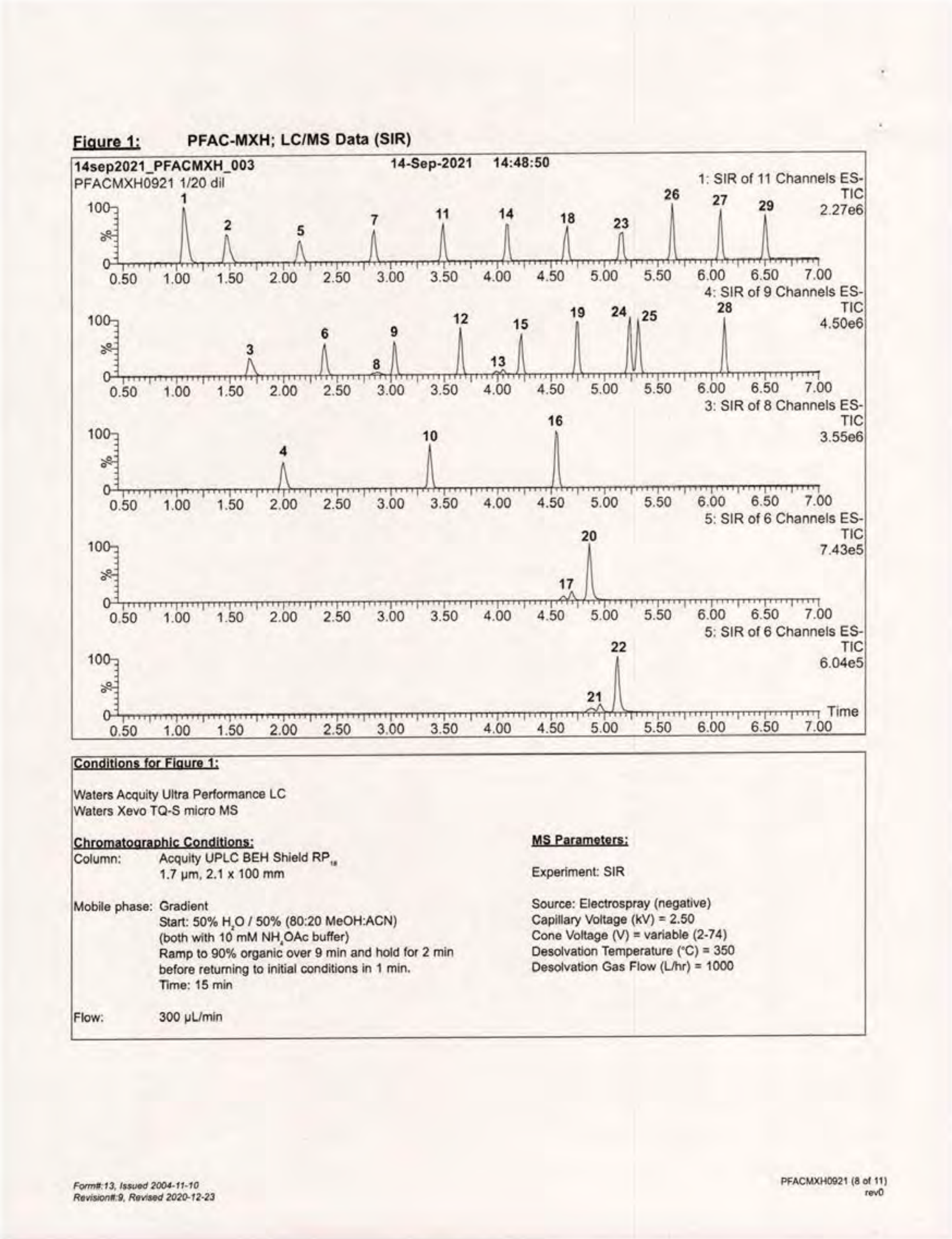

Figure 1: **PFAC-MXH; LC/MS Data (SIR)**

Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 μm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for 2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 μL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = variable (2-74)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

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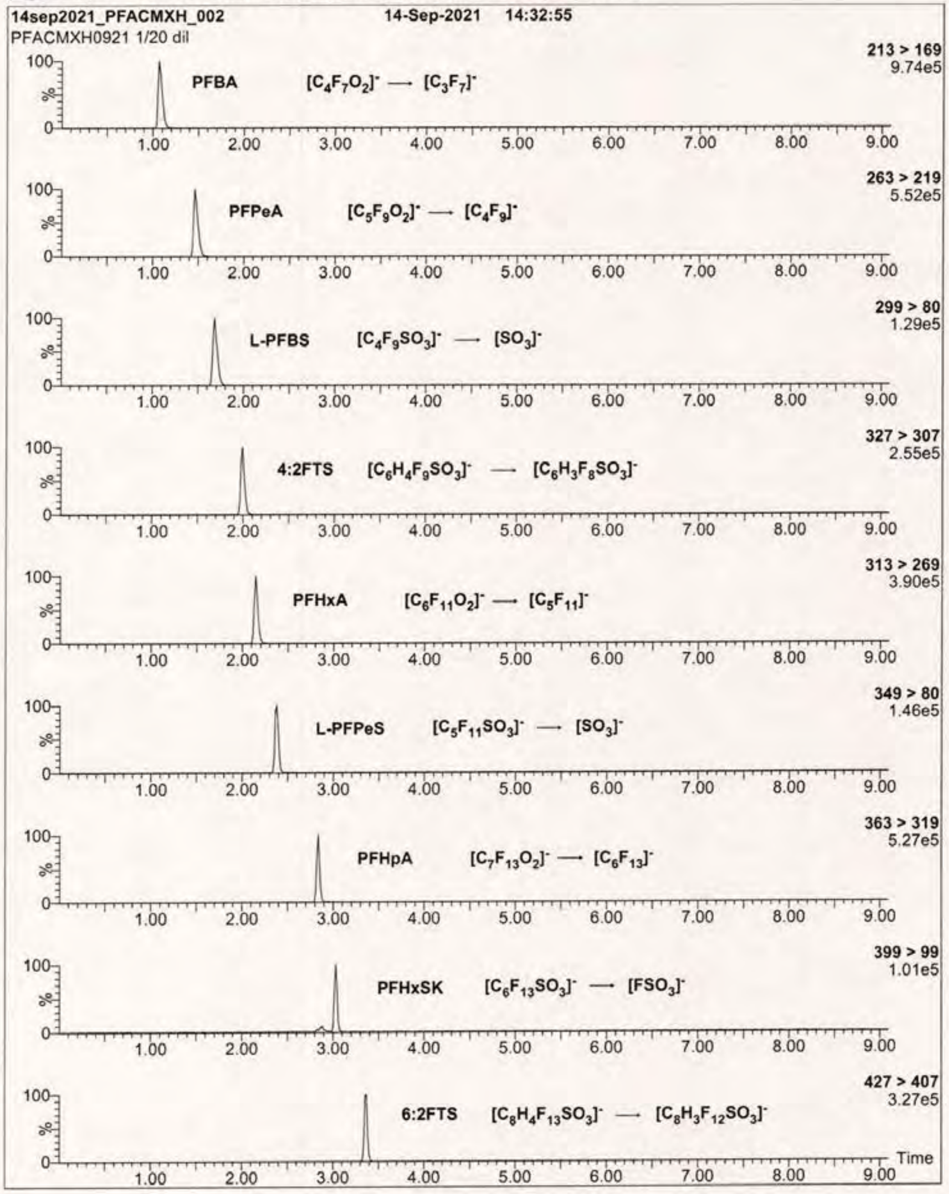
Figure 2: PFAC-MXH; LC/MS/MS Data (Selected MRM Transitions)



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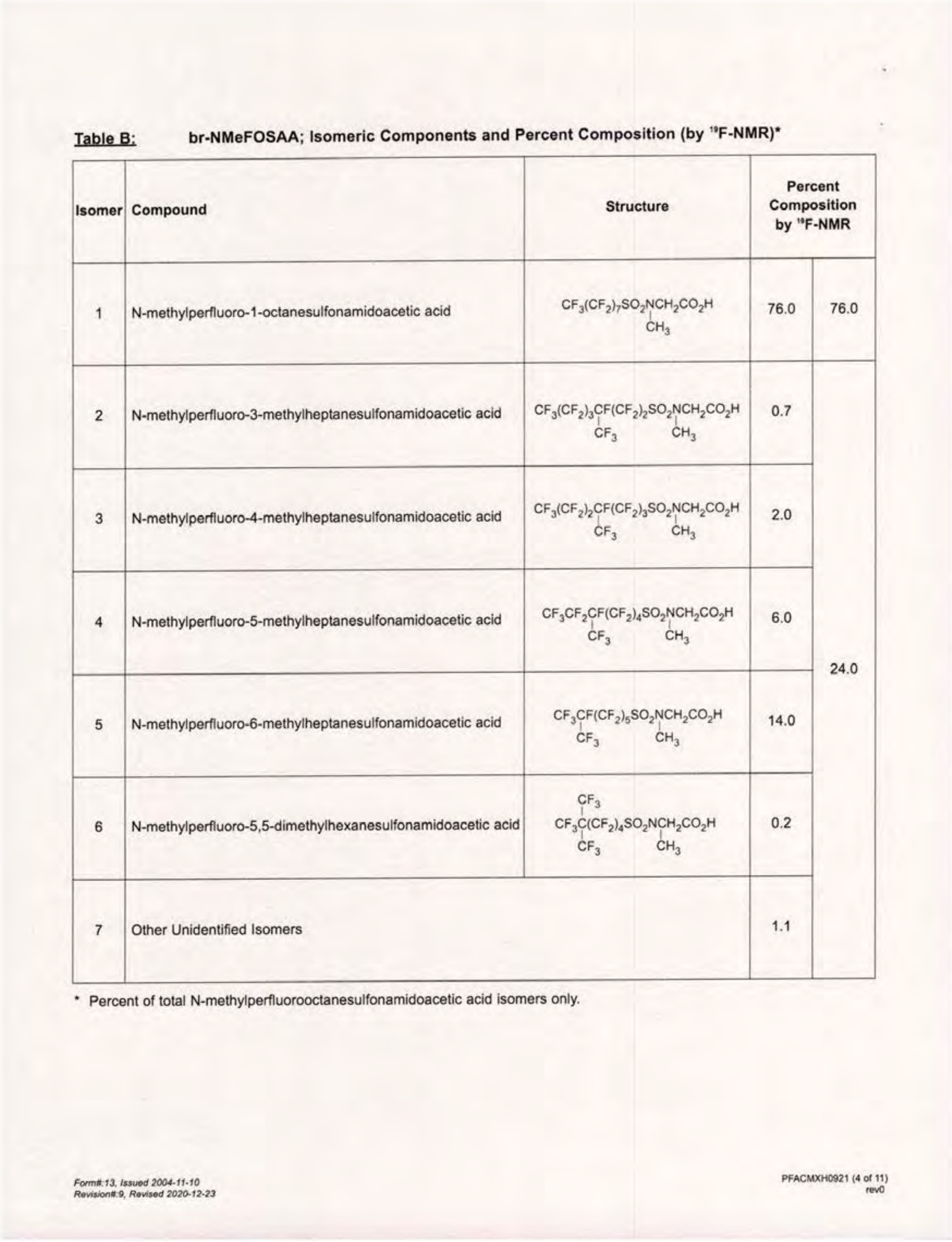

Table B: **br-NMeFOSAA; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	N-methylperfluoro-1-octanesulfonamidoacetic acid	$CF_3(CF_2)_7SO_2\underset{CH_3}{N}CH_2CO_2H$	76.0	76.0
2	N-methylperfluoro-3-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_3\underset{CF_3}{C}F(CF_2)_2SO_2\underset{CH_3}{N}CH_2CO_2H$	0.7	24.0
3	N-methylperfluoro-4-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_2\underset{CF_3}{C}F(CF_2)_3SO_2\underset{CH_3}{N}CH_2CO_2H$	2.0	
4	N-methylperfluoro-5-methylheptanesulfonamidoacetic acid	$CF_3CF_2\underset{CF_3}{C}F(CF_2)_4SO_2\underset{CH_3}{N}CH_2CO_2H$	6.0	
5	N-methylperfluoro-6-methylheptanesulfonamidoacetic acid	$CF_3\underset{CF_3}{C}F(CF_2)_5SO_2\underset{CH_3}{N}CH_2CO_2H$	14.0	
6	N-methylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	$CF_3\overset{CF_3}{\underset{CF_3}{C}}(CF_2)_4SO_2\underset{CH_3}{N}CH_2CO_2H$	0.2	
7	Other Unidentified Isomers		1.1	

* Percent of total N-methylperfluorooctanesulfonamidoacetic acid isomers only.

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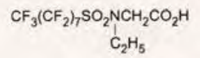
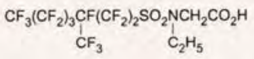
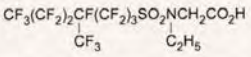
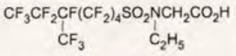
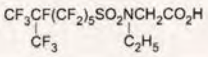
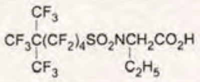
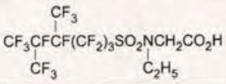
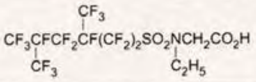
Table C: **br-NEtFOSAA; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	N-ethylperfluoro-1-octanesulfonamidoacetic acid	 $CF_3(CF_2)_7SO_2\underset{C_2H_5}{N}CH_2CO_2H$	77.5	77.5
2	N-ethylperfluoro-3-methylheptanesulfonamidoacetic acid	 $CF_3(CF_2)_3\underset{CF_3}{C}F(CF_2)_2SO_2\underset{C_2H_5}{N}CH_2CO_2H$	2.3	22.5
3	N-ethylperfluoro-4-methylheptanesulfonamidoacetic acid	 $CF_3(CF_2)_2\underset{CF_3}{C}F(CF_2)_3SO_2\underset{C_2H_5}{N}CH_2CO_2H$	2.2	
4	N-ethylperfluoro-5-methylheptanesulfonamidoacetic acid	 $CF_3CF_2\underset{CF_3}{C}F(CF_2)_4SO_2\underset{C_2H_5}{N}CH_2CO_2H$	5.4	
5	N-ethylperfluoro-6-methylheptanesulfonamidoacetic acid	 $CF_3\underset{CF_3}{C}F(CF_2)_5SO_2\underset{C_2H_5}{N}CH_2CO_2H$	10.4	
6	N-ethylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	 $CF_3\overset{CF_3}{\underset{CF_3}{C}}(CF_2)_4SO_2\underset{C_2H_5}{N}CH_2CO_2H$	0.3	
7	N-ethylperfluoro-4,5-dimethylhexanesulfonamidoacetic acid	 $CF_3\underset{CF_3}{C}F\overset{CF_3}{C}F(CF_2)_3SO_2\underset{C_2H_5}{N}CH_2CO_2H$	0.3	
8	N-ethylperfluoro-3,5-dimethylhexanesulfonamidoacetic acid	 $CF_3\underset{CF_3}{C}FCF_2\overset{CF_3}{C}F(CF_2)_2SO_2\underset{C_2H_5}{N}CH_2CO_2H$	0.3	
9	Other Unidentified Isomers		1.3	

* Percent of total N-ethylperfluorooctanesulfonamidoacetic acid isomers only.

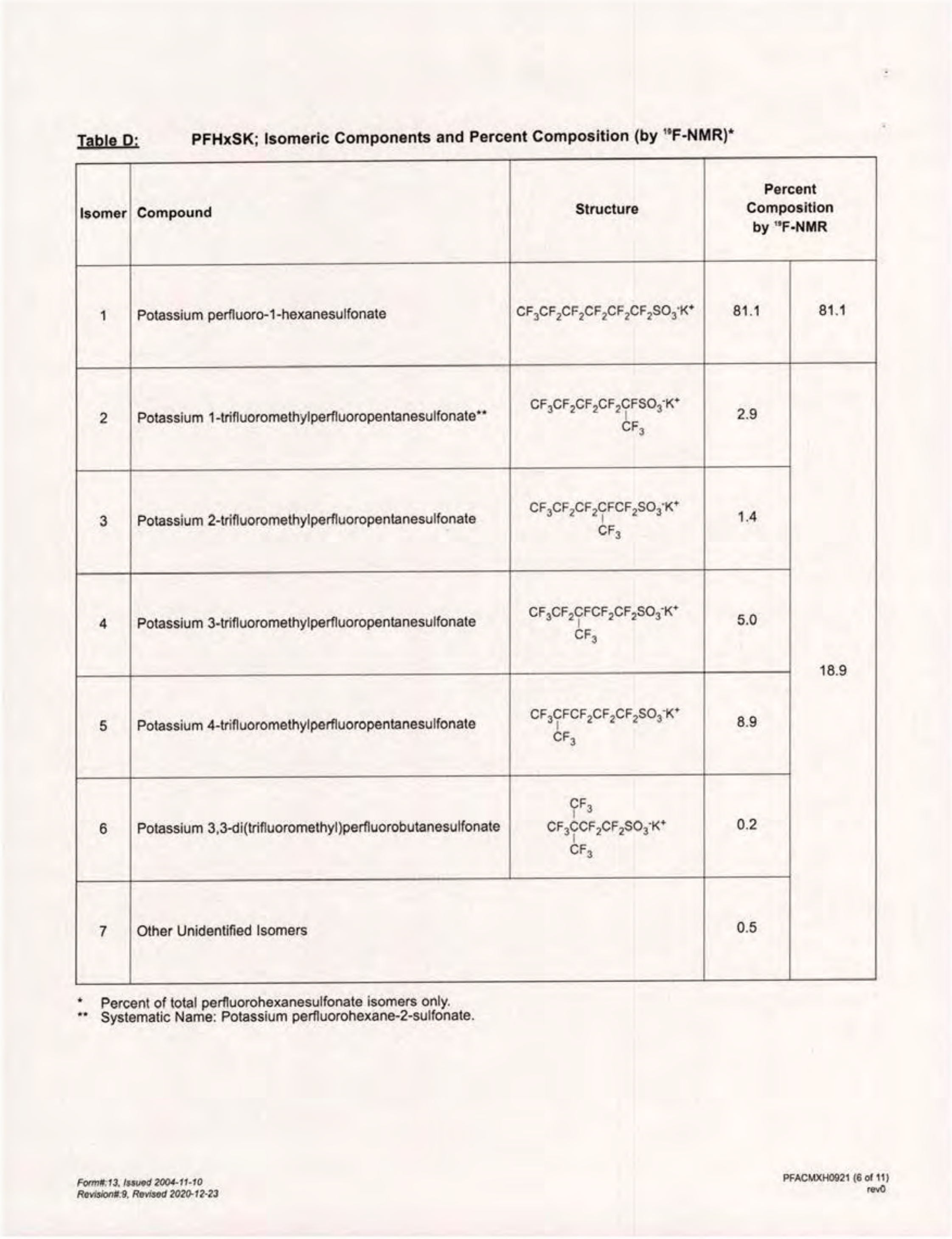


Table D: **PFHxSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-hexanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2SO_3^{-}K^{+}$	81.1	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	$CF_3CF_2CF_2CF_2\underset{CF_3}{C}FSO_3^{-}K^{+}$	2.9	18.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2\underset{CF_3}{C}FCF_2SO_3^{-}K^{+}$	1.4	
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2\underset{CF_3}{C}FCF_2CF_2SO_3^{-}K^{+}$	5.0	
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	$CF_3\underset{CF_3}{C}FCF_2CF_2CF_2SO_3^{-}K^{+}$	8.9	
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	$CF_3\overset{CF_3}{\underset{CF_3}{C}}CF_2CF_2SO_3^{-}K^{+}$	0.2	
7	Other Unidentified Isomers		0.5	

* Percent of total perfluorohexanesulfonate isomers only.
** Systematic Name: Potassium perfluorohexane-2-sulfonate.

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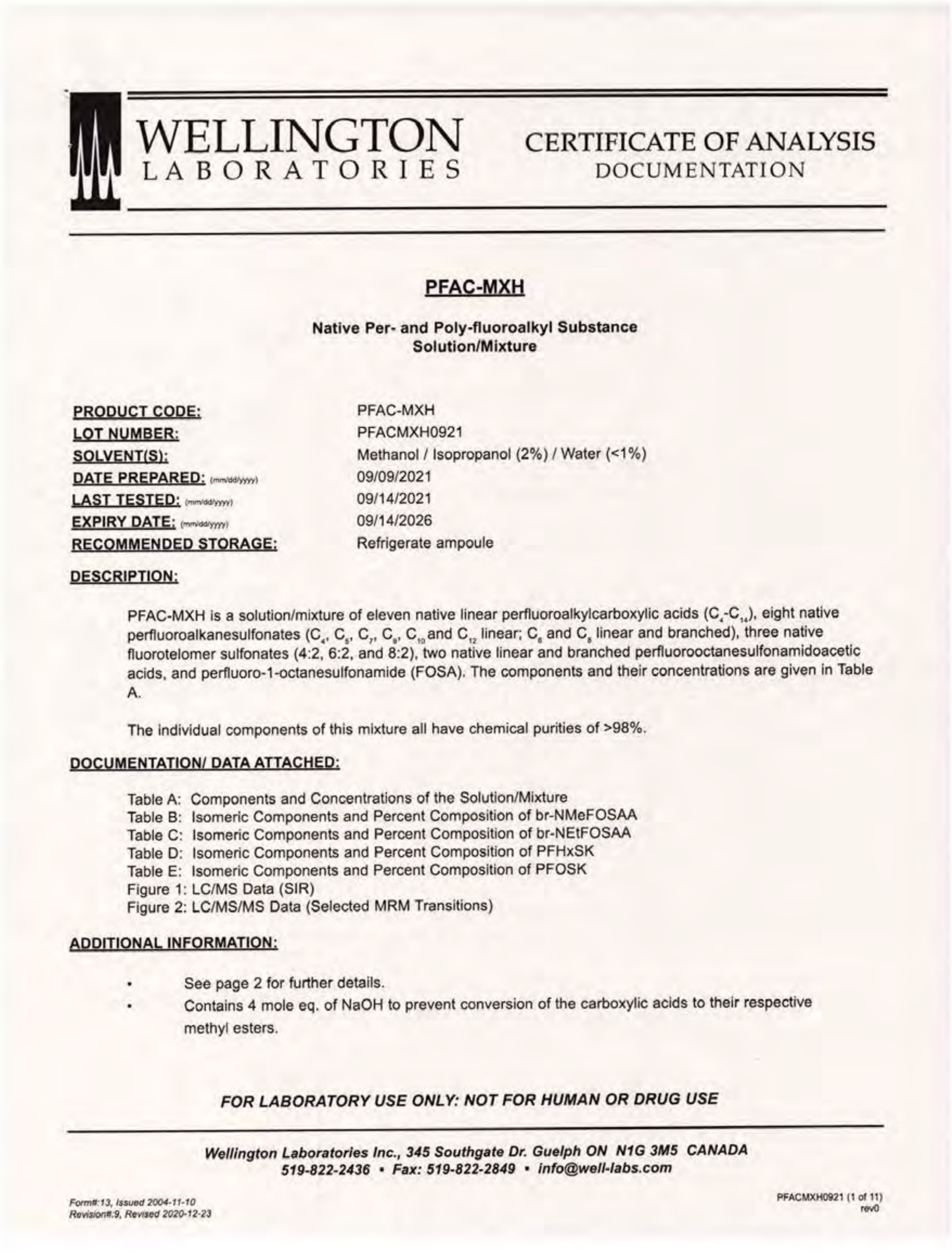


WELLINGTON
LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXH

Native Per- and Poly-fluoroalkyl Substance Solution/Mixture

PRODUCT CODE:	PFAC-MXH
LOT NUMBER:	PFACMXH0921
SOLVENT(S):	Methanol / Isopropanol (2%) / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	09/09/2021
LAST TESTED: (mm/dd/yyyy)	09/14/2021
EXPIRY DATE: (mm/dd/yyyy)	09/14/2026
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-MXH is a solution/mixture of eleven native linear perfluoroalkylcarboxylic acids (C_4-C_{14}), eight native perfluoroalkanesulfonates (C_4, C_5, C_7, C_9, C_{10} and C_{12} linear; C_6 and C_8 linear and branched), three native fluorotelomer sulfonates (4:2, 6:2, and 8:2), two native linear and branched perfluorooctanesulfonamidoacetic acids, and perfluoro-1-octanesulfonamide (FOSA). The components and their concentrations are given in Table A.

The individual components of this mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Table B: Isomeric Components and Percent Composition of br-NMeFOSAA
Table C: Isomeric Components and Percent Composition of br-NEtFOSAA
Table D: Isomeric Components and Percent Composition of PFHxSK
Table E: Isomeric Components and Percent Composition of PFOSK
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

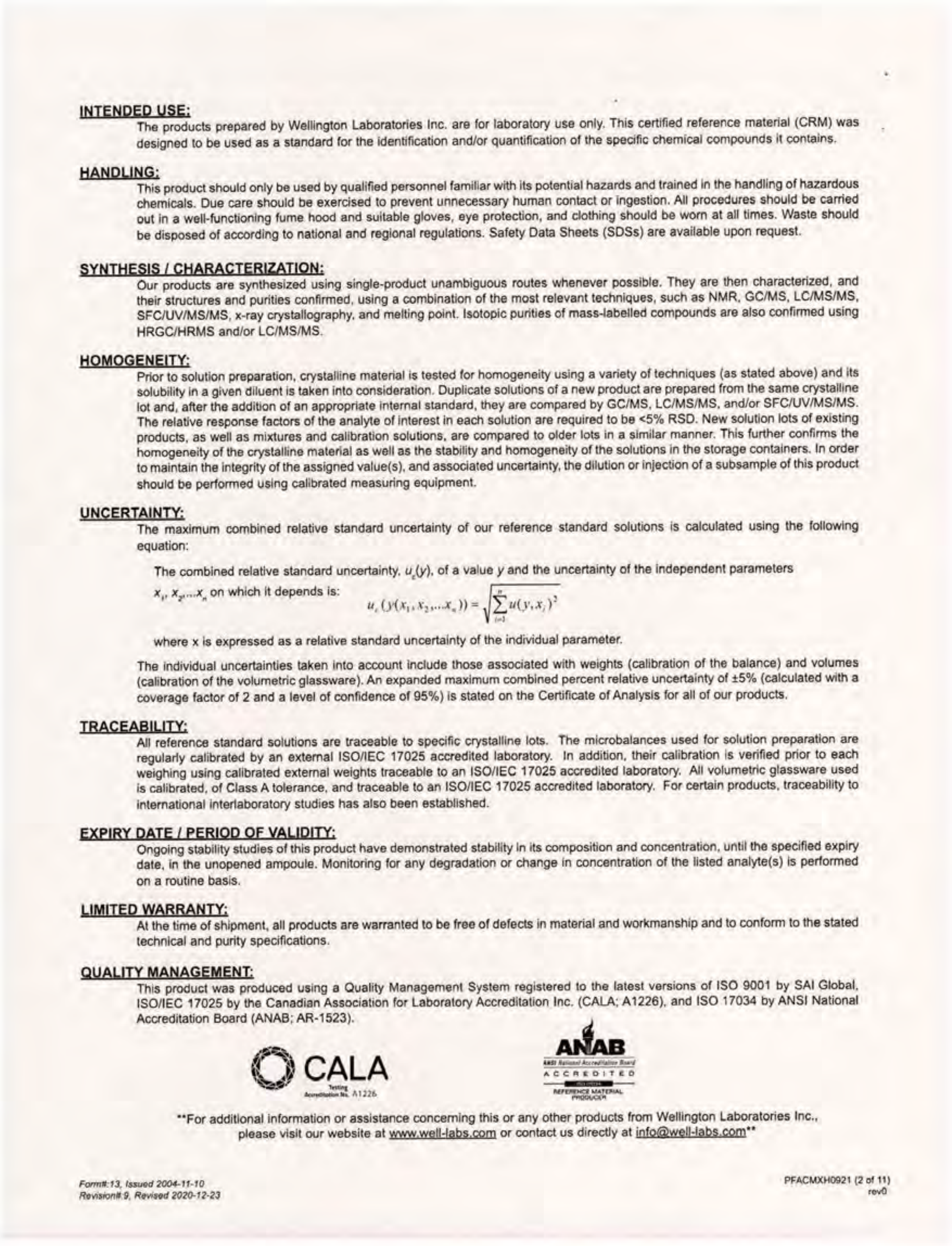
- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXH0921 (1 of 11)
rev0



INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA
Testing
Accreditation No. A1226

ANAB
ANSI National Accreditation Board
ACCREDITED
REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

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rev0

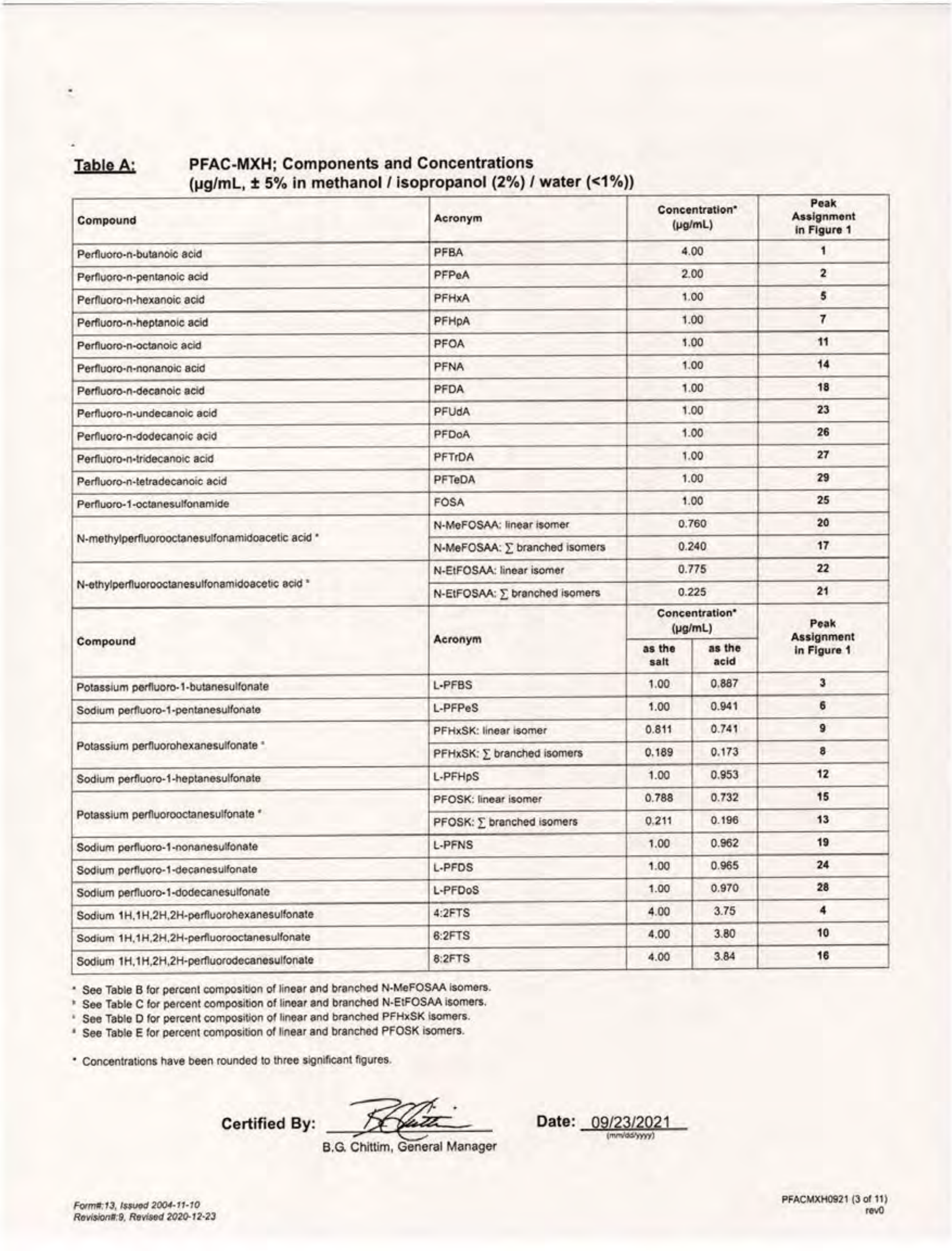


Table A: **PFAC-MXH; Components and Concentrations (µg/mL, ± 5% in methanol / isopropanol (2%) / water (<1%))**

Compound	Acronym	Concentration* (µg/mL)	Peak Assignment in Figure 1
Perfluoro-n-butanoic acid	PFBA	4.00	1
Perfluoro-n-pentanoic acid	PFPeA	2.00	2
Perfluoro-n-hexanoic acid	PFHxA	1.00	5
Perfluoro-n-heptanoic acid	PFHpA	1.00	7
Perfluoro-n-octanoic acid	PFOA	1.00	11
Perfluoro-n-nonanoic acid	PFNA	1.00	14
Perfluoro-n-decanoic acid	PFDA	1.00	18
Perfluoro-n-undecanoic acid	PFUdA	1.00	23
Perfluoro-n-dodecanoic acid	PFDoA	1.00	26
Perfluoro-n-tridecanoic acid	PFTrDA	1.00	27
Perfluoro-n-tetradecanoic acid	PFTeDA	1.00	29
Perfluoro-1-octanesulfonamide	FOSA	1.00	25
N-methylperfluorooctanesulfonamidoacetic acid [a]	N-MeFOSAA: linear isomer	0.760	20
	N-MeFOSAA: ∑ branched isomers	0.240	17
N-ethylperfluorooctanesulfonamidoacetic acid [b]	N-EtFOSAA: linear isomer	0.775	22
	N-EtFOSAA: ∑ branched isomers	0.225	21

Compound	Acronym	Concentration* (µg/mL)		Peak Assignment in Figure 1
		as the salt	as the acid	
Potassium perfluoro-1-butanesulfonate	L-PFBS	1.00	0.887	3
Sodium perfluoro-1-pentanesulfonate	L-PFPeS	1.00	0.941	6
Potassium perfluorohexanesulfonate [c]	PFHxSK: linear isomer	0.811	0.741	9
	PFHxSK: ∑ branched isomers	0.189	0.173	8
Sodium perfluoro-1-heptanesulfonate	L-PFHpS	1.00	0.953	12
Potassium perfluorooctanesulfonate [d]	PFOSK: linear isomer	0.788	0.732	15
	PFOSK: ∑ branched isomers	0.211	0.196	13
Sodium perfluoro-1-nonanesulfonate	L-PFNS	1.00	0.962	19
Sodium perfluoro-1-decanesulfonate	L-PFDS	1.00	0.965	24
Sodium perfluoro-1-dodecanesulfonate	L-PFDoS	1.00	0.970	28
Sodium 1H,1H,2H,2H-perfluorohexanesulfonate	4:2FTS	4.00	3.75	4
Sodium 1H,1H,2H,2H-perfluorooctanesulfonate	6:2FTS	4.00	3.80	10
Sodium 1H,1H,2H,2H-perfluorodecanesulfonate	8:2FTS	4.00	3.84	16

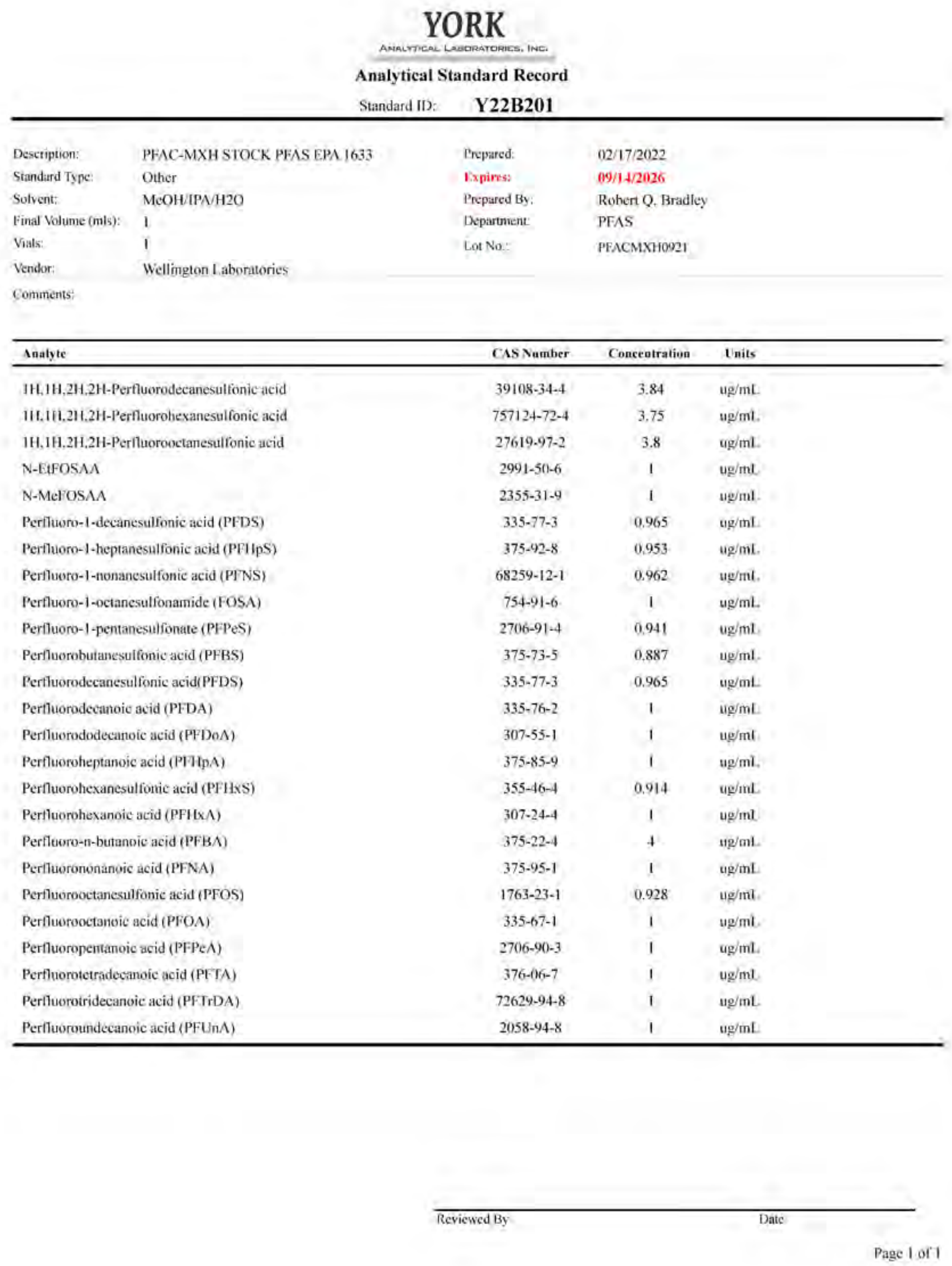
[a] See Table B for percent composition of linear and branched N-MeFOSAA isomers.
[b] See Table C for percent composition of linear and branched N-EtFOSAA isomers.
[c] See Table D for percent composition of linear and branched PFHxSK isomers.
[d] See Table E for percent composition of linear and branched PFOSK isomers.

* Concentrations have been rounded to three significant figures.

Certified By: ______________ **Date:** 09/23/2021
B.G. Chittim, General Manager (mm/dd/yyyy)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXH0921 (3 of 11)
rev0



YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B201**

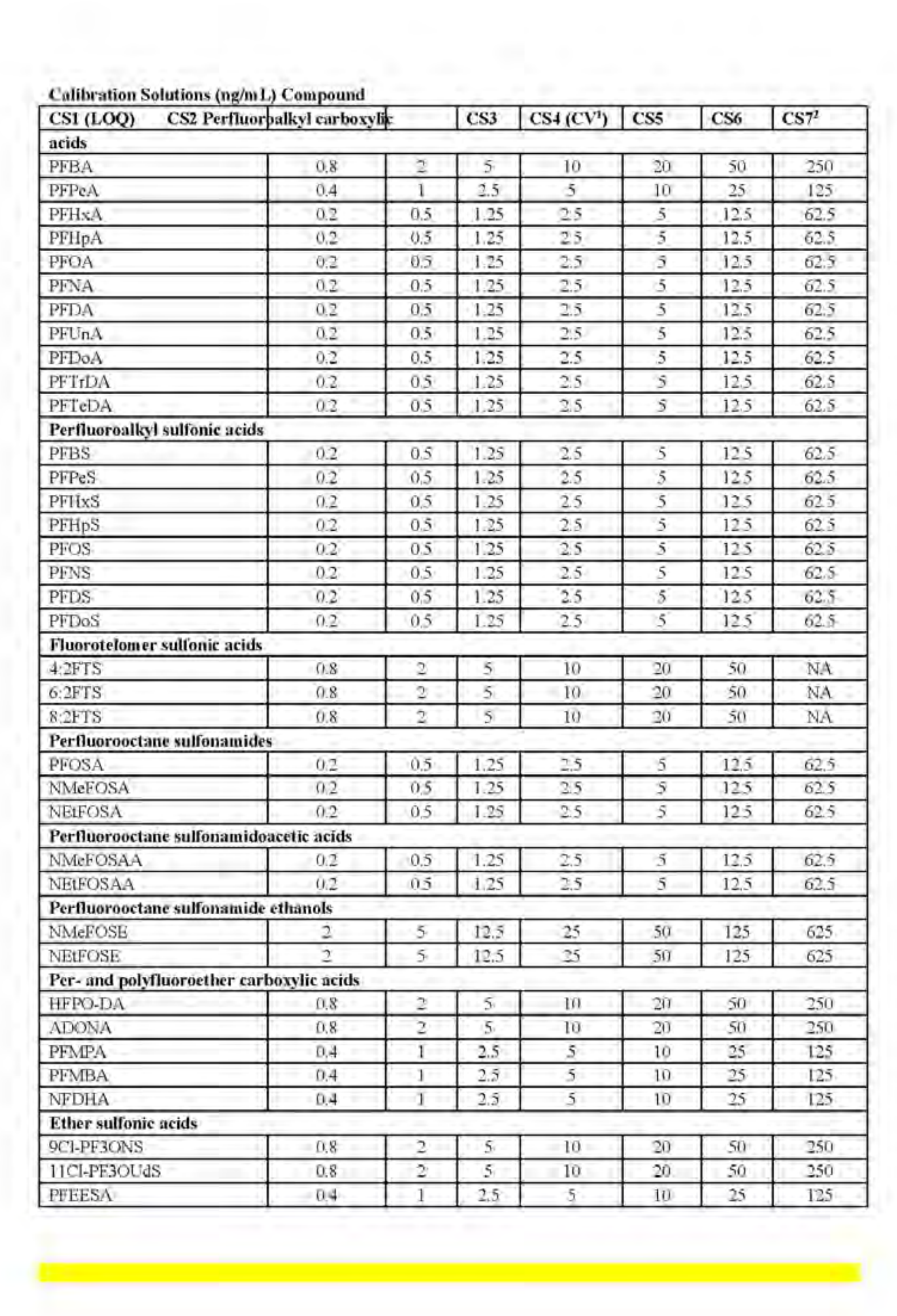
Description:	PFAC-MXH STOCK PFAS EPA 1633	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**09/14/2026**
Solvent:	MeOH/IPA/H2O	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXH0921
Vendor:	Wellington Laboratories		
Comments:			

Analyte	**CAS Number**	**Concentration**	**Units**
1H,1H,2H,2H-Perfluorodecanesulfonic acid	39108-34-4	3.84	ug/mL
1H,1H,2H,2H-Perfluorohexanesulfonic acid	757124-72-4	3.75	ug/mL
1H,1H,2H,2H-Perfluorooctanesulfonic acid	27619-97-2	3.8	ug/mL
N-EtFOSAA	2991-50-6	1	ug/mL
N-MeFOSAA	2355-31-9	1	ug/mL
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	0.965	ug/mL
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	0.953	ug/mL
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	0.962	ug/mL
Perfluoro-1-octanesulfonamide (FOSA)	754-91-6	1	ug/mL
Perfluoro-1-pentanesulfonate (PFPeS)	2706-91-4	0.941	ug/mL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	0.887	ug/mL
Perfluorodecanesulfonic acid(PFDS)	335-77-3	0.965	ug/mL
Perfluorodecanoic acid (PFDA)	335-76-2	1	ug/mL
Perfluorododecanoic acid (PFDoA)	307-55-1	1	ug/mL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	ug/mL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.914	ug/mL
Perfluorohexanoic acid (PFHxA)	307-24-4	1	ug/mL
Perfluoro-n-butanoic acid (PFBA)	375-22-4	4	ug/mL
Perfluorononanoic acid (PFNA)	375-95-1	1	ug/mL
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.928	ug/mL
Perfluorooctanoic acid (PFOA)	335-67-1	1	ug/mL
Perfluoropentanoic acid (PFPeA)	2706-90-3	1	ug/mL
Perfluorotetradecanoic acid (PFTA)	376-06-7	1	ug/mL
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	ug/mL
Perfluoroundecanoic acid (PFUnA)	2058-94-8	1	ug/mL

Reviewed By Date

Page 1 of 1

Attachment 4 – Calibration Concentrations, nominal



Calibration Solutions (ng/mL) Compound

CS1 (LOQ) CS2 Perfluor	alkyl carboxylic		CS3	CS4 (CV^1)	CS5	CS6	CS7^2
acids							
PFBA	0.8	2	5	10	20	50	250
PFPeA	0.4	1	2.5	5	10	25	125
PFHxA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHpA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFOA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFNA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFUnA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDoA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFTrDA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFTeDA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluoroalkyl sulfonic acids							
PFBS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFPeS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHxS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHpS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFOS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFNS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDoS	0.2	0.5	1.25	2.5	5	12.5	62.5
Fluorotelomer sulfonic acids							
4:2FTS	0.8	2	5	10	20	50	NA
6:2FTS	0.8	2	5	10	20	50	NA
8:2FTS	0.8	2	5	10	20	50	NA
Perfluorooctane sulfonamides							
PFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
NMeFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
NEtFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluorooctane sulfonamidoacetic acids							
NMeFOSAA	0.2	0.5	1.25	2.5	5	12.5	62.5
NEtFOSAA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluorooctane sulfonamide ethanols							
NMeFOSE	2	5	12.5	25	50	125	625
NEtFOSE	2	5	12.5	25	50	125	625
Per- and polyfluoroether carboxylic acids							
HFPO-DA	0.8	2	5	10	20	50	250
ADONA	0.8	2	5	10	20	50	250
PFMPA	0.4	1	2.5	5	10	25	125
PFMBA	0.4	1	2.5	5	10	25	125
NFDHA	0.4	1	2.5	5	10	25	125
Ether sulfonic acids							
9Cl-PF3ONS	0.8	2	5	10	20	50	250
11Cl-PF3OUdS	0.8	2	5	10	20	50	250
PFEESA	0.4	1	2.5	5	10	25	125

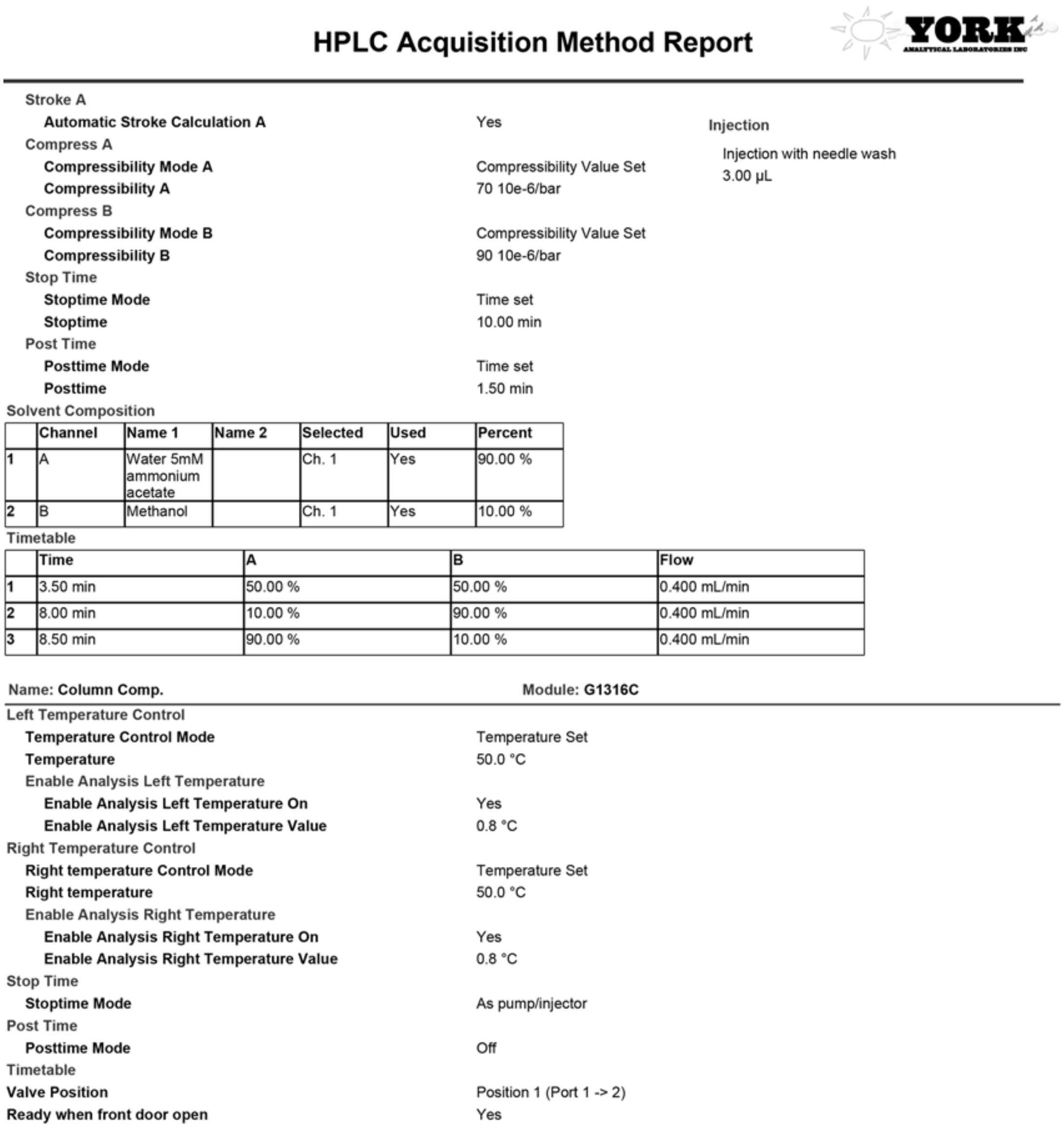
Calibration Solutions (ng/mL) Compound

CS1 (LOQ) CS2 Fluorote	lomer carboxylic		CS3	CS4 (CV[1])	CS5	CS6	CS7[2]
acids							
3:3FTCA	1.0	2.5	6.26	12.5	25	62.4	312
5:3FTCA	5.0	12.5	31.3	62.5	125	312	1560
7:3FTCA	5.0	12.5	31.3	62.5	125	312	1560
Extracted Internal Standard (EIS) Analytes							
$^{13}C_4$-PFBA	10	10	10	10	10	10	10
$^{13}C_5$-PFPeA	5	5	5	5	5	5	5
$^{13}C_5$-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFHpA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_8$-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_9$-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_6$-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_7$-PFUnA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFDoA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFTeDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_3$-PFBS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_3$-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_8$-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_2$-4:2FTS	5	5	5	5	5	5	5
$^{13}C_2$-6:2FTS	5	5	5	5	5	5	5
$^{13}C_2$-8:2FTS	5	5	5	5	5	5	5
$^{13}C_8$-PFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_3-NMeFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_5-NEtFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_3-NMeFOSAA	5	5	5	5	5	5	5
D_5-NEtFOSAA	5	5	5	5	5	5	5
D_7-NMeFOSE	25	25	25	25	25	25	25
D_9-NEtFOSE	25	25	25	25	25	25	25
$^{13}C_3$-HFPO-DA	10	10	10	10	10	10	10
Non-extracted Internal Standard (NIS) Analytes							
$^{13}C_3$-PFBA	5	5	5	5	5	5	5
$^{13}C_2$-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_5$-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{18}O_2$-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5

[1] This calibration point is used as the calibration verification (CV)

[2] A minimum of six contiguous calibrations standards are required for linear models and a minimum of seven calibration standards are required for second-order models.

Attachment 5 -HPLC Method Parameters



HPLC Acquisition Method Report

Stroke A
- **Automatic Stroke Calculation A** Yes

Compress A
- **Compressibility Mode A** Compressibility Value Set
- **Compressibility A** 70 10e-6/bar

Compress B
- **Compressibility Mode B** Compressibility Value Set
- **Compressibility B** 90 10e-6/bar

Stop Time
- **Stoptime Mode** Time set
- **Stoptime** 10.00 min

Post Time
- **Posttime Mode** Time set
- **Posttime** 1.50 min

Injection
- Injection with needle wash
- 3.00 µL

Solvent Composition

	Channel	Name 1	Name 2	Selected	Used	Percent
1	A	Water 5mM ammonium acetate		Ch. 1	Yes	90.00 %
2	B	Methanol		Ch. 1	Yes	10.00 %

Timetable

	Time	A	B	Flow
1	3.50 min	50.00 %	50.00 %	0.400 mL/min
2	8.00 min	10.00 %	90.00 %	0.400 mL/min
3	8.50 min	90.00 %	10.00 %	0.400 mL/min

Name: **Column Comp.** Module: **G1316C**

Left Temperature Control
- **Temperature Control Mode** Temperature Set
- **Temperature** 50.0 °C
- Enable Analysis Left Temperature
  - **Enable Analysis Left Temperature On** Yes
  - **Enable Analysis Left Temperature Value** 0.8 °C

Right Temperature Control
- **Right temperature Control Mode** Temperature Set
- **Right temperature** 50.0 °C
- Enable Analysis Right Temperature
  - **Enable Analysis Right Temperature On** Yes
  - **Enable Analysis Right Temperature Value** 0.8 °C

Stop Time
- **Stoptime Mode** As pump/injector

Post Time
- **Posttime Mode** Off

Timetable

Valve Position Position 1 (Port 1 -> 2)

Ready when front door open Yes

Attachment 6 - Triple Quadrupole Acquisition Method

Acquisition Method Report

Agilent Technologies

Acquisition Method Info

Method Name	PFAS1633_ACQ_092922.m
Method Path	D:\MassHunter\methods\PFAS1633_ACQ_092922.m
Method Description	EPA 1633_Target PFAS Isotope Dilution_Acquisition

Device List

- HiP Sampler
- Binary Pump
- Column Comp.
- QQQ

MS QQQ Mass Spectrometer

Ion Source	AJS ESI	**Tune File**	D:\MassHunter\Tune\QQQ\G6460C \atunes.TUNE.XML
Stop Mode	No Limit/As Pump	**Stop Time (min)**	1
Time Filter	On	**Time Filter Width (min)**	0.07
LC->Waste Pre Row	N/A	**LC->Waste Post Row**	N/A

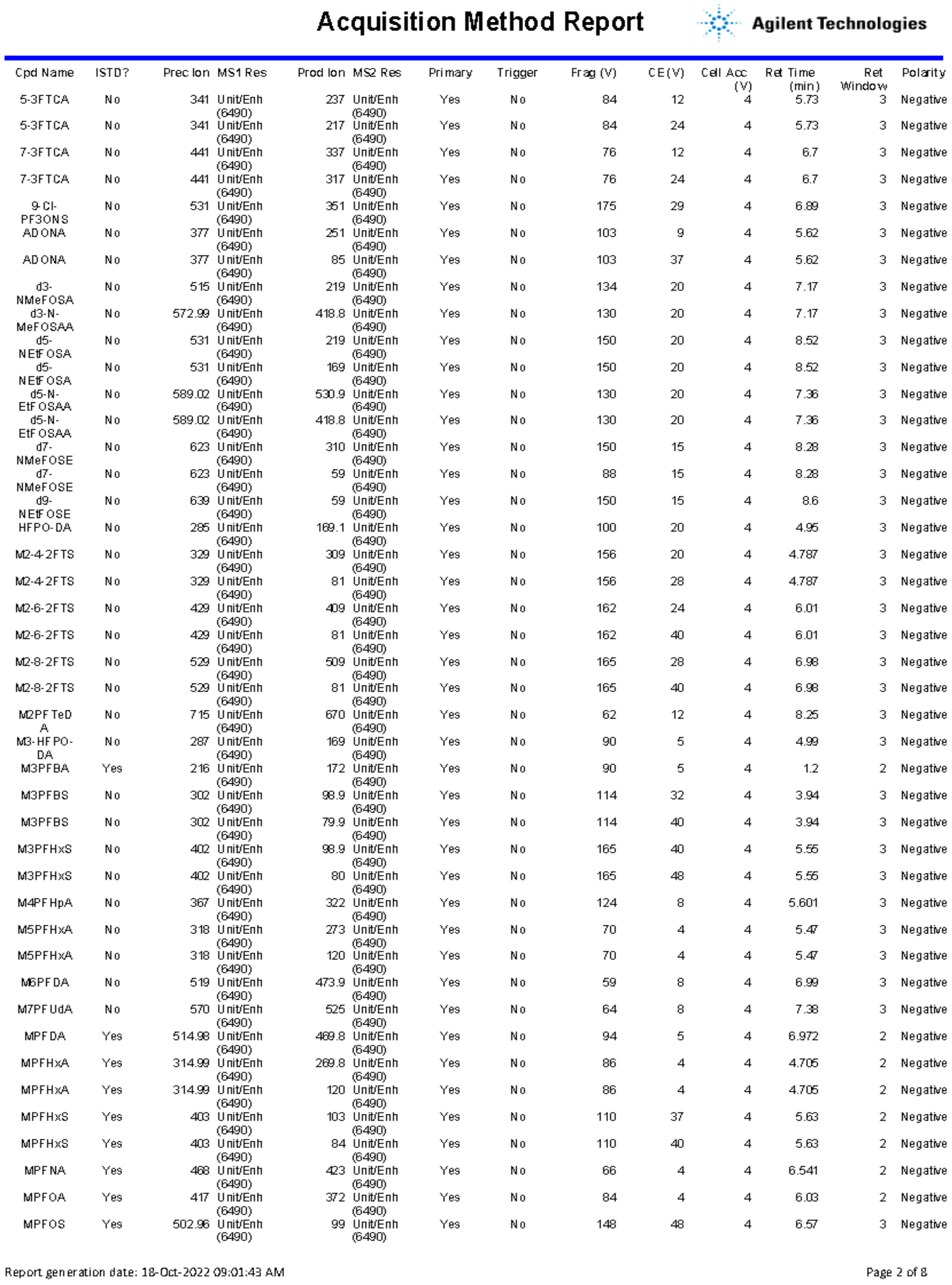
Time Segments

Index	Start Time (min)	Scan Type	Ion Mode	Div Valve	Delta EMV	Store	Cycle Time (ms)	Triggered?	MRM Repeats
1	0	DynamicMRM	ESI+Agilent Jet Stream	To MS	350	Yes	550	Yes	3

Time Segment 1

Scan Segments

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
11-Cl-PF3OUdS	No	631	Unit/Enh (6490)	451	Unit/Enh (6490)	Yes	No	170	33	4	7.62	3	Negative
1H,1H,2H,2H-perfluoro-1-decanesulfonate (8 2FTS)	No	527	Unit/Enh (6490)	507	Unit/Enh (6490)	Yes	No	170	28	4	7.14	3	Negative
1H,1H,2H,2H-perfluoro-1-decanesulfonate (8 2FTS)	No	527	Unit/Enh (6490)	80.9	Unit/Enh (6490)	Yes	No	170	40	4	7.14	3	Negative
1H,1H,2H,2H-perfluoro-1-hexanesulfonate (4 2FTS)	No	327	Unit/Enh (6490)	307	Unit/Enh (6490)	Yes	No	162	20	4	4.788	3	Negative
1H,1H,2H,2H-perfluoro-1-hexanesulfonate (4 2FTS)	No	327	Unit/Enh (6490)	80.9	Unit/Enh (6490)	Yes	No	162	36	4	4.788	3	Negative
1H,1H,2H,2H-perfluoro-1-octanesulfonate (6 2FTS)	No	427	Unit/Enh (6490)	407	Unit/Enh (6490)	Yes	No	162	24	4	6.168	3	Negative
1H,1H,2H,2H-perfluoro-1-octanesulfonate (6 2FTS)	No	427	Unit/Enh (6490)	79.7	Unit/Enh (6490)	Yes	No	162	48	4	6.168	3	Negative
3:3FTCA	No	241	Unit/Enh (6490)	177	Unit/Enh (6490)	Yes	No	74	4	4	3.4	3	Negative
3-3FTCA	No	241	Unit/Enh (6490)	117	Unit/Enh (6490)	Yes	No	74	44	4	3.4	3	Negative



Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE(V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
5-3FTCA	No	341	Unit/Enh (6490)	237	Unit/Enh (6490)	Yes	No	84	12	4	5.73	3	Negative
5-3FTCA	No	341	Unit/Enh (6490)	217	Unit/Enh (6490)	Yes	No	84	24	4	5.73	3	Negative
7-3FTCA	No	441	Unit/Enh (6490)	337	Unit/Enh (6490)	Yes	No	76	12	4	6.7	3	Negative
7-3FTCA	No	441	Unit/Enh (6490)	317	Unit/Enh (6490)	Yes	No	76	24	4	6.7	3	Negative
9-Cl-PF3ONS	No	531	Unit/Enh (6490)	351	Unit/Enh (6490)	Yes	No	175	29	4	6.89	3	Negative
ADONA	No	377	Unit/Enh (6490)	251	Unit/Enh (6490)	Yes	No	103	9	4	5.62	3	Negative
ADONA	No	377	Unit/Enh (6490)	85	Unit/Enh (6490)	Yes	No	103	37	4	5.62	3	Negative
d3-NMeFOSA	No	515	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	134	20	4	7.17	3	Negative
d3-N-MeFOSAA	No	572.99	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	130	20	4	7.17	3	Negative
d5-NEtFOSA	No	531	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	150	20	4	8.52	3	Negative
d5-NEtFOSA	No	531	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	150	20	4	8.52	3	Negative
d5-N-EtFOSAA	No	589.02	Unit/Enh (6490)	530.9	Unit/Enh (6490)	Yes	No	130	20	4	7.36	3	Negative
d5-N-EtFOSAA	No	589.02	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	130	20	4	7.36	3	Negative
d7-NMeFOSE	No	623	Unit/Enh (6490)	310	Unit/Enh (6490)	Yes	No	150	15	4	8.28	3	Negative
d7-NMeFOSE	No	623	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	88	15	4	8.28	3	Negative
d9-NEtFOSE	No	639	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	150	15	4	8.6	3	Negative
HFPO-DA	No	285	Unit/Enh (6490)	169.1	Unit/Enh (6490)	Yes	No	100	20	4	4.95	3	Negative
M2-4-2FTS	No	329	Unit/Enh (6490)	309	Unit/Enh (6490)	Yes	No	156	20	4	4.787	3	Negative
M2-4-2FTS	No	329	Unit/Enh (6490)	81	Unit/Enh (6490)	Yes	No	156	28	4	4.787	3	Negative
M2-6-2FTS	No	429	Unit/Enh (6490)	409	Unit/Enh (6490)	Yes	No	162	24	4	6.01	3	Negative
M2-6-2FTS	No	429	Unit/Enh (6490)	81	Unit/Enh (6490)	Yes	No	162	40	4	6.01	3	Negative
M2-8-2FTS	No	529	Unit/Enh (6490)	509	Unit/Enh (6490)	Yes	No	165	28	4	6.98	3	Negative
M2-8-2FTS	No	529	Unit/Enh (6490)	81	Unit/Enh (6490)	Yes	No	165	40	4	6.98	3	Negative
M2PFTeDA	No	715	Unit/Enh (6490)	670	Unit/Enh (6490)	Yes	No	62	12	4	8.25	3	Negative
M3-HFPO-DA	No	287	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	90	5	4	4.99	3	Negative
M3PFBA	Yes	216	Unit/Enh (6490)	172	Unit/Enh (6490)	Yes	No	90	5	4	1.2	2	Negative
M3PFBS	No	302	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	114	32	4	3.94	3	Negative
M3PFBS	No	302	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	114	40	4	3.94	3	Negative
M3PFHxS	No	402	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	165	40	4	5.55	3	Negative
M3PFHxS	No	402	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	165	48	4	5.55	3	Negative
M4PFHpA	No	367	Unit/Enh (6490)	322	Unit/Enh (6490)	Yes	No	124	8	4	5.601	3	Negative
M5PFHxA	No	318	Unit/Enh (6490)	273	Unit/Enh (6490)	Yes	No	70	4	4	5.47	3	Negative
M5PFHxA	No	318	Unit/Enh (6490)	120	Unit/Enh (6490)	Yes	No	70	4	4	5.47	3	Negative
M6PFDA	No	519	Unit/Enh (6490)	473.9	Unit/Enh (6490)	Yes	No	59	8	4	6.99	3	Negative
M7PFUdA	No	570	Unit/Enh (6490)	525	Unit/Enh (6490)	Yes	No	64	8	4	7.38	3	Negative
MPFDA	Yes	514.98	Unit/Enh (6490)	469.8	Unit/Enh (6490)	Yes	No	94	5	4	6.972	2	Negative
MPFHxA	Yes	314.99	Unit/Enh (6490)	269.8	Unit/Enh (6490)	Yes	No	86	4	4	4.705	2	Negative
MPFHxA	Yes	314.99	Unit/Enh (6490)	120	Unit/Enh (6490)	Yes	No	86	4	4	4.705	2	Negative
MPFHxS	Yes	403	Unit/Enh (6490)	103	Unit/Enh (6490)	Yes	No	110	37	4	5.63	2	Negative
MPFHxS	Yes	403	Unit/Enh (6490)	84	Unit/Enh (6490)	Yes	No	110	40	4	5.63	2	Negative
MPFNA	Yes	468	Unit/Enh (6490)	423	Unit/Enh (6490)	Yes	No	66	4	4	6.541	2	Negative
MPFOA	Yes	417	Unit/Enh (6490)	372	Unit/Enh (6490)	Yes	No	84	4	4	6.03	2	Negative
MPFOS	Yes	502.96	Unit/Enh (6490)	99	Unit/Enh (6490)	Yes	No	148	48	4	6.57	3	Negative

Report generation date: 18-Oct-2022 09:01:43 AM

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Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
MPFOS	Yes	502.96	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	148	54	4	6.57	3	Negative
NEtFOSA	No	526	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	120	20	4	8.528	3	Negative
NEtFOSA	No	526	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	120	20	4	8.528	3	Negative
N-EtFOSAA	No	584	Unit/Enh (6490)	525.9	Unit/Enh (6490)	Yes	No	130	20	4	7.521	3	Negative
N-EtFOSAA	No	584	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	130	20	4	7.521	3	Negative
NEtFOSE	No	630	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	120	20	4	8.301	3	Negative
NFDHA	No	295	Unit/Enh (6490)	201.1	Unit/Enh (6490)	Yes	No	92	2	4	4.641	3	Negative
NFDHA	No	295	Unit/Enh (6490)	84.9	Unit/Enh (6490)	Yes	No	92	34	4	4.641	3	Negative
NMeFOSA	No	512	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	120	20	4	8.298	3	Negative
NMeFOSA	No	512	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	120	20	4	8.298	3	Negative
N-MeFOSAA	No	570	Unit/Enh (6490)	511.9	Unit/Enh (6490)	Yes	No	150	20	4	7.335	3	Negative
N-MeFOSAA	No	570	Unit/Enh (6490)	418.9	Unit/Enh (6490)	Yes	No	150	20	4	7.335	3	Negative
NMeFOSE	No	616	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	120	20	4	8.301	3	Negative
Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)	No	506	Unit/Enh (6490)	78	Unit/Enh (6490)	Yes	No	162	48	4	7.59	3	Negative
Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)	No	507	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	174	48	4	6.59	3	Negative
Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)	No	507	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	174	54	4	6.59	3	Negative
Perfluoro-1-decanesulfonate (L-PFDS)	No	598.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	156	50	4	7.546	3	Negative
Perfluoro-1-decanesulfonate (L-PFDS)	No	598.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	100	60	4	7.546	3	Negative
Perfluoro-1-heptanesulfonate (L-PFHpS)	No	448.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	162	48	4	6.252	3	Negative
Perfluoro-1-heptanesulfonate (L-PFHpS)	No	448.9	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	162	48	4	6.252	3	Negative
Perfluoro-1-octanesulfonamide (FOSA)	No	497.9	Unit/Enh (6490)	478	Unit/Enh (6490)	Yes	No	156	100	4	7.651	3	Negative
Perfluoro-1-octanesulfonamide (FOSA)	No	497.9	Unit/Enh (6490)	78	Unit/Enh (6490)	Yes	No	156	40	4	7.651	3	Negative
Perfluoro-1-pentanesulfonate (L-PFPeS)	No	348.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	36	4	5.042	3	Negative
Perfluoro-1-pentanesulfonate (L-PFPeS)	No	348.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	40	4	5.042	3	Negative

Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
Perfluorobutanesulfonic acid (PFBS)	No	298.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	32	4	4.042	3	Negative
Perfluorobutanesulfonic acid (PFBS)	No	298.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	36	4	4.042	3	Negative
Perfluorodecanoic acid (PFDA)	No	513	Unit/Enh (6490)	468.8	Unit/Enh (6490)	Yes	No	90	8	4	7.158	3	Negative
Perfluorodecanoic acid (PFDA)	No	513	Unit/Enh (6490)	268.8	Unit/Enh (6490)	Yes	No	90	16	4	7.158	3	Negative
Perfluorododecanesulfonic acid (PFDoS)	No	699	Unit/Enh (6490)	99	Unit/Enh (6490)	Yes	No	100	60	4	7.984	3	Negative
Perfluorododecanesulfonic acid (PFDoS)	No	699	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	156	50	4	7.984	3	Negative
Perfluorododecanoic acid (PFDoA)	No	613	Unit/Enh (6490)	568.8	Unit/Enh (6490)	Yes	No	90	12	4	7.876	3	Negative
Perfluorododecanoic acid (PFDoA)	No	613	Unit/Enh (6490)	168.7	Unit/Enh (6490)	Yes	No	90	28	4	7.876	3	Negative
Perfluoroheptanoic acid (PFHpA)	No	363	Unit/Enh (6490)	318.8	Unit/Enh (6490)	Yes	No	90	8	4	5.601	3	Negative
Perfluoroheptanoic acid (PFHpA)	No	363	Unit/Enh (6490)	168.9	Unit/Enh (6490)	Yes	No	90	16	4	5.601	3	Negative
Perfluorohexanesulfonic acid (PFHxS)	No	398.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	40	4	5.685	3	Negative
Perfluorohexanesulfonic acid (PFHxS)	No	398.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	44	4	5.685	3	Negative
Perfluorohexanoic acid (PFHxA)	No	313	Unit/Enh (6490)	268.9	Unit/Enh (6490)	Yes	No	70	4	4	4.856	3	Negative
Perfluorohexanoic acid (PFHxA)	No	313	Unit/Enh (6490)	119	Unit/Enh (6490)	Yes	No	70	20	4	4.856	3	Negative
Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)	No	615	Unit/Enh (6490)	570	Unit/Enh (6490)	Yes	No	53	8	4	7.71	3	Negative
Perfluoro-n-[13C4]butanoic acid (MPFBA)	No	217	Unit/Enh (6490)	172	Unit/Enh (6490)	Yes	No	59	4	4	1.22	3	Negative
Perfluoro-n-[13C54]pentanoic acid (M5PFPeA)	No	268	Unit/Enh (6490)	223	Unit/Enh (6490)	Yes	No	62	4	4	3.44	3	Negative
Perfluoro-n-[13C8]octanoic acid (M8PFOA)	No	421	Unit/Enh (6490)	376	Unit/Enh (6490)	Yes	No	59	4	4	6.05	3	Negative
Perfluoro-n-[13C8]octanoic acid (M8PFOA)	No	421	Unit/Enh (6490)	172	Unit/Enh (6490)	Yes	No	59	16	4	6.05	3	Negative

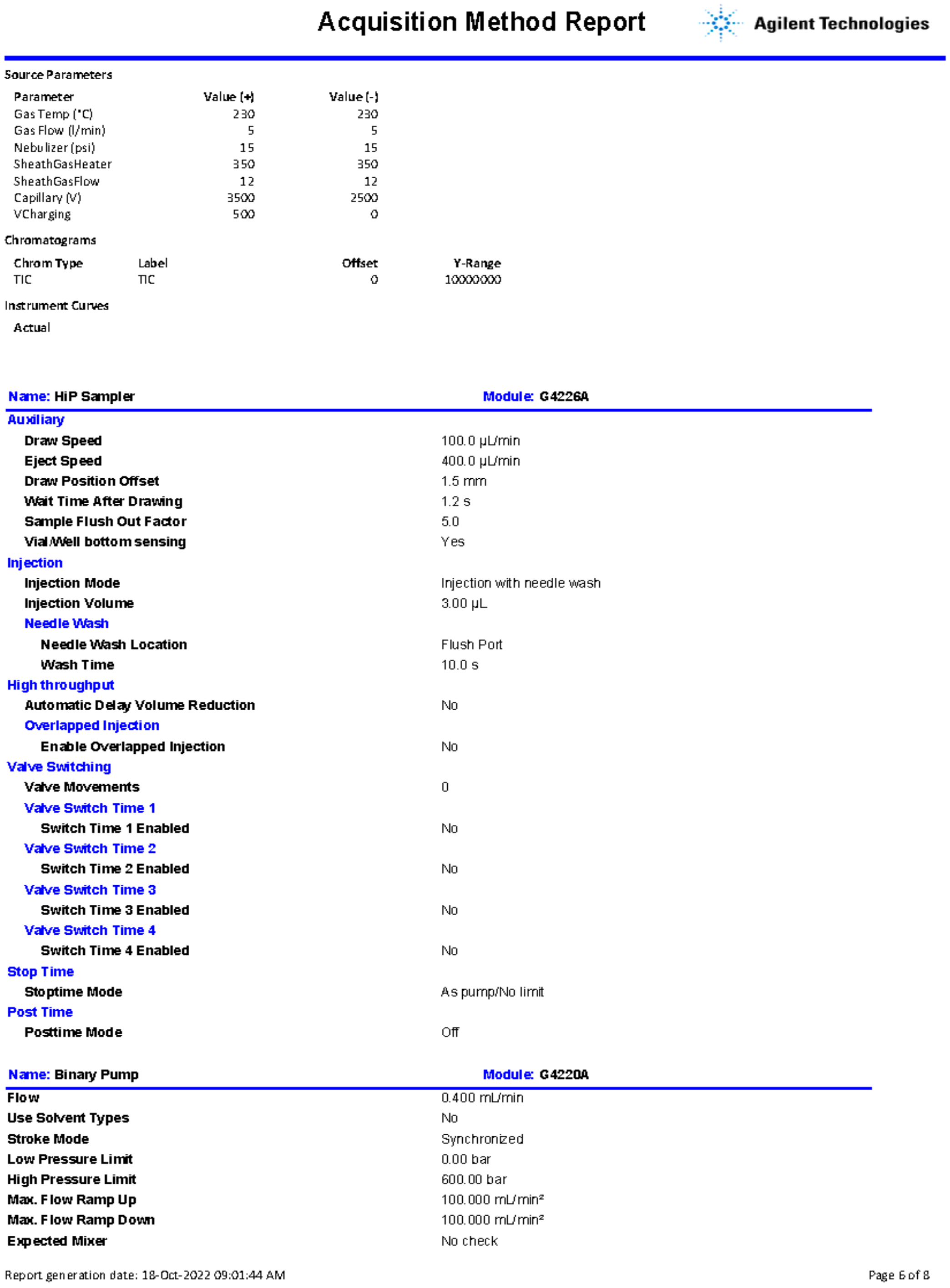
Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
Perfluoro-n-[13C9]nonanoic acid (M9PFNA)	No	472	Unit/Enh (6490)	427	Unit/Enh (6490)	Yes	No	59	8	4	6.56	3	Negative
Perfluoro-n-[13C9]nonanoic acid (M9PFNA)	No	472	Unit/Enh (6490)	223	Unit/Enh (6490)	Yes	No	59	16	4	6.56	3	Negative
Perfluoro-n-butanoic acid (PFBA)	No	213	Unit/Enh (6490)	168.9	Unit/Enh (6490)	Yes	No	70	4	4	1.246	3	Negative
Perfluorononanesulfonate (L-PFNS)	No	548.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	159	48	4	7.174	3	Negative
Perfluorononanesulfonate (L-PFNS)	No	548.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	159	48	4	7.174	3	Negative
Perfluorononanoic acid (PFNA)	No	463	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	90	8	4	6.718	3	Negative
Perfluorononanoic acid (PFNA)	No	463	Unit/Enh (6490)	218.8	Unit/Enh (6490)	Yes	No	90	16	4	6.718	3	Negative
Perfluoro-n-pentanoic acid (PFPeA)	No	263	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	62	4	4	3.526	3	Negative
Perfluorooctanesulfonic acid (PFOS)	No	498.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	44	4	6.743	3	Negative
Perfluorooctanesulfonic acid (PFOS)	No	498.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	84	4	6.743	3	Negative
Perfluorooctanoic acid (PFOA)	No	413	Unit/Enh (6490)	368.8	Unit/Enh (6490)	Yes	No	90	8	4	6.202	3	Negative
Perfluorooctanoic acid (PFOA)	No	413	Unit/Enh (6490)	168.9	Unit/Enh (6490)	Yes	No	90	16	4	6.202	3	Negative
Perfluorotetradecanoic acid (PFTA)	No	713	Unit/Enh (6490)	669	Unit/Enh (6490)	Yes	No	110	12	4	8.414	3	Negative
Perfluorotetradecanoic acid (PFTA)	No	713	Unit/Enh (6490)	168.8	Unit/Enh (6490)	Yes	No	110	28	4	8.414	3	Negative
Perfluorotridecanoic acid (PFTrDA)	No	663	Unit/Enh (6490)	618.8	Unit/Enh (6490)	Yes	No	90	12	4	8.164	3	Negative
Perfluoroundecanoic acid (PFUnA)	No	563	Unit/Enh (6490)	519	Unit/Enh (6490)	Yes	No	90	8	4	7.538	3	Negative
Perfluoroundecanoic acid (PFUnA)	No	563	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	90	24	4	7.538	3	Negative
PFEESA	No	315	Unit/Enh (6490)	135	Unit/Enh (6490)	Yes	No	112	26	4	4.464	3	Negative
PFEESA	No	315	Unit/Enh (6490)	83	Unit/Enh (6490)	Yes	No	112	14	4	4.464	3	Negative
PFMBA	No	279	Unit/Enh (6490)	85	Unit/Enh (6490)	Yes	No	75	18	4	4.011	3	Negative
PFMPA	No	229	Unit/Enh (6490)	85	Unit/Enh (6490)	Yes	No	59	6	4	2.15	3	Negative

Scan Parameters

Data Stg	Threshold
Centroid	0



Acquisition Method Report

Agilent Technologies

Source Parameters

Parameter	Value (+)	Value (-)
Gas Temp (°C)	230	230
Gas Flow (l/min)	5	5
Nebulizer (psi)	15	15
SheathGasHeater	350	350
SheathGasFlow	12	12
Capillary (V)	3500	2500
VCharging	500	0

Chromatograms

Chrom Type	Label	Offset	Y-Range
TIC	TIC	0	10000000

Instrument Curves

Actual

Name: HiP Sampler **Module:** G4226A

Auxiliary	
Draw Speed	100.0 µL/min
Eject Speed	400.0 µL/min
Draw Position Offset	1.5 mm
Wait Time After Drawing	1.2 s
Sample Flush Out Factor	5.0
Vial/Well bottom sensing	Yes
Injection	
Injection Mode	Injection with needle wash
Injection Volume	3.00 µL
Needle Wash	
Needle Wash Location	Flush Port
Wash Time	10.0 s
High throughput	
Automatic Delay Volume Reduction	No
Overlapped Injection	
Enable Overlapped Injection	No
Valve Switching	
Valve Movements	0
Valve Switch Time 1	
Switch Time 1 Enabled	No
Valve Switch Time 2	
Switch Time 2 Enabled	No
Valve Switch Time 3	
Switch Time 3 Enabled	No
Valve Switch Time 4	
Switch Time 4 Enabled	No
Stop Time	
Stoptime Mode	As pump/No limit
Post Time	
Posttime Mode	Off

Name: Binary Pump **Module:** G4220A

Flow	0.400 mL/min
Use Solvent Types	No
Stroke Mode	Synchronized
Low Pressure Limit	0.00 bar
High Pressure Limit	600.00 bar
Max. Flow Ramp Up	100.000 mL/min²
Max. Flow Ramp Down	100.000 mL/min²
Expected Mixer	No check

Report generation date: 18-Oct-2022 09:01:44 AM

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APPENDIX C: Community Air Monitoring Plan

GALLAGHER BASSETT | TECHNICAL SERVICES

COMMUNITY AIR MONITORING PLAN

The Green - Newburgh

City of Newburgh, Orange County, New York

NYSDEC BCP Site: 336099

November 2024

GBTS Project: 22003-0092

Technical Services Division

22 IBM Road, Suite 101., Poughkeepsie, NY 12601   T: 845-452-1658   F: 845-485-7083
www.gallagherbassett.com

COMMUNITY AIR MONITORING PLAN

November 2024

GBTS Project: 22003-0092

Prepared By:

Gallagher Bassett Technical Services
22 IBM Road, Suite 101
Poughkeepsie, New York 12601

Prepared For:

Kearney Realty & Development Group Inc.
57 Route 6, Suite 207
Baldwin Place, New York 10505

The undersigned have reviewed this Community Air Monitoring Plan and certify to Kearney Realty & Development Group Inc. and to the New York State Department of Environmental Conservation that the information provided in this document is accurate as of the date of issuance by this office.

Scott Spitzer

Scott Spitzer
Gallagher Bassett Technical Services
Technical Director – Environmental Consulting

R Hooker

Richard Hooker
Gallagher Bassett Technical Services
Manager – Environmental Consulting

TABLE OF CONTENTS

Attachments

1.0 INTRODUCTION

1.1 Purpose

This Community Air Monitoring Plan (CAMP) has been developed to provide the requirements and general procedures to be followed by Gallagher Bassett Technical Services (GBTS) and on-Site subcontractors while performing investigative services at The Green-Newburgh BCP Site (336099) located in the City of Newburgh, Orange County, New York. This CAMP requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area and is intended to provide protection for the downwind receptors, including off-Site properties and on-site workers not directly involved in the handling of contaminated materials. Implementation of the CAMP helps to confirm that work activities did not spread contamination off-site through the air. The Project Manager or Site Health and Safety Officer (SHSO) may impose other requirements necessary for safe Site operations and protection of potential receptors.

1.2 Site Location and Fieldwork Area

The Site is defined as the property located at 1137 Smith Street and 140 and 146 Montgomery Street, City of Newburgh, Orange County, New York. A Proposed Remedial Investigation Map illustrating the Site configuration is attached.

1.3 Work Activities

Proposed remedial investigative actions include extension of soil borings, installation of monitoring wells and soil vapor probes, and collection of soil, groundwater, and vapor samples to document and delineate on-Site contamination conditions.

1.4 Health and Safety Hazards

The potential exists for the presence of elevated levels of organic compounds and metals in Site soils and groundwater, and volatile compounds in soil vapor. The possibility exists for on-site personnel to have contact with contaminated soils, groundwater, and/or vapor during fieldwork activities. Contact with contaminated substances may present a skin contact, inhalation, and/or ingestion hazard.

2.0 AIR MONITORING

2.1 General Requirements

The implementation of the CAMP will document the presence or absence of VOCs and dust in the air surrounding the work zone, which may migrate off-Site due to fieldwork activities. Monitoring will be conducted at all times that fieldwork activities which are likely to generate emissions are occurring. This plan provides guidance on the need for implementing more stringent dust and emission controls based on air quality data.

2.1.1 Continuous Monitoring

Real-time air monitoring for VOCs and particulate levels at the perimeter of the exclusion zone or work area will be performed according to the NYSDOH Generic Community Air Monitoring Plan (provided as an Attachment), and in accordance with the special requirements presented below, during all ground intrusive activities and any other fieldwork that is reasonably likely to generate significant dust or vapors from known or suspected contaminated soils. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells. The locations of CAMP monitoring stations (a minimum of four are proposed) are shown on the attached Figure.

2.1.2 Periodic Monitoring

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

2.1.3 Health and Safety

Photoionization detector (PID) and dust readings consistently in excess of CAMP limits will be used as an indication of the need to initiate personnel monitoring, increase worker protective measures, and/or modify or cease on-site operations in order to mitigate off-site community exposure. PID readings that consistently exceed background in the breathing zone (during any proposed tasks) will necessitate moving away from the source or implementing a higher level of personal protective equipment (concentrations of VOCs in the air are expected to be below the OSHA Permissible Exposure Limits [PELs]).

2.1.4 VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. Monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present.

The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or occupied structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shut down.

All 15-minute readings must be recorded and be available for NYSDEC personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

2.1.5 Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level.

The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed and work will continue provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and will be available for NYSDEC personnel to review.

2.2 Special Requirements

2.2.1 Work within 20 Feet of Potential Receptors

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be predetermined). Background readings in the occupied spaces must be taken and discussed with NYSDOH prior to commencement of the work.

If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, and carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

2.2.2 Special Requirements for Indoor Work

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under Section 2.2.1, except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g., weekends or evenings) when building occupancy is at a minimum.

2.3 Contaminant Control

Mitigation measures may be required to control the generation of vapors and/or dust.

2.3.1 Dust Control

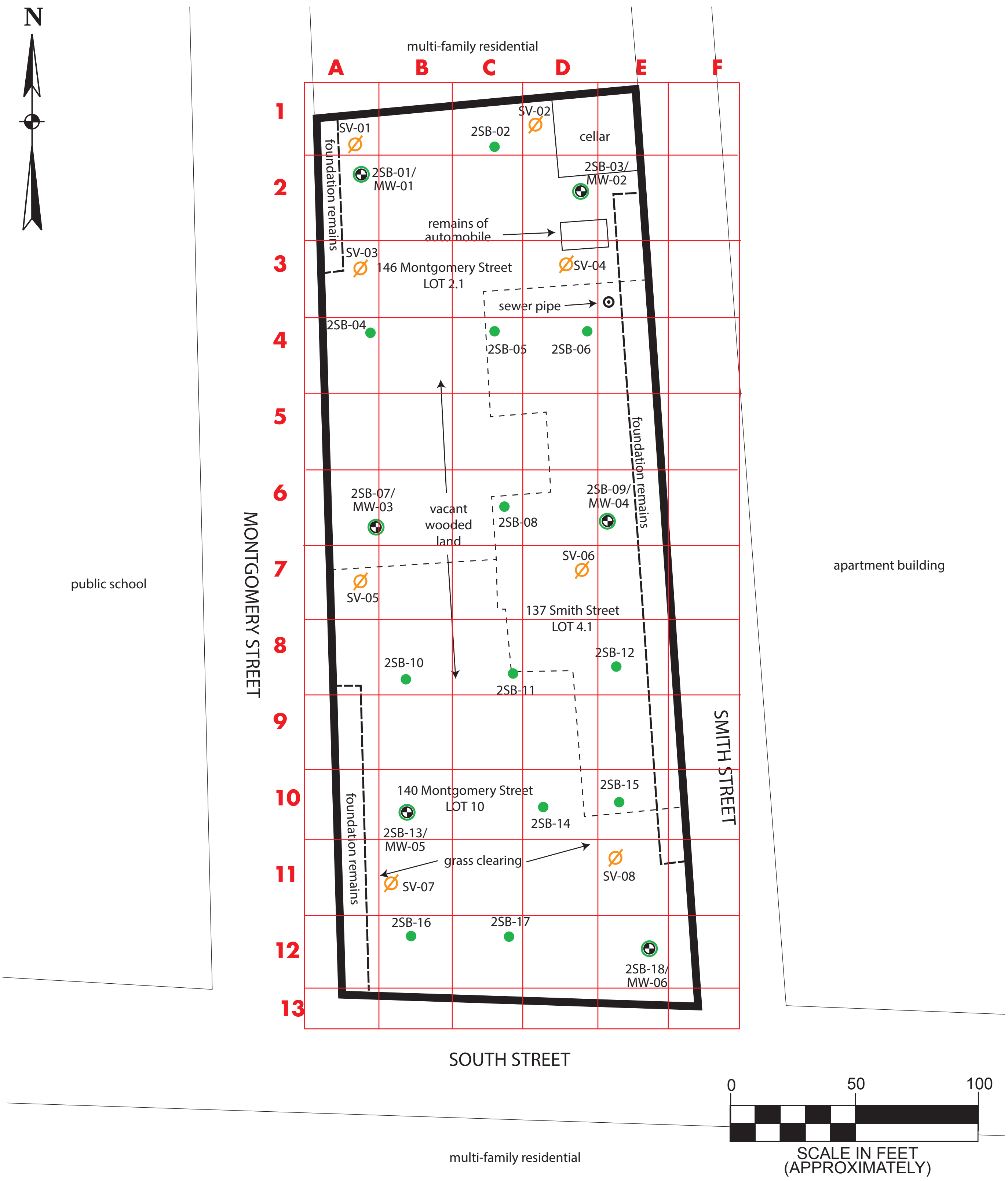
Mitigation measures may include reducing the surface area of contaminated soil being disturbed at one time, wetting heavy equipment and exposed soils to reduce fugitive dust, using covered stockpiles/trucks, or stopping excavation and/or other soil disturbing activities. Dust suppression will be conducted during construction activities that will disturb on-Site soils and may include misting, reduction in soil movement, reducing vehicle speeds, or cessation of excavation.

2.3.2 Vapor Control

Mitigation measures include all controls used for dust suppression, as well as specific techniques for reducing releases of vapors, such as spraying commercial odor control products (e.g., BioSolve) or limiting work to cooler or less windy times of day.

3.0 QUALITY ASSURANCE

All instruments will be properly calibrated before the start of fieldwork, with periodic calibration checks as necessary. All equipment will be operated in accordance with the manufacturer's recommendations and the operator’s manual. The fieldwork manager will review all data and take appropriate actions based on the requirements in Section 2 of this CAMP. A record of all calibration events, and any unusual occurrence that affect CAMP data, will be recorded in the project field log book. Instrument calibration shall be documented in the designated field logbook. Exceedances of action levels observed during performance of the CAMP will be reported to the NYSDEC Project Manager and included in the Daily Report.



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure: Proposed Remedial Investigation Map

137 Smith Street, 140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

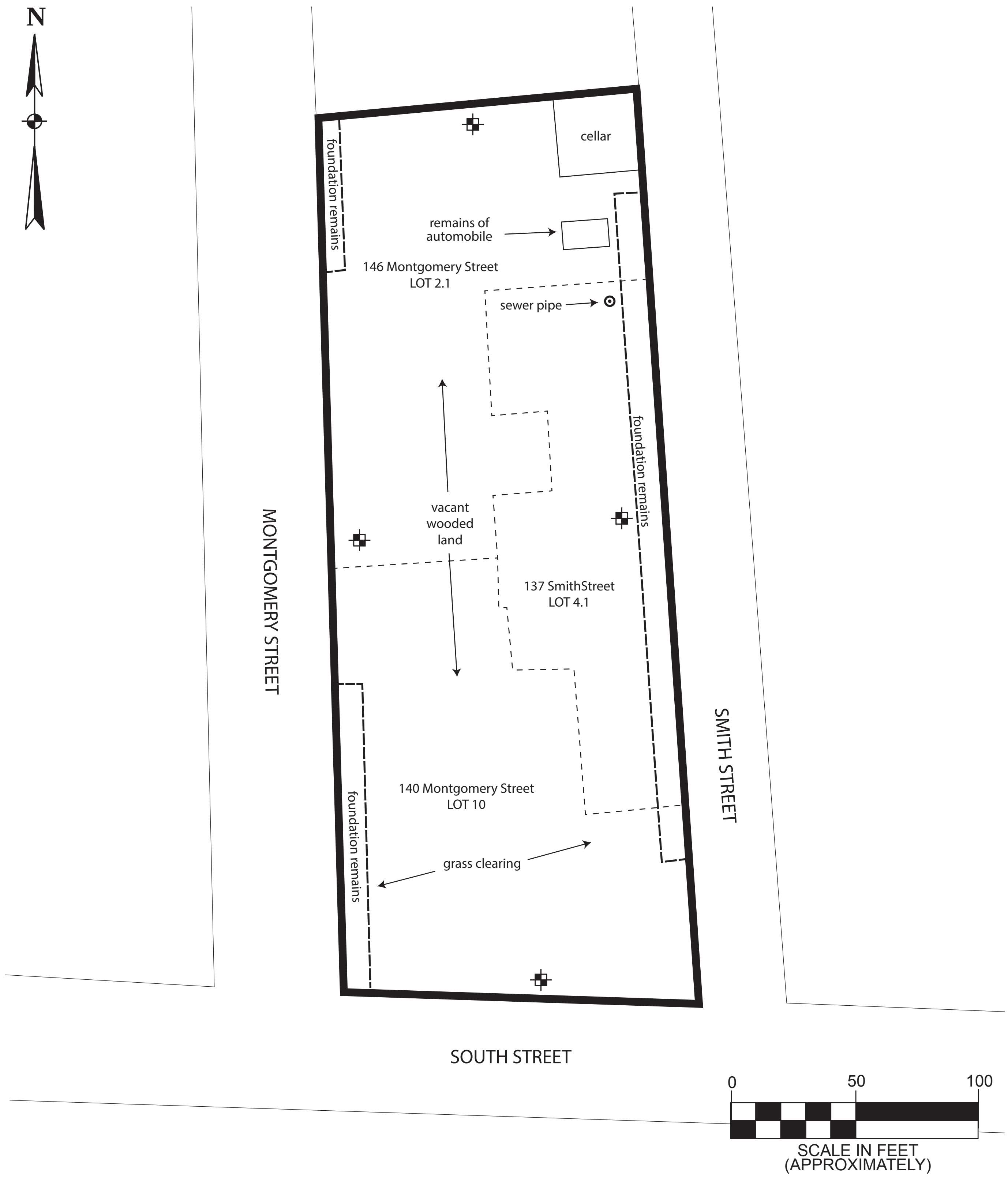
Legend:

- ▬ subject property border
- - - - - lot lines
- ● proposed soil sample location
- Ø proposed soil vapor location
- ⊕ proposed soil sample and monitoring well location

File: 22003-0092

November 2024

Scale as shown



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

CAMP Locations

137 Smith Street
140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

Legend:

━━ BCP site boundary
- - - lot lines
⊕ proposed CAMP station locations

File: 22003-0092

November 2024

Scale as shown

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

APPENDIX D: Previous Environmental Reports

GALLAGHER BASSETT | TECHNICAL SERVICES

PHASE I

ENVIRONMENTAL

SITE ASSESSMENT

137 Smith Street
140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

Tax IDs: Section 12, Block 4, Lots 2.1, 4.1, and 10

January 9, 2023

GBTS Project: 22003-0092

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22 IBM Road – Suite 101
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PHASE I ENVIRONMENTAL SITE ASSESSMENT

January 9, 2023

GBTS Project: 22003-0092

Prepared By

Gallagher Bassett Technical Services
22 IBM Road – Suite 101
Poughkeepsie, New York 12601

Prepared For

Kearney Realty & Development Group
57 Route 6, Suite 207
Baldwin Place, New York 10505

Gallagher Bassett Technical Services conducted a Phase I Environmental Site Assessment in accordance with ASTM Method E 1527-13 and updated procedures specified in E1527-21.

The undersigned have prepared and reviewed this Phase I Environmental Site Assessment and certify to Kearney Realty & Development Group that the information provided in this document is to the best of our abilities considered accurate as of the date of issuance by this office.

Jennifer Gonzalez
Gallagher Bassett Technical Services
Environmental Field Scientist

Scott Spitzer

Scott Spitzer
Gallagher Bassett Technical Services
Technical Director – Environmental Consulting

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MAPS IN REPORT

APPENDICES

EXECUTIVE SUMMARY

Gallagher Bassett Technical Services (GBTS) performed a Phase I Environmental Site Assessment (ESA) of the property located at 137 Smith Street and 140 and 146 Montgomery Street, City of Newburgh, Orange County, New York. This ESA identifies Recognized Environmental Conditions (RECs) in conformance with the scope and limitations of ASTM Practice E 1527-13 and updated procedures specified in E1527-21, as well as conditions that do not meet the threshold to be considered a REC but represent a significant existing or likely environmental liability (de minimis conditions and items outside the ASTM Phase I ESA scope are noted as appropriate). Findings, conclusions and recommendations are summarized below and in Section 4.0.

Subject Property Description and History

The subject property is a 1.16-acre vacant parcel located in an urban setting. The property formerly contained multiple structures (likely used for residential purposes) from at least the late 1800s through sometime between 1971 and 1992. No evidence of former commercial or industrial uses was found during the review of historical records. A limited soil investigation indicates that fill material with debris (primarily brick) is present throughout the property, potentially related to the construction and/or subsequent demolition of the former buildings. Metals (including arsenic, lead, and mercury) were detected in virtually all soil samples at concentrations above NYSDEC Soil Cleanup Objectives (SCOs) for Restricted-Residential Use, and pesticides are present above Unrestricted Use SCOs; no field evidence of contamination (odors, staining, gross contaminated material), however, was observed in on-site soil. These findings are consistent with impacts from poor-quality fill, demolition debris, and/or from debris materials historically dumped on-Site (including at least one former automobile). No further investigation of historical records is recommended.

Identified Areas of Environmental Concern

Category	Specific Environmental Concerns	Recommendations
RECs *	Documented metal and pesticide contamination in on-site soils	Perform Phase II subsurface investigation
General Concerns	On-site debris (including materials potentially containing asbestos or lead)	Dispose off-site; properly manage any subsurface materials encountered during site development
Non-Scope Considerations	Elevated radon concentrations	Perform radon testing in the event of residential site development

** No Historical RECs or de minimis conditions were identified in connection with the property.*

1.0 INTRODUCTION

1.1 Purpose

This Phase I Environmental Site Assessment (Report) identifies recognized environmental conditions (RECs) and/or other significant environmental liabilities resulting from or associated with the storage, use, transport or disposal of hazardous or other regulated materials on the property described in Section 2.1.

1.2 Methodology

This Report was prepared in conformance with the attached Scope of Services and with guidelines set by American Society for Testing and Materials (ASTM) Method E1527-13[1] (no exceptions to or deletions from this practice have occurred. All work was performed under the direct supervision and responsible charge of a qualified environmental professional, following requirements for "all appropriate inquiry" as defined in 40 CFR Part 312. Gallagher Bassett Technical Services (GBTS) performed the following work:

1. Investigation of the subject property's history and characteristics through the analysis of available physical settings maps, historical documents, local municipal records, and information provided by subject property representatives and/or other knowledgeable individuals.
2. Review of Federal, State, and/or Tribal regulatory-agency databases and printed records for documentation of potential environmental liabilities relevant to the property, consistent with (or exceeding) applicable ASTM requirements. All interviews, and the review of government records, were completed on or after the date of the site reconnaissance.
3. Inspection of the property by Jennifer Gonzalez of GBTS on November 11, 2022.

1.3 Limitations

This Report is a representation and evaluation of the property described in Section 2.1 below as of the dates that services were provided, and is not valid for any other property or location. This Report is based in part on information provided in writing or verbally by federal, state, and local officials (including public records) and other referenced parties. The accuracy or completeness of this information was not independently verified. Unless specifically noted, the findings and conclusions contained herein must be considered not as scientific certainties, but as probabilities based on professional judgment. Limitations specific to the site inspection (if any) are detailed in Section 3.3.

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[1] As of the date of this Report, USEPA has not adopted a rule formally recognizing the new E1527-21 standard as compliant with the All Appropriate Inquiries (AAI) rule; this Report, however, is in substantial conformance with the updated procedures specified in E1527-21.

1.4 Definitions

Definitions of some key terms found in this Environmental Site Assessment (ESA) are provided below.

Recognized Environmental Condition (REC)

A REC is defined as (1) the presence of hazardous substances or petroleum products in, on or at the subject property due to a release to the environment; (2) the likely presence of hazardous substances or petroleum products in, on or at the subject property due to a release or likely release to the environment; or (3) the presence of hazardous substances or petroleum products in, on or at the subject property under conditions that pose a material threat of a future release to the environment. Note: A material threat is an obvious threat likely to lead to a release and that, in the opinion of the environmental professional, would likely result in impact to public health or the environment.

Controlled Recognized Environmental Condition (CREC)

A CREC *is a REC* affecting the subject property that has been addressed to the satisfaction of the applicable regulatory authority or authorities with hazardous substances or petroleum products allowed to remain in place subject to implementation of controls (e.g., activity and use limitations).

Historical Recognized Environmental Condition (HREC)

A HREC is a previous release of hazardous substances or petroleum products affecting the subject property that has been addressed to the satisfaction of the applicable regulatory authority or authorities *and* meeting unrestricted use criteria established by the applicable regulatory authority or authorities, without subjecting the property to any controls (e.g., activity and use limitations).

De Minimis Conditions

An environmental condition is considered “de minimis” when that condition generally does not present a threat to human health or the environment and generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

Conditions determined to be de minimis are not recognized environmental conditions.

Sensitive Environmental Receptors

Sensitive Environmental Receptors (SERs) are valued physical (natural or human-made) or biological features that may be adversely impacted by environmental contamination, and where a discharge or release could pose a greater threat than a discharge or release to other less valued areas. SERs include (but are not limited to) potable supply wells, wetlands, and protected wildlife habitat.

2.0 SITE LOCATION AND PHYSICAL SETTING

This ESA was performed for the parcel of land ("subject property") located at 137 Smith Street and 140 and 146 Montgomery Street, City of Newburgh, Orange County, New York (tax IDs: Section 12, Block 4, Lots 2.1, 4.1 and 10). Note: This Report references 137 Smith Street as "Lot 4.1," 140 Montgomery Street as "Lot 10" and 146 Montgomery Street as "Lot 2.1." All tax lot parcels are contiguous. Site maps are located on Pages 6 and 7 and photographs are provided in Appendix A. Information sources are cited in Section 5.0 and site-specific topographic, wetlands and/or other maps are provided in Appendix B.

2.1 Description of Subject Property

The subject property is a somewhat rectangular 1.16-acre parcel located on located on the western side of Smith Street, northern side of South Street, and the eastern side of Montgomery Street. The property is vacant wooded land, with a grass clearing at the southern portion. Comprehensive observations from a physical inspection of the property are provided in Section 3.3.

2.2 Description of Adjoining and Surrounding Area Properties

The property is located in an urban setting, with most properties developed for residential purposes. Uses at adjoining properties include multi-family residences to the north, east and south, and a public school to the west (see Selected Site Features Map, page 7).

2.3 Physical Setting

2.3.1 Topography

The subject property and nearby sites are located on land with overall moderate to steep downward slopes to the east and southeast, towards the Hudson River. The USGS Topographic map providing coverage for the property indicates approximate on-site surface elevations ranging from 140 to 80 feet above mean sea level (the property was observed to slope downward from northwest to southeast). No specific on-site structures are depicted on the map. The map did not indicate the presence of any soil/gravel mining operations or unusual topographic patterns indicative of landfilling activities on the property.

2.3.2 Local Geology and Hydrogeology

Soils in the vicinity of the subject property are likely to be derived from glacial till deposits, which overlie sedimentary bedrock. Soil survey maps indicate that Mardin gravelly silt loam (8-15% and 15-25% slopes) soils are likely to be located on the property. The Mardin gravelly silt loam is a deep, moderately well drained, gently sloping soil formed in glacial till deposits derived from sandstone, shale, and slate. Depth to bedrock in Mardin gravelly silt loam soils is likely to be greater than 6 feet. Bedrock outcrops were not observed on the property. Soil survey data indicate generalized groundwater depths of 1 to 2 feet in on-site soils. The former presence of on-site structures suggests that soils located on the property may have been altered by cutting, regrading and/or filling activities.

GBTS performed a limited subsurface investigation on November 11, 2022, in support of future site development activities (see Section 3.1.6). Likely fill materials were observed throughout the property (generally variable texture sands with brick), underlain by variable texture glacial till. Boring refusal was encountered from 4.5 to 12 feet below surface grade (bsg), apparently on shale or slate bedrock (or possible remains of building foundations). Wet soil was encountered in one boring at the northeastern portion of the property at a depth of approximately 10 feet bsg. GBTS has not reviewed any other reports documenting site-specific subsurface conditions.

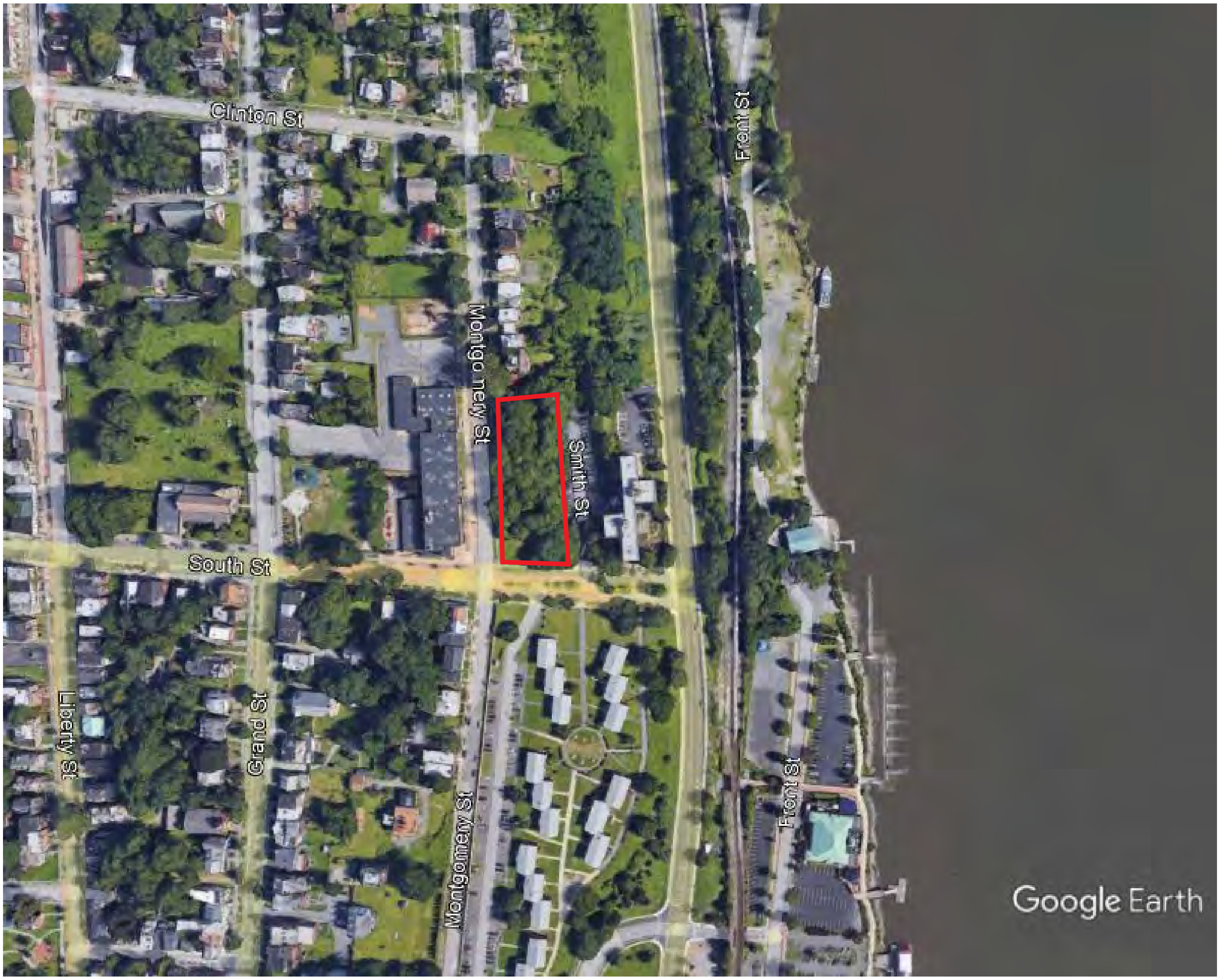
Shallow groundwater flow in the vicinity of the property is likely to generally follow surficial topography and be to the east, towards the Hudson River (located approximately 0.1-mile from the property).

2.3.3 Surface Hydrology and Wetlands

No waterbodies or wet areas were observed on the subject property or in the immediate vicinity during the site inspection. Federal and state mapping data do not identify any classified surface waterbodies, wet areas, or regulated wetlands on or in the immediate vicinity of the property.

2.3.4 Sensitive Environmental Receptors

The review of maps and observations made during the site inspection indicate that no SERs are located on or in the immediate vicinity of the subject property. The Hudson River is located approximately 0.1 mile to the east.



Site Location Map

137 Smith Street
140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

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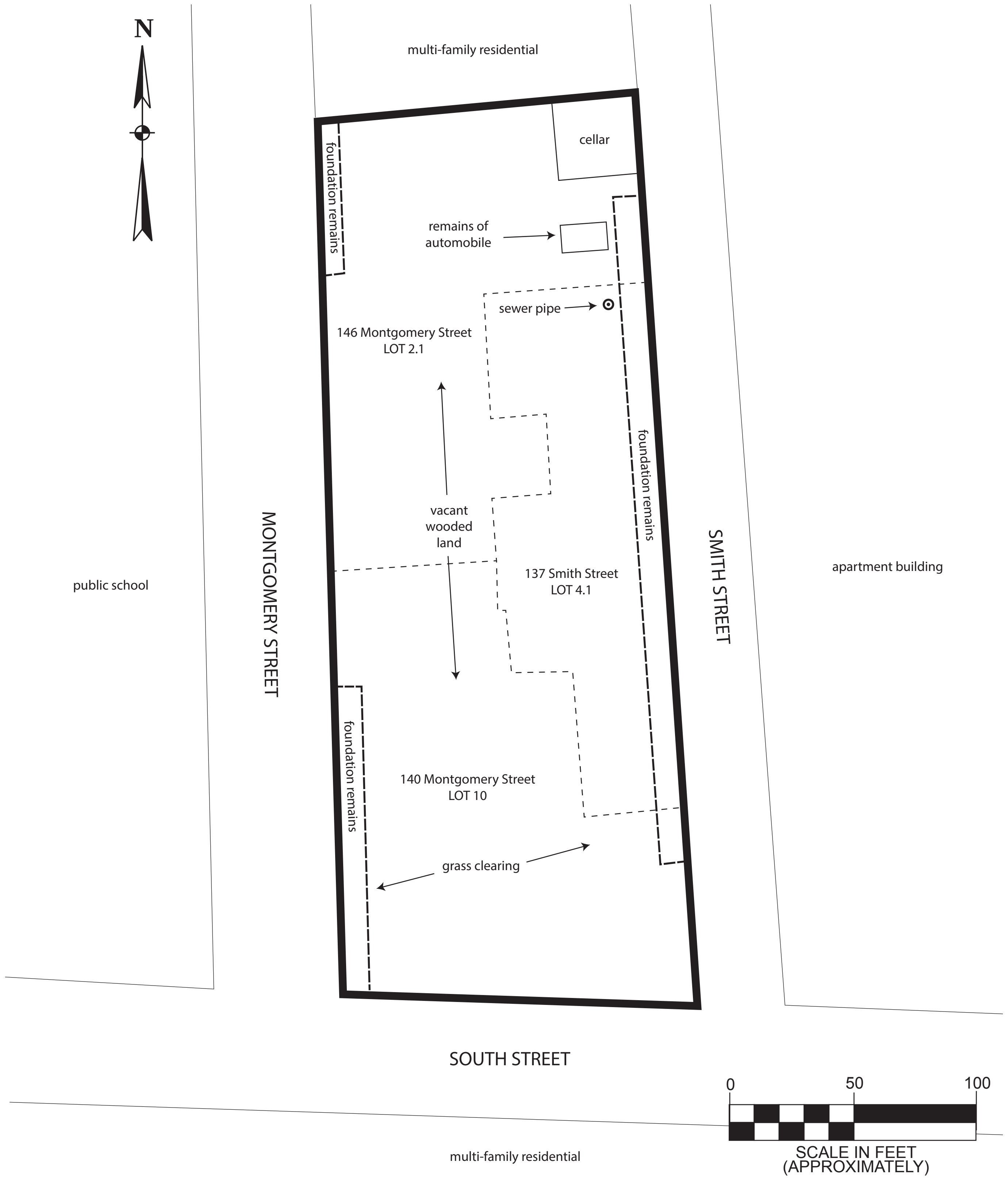
File No: 22003-0092

January 2023



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Selected Site Features Map

137 Smith Street
140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

Legend:

▬▬▬ subject property border
- - - - - - - lot lines

File: 22003-0092

January 2023

Scale as shown

3.0 INVESTIGATION

3.1 Site History

The history of the property was researched by interviewing knowledgeable individuals and reviewing standard ASTM historical sources (local agency records, historical maps, aerial photographs or city directories) and additional sources (if reasonably ascertainable and sufficiently useful, accurate, and complete considering the objective of the records review).

3.1.1 User-Reported Information

ASTM Practice E 1527-13, Section 6, requires the User (the party seeking to complete the environmental site assessment [ESA] of the property) to provide specific information to the Environmental Professional to meet the requirements for "all appropriate inquiry". Christian Donahoe, representing Kearney Realty & Development Group (the User), responded to a questionnaire provided by GBTS requesting information regarding the subject property as specified in Section 6. Mr. Donahoe had no specialized knowledge or experience, actual knowledge, or knowledge of commonly known or reasonably ascertainable information regarding: 1) information material to recognized environmental conditions or other environmental liabilities in connection with the property; 2) the results of a review of title and/or judicial records for environmental liens/AULs; or, 3) reason(s) for a purchase price that does not reasonably reflect fair market value because of known or suspected contamination. GBTS assumes that the User requested that the Phase I ESA be performed in order to qualify for one or more Landowner Liability Protections (LLPs) to CERCLA liability and to document potential environmental liabilities on the subject property.

3.1.2 Interviews

A Key Site Manager (a person having good knowledge of the uses and physical characteristics of the subject property) was not identified. Based on other known information regarding the subject property, it is GBTS's opinion that the inability to identify and interview a Key Site Manager does not represent a significant data gap.

3.1.3 Ownership Records

Property ownership information, based on City of Newburgh Assessor's Office records, is summarized below. "Date of Ownership" indicates a time the property was owned by the specified entity.

Tax Lot Parcel	Owner	Date of Ownership
Lot 4.1	City of Newburgh (Current Owner) Newburgh Community Development Agency	5/10/2010 Unknown
Lot 10	City of Newburgh (Current Owner) Newburgh Community Development Agency Newburgh Urban Renewal Agency Eleanor Jones	5/10/2010 Unknown 10/26/1972 Unknown
Lot 2.1	City of Newburgh (Current Owner) Newburgh Community Development Agency	5/10/2010 Unknown

3.1.4 Standard ASTM Historical Sources

This section provides a summary of environmentally significant information from a review of standard historical sources (topographic maps, fire insurance maps, aerial photographs, and/or city directories). Information sources are included below if they were reasonably ascertainable, applicable to the subject property, and likely be useful in determining whether activities were conducted that would be expected to result in a release. [Note: Property outlines on supporting documents are reasonable approximations.]

Historical Topographic Maps

GBTS reviewed historical USGS topographic maps dated 1903 and 1947 (copies of reviewed maps are provided in Appendix C).

1903: The subject property is bordered by streets on all sides. Multiple structures (likely residential) are indicated at the subject property. Small, likely residential, structures are located at the western adjoining property. The surrounding area is similarly developed with likely residential structures.

1947: A school building and church are depicted at the western adjoining property. Fewer structures are depicted in the surrounding area, which is well developed.

Sanborn Fire Insurance Maps

GBTS reviewed historical Sanborn Fire Insurance Company Maps dated 1884, 1890, 1913, 1957, 1967, 1969, and 1971 (relevant copies of these maps are provided in Appendix D).

1884-1913: Historical addresses associated with the subject property include 132-156 and 8707 Montgomery Street, 110-161 Smith Street and 64-74 South Street. An historical street (Barclay Street) is present running east to west across the northern-most portion of the property. Municipal water is depicted as being available to the property. No petroleum or chemical bulk storage tanks are noted at the subject property or adjoining properties. Several two- and three-story dwellings, one-story sheds, and stables are located at the subject property. A dwelling in the southeastern corner of the property (131-133 Smith Street) is demolished sometime between 1890 and 1913 and is replaced by an apartment building beginning in 1913. The western adjoining property historically contained small tax lots with single-family dwellings, a church, institutional facility, and a school (the 1890 map indicates the building was demolished and rebuilt in 1885). The eastern adjoining property historically contained small tax lots with single- and multi-family residential dwellings, two factories, located at the historical addresses of 60 South Street (1884 only) and 181 Water Street (1913 only), and several storefronts and restaurants. Surrounding area uses are primarily single- and multi-family residential, with some manufacturing uses to the north and east.

1957-1971:	A gasoline tank is located in front of the southern adjoining property, across the roadway at 67 South Street (1957-1969). All former structures at the eastern adjoining property have been demolished and are replaced by an apartment building likely to be the current structure (labelled Bourne Apartments). Structures at the subject property along Smith Street are demolished between 1957 and 1967 with the exception of the apartment building at the southeastern corner. The western adjoining school, institutional facilities and church are replaced by the current public school building by 1967.

City Directories

GBTS reviewed historical city directories dated 1961, 1966, 1992, 1995, 2000, 2005, 2010, 2014, and 2017 for the subject property and for several adjoining properties (data sources are provided in Appendix E). Occupants of the former buildings have included residential tenants (1961 and 1966 only). No uses of adjoining properties were identified that are likely to represent a significant environmental threat to the subject property.

3.1.5 Municipal and Regulatory Agency Records

Assessor's Office Records

City of Newburgh Assessor's Office property card records for the subject property were reviewed on November 18, 2022. No information pertinent to the environmental integrity of the subject property was present in these records. Readily available property ownership information is summarized in Section 3.1.3.

Building Department Records

City of Newburgh Building Department records for the subject property were reviewed on November 18, 2022. Records indicate several violations and complaints related to on-site debris and dumping, including an incident of illegal dumping of construction-related debris in 1997. No other information pertinent to the environmental integrity of the subject property was present in Building Department records provided for review.

NYSDEC

A request was made on November 9, 2022 to search available NYSDEC records for information regarding the subject property as well as an open spill at the western adjoining property (file 1808168). According to the NYSDEC, that agency does not maintain files identified with the subject property address. Information regarding the spill is provided in Section 3.2.2 below.

3.1.6 Previous Environmental Reports

GBTS issued a Summary Report of Subsurface Investigation (SRSI; date) documenting a limited soil investigation at the subject property (soil was collected from nine [9] boring and five [5] surface locations). Fill materials were noted (see Section 2.3.2) but no field evidence of contamination was observed.

Samples were submitted for laboratory analysis of metals and pesticides. Metals were found above NYSDEC Part 375 Restricted-Residential Use (RRU) Soil Cleanup Objectives (SCOs) in 13 of 14 samples (generally in the upper 5 feet of soil), including arsenic (up to 51.9 parts per million [ppm]), barium, cadmium, lead (up to 3,050 ppm), and mercury (up to 2.87 ppm). Half of the samples contained pesticides (DDT and breakdown products, and dieldrin) above Unrestricted Use (UU) SCOs. A copy of the SRSI is provided in Appendix F).

GBTS did not review any other relevant previous environmental reports (e.g., due diligence site assessments, subsurface investigation, remediation or closure reports, or similar documents) for the subject property.

3.2 Review of Federal and State Agency Records

Federal and state records were reviewed for documentation of environmental conditions and/or liabilities relevant to the property.

3.2.1 Methodology

The following ASTM Standard Environmental Record Sources (as available for the subject property's locality) were reviewed (search distances are consistent with, or exceed, ASTM requirements).

Federal National Priority List (1.0 mile) and delisted National Priority List sites (0.5 mile)
Federal SEMS (formerly CERCLIS) list and SEMS NFRAP site list (0.5 mile)
Federal RCRA CORRACTS facilities list (1.0 mile)
Federal RCRA non-CORRACTS TSD facilities list (0.5 mile)
Federal RCRA generators list (subject/adjoining properties)
Federal ERNS list (subject property)
Federal, State, and Tribal Institutional Control / Engineering Control registries (subject property)
State- and Tribal-equivalent NPL (1.0 mile)
State- and Tribal-equivalent SEMS (0.5 mile)
State and Tribal Brownfield and voluntary cleanup sites (0.5 mile)
State and Tribal leaking storage tank lists (0.25 mile; reduced distance due to high level of development)
State (including locally administered) and Tribal registered storage tank lists (subject/adjoining properties)
State and Tribal landfill and/or solid waste disposal site lists (0.5 mile)

Additional Environmental Record Sources (as available for the subject property's locality) were reviewed to enhance and supplement the review of standard sources, including: spill file records; oil storage facility lists; radon data; wastewater discharge permits; and federal Toxic Release Information System (TRIS) and Facility Index System (FINDS) databases.

A copy of relevant portions of a database search conducted by Environmental Data Resources, Inc. (EDR) for GBTS is provided is provided in Appendix G. Not all sites identified in the attached database search may be referenced below, as some sites may have been excluded based on one or more of the following: ASTM requirements; GBTS's scope of services or professional opinion; and/or information obtained during the review of historical records and the site inspection. Some information may have been deemed to not be practically reviewable as defined in ASTM E1527 (e.g., records lack adequate address information). Sites or additional information not included in the EDR report may also be referenced based on GBTS's search of additional records and/or knowledge of the subject property area.

GBTS's opinion is presented for any sites identified within the specified approximate minimum search distances as to any possible impacts that might result in RECs in connection with the subject property, arising from the migration of contaminated soil, soil vapor and/or groundwater. Evaluation of potential impacts to the subject property is based on: distance and direction to the identified site; type of regulated materials and other relevant information found in available records; presence of intervening roadways and/or other physical conduits; local physical setting (topography, soil conditions, geology, hydrology, etc.); and other information known to GBTS.

In accordance with ASTM requirements, this Report assesses the potential for hazardous vapors to migrate onto or within the target property. To accomplish this task, GBTS has performed an evaluation of potential Vapor Encroachment Conditions (VECs) arising from identified sites, consistent with a "Tier 1" screening as specified in ASTM E2600-15 (including a review of database records as well as analysis of historical uses, physical setting information and other known information).

3.2.2 Findings of Regulatory Records Review

Federal Hazardous Waste-Contaminated Sites

The subject property is not identified on the United States Environmental Protection Agency's (USEPA): National Priority List (NPL) of uncontrolled or abandoned hazardous waste sites identified for priority remedial actions; Superfund Enterprise Management System (SEMS, formerly CERCLIS) list of sites that are proposed to the NPL or that are in the screening and assessment phase for possible proposal to the NPL; SEMS-Archive list (formerly CERCLIS NFRAP), which are former SEMS sites that were delisted because no significant contamination was found, or because the site has been remediated; or Federal Brownfields list of sites with known or potential contaminants receiving federal cleanup funding. The subject property is not identified on available USEPA Institutional Control/Engineering Control registries.

The following relevant sites have been identified:

Site Name	Site ID	Distance/Direction	Database
Consolidated Iron and Metal	NY0002455756	0.68 mile, S	Delisted NPL, SEMS
Hudson River PCBs	NYD980763841	0.09 mile, E	SEMS
Dupont Stauffer Duramate	NYD980766182	0.10 mile, SE	SEMS

Based on a review of reported information, these sites are not likely to impact the property.

No NPL sites are located within one mile of the property and no other SEMS sites or delisted NPL sites are located within a half mile of the property.

State Sites

Inactive Hazardous Waste Disposal Sites

NYSDEC maintains a Registry of Inactive Hazardous Waste Disposal Sites (IHWDS), a state equivalent to the federal NPL, which are commonly referred to as "Registry" or "Superfund" sites. Sites are placed on the Registry if there is evidence that hazardous waste was disposed and a determination has been made that a significant threat to public health is present. Once a Registry site has been remediated, it is reclassified or removed (delisted) to indicate that the significant threat(s) has been addressed. Non-Registry sites may (but usually do not) also present significant threats. The property is not identified as a NYSDEC IHWD site, and has not been listed as a site under investigation for inclusion in the IHWDS Registry (a state equivalent to the federal SEMS List).

The following relevant sites have been identified:

Site Name	Site ID	Distance/Direction	Classification Code
Consolidated Iron and Metal	336055	0.60 mile, S	4 – closed, management required
McCall Place Plume	336059	0.68 mile, WNW	N – no further action at this time
CHG&E, Newburgh Site	336042	0.81 mile, S	C – completed, may need maintenance

Based on a review of reported information, these sites are not likely to impact the property.

Voluntary Cleanup, Brownfields Cleanup, and Environmental Restoration Programs

Contaminated properties that are not Registry sites may be listed in database records under the NYSDEC Voluntary Cleanup (VCP), Brownfields Cleanup (BCP) or Environmental Restoration (ERP) programs. The property is not identified as a NYSDEC remedial program site.

The following relevant site has been identified:

Site Name (Program)	Site ID	Distance/Direction	Classification Code
350/352 Liberty Street (ERP)	B00189	0.17 mile, WNW	A – active site, work is ongoing

Based on a review of reported information, this site is not likely to impact the property.

New York Institutional and Engineering Controls

The subject property is not identified in NYSDEC Institutional and Engineering Control databases.

Federal Hazardous Waste Handlers

The SEMS database details facilities that report treatment, storage or disposal of hazardous waste (TSD facilities) or generation or transportation of hazardous waste. Facilities that have been notified by USEPA to take corrective action regarding their handling of hazardous waste are classified as CORRACTS facilities.

The subject property is not registered with the USEPA as a CORRACTS and/or TSD facility, and no sites are located within one mile of the property. The subject property and adjoining properties are not registered with the USEPA as generators or transporters of hazardous waste.

Chemical Bulk Storage (CBS)

The subject property and adjoining properties are not identified in database records as CBS facilities. Observations made during the site inspection did not indicate the presence of chemical bulk storage on the subject property or at adjoining properties.

Petroleum Bulk Storage (PBS)

Subject Property

The subject property is not identified in database records as either a regulated or unregulated PBS facility.

Adjoining Properties

Once adjoining property was identified in database records a regulated facility.

The property at 137 Montgomery Street (PBS Number: 3-410268), which adjoins the subject property to the west, reportedly contains an active 10,000-gallon #2 fuel oil underground storage tank (UST) that was installed in 1987. One active NYSDEC spill event is reported for this adjoining property (see the State Chemical and Petroleum Spill and Leaking Underground Storage Tank Events subsection, below). Spill records indicate a former UST was closed and removed in 1987 after a leak was discovered.

The Bourne Apartments property at 150-154 Smith Street (PBS Number: 3-601361), which adjoins the subject property to the east, is reported as an unregulated facility that formerly contained one, 12,000-gallon #2 fuel oil UST. Reported information indicates the tank was closed and removed on May 25, 2006.

No evidence of aboveground or underground PBS tanks was noted on adjoining properties during the site inspection.

Major Oil Storage Facilities

The subject property is not listed with the NYSDEC as a major oil storage facility (MOSF). No MOSFs are located within a half mile of the property.

Federal Chemical and Petroleum Spills

The USEPA Emergency Response Notification System (ERNS) database documents releases of oil and hazardous substances as reported to federal authorities. There are currently no chemical or petroleum spills on record for the subject property.

State Chemical and Petroleum Spill and Leaking Underground Storage Tank Events

NYSDEC database records were reviewed to determine possible impacts from leaking tanks and other reported releases within a quarter mile of the subject property. No spill events are known to have occurred at the subject property.

Open spill 1808168 was reported on October 31, 2018 for the adjoining Horizons on the Hudson Elementary School property to the west at 137 Montgomery Street, due to the discovery of oil in an excavation at the northwestern corner of Montgomery Street and South Street. NYSDEC records indicate that a 10,000 gallon UST with approximately 40 gallons of fuel oil was located at the school approximately 20 feet from the excavation. Based on the remediation activities and the location of the release (likely to be cross gradient), this open spill is not likely to have significantly impacted the subject property.

Several closed spill events are associated with the adjoining school property, as well as the adjoining property to the east; based on reported information, including the likely cross gradient and downgradient locations and the presence of intervening roadways and buried utilities, these releases are not likely to have significantly impacted the subject property.

No other relevant spill events were identified in database records.

Air Discharges

No NYSDEC permits for air discharges from the subject property are known to exist. No operations likely to require a NYSDEC air discharge permit were noted on the subject property.

Wastewater Discharges

No USEPA National or NYSDEC State Pollutant Discharge Elimination System (NPDES or SPDES) permit was identified for the subject property No wastewater discharges are known to exist on the subject property No adjoining properties are registered as NPDES or SPDES facilities.

Radon

The USEPA maintains a Map of Radon Zones to identify areas with the potential for elevated indoor radon levels, and has established a guidance value (the level where mitigation measures may be appropriate) for radon concentrations of 4.0 or greater picoCuries/liter (pCi/l). The subject property is located in Ulster County, which is designated as Zone 1, indicating predicted average indoor radon screening levels greater than 4 pCi/L. New York State Department of Health (NYSDOH) data indicate that the average radon level in the City of Newburgh (287 homes tested) is 3.27 pCi/L, and that 45 percent of homes exceed USEPA guidance. GBTS has not reviewed any radon test data for the subject property.

Based on the NYSDOH data, radon above actionable levels may be present at the subject property.

Vapor Encroachment Conditions at Identified Sites

Information obtained during the database review was evaluated consistent with the Tier 1 screening process presented in ASTM E2600-15. Based on this review, releases at identified sites are not likely to have resulted in vapor encroachment at the subject property.

3.3 Site Inspection

The subject property was inspected by GBTS on November 11, 2022. The weather at the time of the inspection was cloudy and in the 50s F. There were no relevant limitations to the inspection of the subject property.

3.3.1 Protocol

The site inspection was conducted to address any potential concerns raised during the investigation of site history (Section 3.1) and the regulatory agency records review (Section 3.2), and to identify any additional indications of contamination from the use, storage, or disposal of hazardous or regulated materials. To the extent possible, on-site structures, vegetation, topography, surface waters, and other property features were examined for obvious evidence of existing or previous contamination or unusual patterns (e.g., soil staining, vegetative stress, surface water sheen, or the physical presence of contaminants), which would indicate that the environmental integrity had been or could be impacted.

Section 3.3.2 describes the physical characteristics of the subject property. Section 3.3.3 is divided into topics on specific environmental conditions or concerns, actual or potential, noted on the subject property during the site inspection. Section 3.3.4 describes the physical characteristics of adjoining properties as they concern the potential or actual environmental condition of the subject property.

A Selected Site Features Map illustrating the subject property layout and locations of specific areas of concern (if any) is provided on Page 7, and photographs of the property are provided in Appendix A.

3.3.2 Physical Characteristics of the Subject Property

3.3.2.1 Property

The subject property is a somewhat rectangular 1.16-acre parcel, which has approximately 357 feet of frontage on the eastern side of Montgomery Street, 147 feet on the northern side of South Street, and 378 feet on the western side of Smith Street. The property is vacant wooded land, with a grass clearing at the southern portion. A chain-link fence defines the eastern border; remaining property lines are undefined.

3.3.2.2 Structures

Portions of masonry foundations from previous structures are located throughout the Site (see Selected Site Features Map), including masonry retaining walls and the remains of a cellar at the northeastern portion of the property. No other overt evidence of former on-site structures (e.g., supply wells, etc.) was observed during the site inspection.

3.3.3 Specific On-Site Environmental Conditions

Debris Areas

The remains of an automobile are located in the northeastern portion of the subject property. These materials may be a potential source of contamination to the subsurface.

Household trash is located at the northeastern portion of the property and in the cellar area. None of these materials are likely to represent a threat to the environmental integrity of the subject property.

Petroleum and Chemical Storage

No evidence of the on-site storage or use of petroleum or chemical products (small containers, aboveground tanks or indications of underground tanks) was observed on the property.

Asbestos-Containing Materials and Lead Based Paint

The likely dates of construction of the former on-site buildings suggest that asbestos-containing materials (ACM) and lead-based paint (LBP) may have been used during initial building construction and/or during subsequent maintenance work. Debris from former on-site structures could be present in subsurface soils; such materials, should any exist, could contain asbestos or LBP.

Wastewater Discharges

The term "wastewater" indicates water that: (1) is or has been used in an industrial or manufacturing process; (2) or is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant; (3) or conveys or has conveyed sewage (water originating on or passing through or adjacent to a site, such as stormwater flows, is not generally considered to be wastewater). No evidence of wastewater discharges into drains, ditches, or streams on or adjacent to the property was observed during the site inspection.

Stormwater Management and Exterior Drains/Sumps/Conduits

No exterior stormwater catch basins, drains, sumps, or other potential significant conduits to the subsurface, or indications of liquid discharges into drains, ditches, or streams on or adjacent to the property, were observed during the site inspection.

Staining/Corrosion/Leaks

No evidence of corrosion, leaks, or staining (indicative of an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products onto the property was observed on the property.

Topographic Irregularities

No overt topographic irregularities (e.g., sinkholes or berms) indicative of the presence of non-natural materials (including debris) in the subsurface were observed on the property.

Vegetative Features

No overt areas of stressed or dying vegetation indicative of the presence of contaminants in surface or subsurface soils were observed on the property.

Pits, Ponds, or Lagoons

No pits, ponds, or lagoons exhibiting evidence (e.g., discolored water, distressed vegetation, obvious wastewater discharge) of holding liquids or sludge containing hazardous substances or petroleum products were observed on the property.

Surface Waters

No surface water bodies are located on the subject property.

Odors

No unusual odors indicative of the presence of contamination were noted during the site inspection.

PCBs

Polychlorinated biphenyls (PCBs) were widely used in equipment such as transformers, capacitors, and hydraulic equipment until 1979 when the USEPA regulated their use in this capacity. No equipment likely to contain PCBs was noted on the subject property.

3.3.4 Environmental Concerns at Adjoining and Nearby Properties

Adjoining and nearby properties were observed from the subject property and from public thoroughfares to identify any recognized environmental conditions or other potential environmental concerns. Several utility company-owned pole-mounted transformers were noted to the south of the property along South Street. The presence of these transformers is not a significant environmental concern.

No other relevant conditions were observed during the site inspection.

4.0 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Gallagher Bassett Technical Services (GBTS) performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM E 1527-13, and updated procedures specified in E1527-21, to identify recognized environmental conditions (RECs), historical RECs (HRECs) and/or other significant environmental liabilities resulting from or associated with the storage, use, transport, or disposal of hazardous or regulated materials at the property located at 137 Smith Street and 140 and 146 Montgomery Street, City of Newburgh, Orange County, New York. Any exceptions to, or deletions from, this practice are described in Section 1.2 of this report. Identified RECs are noted in Section 4.1. GBTS's findings, conclusions and recommendations regarding RECs, other potential environmental liabilities associated with the property, and de minimis conditions are presented in Sections 4.2 through 4.5.

4.1 Recognized Environmental Conditions

Significant Data Gaps

The Environmental Professionals preparing this report have not identified any significant data gaps that affect their ability to identify RECs.

Overview of Identified RECs

This assessment has revealed evidence of the following RECs in connection with the property:

- Documented metal and pesticide contamination in on-site soils – Section 4.2

No Historical RECs (HRECs) or de minimis conditions were identified in connection with the property.

4.2 Site History

The subject property, which is vacant, formerly contained multiple structures (likely used for residential purposes) from at least the late 1800s through sometime between 1971 and 1992. No evidence of former commercial or industrial uses was found during the review of historical records. A limited soil investigation indicates that fill material with debris (primarily brick) is present throughout the property, potentially related to the construction and/or subsequent demolition of the former buildings. Heavy metals (including arsenic, lead, and mercury) were detected in virtually all soil samples at concentrations above NYSDEC Soil Cleanup Objectives (SCOs) for Restricted-Residential Use, and pesticides are present above Unrestricted Use SCOs; no field evidence of contamination (odors, staining, gross contaminated material), however, was observed in on-site soil. These findings are consistent with impacts from debris materials associated with the remains of former on-site structures and historical dumping on-Site (including at least one former automobile).

No further investigation of historical records is recommended. Additional investigation should be conducted to fully characterize documented site contamination. Any future development activities at the property should be conducted with an awareness of the presence of subsurface debris and provision should be made for the proper management of any materials that warrant special handling.

4.3 Review of Regulatory Records

The subject property was not identified during the review of regulatory agency records. The adjoining property to the west at 137 Montgomery Street is a petroleum bulk storage (PBS) facility with several associated NYSDEC spill files. Based on reported information, tank location, and topographic conditions, this site represents a general environmental concern but is not likely to have significantly impacted the subject property (known conditions do not meet the threshold to be considered a REC). No other relevant sites were identified during the review of regulatory records.

Any concerns associated with this adjoining property may be investigated during the environmental fieldwork recommended in Section 4.2.

4.4. Relevant Site Observations and General Concerns

The remains of an automobile in the northeastern portion of the subject property may be associated with document soil contamination by metals. Household trash is located at the property but is not likely to represent a significant threat.

It is recommended that debris materials be segregated into appropriate waste streams (i.e., those which can be disposed of as non-regulated solid waste and those which require special handling) and be disposed of off-site, in accordance with any applicable local, state and federal regulations.

4.5 Non-scope Considerations

Environmental issues and/or concerns that are outside the scope of ASTM E 1527-13 are discussed below.

Limited visual observations by GBTS and the likely dates of building construction suggest that asbestos-containing materials (ACM) and lead-based paint (LBP) may be present at foundation remains and/or in subsurface debris.

Any suspect material encountered during site development should be tested for asbestos or lead, or, in the absence of analytical data, be treated as though it contained asbestos or lead.

Elevated concentrations of radon may be present at the subject property.

It is recommended that radon testing be conducted in the event of future residential development.

5.0 SOURCES OF INFORMATION

5.1 Maps and Documents

Environmental Data Resources, Inc. (EDR), City Directory Abstract, 1961, 1966, 1992, 1995, 2000, 2005, 2010, 2014, and 2017

EDR, Regulatory Database Report, December 6, 2022

New York State Department of Environmental Conservation, Freshwater Wetlands Map of the Newburgh, New York Quadrangle, accessed online October 28, 2022 via Environmental Resource Mapper at dec.ny.gov

Sanborn Fire Insurance Company Maps dated 1884, 1890, 1913, 1957, 1967, 1969, and 1971

United States Department of Agriculture, Natural Resources Conservation Service, Soil Survey for Orange County, New York, accessed online November 10, 2022 via websoilsurvey.sc.egov.usda.gov

United States Department of the Interior National Wetlands Inventory Map of the Newburgh, New York, Quadrangle, accessed online October 28, 2022 via fws.gov/wetlands/Data/Mapper.html

United States Geological Survey (USGS) Topographic Maps of the Newburgh, New York Quadrangle, dated 1903, 1947 and 2019, digital images provided by https://ngmdb.usgs.gov/topoview

5.2 Local Agency Records

City of Newburgh Assessor's Office records, reviewed November 18, 2022

City of Newburgh Building Department records, reviewed November 18, 2022

NYSDEC records, requested November 9, 2022

5.3 Communications

Christian Donahoe, representing the Kearney Realty & Development Group (the User), November 10, 2022

6.0 ENVIRONMENTAL PROFESSIONAL STATEMENT

The following statements are required by 40 CFR 312.21(d) of the environmental professional(s) responsible for conducting and preparing the Phase I Environmental Site Assessment report.

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312.

and

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Scott Spitzer

____
Scott Spitzer – January 9, 2023
Gallagher Bassett Technical Services
Senior Environmental Consultant
Technical Director – Environmental Services

APPENDIX A

Site Photographs

1. **Subject property, Lot 10, facing east, across from Montgomery Street; eastern adjoining apartment building in background**

2. **Subject property, Lots 10 and 4.1, facing northeast**

3. **Typical view of vacant, wooded area**

4. **Retaining wall and foundation remains as viewed from the eastern adjoining property, facing west**

5. Foundation remains, northeastern corner; as viewed from the eastern adjoining property, facing west

6. Trash located at cellar area

7. **Sewer pipe and trash at the northeastern portion of property**

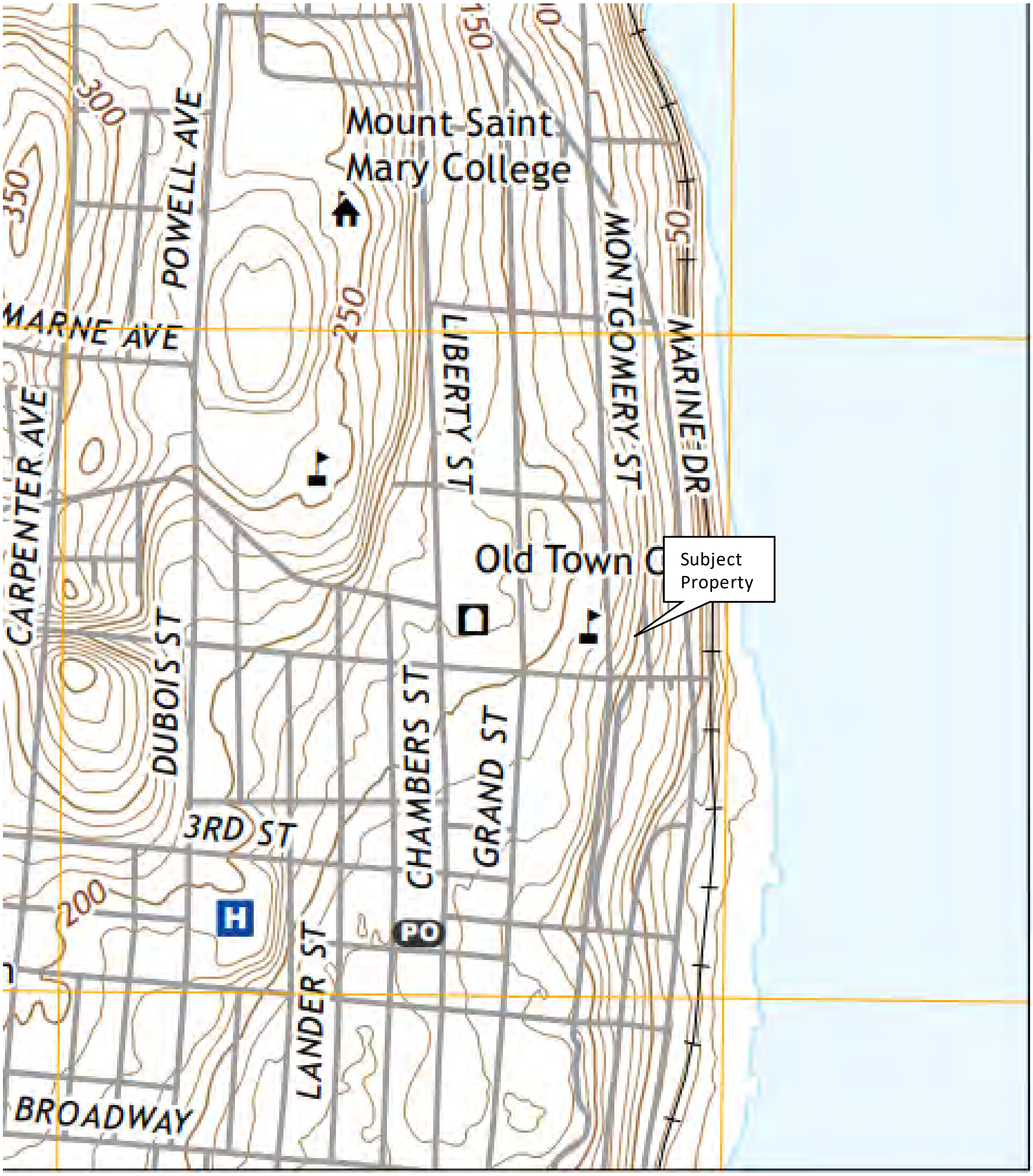
8. **Remains of an automobile at the northeastern portion of the property**

9. Western adjoining public school

10. Northern adjoining property

APPENDIX B

Physical-Setting Maps



Source: USGS Topographic Map of the Newburgh, New York Quadrangle, dated 2019, digital image provided by https://ngmdb.usgs.gov/topoview

U.S.G.S. Topographic Map 137 Smith Street 140 and 146 Montgomery Street City of Newburgh Orange County, New York	N	File No: 22003-0092 January 2023 Appendix B

U.S. Fish and Wildlife Service

National Wetlands Inventory

22003-0092

U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov

October 28, 2022

Wetlands

■ Estuarine and Marine Deepwater

■ Estuarine and Marine Wetland

■ Freshwater Emergent Wetland

■ Freshwater Forested/Shrub Wetland

■ Freshwater Pond

■ Lake

■ Other

■ Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

22003-0092 - NYS Wetlands

October 28, 2022

1:2,257

0 0.02 0.04 0.08 mi

0 0.03 0.07 0.13 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

NYS Department of Environmental Conservation
Not a legal document

APPENDIX C

Historical Topographic Maps

Source: USGS Topographic Map of the Newburgh, New York Quadrangle, dated 1903

1903 Historical Topographic Map

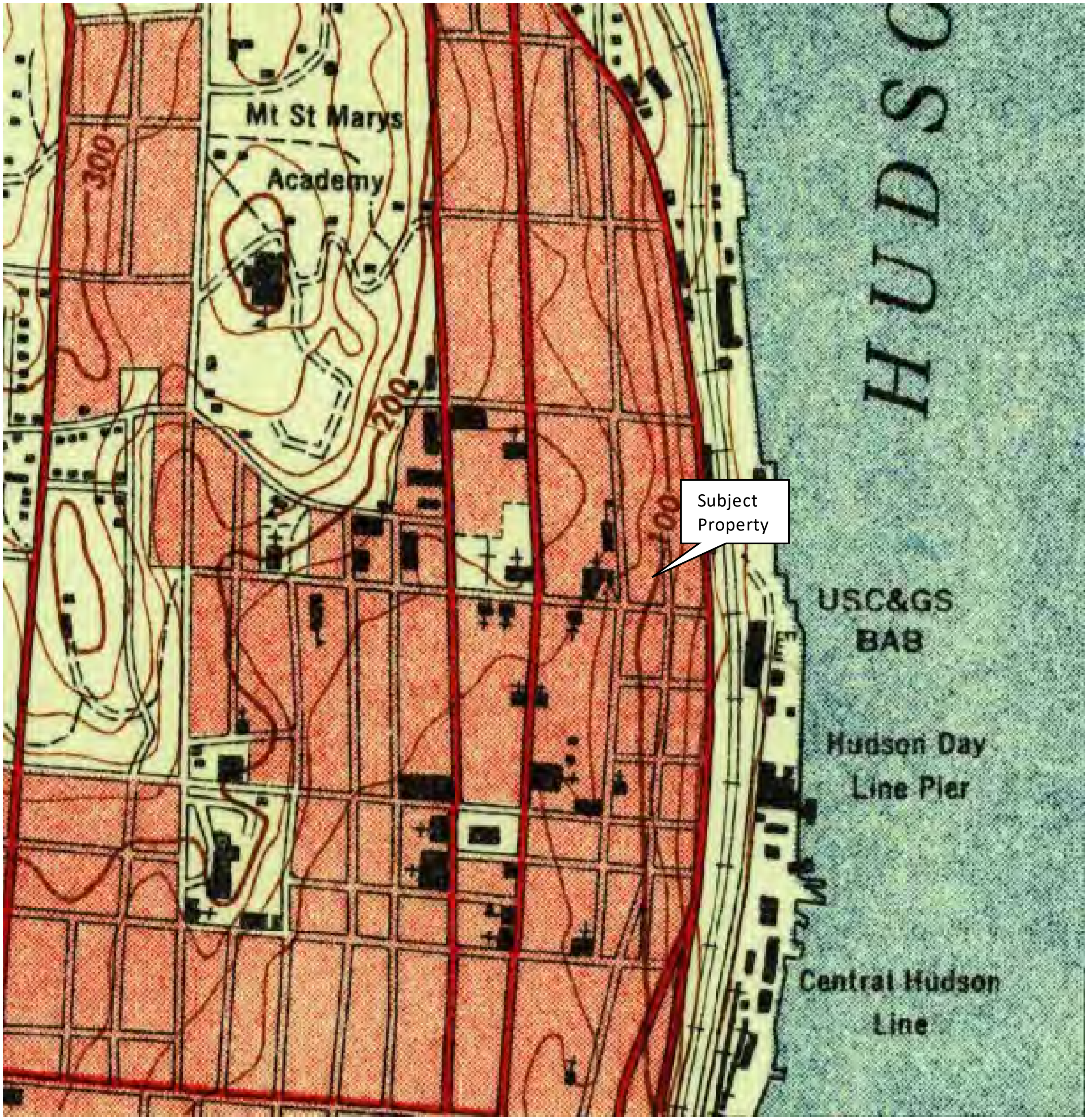
137 Smith Street
140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

N

File No: 22003-0092

January 2023

Appendix C



Source: USGS Topographic Map of the Newburgh, New York Quadrangle, dated 1947

1947 Historical Topographic Map
137 Smith Street
140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

N

File No: 22003-0092

January 2023

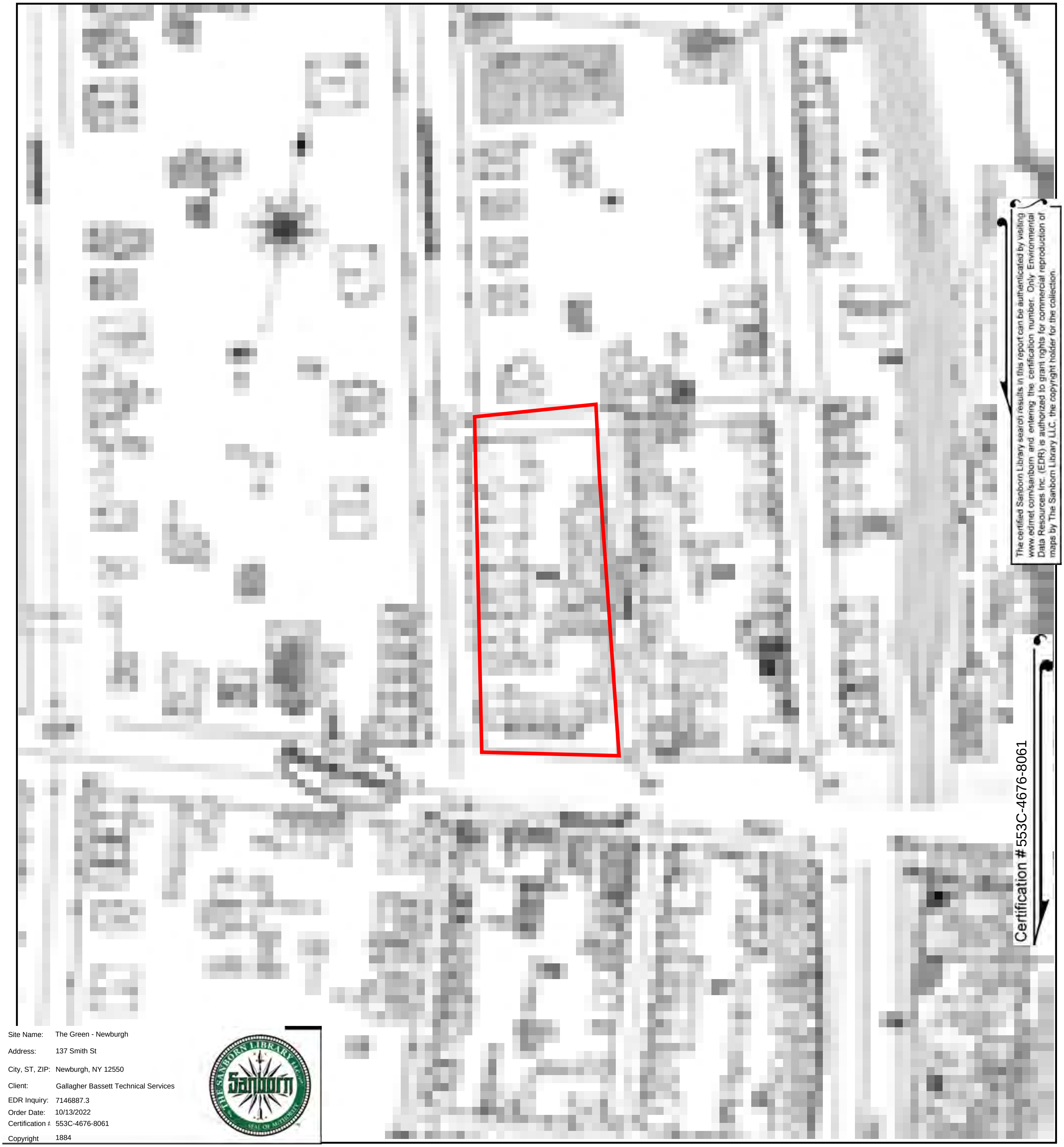
Appendix C

APPENDIX D

Sanborn Fire Insurance Maps

Certified Sanborn® Map

1884

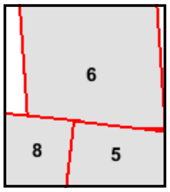


Certification # 553C-4676-8061

Site Name:	The Green - Newburgh
Address:	137 Smith St
City, ST, ZIP:	Newburgh, NY 12550
Client:	Gallagher Bassett Technical Services
EDR Inquiry:	7146887.3
Order Date:	10/13/2022
Certification #	553C-4676-8061
Copyright	1884

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

0 Feet 150 300 600

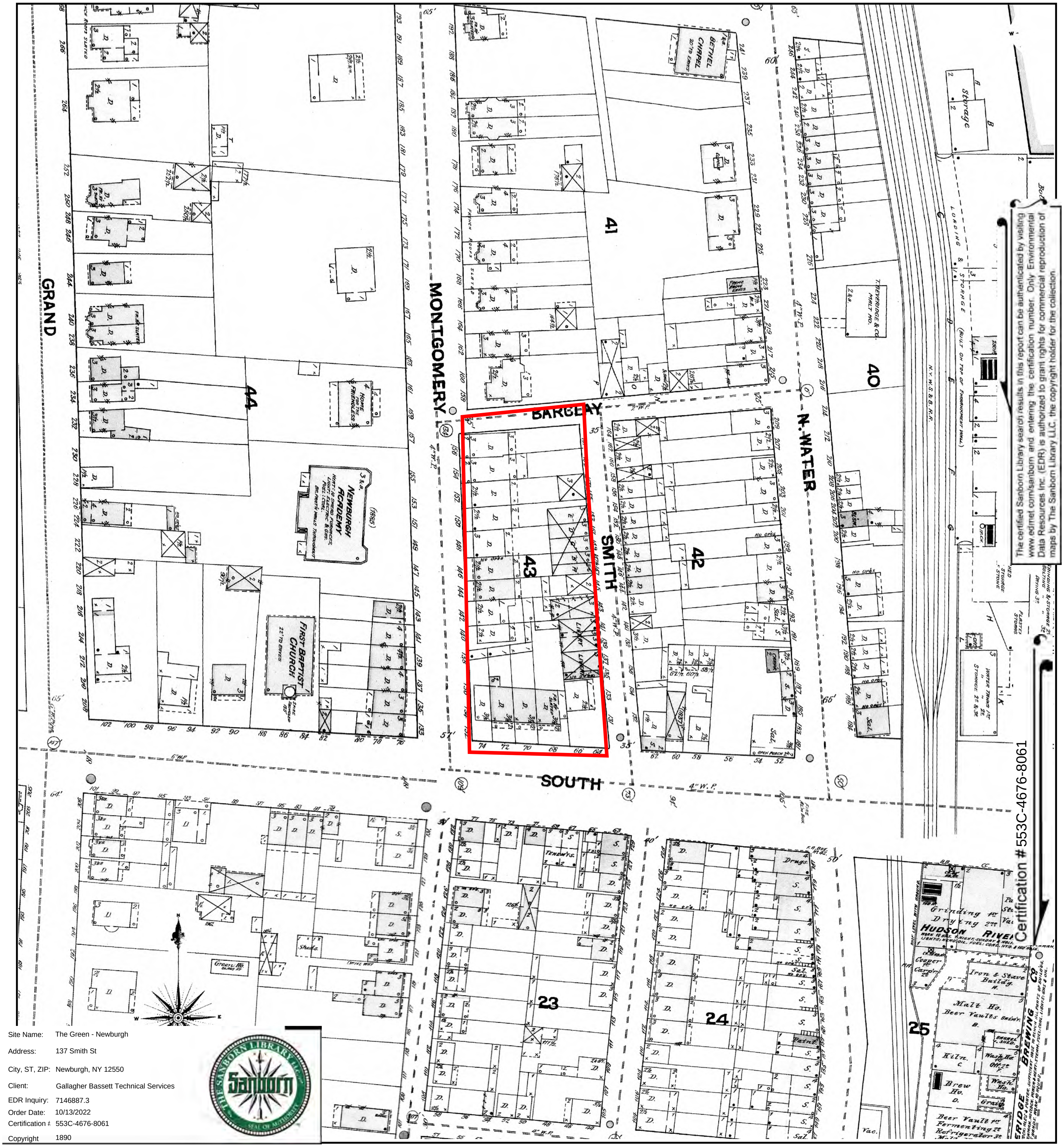


Volume 1, Sheet 5
Volume 1, Sheet 8
Volume 1, Sheet 6

N

Certified Sanborn® Map

1890



Certification # 553C-4676-8061

Site Name: The Green - Newburgh
Address: 137 Smith St
City, ST, ZIP: Newburgh, NY 12550
Client: Gallagher Bassett Technical Services
EDR Inquiry: 7146887.3
Order Date: 10/13/2022
Certification # 553C-4676-8061
Copyright 1890

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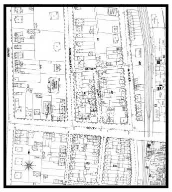

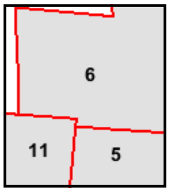

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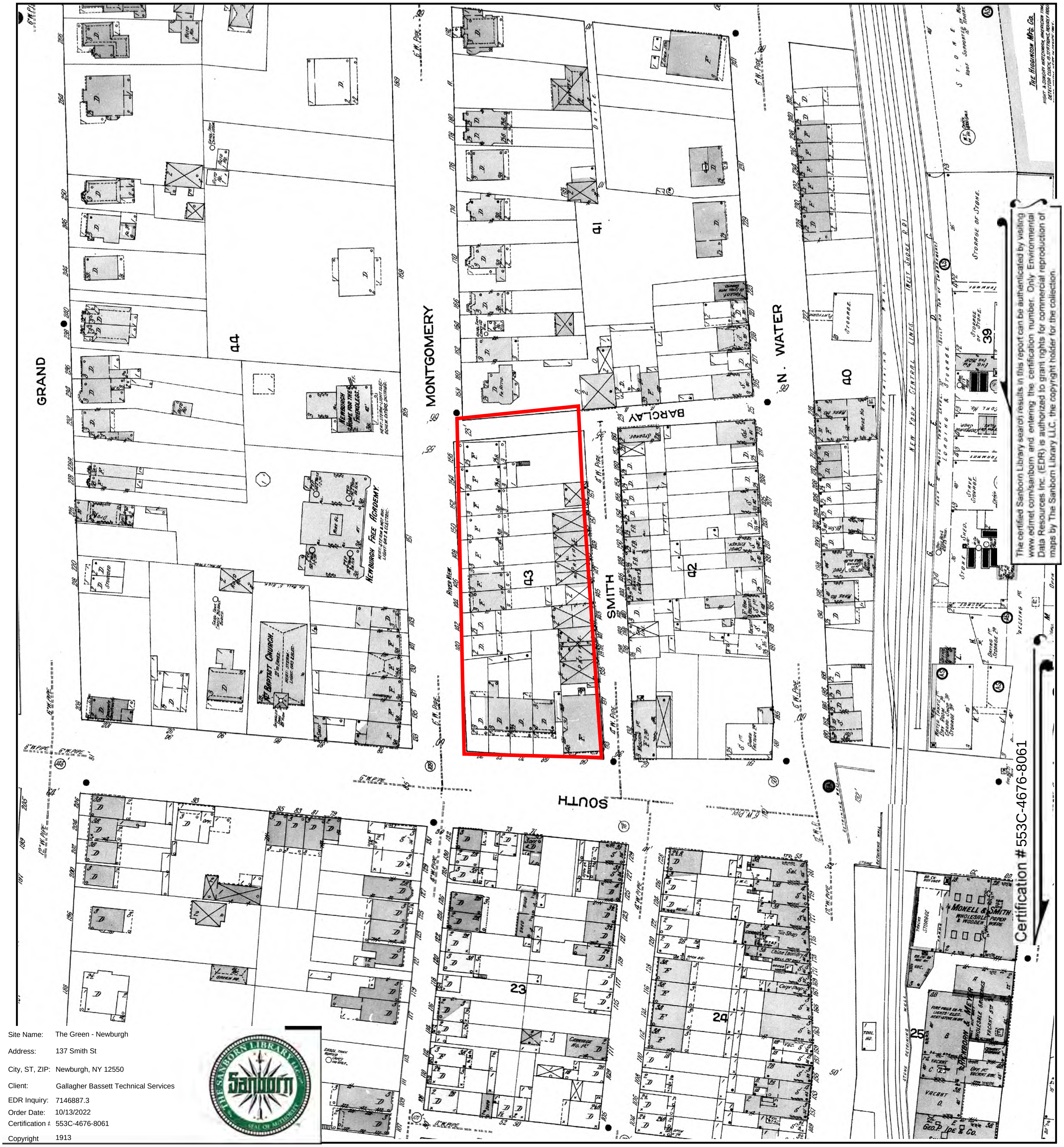
1913



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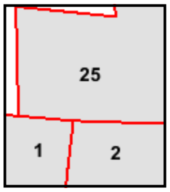

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N

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1957

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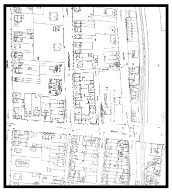

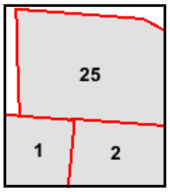

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Volume 1, Sheet 2
Volume 1, Sheet 1

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N

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1967

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Copyright	1967

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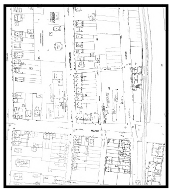

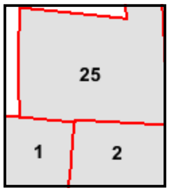

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N

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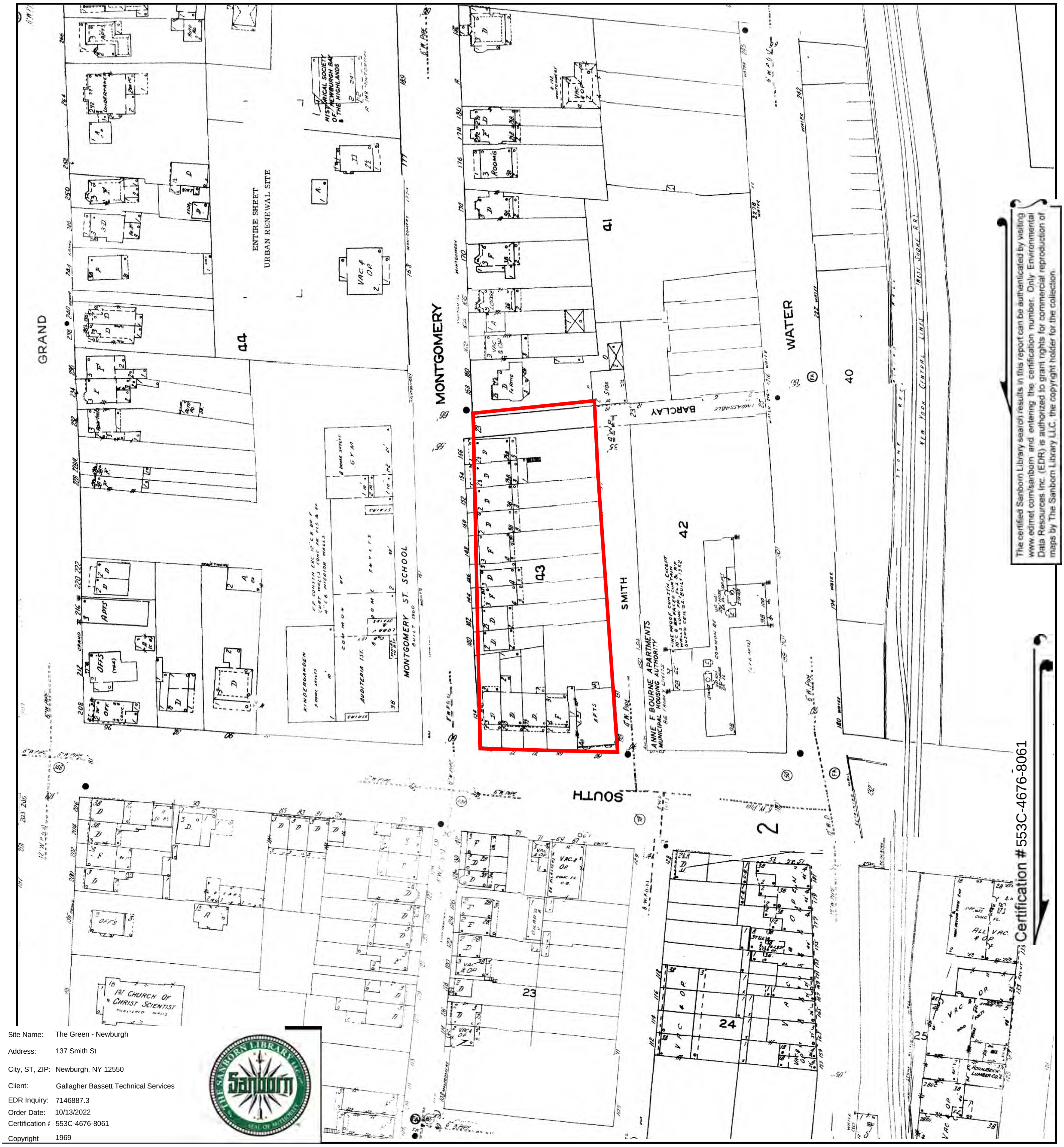
1969



Certification # 553C-4676-8061

Site Name: The Green - Newburgh
Address: 137 Smith St
City, ST, ZIP: Newburgh, NY 12550
Client: Gallagher Bassett Technical Services
EDR Inquiry: 7146887.3
Order Date: 10/13/2022
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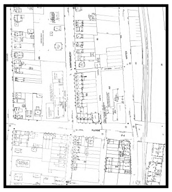

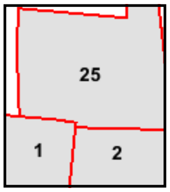

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0 Feet 150 300 600

N

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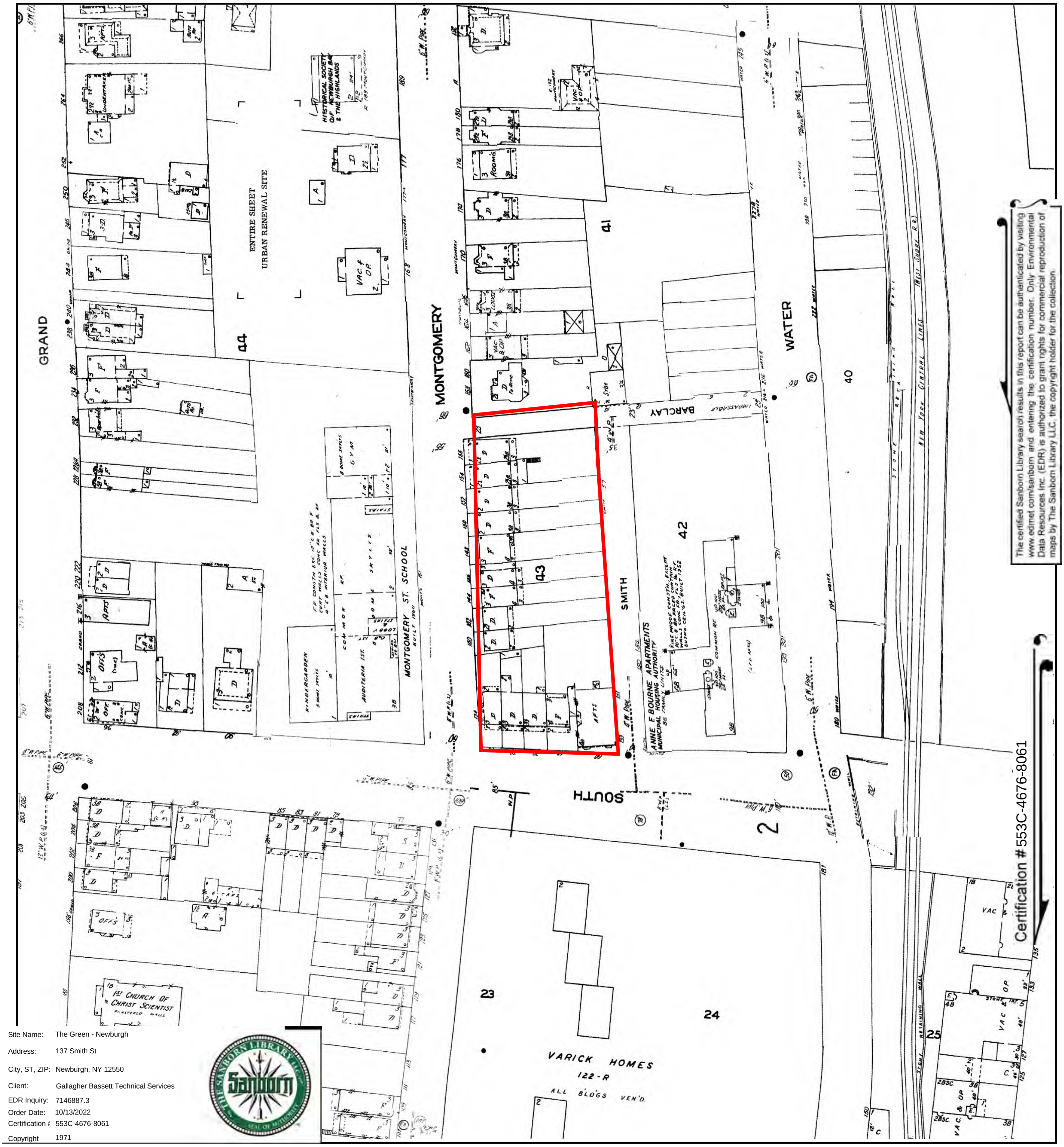
1971



Certification # 553C-4676-8061

Site Name:	The Green - Newburgh
Address:	137 Smith St
City, ST, ZIP:	Newburgh, NY 12550
Client:	Gallagher Bassett Technical Services
EDR Inquiry:	7146887.3
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Certification #	553C-4676-8061
Copyright	1971

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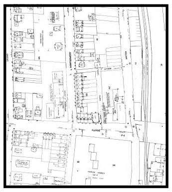

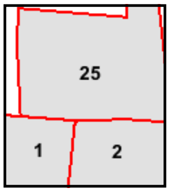

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Volume 1, Sheet 25

0 Feet 150 300 600

APPENDIX E

City Directories

The Green - Newburgh
137 Smith St
Newburgh, NY 12550

Inquiry Number: 7146887.5
November 09, 2022

The EDR-City Directory Image Report

EDR® Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

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SECTION

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EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available city directory data at 5 year intervals.

RECORD SOURCES

EDR's Digital Archive combines historical directory listings from sources such as Cole Information and Dun & Bradstreet. These standard sources of property information complement and enhance each other to provide a more comprehensive report.

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Data by

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RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

Year	***Target Street***	***Cross Street***	***Source***
2017	☑	☑	EDR Digital Archive
2014	☑	☑	EDR Digital Archive
2010	☑	☑	EDR Digital Archive
2005	☑	☑	EDR Digital Archive
2000	☑	☑	EDR Digital Archive
1995	☑	☑	EDR Digital Archive
1992	☑	☑	EDR Digital Archive
1966	☑	☑	Price & Lee's City Directory
1961	☐	☑	Price & Lee's City Directory

FINDINGS

TARGET PROPERTY STREET

137 Smith St
Newburgh, NY 12550

Year	***CD Image***	***Source***	
SMITH ST			
2017	pg A4	EDR Digital Archive	
2014	pg A8	EDR Digital Archive	
2010	pg A12	EDR Digital Archive	
2005	pg A16	EDR Digital Archive	
2000	pg A20	EDR Digital Archive	
1995	pg A22	EDR Digital Archive	
1992	pg A25	EDR Digital Archive	
1966	pg A27	Price & Lee's City Directory	
1961	-	Price & Lee's City Directory	Target and Adjoining not listed in Source

FINDINGS

CROSS STREETS

MONTGOMERY ST

Year	*CD Image*	*Source*
2017	pg. A2	EDR Digital Archive
2014	pg. A6	EDR Digital Archive
2010	pg. A10	EDR Digital Archive
2005	pg. A14	EDR Digital Archive
2000	pg. A18	EDR Digital Archive
1995	pg. A21	EDR Digital Archive
1992	pg. A23	EDR Digital Archive
1966	pg. A26	Price & Lee's City Directory
1961	pg. A28	Price & Lee's City Directory

City Directory Images

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

MONTGOMERY ST 2017

99	ASMANN, ERIC M
109	BROWN, LATOYA D
	GERALD, ELIANE M
	HODGE, WAVERLY
	MEYERS, CORRINE M
	SIMMONS, MICHAEL
111	LINSALATO, CARMEN V
	PORTILLO, MODESTO
	VAZQUEZ, KIMBERLY
117	HERRING, MADLINE O
	QUISPE, JORGE
119	DIFABBIO, JOSEPH M
	JOHNSON, LARRY
	RUFFIN, KENNETH
121	RIVERA, MARIBEL
123	STEVENS, TYARIA
	TICE, AMY
137	HORIZONONTHEHUDSON MAGNET SCHOOL
158	BETTERTON, DONALD M
162	JACKSON, INEZ
	WRIGHT, BARBARA
170	SULLIVAN, CHRISTOPHER D
	TARALLO, PHILIP A
174	ADDAMO, JENNIFER M
	COMMALATO, LISA
	RECCHIO, GABRIEL
176	BOYKIN, JOHNISHA
177	COOPER, TRACEY
	CUBIC, CASSANDRA
	DEMEIO, TERI E
	REIFENBERG, MARK
180	GONZALES, ZORAIDA
182	ESPADA, JAEL
	MALDONADO, JERRY M
	MEJIA, KAREN O
189	HISTORICAL SOC OF NEWBURGH BAY & HIG
192	POLLICK, ADAM C
195	RYAN, PATRICIA M
196	DEPAUW, DAMIAN
201	HOFMANN, RUEDI P
202	PARISI, GLORIA J
204	LONG, EMILLE A
205	BARRON, ROBERT P
206	AGARDJONES, VANESSA A
208	TARR, NADIA
209	LICHTE, SHANNON M
215	DOUR, DANIEL J
216	ZUBER, DANIEL M
221	SMITH, PETER F
222	BESTEN, RICHARD

MONTGOMERY ST 2017 (Cont'd)

222	COLACICCO, FALLON L SANDERS, ANDREW

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

SMITH ST 2017

150	AMPAH, CHARLOTTE
	ARAGONA, JAMES A
	ARIAS, JOSUE
	ARNOLD, SARAH
	ARZU, ISABEL
	ARZU, JOELY
	ATKINS, LAKISHA
	BAEZ, ASHLEY
	BALMORE, ORTIZ
	BARTEE, JEANETTE
	BORGEN, SANTA
	BOURNE & KENNY REDEVELOPMENT CO LL
	CASTILLO, ANNY
	CHANDLER, WILLIAM
	COATES, CANDY
	DEVINE, JOANN
	DIAZ, MAGDA
	DONAIRE, ROSAMARIE M
	ENAMORADO, MARLEN
	FARRAR, DOROTHEA A
	GARCIA, YESHANERI
	GRANT, TAURI
	HADAD, KEN
	HAMMOND, TAYQUAN
	HASSINE, AHLEM
	HENRY, F
	HERNANDE, EDY
	JACOBS, WANDA L
	JANEA, HILL
	JESSICA, SANTIAGO
	KNOWLES, RHEVANY N
	LADUCA, ANGELA
	LADUCA, ANGELA C
	LAWRENCE, SHATIRO
	LEWIS, SUZANNE B
	MEJIA, LYDIA
	MOLINA, MARIBEL M
	MORALES, MICHAEL
	NEPTUNE, KEISHA L
	OAKES, KATHERINE E
	OLIVIER, VALERIE
	OWENS, SONYA
	PADILLA, JESSICA
	PETTWAY, DURRELL
	PIERRE, FRANCIS
	PINZON, APOLSO
	QUINTANA, AMANDA
	RODRIGUEZ, DEZEREA T
	RODRIGUEZ, MELISSA L
	RODRIGUEZ, RAFAEL

SMITH ST 2017 (Cont'd)

150	SPRINGFIELD, OMAR
	STANLEY, GAIL M
	STEGALL, SCOTT B
	TORRES, MELVIN
	TOVAR, ANTHONY
	WARE, CHYKIRA K
154	ALLIE, SHEIK
	ARIAS, ADELA
	BARNES, JULIE K
	BAZAN, ROSA
	CARVAJAL, MONIKA
	CLARK, YVETTE
	CORTEZ, ALBERTO
	COUSAR, WILLIE
	DEVINE, C
	GONZALEZ, ELIZABETH
	HARRIS, VICTOR
	JACKSON, CHARLES
	JAIME, SULMA A
	KING, ESSENCE
	LIMONES, DAVID J
	MARTINES, SILVIA
	MCKINNON, NICOLE
	MOLINA, MARIBEL
	ORTIZ, ANTONIO
	PARRILLA, ANGEL L
	PINZON, ADOLFO
	ROBBINS, INDIA
	VELCIME, MYRLANDE
	VOLIVA, SAMANTHA E

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

MONTGOMERY ST 2014

51	SMEDMAN, KEVIN P
57	NAGEL, JAMES G
70	SULLIVAN, RICHARD
75	MESSINA, VITO R
76	CAMPBELL, E
80	SLAPP, MICHAEL W
86	STORMS, JAMES L
91	CLARKE, JOSEPH
95	SMITH, KEVIN E
99	ASMANN, CHRIS L
100	FIELDSON, HAROLD E
103	FLINT, TAMMY A
106	RABADI, NADA
107	OCCUPANT UNKNOWN,
109	FLORES, COLTIN
	HODGE, WAVERLY
	SIMMONS, CYNTHIA L
110	MEYER, RAYMOND H
111	LINSALATO, CARMEN V
	PORTILLO, MODESTO
	VAZQUEZ, KIMBERLY
115	COTTEN, RUBY
117	BALOGH, ANA
	BROWN, DAWN V
	HERRING, MADLINE O
	QUISPE, JORGE
119	DIFABBIO, JOSEPH M
	JOHNSON, LARRY
	RUFFIN, KENNETH
	SMITH, SANDRA
121	RIDGILL, CONRAD B
	ROMAN, JOSEFINA R
123	GORDEN, JAYNIECE
	HOLMES, ZSA Z
	MORRIS, JANET L
	STEVENS, KIM
125	POSSIDENTO, EUGENE F
131	OCCUPANT UNKNOWN,
137	HORIZONONTHEHUDSON MAGNET SCHOOL
158	MINNIES, PARISH P
	STOCKBRIDGE RAMSDELL HOUSE BED & BRE
162	BERRY, ADRIAN M
	BLACKBURN, LAVERNE E
	QUINONES, ERIC
	WRIGHT, BARBARA
166	JONES, SAMUEL
170	BELL, MARGE R
	SMITH, WARREN J
174	HOGAN, KERRY
	TORRES, DIANA M

MONTGOMERY ST 2014 (Cont'd)

176	HERRING, CHARDAE
	HINSON, ANN
	MAVOIDES, CHRISTINA M
	PEOPLES, RASHOD
177	CASTROVINCI, ANTONIO
	DEMEIO, TERI E
	REIFENBERG, MARK
180	HARRISON, ERIN M
182	MALDONADO, JERRY
	MEJIA, KAREN
189	HISTORICAL SOC OF NEWBURGH BAY & HIG
192	FORD, MAGGIE
	POLLICK, ADAM C
195	SALADINO, PAUL I
196	DEPAUW, DAMIAN
201	HOFMANN, RUEDI P
202	COLETTE, CHARLES J
	ECKERSON, CHARLES
	PARISI, GLORIA J
204	LONG, EMILE
205	BARRON, CLYDE
206	CLARK, ELWYN C
208	SHIRES, ERICA C
209	OCCUPANT UNKNOWN,
215	PRAGER, CATHY M
216	CONNER, ELIZABETH
	THERRIEN, MEGHAN
221	OCCUPANT UNKNOWN,
222	BAKER, HENRY K
	RACANELLI, LAUREN
	SCHAEFFER, ALISA B
	WICHER, CHRISTOPHER M

SMITH ST 2014

150	ARIAS, RENE V
	BAILEY, SELENA
	BAZAN, MARGARITA
	BORGES, SONIA
	BRODIE, LARRY
	CARR, LEANDRA
	CORONA, MARIO
	CORREA, ALMA R
	CORREA, SHAREEN T
	CUELLO, MELINDA A
	DAVIS, DIONNE
	DIX, INDIA R
	FORESTER, ANDRE S
	GALVEZ, BELMA L
	GRANT, LISA A
	GUEVARA, BLANCA
	HARVEY, ETHEL M
	JACOBS, WANDA L
	JAYCOX, BRIANNA
	JONS, JAID
	KNOWLES, RHEVANY N
	LAMB, LATOYA
	LAWSON, JANAE
	LEWIS, AMBER D
	MARTINA, SIOMASIS
	MARTINEZ, JUANA
	MAXWELL, JOHN
	MCNAIR, JOSEPH
	MOLINA, MARIBEL M
	NORALES, AVILIO
	OBOYSKI, THERESA
	ORTIZ, IRIS
	PADILLA, WHILEYNER
	PETTWAY, ROBIN
	PRINGLE, LAVAUNDREA S
	PUCINO, JANET
	RODRIGUEZ, DEZEREA T
	RODRIGUEZ, MELISSA L
	ROSADO, JOHN
	SMITH, CHRISTOPHER
	STANLEY, GAIL M
	STRINGFIELD, HEIDI L
	TOVAR, ANTHONY
	VOLIVA, SAMANTHA
	WARF, KAY
154	ALLIE, SHEIK
	BONAPARTE, TARA L
	BORGES, SANTA
	BRENNAN, VALENTINO
	CALIX, JOSE

SMITH ST 2014 (Cont'd)

154	CARVAJAL, MONIKA
	CLEARY, JOHN M
	COLEMAN, GLORIA J
	COLON, JACKELYN P
	CORDOVA, ILDA
	CREAMER, STEPHANIE
	DONAIRE, ROSAMARIE M
	EVERY, MARISSA
	FLORES, MARIA
	GARDNER, JEANETTE
	GRANT, CARDINE
	JACKSON, CHARLES
	JOHNSON, MONCHELLA
	KING, ESSENCE
	LAWSON, SUSAN D
	LIMONES, DAVID J
	MARTINES, SILVIA
	MCDUFFIE, MINNIE
	MCGRIFF, DWAYNE
	MELISSA, RODRIGUEZ
	MURRY, SHATANEE
	MYLES, ALEXANDER R
	NEWMAN, PEGGY F
	NICHOLAS, JULIE
	ORTIZ, ANTONIO
	PARRILLA, ANGEL L
	PRADO, ROBERTO E
	RAYE, CANDACE
	ROBBINS, INDIA
	RUSSELL, MARTHA
	SAGAR, ALEXA
	SIFUENTE, FLOR
	TORRES, MARIA E
	VALENTIN, PEDRO
	VELCIME, MYRLANDE
	VOLIVA, SAMANTHA E

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

MONTGOMERY ST 2010

51	SMEDMAN, KEVIN P
57	NAGEL, JAMES G
65	MURPHY, BARBARA G
68	SEARLES, GIL M
73	SULLIVAN, MELVIN
75	MESSINA, VITO R
76	CAMPBELL, E
79	ALTER, RAYMOND J
80	SLAPP, MICHAEL W
83	DATINE, PIERROT
86	STORMS, JAMES L
87	GILLICK, ROBERT
90	RAMUS, GEORGE J
95	SMITH, KEVIN E
99	ASMANN, CHRIS L
100	FIELDSON, HAROLD E
101	PAUL, DAVID M
103	FLINT, TAMMY A
104	GRAYSON, CHRISTINE D
106	RABADI, NADA
108	SCANK, GARY R
109	DERAS, GLORIA
	FLORES, JUDY
	HODGE, WAVERLY
110	MEYER, RAYMOND H
111	LINSALATO, CARMEN V
	PORTILLO, MODESTO
	VAZQUEZ, KIMBERLY
114	DECKER, DIANA L
115	COTTEN, IRIEL L
119	DIFABBIO, JOSEPH F
	GONZALEZ, MANUEL
	JOHNSON, MARINA L
	RUFFIN, KENNETH
121	RIDGILL, CONRAD
123	HOLMES, KRISTLA D
	MORRIS, JANET L
125	HARDY, DARRELL E
127	OCCUPANT UNKNOWN,
129	EDWARD, OKRI
	EVANS, DAVID
	MORGAN, WALTER L
	REESE, VALERIE
131	SMITH, RENYSI
137	HORIZONS ON THE HUDSON
158	OCCUPANT UNKNOWN,
	RUSSELL INN LLP
162	BERRY, ADRIAN
	BLACKBURN, LAVERNE E
	HEALTHY CONNECTIONS UNLIMITED

MONTGOMERY ST 2010 (Cont'd)

162	LUCAS, JR
	QUINONES, ERIC
	WRIGHT, AQUANETTA H
164	CALABRESE, LOUIS G
168	BELL, MARGE R
170	BELL, MARGE E
	RIBBLE, DENISE J
	SMITH, WARREN J
174	AWAREZ, JADIRA
	MIMMER, KERRILEE
176	BRUGMAN, ALEX
	HERRING, CHARDAE
	HINSON, ANN
	PATERNOSTRO, CHARLES
	PAYNE, KERRY
	SANTOS, L
	SIGNORILE, VICTORIA
	WILSON, JULIA L
177	BLOCK, RICKI E
	CASTROVINCI, ANTONIO
	DEMEIO, TERI E
	REIFENBERG, MARK
180	GONZALES, ZORAIDA
182	DURHAM, EASTER B
	GRADY, PAMELA C
	HENRY, LORI S
	HUBBARD, KATHLEEN
	MALDONADO, JERRY
189	CRAWFORD HOUSE
192	VOLPE, ERIC
	WALK, SARA
195	SALADINO, PAUL I
196	OCCUPANT UNKNOWN,
201	GALE, SEAN P
202	BUTWELL, GEORGE R
	ECKERSON, CHARLES
	PARISI, GLORIA J
204	LONG, EMILIE A
205	PITMAN, MICHAEL C
208	PAPAGNI, JOSEPHINE F
209	DONOVAN, KERRY T
215	PRAGER, CATHY M
216	CONNER, ELIZABETH
	NUNEZ, PAOLA
221	SMITH PETER
222	BAKER, DONNA
	JOHNSON, KELLY
	RICHMOND, BRUCE M
	SCHAEFFER, ALISA

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

SMITH ST 2010

150	BONAPARTE, TARA
	BUSH, MORICE
	CINTRON, FERNANDO
	CRUZ, ERIC
	DELPHONSE, ROBERTE
	DHEUREUX, DANA
	DHUREUX, DANA
	FARRAR, DOROTHEA A
	GALVEZ, BELMA L
	GRIFFIN, ANTHONY
	MCDONALD, RONNESHIA
	MCDUFFIE, MINNIE
	MIGUET, SIMON
	MORGAN, PERRIS
	OWENS, SONYA
	PRADO, JOHANA
	ROBINSON, NADINE Y
	RODRIGUEZ, LISA
	TAYLOR, BLANCA M
	TORELLI, DEWINGYA
	UTLEY, RHODA
154	ALLIE, SHEIK
	ALVARES, NIXON
	AMMANS, NAKEISHA
	ARZU, ISABEL
	AVILA, OSCAR
	BONET, ALFREDO E
	BOURNE & KENNY REDEVELOPMENT
	BRENNAN, VALENTINO
	BROWN, SANDRA B
	CHAMBERLAIN, ANNIE R
	CLAVIJO, JUSTINE
	COMMUNITY CENTERS OF NEWBURGH
	CORA, KENYTTA
	CORDOVA, ILDA
	CORTEZ, ALBERTO
	DANIELS, SHEDARIAN
	DELPHONSE, CRYSTAL
	EDSON, ELOGE
	FERGUSON, CARDELL
	FISHER, JAMIE
	FORD, RAYQUAN
	FULLER, GARY
	GARDNER, NETTIE B
	GCOLO, MERCY
	GRIDE, SHANIQUA
	HARVEY, ETHEL
	JACKSON, HENRY A
	JOHNSON, MONCHELLA
	JORDAN, SHANISSE

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

SMITH ST 2010 (Cont'd)

154	LOUIS, MARIE
	MAISE, LAYNA M
	MAJURIE, BRYRAN
	MCDONDALD, MICHELLE
	MCNALLY, JEANNIE
	MOSLEY, MITCHELL E
	MURRY, RAHSEAN
	PETE, ANGELO
	POLON, J
	PORTER, NIKESHA
	RAMDEEM, HOWARD
	RAMSEY, KELLY
	RIVERA, KAREN
	ROYAL, VIVIAN D
	SAGAR, ALEXA
	SIFUENTES, FLOR
	SIMON, GINA
	THELOT, SHEILA
	THOMPSON, DANIEL
	TORRES, MARIA
	TREJO, JOSUE
	VALDEZ, SULMA
	VALENTIN, PEDRO
	VASQUEZ, NOHEMI V
	VEGA, ESMERALDA
	VOLIVA, SAMANTHA
	WARE, LATARA
	WILLIAMS, C

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

MONTGOMERY ST 2005

99	ASMANN, CHRIS L
109	DERAS, GLORIA
	OCONNER, JOSEPH
115	COTTEN, IRIEL L
117	VALLE, JOVANNY
	WILKINS, T C
119	GONZALEZ, MANUEL
	RIVERA, ARLENE
	ROSARIO, LISA
	RUFFIN, KENNETH
	UNDERHILL, DANIEL
121	ARMIJO, JUANA
	GARCIA, MIGUEL A
	HERNANDEZ, REYNALDA
	LANSPERY, JEFFREY K
123	WAKELY, ANTWAN J
125	BROWN, SHIRLEY
	CANARIO, GISSELL
	HAYES, JACKIE
129	EVANS, DAVID
	HENRY, L
	MOTHERS BY ASSN
	NEALIS, MALINA
131	MILLER, JAMAL A
158	OCCUPANT UNKNOWN,
162	BERRY, ADRIAN
	PETERSON, DOROTHY
166	FREDERICKS, WILLIAM K
168	BELL, MARGE R
170	BELL, MARGE E
	MULLIGAN, JOSEPH P
	RIBBLE, DENISE J
	SEMENKOW, PAUL
	SULLIVAN, CHRISTOPHER D
174	MINUTA, THERSA
	POULOS, GEORGE N
176	DAMBROGIO, DAN
	LAUDIERO, FRANK
	NORDEN, DANIELLE
	SANTOS, L
177	BLOCK, RICKI E
	COOK, BRIAN J
	DEMATTEO, LESLIE
	HALK, PETER J
	PACENZA, TRACEY L
	REIFENBERG, MARK
180	WANDS, KEITH
182	BLAKE, MICHELLE
	HEIMBACH, JONATHAN
	KELLY, JASON

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

MONTGOMERY ST 2005 (Cont'd)

192	HILL, DOROTHY M
193	PFEIFFER, MARILYN
195	OCCUPANT UNKNOWN,
196	HODGE, DAN M
201	LENDINO, ROSE M
202	BUTWELL, MARIANNE M
	GIUDICE, MARIANNE B
	LOWE, TARA M
	SPIGNARDO, MARGARET A
204	PEARSON, LAURA E
	TRANSFORMATION IN ACTION
205	PITMAN, MICHAEL C
	WEEDS & REEDS
206	OCCUPANT UNKNOWN,
208	GREENWAY TOPSOIL
	PAPAGNI, DEMIAN
209	DONOVAN, KERRY T
215	PRAGER, CATHY M
216	BURGOA, JORGE C
	CLARKE, JOSEPH
	GREAK, JEANIA M
	NUNEZ, PAOLA
221	SMITH, PETER
222	FIRE HO
	SCHAEFFER, ALISA

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

SMITH ST 2005

150	BARRETT, ALFRED
	CARTER, DENISE
	CHAMBERLAIN, ANNIE R
	CLARK, MARY E
	COLEMAN, TG
	COLLAZO, ENYD
	DONAIRE, ROSAMARIE M
	FARRAR, DOROTHEA A
	FERGUSON, CARDELL
	GALVEZ, BELMALUZ L
	GARDNER, NETTIE B
	HICKEY, KELLY
	JACKSON, DOROTHY
	LEWIS, DEA
	MCMILLIAN, C
	MUZALIER, RICOLSON
	POWELL, CHANNON
	PRADO, ROBERTO
	RODRIGUEZ, NELLY
	SANCHEZ, ERNESTO
	SANTIAGO, JOSE A
	SHARON, MORGAN
	THOMPSON, EDDIE
	TORELLI, DEWINGYA
	VANKLEECK, JENNIFER
154	BELFORD, CATHERINE
	BROWN, MARVIN B
	BRUNO, ROBERT
	BULLOCK, J M
	CORA, K
	CORDOVA, ILDA
	COUSAR, JANICE
	EDWARDS, FESTUS L
	GOJAH, PAULETTE
	GORDON, JAYNIECE
	GREENE, KAREN
	HAMILTON, JW
	HARVEY, ETHEL
	HOUSTON, DENISE
	JACKSON, HENRY A
	JENNINGS, JEANINE
	KURZ, PAULA A
	MARIAN, MAURICE
	MASON, SHARON
	MENDIETA, ROXANA E
	MIRANDA, LUIS
	MOTLEY, ERIC B
	MUNOZ, MARIO A
	PETE, ANGELO
	PRICE, S

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

SMITH ST 2005 (Cont'd)

154	RAMDEEM, HOWARD
	RAMOS, RAUL
	RICKETT, TRIVIA
	ROSCOE, EUGENE D
	ROYAL, VIVIAN D
	SIMMS, L
	VALENTIN, PEDRO
	VETERINARY MULTI IMAGING
	VOLIVA, SAMANTHA
	WEST, LEONARD

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

MONTGOMERY ST 2000

99	ASMANN, C
115	COTTEN, IRIEL L
117	OCCUPANT UNKNOWN,
119	RUFFIN, KENNETH
123	OCCUPANT UNKNOWN,
125	HAYES, A
129	RICHARDSON, CARROL
131	MILLER, JAMAL
137	NEWBURGH CITY SCHOOL DISTRICT
	NEWBURGH CITY SCHOOL DISTRICT SCHOOLS
158	BETTERTON, DON
	WOTORSON, AMBROSE
162	AMIDON, LAUREL C
	BERRY, ADRIAN
164	FREDERICKS, WILLIAM K
166	DUFFANY, MAHLER J
	FREDERICKS, WILLIAM
	MARTINEZ, GLADYS M
168	OCCUPANT UNKNOWN,
170	HYDE, B
	SULLIVAN, C D
174	CESPEDES, A
	FORBES, KENNETH
	FULFORD, A
175	BLOCK, RICKI
176	CANTOR, WENDY
	EMMETT, GREGORY
	HUNTER, DAVID
	SANGUEDOLCE, VICTOR
	TOBACK, DAVID
	TONE, J
177	AINSWORTH, J
	BLOCK, RICKI
	COOK, BRIAN J
	FLEMMING, CRAIG S
	JOHNSON, DARLEEN
	MOCCIO, C M
	REIFENBERG, MARK
182	BRUTON, KEN
	EMMETT, GREGORY
	ESPADA, JAEL
	KNIFFIN, JAMES F
	MARINO, ANDREW C
184	HILL, DOROTHY M
189	HISTORICAL SOC OF NEWBURGH BAY & HIGHLANDS
192	HILL, DOROTHY
	KOLB, MICHAEL
193	PFEIFFER, MARILYN
194	HODGE, DANIEL M
195	PFEIFFER, MARILYN

MONTGOMERY ST 2000 (Cont'd)

196	AIKEN, CHARLES
	HODGE, K
197	LENDINO, ROSE M
201	BALL, MELINDA
	LENDINO, ROSE M
202	BUTWELL, M
	GIUDICE, M B
	SCHOENIG, BILL
203	JOHNSON, CHESTER A
204	KNAPP, THOMAS D
	PEARSON, R Y
206	EDWARDS, BRENDA
207	DONOVAN, KERRY
208	PAPAGNI, DEMIAN
	PAPAGNI-BELL, J
209	DONOVAN, D
215	PRAGER, CATHY
216	GROSS, ALTHA M
221	SMITH PETER ARCHITECT
222	ALDRICH, JEFFREY A
	BABCOCK, JOHN
	FANNING, J
	FRANK, J P
	MURPHY, DENNIS
	RITOSA, DORINA
	SCHIAVONE, NATALIE J

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

SMITH ST 2000

150	ARIAS, DIANA
	BARRETT, ALFRED
	BROWN, S
	CHAMBERLAIN, A
	CHAMBERLAIN, ANNIE
	COMMAND SECURITY CORPORATION
	CORDOVA, ILDA
	FARRAR, GARNET F
	FERGUSON, CARDELL
	GALVEZ, B
	GARDNER, NETTIE
	JACKSON, DOROTHY
	NEWBURGH HOUSING AUTHORITY
	NEWBURGH HOUSING AUTHORITY SECTION 8
	PARKER, GRADY
	POWELL, C
	RAMIREZ, MICHAEL
	RIVAS, DINA
	THOMPSON, EDDIE
	TRINIDAD, JUAN
	VANN, J
	WATSON, TERESA
154	BULLOCK, J M
	COMMUNITY CENTERS OF NEWBURGH INCORPORATED
	EDWARDS, FESTUS
	EVANS DAVID LEE REV
	JACKSON, LENA
	LAMB, DOUGLAS
	MCCLEARY, JOHNNY
	MENDIETA, ROXANA
	MOTLEY, JAMIE
	PEREZ, THELMA
	PETE, ANGELO
	SALAZAR, E
	SMITH, LAURA
	SUKI, PAM
	VASQUEZ, NOHEMI
	WILEY, DEXTER
	WILSON, L

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

MONTGOMERY ST 1995

137	NEWBURGH CITY SCHOOL DISTRICT-SCHOOLS-HORIZONS-ON-THE-HUDSON
189	HISTORICAL SOC OF NEWBURGH BAY & HIGHLANDS
221	SMITH, PETER, ARCHITECT

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

SMITH ST 1995

150	COMMAND SECURITY CORP
	M A ANGELIADES
	NEWBURGH HOUSING AUTHORITY-OFCC
154	COMMUNITY CENTERS OF NEWBURGH INC

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

MONTGOMERY ST 1992

99	ASMANN, ULRICH
	WILLIAMS, GLENN
117	COTTEN, RUBY
121	BANKS, S
	HARPER, L A
	WEBB, D
123	DOUGHERTY, RICHARD
125	PHILLIP, J
129	RICHARDSON, CARROL
131	RODRIGUEZ, ALLEN F
137	NEWBURGH CITY SCHOOL DIST-SCHOOL-HORIZONS-ON-THE-HUDSON MAGN
158	HELLER, TAMMY & JEFF
	MAZZOCCA, ALEX
	PORFIDIO, THOMAS A
162	CANONIGO, BERNICE
	CONGELLI, R J
	POMARICO, MICHAEL ANTHONY
166	BONILLA, BRENDA
	ROCAFORT, STERLING
170	BORSEY, CHARLES
	HURLEY, M
	MCGURGAN, ERIN
174	NEWCOMB, C A
176	ADAMS, EDWIN
	APP, E
	OSTERHOUT, JOHN G
177	MALER, DONALD A
	STRIANO, M
	SUREDA, JOHN B
182	JACKSON, CAROLINE
189	HISTORICAL SOC OF NEWBURGH BAY & HIGHLANDS
192	HILL, D
195	GALLAGHER, FRANK X
196	HODGE, KATHLEEN
201	COLEMAN, WILLIAM H
202	CODETT, BRYANT
	GITTENS, M
	TATE, ANDREW
204	PREVOST, JULIE
	SMITH, JULIA
205	ATKINS, S
	GORE, WILLIAM
	JOHNSON, JEFFREY & LILLIAN
206	BUNTING, DOROTHY
215	PRAGER, C
216	GROSS, ALTHA MAE
221	SMITH, PETER, ARCHITECT
222	BISHOP, SCHUYLER
	HUGHES, CHARLES
	JOHNSON, JAMES A

MONTGOMERY ST 1992 (Cont'd)

222	NEISS, KEVIN
	SCOTT, STEVEN M

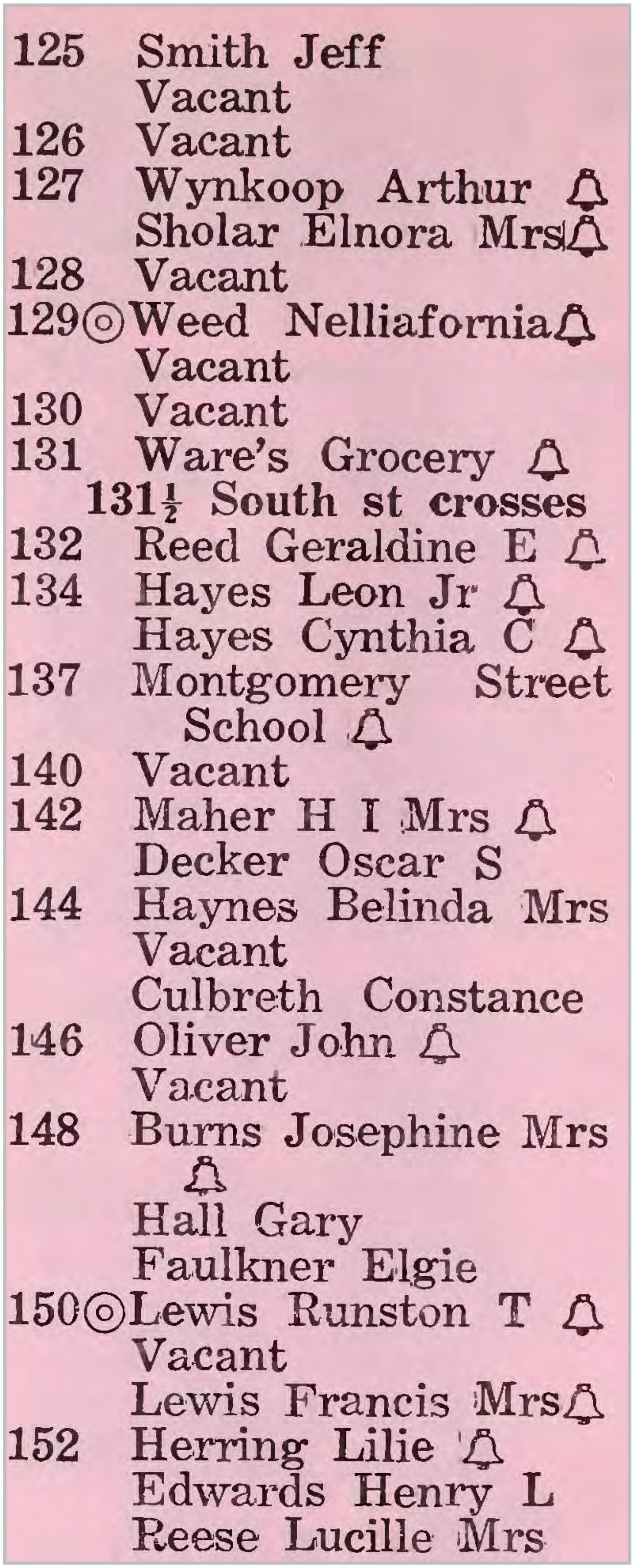
Target Street	Cross Street	Source
✓	-	EDR Digital Archive

SMITH ST 1992

150	CHAMBERLAIN, A
	COMMAND SECURITY CORP
	DIDLEY, DINO
	FARRAR, GARNET F
	JERIDO, MARGUERITE
	LIPSCOMB, MINNIE LEE
	MCMILLIAN, H
	MILLER, L
	NEWBURGH HOUSING AUTHORITY-OFC
	PARKER, C L
	PARKER, GRADY, SR
	PURVIS, K R
	RIVERA, J
	SPEARMAN, KAREN
154	BOYKIN, CARRIE
	FOSTER, EUGENE
	GLEN HINES MEMORIAL CENTER
	JOHNSON, D
	JOYNER, HENRY
	LOGAN, RHONDA
168	PATRICK, ERNEST
169	BETZ, D

Target Street	Cross Street	Source
-	✓	Price & Lee's City Directory

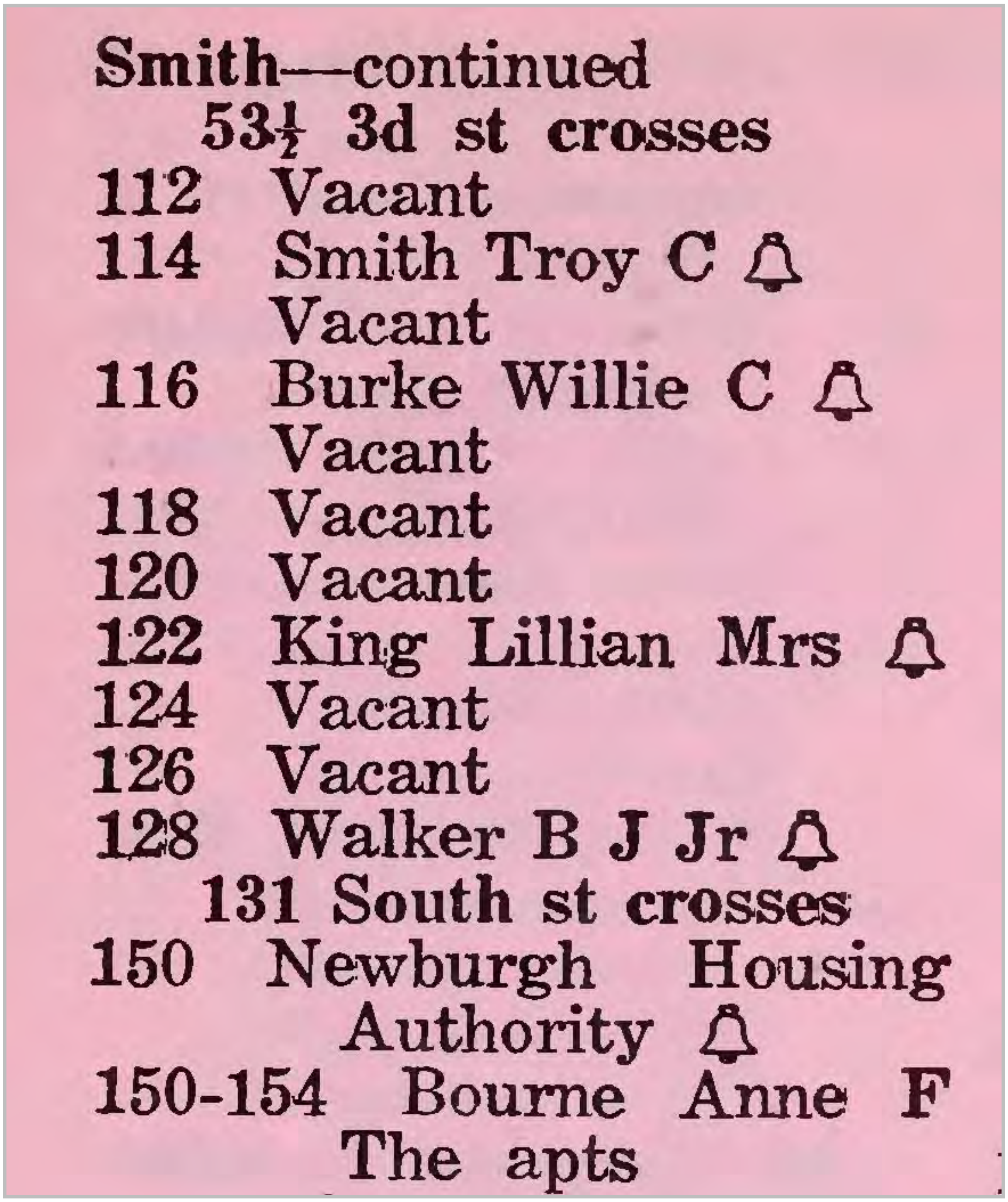
MONTGOMERY ST 1966



125 Smith Jeff
Vacant
126 Vacant
127 Wynkoop Arthur 🔔
Sholar Elnora Mrs 🔔
128 Vacant
129 ◎ Weed Nelliafornia 🔔
Vacant
130 Vacant
131 Ware's Grocery 🔔
131½ South st crosses
132 Reed Geraldine E 🔔
134 Hayes Leon Jr 🔔
Hayes Cynthia C 🔔
137 Montgomery Street School 🔔
140 Vacant
142 Maher H I Mrs 🔔
Decker Oscar S
144 Haynes Belinda Mrs
Vacant
Culbreth Constance
146 Oliver John 🔔
Vacant
148 Burns Josephine Mrs 🔔
Hall Gary
Faulkner Elgie
150 ◎ Lewis Runston T 🔔
Vacant
Lewis Francis Mrs 🔔
152 Herring Lilie 🔔
Edwards Henry L
Reese Lucille Mrs

Target Street	Cross Street	Source
✓	-	Price & Lee's City Directory

SMITH ST 1966



Smith—continued

53½ 3d st crosses

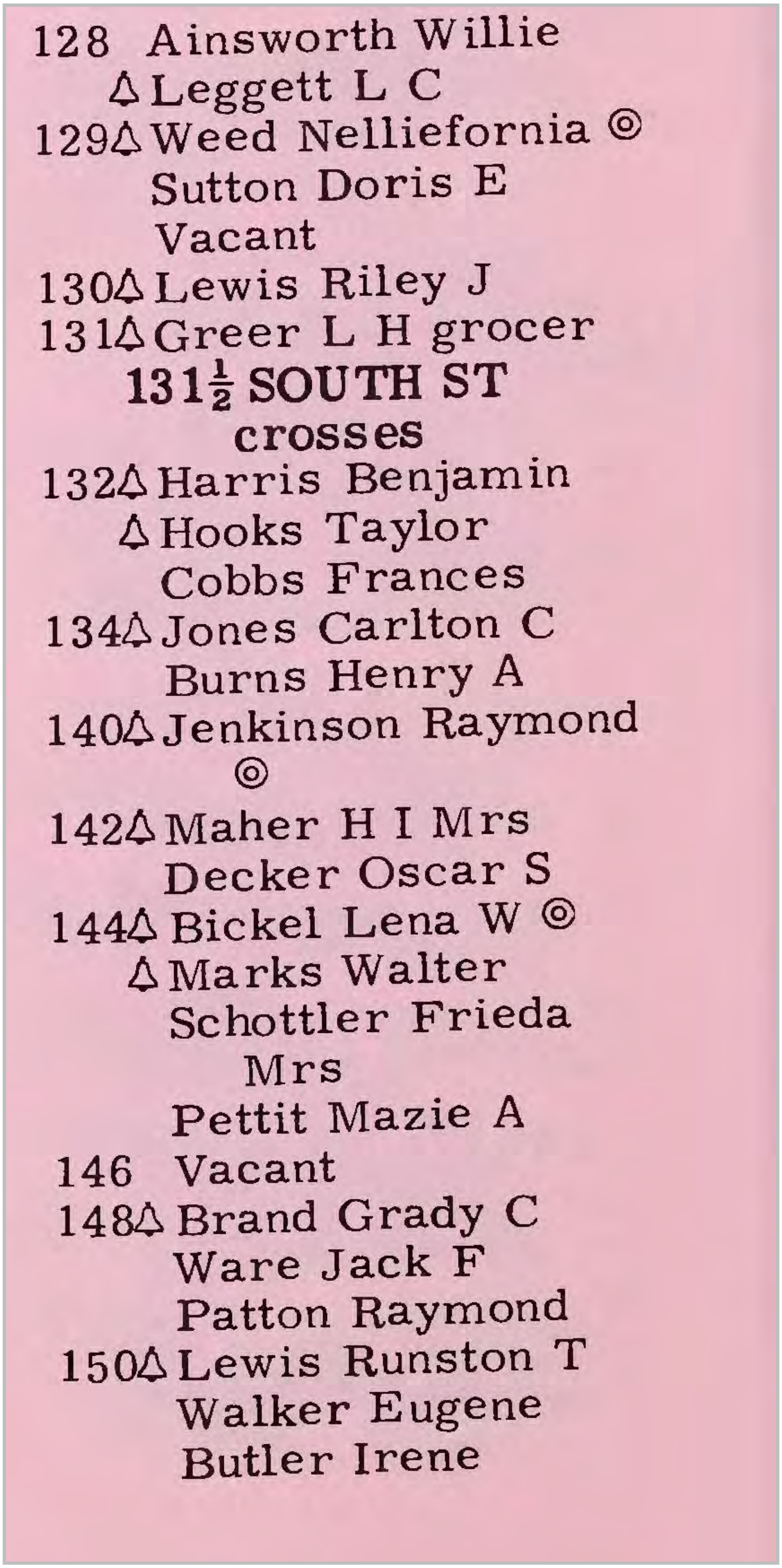
112 Vacant
114 Smith Troy C 🔔
Vacant
116 Burke Willie C 🔔
Vacant
118 Vacant
120 Vacant
122 King Lillian Mrs 🔔
124 Vacant
126 Vacant
128 Walker B J Jr 🔔

131 South st crosses

150 Newburgh Housing Authority 🔔
150-154 Bourne Anne F The apts

Target Street	Cross Street	Source
-	✓	Price & Lee's City Directory

MONTGOMERY ST 1961



128 Ainsworth Willie
🔔Leggett L C
129🔔Weed Nelliefornia ◎
Sutton Doris E
Vacant
130🔔Lewis Riley J
131🔔Greer L H grocer

131½ SOUTH ST crosses

132🔔Harris Benjamin
🔔Hooks Taylor
Cobbs Frances
134🔔Jones Carlton C
Burns Henry A
140🔔Jenkinson Raymond ◎
142🔔Maher H I Mrs
Decker Oscar S
144🔔Bickel Lena W ◎
🔔Marks Walter
Schottler Frieda Mrs
Pettit Mazie A
146 Vacant
148🔔Brand Grady C
Ware Jack F
Patton Raymond
150🔔Lewis Runston T
Walker Eugene
Butler Irene

APPENDIX F

Previous Reports

APPENDIX G

Regulatory Review Database Report

The Green - Newburgh
137 Smith St
Newburgh, NY 12550

Inquiry Number: 07146887.2r
December 06, 2022

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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SECTION **PAGE**

GEOCHECK ADDENDUM

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E1527-21), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

137 SMITH ST
NEWBURGH, NY 12550

COORDINATES

Latitude (North):	41.5072740 - 41˚ 30' 26.18''
Longitude (West):	74.0072400 - 74˚ 0' 26.06''
Universal Tranverse Mercator:	Zone 18
UTM X (Meters):	582852.0
UTM Y (Meters):	4595334.5
Elevation:	113 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	14115968 NEWBURGH, NY
Version Date:	2019
Northeast Map:	14123677 WAPPINGERS FALLS, NY
Version Date:	2019
Southeast Map:	14122356 WEST POINT, NY
Version Date:	2019
Southwest Map:	14106040 CORNWALL ON HUDSON, NY
Version Date:	2019

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20150522
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
137 SMITH ST
NEWBURGH, NY 12550

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
Reg	HUDSON RIVER PCBS	NO STREET APPLICABLE	NPL, SEMS, RCRA-LQG, US ENG CONTROLS, US INST...	Same	487, 0.092, East
A1	MONTGOMERY & SOUTH S	MONTGOMERY & SOUTH S	NY Spills	Lower	43, 0.008, SSW
A2	HORIZON ON HUDSON SC	SOUTH ST. & MONTGOME	LTANKS	Lower	43, 0.008, SSW
A3	WAREHOUSE	75 SOUTH STREET	NY Spills	Lower	72, 0.014, South
B4	SHELL DRAKE ORGANIZA	150 SMITH ST	LTANKS, NY Spills	Lower	87, 0.016, East
B5	BOURNE APARTMENTS (F	150-154 SMITH STREET	UST	Lower	87, 0.016, East
C6	HORIZONS ON THE HUDS	137 MONTGOMERY ST	NY Spills	Higher	88, 0.017, WNW
C7	HORIZONS ON THE HUDS	137 MONTOGOMERY ST	UST	Higher	88, 0.017, WNW
B8	BORN APTS	RIVER ST	LTANKS	Lower	128, 0.024, ESE
B9	BORN	RIVER ST	LTANKS	Lower	128, 0.024, ESE
A10	JAKUBEK RESIDENCE	127 MONTGOMERY ST	NY Spills	Higher	167, 0.032, SSW
C11	MONTGOMERY SCHOOL	S STREET	LTANKS	Higher	170, 0.032, West
C12	NEWBURGH SCHOOL	FRONT ST	NY Spills	Higher	170, 0.032, West
A13	TELEPHONE POLE	123 MONTGOMERY ST.	NY Spills	Higher	209, 0.040, SSW
A14	HOME	121 MONTGOMERY ST	NY Spills	Higher	233, 0.044, SSW
D15	WAREX TERMINAL	1 SOUTH ST	LTANKS	Lower	248, 0.047, SE
D16	BORN APARTMENTS	WATER & SOUTH ST	NY Spills	Lower	270, 0.051, SE
D17	MARINE DRIVE	SOUTH ST & MARINE DR	NY Spills	Lower	275, 0.052, SE
18	TO ROADWAY	CLINTON ST AND MONTG	NY Spills	Higher	482, 0.091, North
E19	DUPONT STAUFFER DURA	SOUTH ST	SEMS	Lower	527, 0.100, SE
E20	CHG&E : POLE # 15516	139 FRONT ST	NY Spills	Lower	541, 0.102, ESE
21	193 GRAND STREET RES	193 GRAND STREET	NY Spills	Higher	561, 0.106, SW
E22	HUDSON RIVER	120 FRONT ST	NY Spills	Lower	620, 0.117, SE
E23	IN THE RIVER	120 FRONT STREET	NY Spills	Lower	620, 0.117, SE
F24	LDL PROPERTIES, LLC	261 GRAND STREET	UST	Higher	633, 0.120, NW
F25	ACTIVE VENTILATION P	85 CLINTON STREET	NY Spills	Higher	759, 0.144, NW
26	SOIL	157 GRAND ST	NY Spills	Higher	850, 0.161, SW
G27	350/352 LIBERTY STRE	350/352 LIBERTY STRE	ERP	Higher	886, 0.168, WNW
28	BASEMENT	288 GRAND STREET	NY Spills	Higher	892, 0.169, NNW
G29	CITY OF NEWBURGH REA	82 CLINTON ST	NY Spills	Higher	911, 0.173, NW
H30	JOHNSON FAMILY CLEAN	303 LIBERTY ST	EDR Hist Cleaner	Higher	915, 0.173, West
31	HOWARDS MOBIL SERVIC	323 LIBERTY ST	EDR Hist Auto	Higher	918, 0.174, West
G32	RON-SUN CLEANERS LAU	337 LIBERTY STREET	DRYCLEANERS	Higher	943, 0.179, WNW
G33	RON-SAN CLEANERS & L	337 LIBERTY ST	EDR Hist Cleaner	Higher	943, 0.179, WNW
I34	ON HUDSON RIVER NEAR	NEWBUGH CITY DOCK	NY Spills	Lower	1003, 0.190, SSE
H35	KOLOKITHAS RESIDENCE	291 LIBERTY ST	NY Spills	Higher	1018, 0.193, WSW
I36	HUDSON RIVER	76 FRONT STREET	NY Spills	Lower	1045, 0.198, SSE
J37	IN NEWBURG BY THE	CENTRAL HUDSON POWER	NY Spills	Lower	1050, 0.199, South
H38	SEWER	CHAMBER & SOUTH STRE	NY Spills	Higher	1106, 0.209, West

MAPPED SITES SUMMARY

Target Property Address:
137 SMITH ST
NEWBURGH, NY 12550

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
J39	MANWAY / C/B	124 GRAND ST	NY Spills	Lower	1138, 0.216, SSW
40	REGAL BAG	302 WATER ST	NY Spills	Lower	1150, 0.218, North
K41	F O B COMMUNITY SVC	240 LIBERTY ST	EDR Hist Auto	Higher	1179, 0.223, SW
K42	GOVERNMENT BUILDING	123 GRAND ST	NY Spills	Higher	1218, 0.231, SSW
L43	VIKING BUILDING PROD	150 SOOUTH WATER ST	NY Spills	Higher	1232, 0.233, West
K44	SAN MIGUEL SCHOOL	241 LIBERTY ST	NY Spills	Higher	1266, 0.240, SW
L45	RAW SEWAGE	189 LANDER ST	NY Spills	Higher	1292, 0.245, West
46	NEWBURGH LANDING	FRONT STREET	NY Spills	Lower	1308, 0.248, SSE
47	NAVSTORHOUSE-SHIPYAR		FUDS	Lower	2367, 0.448, South
M48	NEWBURGH NAV RES TRG		FUDS	Lower	2964, 0.561, South
M49	USEPA REGION II @ CO	WASHINGTON & WATER S	SHWS, ENG CONTROLS, INST CONTROL, NY Spills,...	Lower	3141, 0.595, South
N50	CONSOLIDATED IRON AN	EAST END OF WASHINGT	Delisted NPL, SEMS, RCRA-LQG, US ENG CONTROLS, US...	Lower	3569, 0.676, South
N51	CONSOLIDATED IRON &	1 WASHINGTON STREET	RGA HWS	Lower	3569, 0.676, South
52	MCCALL PLACE PLUME	INTERSECTION OF ROUT	SHWS	Higher	3582, 0.678, NNW
O53	CENTRAL HUDSON E AND	SOUTH COLDEN STREET	EDR MGP	Lower	4257, 0.806, South
O54	CHG&E, NEWBURGH SITE	S. WATER STREET	HSWDS	Lower	4290, 0.812, South
O55	CENTRAL HUDSON E&G M	SOUTH COLDEN STREET	DEL SHWS	Lower	4290, 0.812, South

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

Proposed NPL	Proposed National Priority List Sites
NPL LIENS	Federal Superfund Liens

Lists of Federal sites subject to CERCLA removals and CERCLA orders

FEDERAL FACILITY	Federal Facility Site Information listing

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE	Superfund Enterprise Management System Archive

Lists of Federal RCRA facilities undergoing Corrective Action

CORRACTS	Corrective Action Report

Lists of Federal RCRA TSD facilities

RCRA-TSDF	RCRA - Treatment, Storage and Disposal

Lists of Federal RCRA generators

RCRA-SQG	RCRA - Small Quantity Generators
RCRA-VSQG	RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

Federal institutional controls / engineering controls registries

LUCIS	Land Use Control Information System

Federal ERNS list

ERNS	Emergency Response Notification System

Lists of state and tribal landfills and solid waste disposal facilities

SWF/LF	Facility Register

Lists of state and tribal leaking storage tanks

INDIAN LUST	Leaking Underground Storage Tanks on Indian Land
HIST LTANKS	Listing of Leaking Storage Tanks

Lists of state and tribal registered storage tanks

FEMA UST	Underground Storage Tank Listing
CBS UST	Chemical Bulk Storage Database
MOSF UST	Major Oil Storage Facilities Database
MOSF	Major Oil Storage Facility Site Listing
CBS	Chemical Bulk Storage Site Listing
AST	Petroleum Bulk Storage
CBS AST	Chemical Bulk Storage Database
MOSF AST	Major Oil Storage Facilities Database
INDIAN UST	Underground Storage Tanks on Indian Land
TANKS	Storage Tank Faciliy Listing

State and tribal institutional control / engineering control registries

RES DECL	Restrictive Declarations Listing
ENG CONTROLS	Registry of Engineering Controls
INST CONTROL	Registry of Institutional Controls

Lists of state and tribal voluntary cleanup sites

INDIAN VCP	Voluntary Cleanup Priority Listing
VCP	Voluntary Cleanup Agreements

Lists of state and tribal brownfield sites

BROWNFIELDS	Brownfields Site List

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS	A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

SWTIRE	Registered Waste Tire Storage & Facility List
SWRCY	Registered Recycling Facility List
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
IHS OPEN DUMPS	Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL	Delisted National Clandestine Laboratory Register
US CDL	National Clandestine Laboratory Register

Local Lists of Registered Storage Tanks

HIST UST	Historical Petroleum Bulk Storage Database

HIST AST	Historical Petroleum Bulk Storage Database

Local Land Records

LIENS	Spill Liens Information
LIENS 2	CERCLA Lien Information

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
NY Hist Spills	SPILLS Database
SPILLS 90	SPILLS 90 data from FirstSearch
SPILLS 80	SPILLS 80 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated
DOD	Department of Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US MINES	Mines Master Index File
ABANDONED MINES	Abandoned Mines
FINDS	Facility Index System/Facility Registry System
UXO	Unexploded Ordnance Sites
DOCKET HWC	Hazardous Waste Compliance Docket Listing
ECHO	Enforcement & Compliance History Information
FUELS PROGRAM	EPA Fuels Program Registered Listing
PFAS	PFAS Contamination Site Location Listing
AIRS	Air Emissions Data
COAL ASH	Coal Ash Disposal Site Listing
E DESIGNATION	E DESIGNATION SITE LISTING

Financial Assurance	Financial Assurance Information Listing
MANIFEST	Facility and Manifest Data
SPDES	State Pollutant Discharge Elimination System
VAPOR REOPENED	Vapor Intrusion Legacy Site List
UIC	Underground Injection Control Wells
COOLING TOWERS	Registered Cooling Towers
LEAD	Lead-based Paint Testing Results
MINES MRDS	Mineral Resources Data System

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF	Recovered Government Archive Solid Waste Facilities List

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.

A review of the NPL list, as provided by EDR, and dated 10/27/2022 has revealed that there is 1 NPL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUDSON RIVER PCBS Cerclis ID:: 202229 EPA Id: NYD980763841	***NO STREET APPLICABLE***	***E 0 - 1/8 (0.092 mi.)***	***0***	***8***

Lists of Federal Delisted NPL sites

Delisted NPL: The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may deleted from the NPL where no further response is appropriate.

A review of the Delisted NPL list, as provided by EDR, and dated 10/27/2022 has revealed that there is 1 Delisted NPL site within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CONSOLIDATED IRON AN EPA ID:: NY0002455756 Site ID:: 204175	***EAST END OF WASHINGT***	***S 1/2 - 1 (0.676 mi.)***	***N50***	***116***

Lists of Federal sites subject to CERCLA removals and CERCLA orders

SEMS: SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

A review of the SEMS list, as provided by EDR, and dated 10/27/2022 has revealed that there are 2 SEMS sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUDSON RIVER PCBS Site ID: 0202229 EPA Id: NYD980763841	***NO STREET APPLICABLE***	***E 0 - 1/8 (0.092 mi.)***	***0***	***8***

Lower Elevation	Address	Direction / Distance	Map ID	Page
DUPONT STAUFFER DURA Site ID: 0202231 EPA Id: NYD980766182	SOUTH ST	SE 0 - 1/8 (0.100 mi.)	E19	61

Lists of Federal RCRA generators

RCRA-LQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

A review of the RCRA-LQG list, as provided by EDR, and dated 11/21/2022 has revealed that there is 1 RCRA-LQG site within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUDSON RIVER PCBS EPA ID:: NYD980763841	***NO STREET APPLICABLE***	***E 0 - 1/8 (0.092 mi.)***	***0***	***8***

Federal institutional controls / engineering controls registries

US ENG CONTROLS: A listing of sites with engineering controls in place.

A review of the US ENG CONTROLS list, as provided by EDR, and dated 08/15/2022 has revealed that there is 1 US ENG CONTROLS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUDSON RIVER PCBS EPA ID:: NYD980763841 EPA ID:: NYD980763841	***NO STREET APPLICABLE***	***E 0 - 1/8 (0.092 mi.)***	***0***	***8***

US INST CONTROLS: A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

A review of the US INST CONTROLS list, as provided by EDR, and dated 08/15/2022 has revealed that there is 1 US INST CONTROLS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUDSON RIVER PCBS EPA ID:: NYD980763841	***NO STREET APPLICABLE***	***E 0 - 1/8 (0.092 mi.)***	***0***	***8***

Lists of state- and tribal hazardous waste facilities

SHWS: The State Hazardous Waste Sites records are the states’ equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Environmental Conservation’s Inactive Hazardous waste Disposal Sites in New York State.

A review of the SHWS list, as provided by EDR, and dated 08/08/2022 has revealed that there are 2 SHWS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MCCALL PLACE PLUME Site Code: 57079	INTERSECTION OF ROUT	NNW 1/2 - 1 (0.678 mi.)	52	136

Lower Elevation	Address	Direction / Distance	Map ID	Page
USEPA REGION II @ CO Site Code: 57007 Class Code: Site is properly closed - requires continued management.	***WASHINGTON & WATER S***	***S 1/2 - 1 (0.595 mi.)***	***M49***	***94***

EXECUTIVE SUMMARY

Lists of state and tribal leaking storage tanks

LTANKS: Leaking Storage Tank Incident Reports. These records contain an inventory of reported leaking storage tank incidents reported from 4/1/86 through the most recent update. They can be either leaking underground storage tanks or leaking aboveground storage tanks. The causes of the incidents are tank test failures, tank failures or tank overfills

A review of the LTANKS list, as provided by EDR, and dated 08/08/2022 has revealed that there are 6 LTANKS sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MONTGOMERY SCHOOL Spill Number/Closed Date: 8701126 / 1987-05-22 Site ID: 268311 Spill Date: 1987-05-09	S STREET	W 0 - 1/8 (0.032 mi.)	C11	52

Lower Elevation	Address	Direction / Distance	Map ID	Page
HORIZON ON HUDSON SC Spill Number/Closed Date: 9502898 / 1995-12-31 Site ID: 129079 Spill Date: 1995-06-07	SOUTH ST. & MONTGOME	SSW 0 - 1/8 (0.008 mi.)	A2	35
SHELL DRAKE ORGANIZA Spill Number/Closed Date: 9904937 / 1999-08-09 Site ID: 330650 Spill Date: 1999-07-26	***150 SMITH ST***	***E 0 - 1/8 (0.016 mi.)***	***B4***	***37***
BORN APTS Spill Number/Closed Date: 8701305 / 1987-05-29 Site ID: 271089 Spill Date: 1987-05-16	RIVER ST	ESE 0 - 1/8 (0.024 mi.)	B8	46
BORN Spill Number/Closed Date: 8701267 / 1989-09-15 Site ID: 271088 Spill Date: 1987-05-14	RIVER ST	ESE 0 - 1/8 (0.024 mi.)	B9	47
WAREX TERMINAL Spill Number/Closed Date: 9707847 / 1998-04-02 Site ID: 331358 Spill Date: 1997-10-02	1 SOUTH ST	SE 0 - 1/8 (0.047 mi.)	D15	57

Lists of state and tribal registered storage tanks

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Conservation’s Petroleum Bulk Storage (PBS) Database

A review of the UST list, as provided by EDR, has revealed that there are 3 UST sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HORIZONS ON THE HUDS Database: UST, Date of Government Version: 09/19/2022	137 MONTOGOMERY ST	WNW 0 - 1/8 (0.017 mi.)	C7	44

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
LDL PROPERTIES, LLC Database: UST, Date of Government Version: 09/19/2022	261 GRAND STREET	NW 0 - 1/8 (0.120 mi.)	F24	67

Lower Elevation	Address	Direction / Distance	Map ID	Page
BOURNE APARTMENTS (F Database: UST, Date of Government Version: 09/19/2022	150-154 SMITH STREET	E 0 - 1/8 (0.016 mi.)	B5	40

Lists of state and tribal brownfield sites

ERP: In an effort to spur the cleanup and redevelopment of brownfields, New Yorkers approved a $200 million Environmental Restoration or Brownfields Fund as part of the $1.75 billion Clean Water/Clean Air Bond Act of 1996 (1996 Bond Act). Enhancements to the program were enacted on October 7, 2003. Under the Environmental Restoration Program, the State provides grants to municipalities to reimburse up to 90 percent of on-site eligible costs and 100% of off-site eligible costs for site investigation and remediation activities. Once remediated, the property may then be reused for commercial, industrial, residential or public use.

A review of the ERP list, as provided by EDR, and dated 08/08/2022 has revealed that there is 1 ERP site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
350/352 LIBERTY STRE Site Code: 57699	350/352 LIBERTY STRE	WNW 1/8 - 1/4 (0.168 mi.)	G27	71

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Hazardous waste / Contaminated Sites

DEL SHWS: A database listing of sites delisted from the Registry of Inactive Hazardous Waste Disposal Sites.

A review of the DEL SHWS list, as provided by EDR, and dated 08/08/2022 has revealed that there is 1 DEL SHWS site within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CENTRAL HUDSON E&G M Status: Order Signed Site Code Id: 336031	SOUTH COLDEN STREET	S 1/2 - 1 (0.812 mi.)	O55	140

Records of Emergency Release Reports

NY Spills: Data collected on spills reported to NYSDEC. is required by one or more of the following: Article 12 of the Navigation Law, 6 NYCRR Section 613.8 (from PBS regs), or 6 NYCRR Section 595.2 (from CBS regs). It includes spills active as of April 1, 1986, as well as spills occurring since this date.

A review of the NY Spills list, as provided by EDR, and dated 08/08/2022 has revealed that there are 32 NY Spills sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUDSON RIVER PCBS Spill Number/Closed Date: 0308107 / 2003-10-31 Site ID: 237813 Spill Date: 2003-10-31	***NO STREET APPLICABLE***	***E 0 - 1/8 (0.092 mi.)***	***0***	***8***
HORIZONS ON THE HUDS Spill Number/Closed Date: 1808168 / Not Reported Site ID: 578965 Spill Date: 2018-10-31	137 MONTGOMERY ST	WNW 0 - 1/8 (0.017 mi.)	C6	42
JAKUBEK RESIDENCE Spill Number/Closed Date: 0810052 / 2012-03-19 Spill Number/Closed Date: 0700025 / Not Reported Spill Number/Closed Date: 0700560 / 2007-04-16 Site ID: 407562 Site ID: 379261 Site ID: 379919 Spill Date: 2008-12-08 Spill Date: 2007-04-02 Spill Date: 2007-04-16	127 MONTGOMERY ST	SSW 0 - 1/8 (0.032 mi.)	A10	49
NEWBURGH SCHOOL Spill Number/Closed Date: 8701356 / 1987-05-29 Site ID: 288069 Spill Date: 1987-05-18	FRONT ST	W 0 - 1/8 (0.032 mi.)	C12	53
TELEPHONE POLE Spill Number/Closed Date: 9203552 / 1992-06-26 Site ID: 265163 Spill Date: 1992-06-24	123 MONTGOMERY ST.	SSW 0 - 1/8 (0.040 mi.)	A13	54
HOME Spill Number/Closed Date: 1609386 / 2019-06-18 Site ID: 538171 Spill Date: 2017-01-10	121 MONTGOMERY ST	SSW 0 - 1/8 (0.044 mi.)	A14	55
TO ROADWAY Spill Number/Closed Date: 1809380 / 2018-12-26 Site ID: 580222 Spill Date: 2018-12-06	CLINTON ST AND MONTG	N 0 - 1/8 (0.091 mi.)	18	60
193 GRAND STREET RES Spill Number/Closed Date: 2008076 / 2021-04-27 Site ID: 615001 Spill Date: 2020-12-14	193 GRAND STREET	SW 0 - 1/8 (0.106 mi.)	21	64
ACTIVE VENTILATION P Spill Number/Closed Date: 0651585 / 2009-01-22 Site ID: 373674	85 CLINTON STREET	NW 1/8 - 1/4 (0.144 mi.)	F25	69

Spill Date: 2006-11-16

SOIL Spill Number/Closed Date: 1602420 / 2016-08-18 Site ID: 528823 Spill Date: 2016-06-09	157 GRAND ST	SW 1/8 - 1/4 (0.161 mi.)	26	70
BASEMENT Spill Number/Closed Date: 1406848 / 2015-02-10 Site ID: 500339 Spill Date: 2014-09-29	288 GRAND STREET	NNW 1/8 - 1/4 (0.169 mi.)	28	73
CITY OF NEWBURGH REA Spill Number/Closed Date: 1907557 / 2020-05-08 Spill Number/Closed Date: 1908433 / 2020-05-08 Site ID: 595691 Site ID: 598616 Spill Date: 2019-10-28 Spill Date: 2019-11-21	82 CLINTON ST	NW 1/8 - 1/4 (0.173 mi.)	G29	74
KOLOKITHAS RESIDENCE Spill Number/Closed Date: 2109965 / Not Reported Site ID: 633996 Spill Date: 2022-02-24	291 LIBERTY ST	WSW 1/8 - 1/4 (0.193 mi.)	H35	79
SEWER Spill Number/Closed Date: 9008977 / 1990-11-21 Site ID: 320228 Spill Date: 1990-11-15	CHAMBER & SOUTH STRE	W 1/8 - 1/4 (0.209 mi.)	H38	82
GOVERNMENT BUILDING Spill Number/Closed Date: 2201418 / Not Reported Site ID: 636465 Spill Date: 2022-05-17	123 GRAND ST	SSW 1/8 - 1/4 (0.231 mi.)	K42	87
VIKING BUILDING PROD Spill Number/Closed Date: 9802494 / 1998-07-15 Site ID: 287057 Spill Date: 1998-01-23	150 SOOUTH WATER ST	W 1/8 - 1/4 (0.233 mi.)	L43	88
SAN MIGUEL SCHOOL Spill Number/Closed Date: 1303379 / 2013-09-27 Site ID: 483856 Spill Date: 2013-06-28	241 LIBERTY ST	SW 1/8 - 1/4 (0.240 mi.)	K44	89
RAW SEWAGE Spill Number/Closed Date: 1104888 / 2011-07-29 Site ID: 452502 Spill Date: 2011-07-29	189 LANDER ST	W 1/8 - 1/4 (0.245 mi.)	L45	91

Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
MONTGOMERY & SOUTH S Spill Number/Closed Date: 9001802 / 1990-05-16 Site ID: 274139 Spill Date: 1990-05-16	MONTGOMERY & SOUTH S	SSW 0 - 1/8 (0.008 mi.)	A1	34
WAREHOUSE Spill Number/Closed Date: 9306538 / 1993-10-28 Site ID: 206603 Spill Date: 1993-08-28	75 SOUTH STREET	S 0 - 1/8 (0.014 mi.)	A3	36
SHELL DRAKE ORGANIZA	***150 SMITH ST***	***E 0 - 1/8 (0.016 mi.)***	***B4***	***37***

Spill Number/Closed Date: 0602590 / 2008-07-21 Site ID: 365101 Spill Date: 2006-06-07				
BORN APARTMENTS Spill Number/Closed Date: 8607796 / 1987-05-13 Site ID: 277259 Spill Date: 1987-03-21	WATER & SOUTH ST	SE 0 - 1/8 (0.051 mi.)	D16	58
MARINE DRIVE Spill Number/Closed Date: 8700958 / 1987-07-31 Site ID: 122443 Spill Date: 1987-05-04	SOUTH ST & MARINE DR	SE 0 - 1/8 (0.052 mi.)	D17	59
CHG&E : POLE # 15516 Spill Number/Closed Date: 0705852 / 2007-08-22 Site ID: 386253 Spill Date: 2007-08-22	139 FRONT ST	ESE 0 - 1/8 (0.102 mi.)	E20	63
HUDSON RIVER Spill Number/Closed Date: 1305801 / 2013-09-03 Site ID: 486382 Spill Date: 2013-09-01	120 FRONT ST	SE 0 - 1/8 (0.117 mi.)	E22	65
IN THE RIVER Spill Number/Closed Date: 1701160 / 2017-05-08 Site ID: 548193 Spill Date: 2017-05-05	120 FRONT STREET	SE 0 - 1/8 (0.117 mi.)	E23	66
ON HUDSON RIVER NEAR Spill Number/Closed Date: 9707936 / 1997-10-06 Site ID: 164339 Spill Date: 1997-10-06	NEWBUGH CITY DOCK	SSE 1/8 - 1/4 (0.190 mi.)	I34	78
HUDSON RIVER Spill Number/Closed Date: 9308538 / 1993-10-19 Site ID: 62748 Spill Date: 1993-10-14	76 FRONT STREET	SSE 1/8 - 1/4 (0.198 mi.)	I36	80
IN NEWBURG BY THE Spill Number/Closed Date: 9704362 / 1997-07-13 Site ID: 272830 Spill Date: 1997-07-12	CENTRAL HUDSON POWER	S 1/8 - 1/4 (0.199 mi.)	J37	81
MANWAY / C/B Spill Number/Closed Date: 0806598 / 2008-10-09 Site ID: 403885 Spill Date: 2008-09-12	124 GRAND ST	SSW 1/8 - 1/4 (0.216 mi.)	J39	83
REGAL BAG Spill Number/Closed Date: 0907138 / Not Reported Spill Number/Closed Date: 9708394 / 1997-10-17 Site ID: 419622 Site ID: 286096 Spill Date: 2009-09-24 Spill Date: 1997-10-17	302 WATER ST	N 1/8 - 1/4 (0.218 mi.)	40	84
NEWBURGH LANDING Spill Number/Closed Date: 9004370 / 1990-07-23 Site ID: 322138 Spill Date: 1990-07-20	FRONT STREET	SSE 1/8 - 1/4 (0.248 mi.)	46	92

Other Ascertainable Records

FUDS: The Listing includes locations of Formerly Used Defense Sites Properties where the US Army Corps Of Engineers is actively working or will take necessary cleanup actions.

A review of the FUDS list, as provided by EDR, and dated 08/11/2022 has revealed that there are 2 FUDS sites within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
NAVSTORHOUSE-SHIPYAR		S 1/4 - 1/2 (0.448 mi.)	47	93
NEWBURGH NAV RES TRG		S 1/2 - 1 (0.561 mi.)	M48	94

ROD: Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid the cleanup.

A review of the ROD list, as provided by EDR, and dated 10/27/2022 has revealed that there are 2 ROD sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUDSON RIVER PCBS EPA ID:: NYD980763841	***NO STREET APPLICABLE***	***E 0 - 1/8 (0.092 mi.)***	***0***	***8***

Lower Elevation	Address	Direction / Distance	Map ID	Page
CONSOLIDATED IRON AN EPA ID:: NY0002455756	***EAST END OF WASHINGT***	***S 1/2 - 1 (0.676 mi.)***	***N50***	***116***

CONSENT: Major Legal settlements that establish responsibility and standards for cleanup at NPL (superfund) sites. Released periodically by U.S. District Courts after settlement by parties to litigation matters.

A review of the CONSENT list, as provided by EDR, and dated 06/30/2022 has revealed that there is 1 CONSENT site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HUDSON RIVER PCBS	***NO STREET APPLICABLE***	***E 0 - 1/8 (0.092 mi.)***	***0***	***8***

DRYCLEANERS: A listing of all registered drycleaning facilities.

A review of the DRYCLEANERS list, as provided by EDR, and dated 08/30/2022 has revealed that there is 1 DRYCLEANERS site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
RON-SUN CLEANERS LAU Facility Id: 3-3311-00076	337 LIBERTY STREET	WNW 1/8 - 1/4 (0.179 mi.)	G32	77

HSWDS: The List includes any known or suspected hazardous substance waste disposal sites. Also included are sites delisted from the Registry of Inactive Hazardous Waste Disposal Sites and non-registry sites that U.S. EPA Preliminary Assessment (PA) reports or Site Investigation (SI) reports were prepared. Hazardous Substance Waste Disposal Sites are eligible to be Superfund sites now that the New York State Superfund has been refinanced and changed. This means that the study inventory has served its purpose and will no longer be maintained as a separate entity The latest version of the study is frozen in time. The sites on the study will not automatically be made superfund sites, rather each site will be further evaluated for listing in the registry. So overtime they will be added to the registry or not.

A review of the HSWDS list, as provided by EDR, and dated 01/01/2003 has revealed that there is 1 HSWDS site within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CHG&E, NEWBURGH SITE Facility Id: HS3012	S. WATER STREET	S 1/2 - 1 (0.812 mi.)	O54	138

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR’s researchers. Manufactured gas sites were used in the United States from the 1800’s to 1950’s to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

A review of the EDR MGP list, as provided by EDR, has revealed that there is 1 EDR MGP site within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CENTRAL HUDSON E AND	SOUTH COLDEN STREET	S 1/2 - 1 (0.806 mi.)	O53	138

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR’s review was limited to those categories of sources that might, in EDR’s opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR’s HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 2 EDR Hist Auto sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HOWARDS MOBIL SERVIC	323 LIBERTY ST	W 1/8 - 1/4 (0.174 mi.)	31	77
F O B COMMUNITY SVC	240 LIBERTY ST	SW 1/8 - 1/4 (0.223 mi.)	K41	87

EDR Hist Cleaner: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR’s review was limited to those categories of sources that might, in EDR’s opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR’s HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there are 2 EDR Hist Cleaner sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
JOHNSON FAMILY CLEAN	303 LIBERTY ST	W 1/8 - 1/4 (0.173 mi.)	H30	77
RON-SAN CLEANERS & L	337 LIBERTY ST	WNW 1/8 - 1/4 (0.179 mi.)	G33	78

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Conservation in New York.

A review of the RGA HWS list, as provided by EDR, has revealed that there is 1 RGA HWS site within approximately 1 mile of the target property.

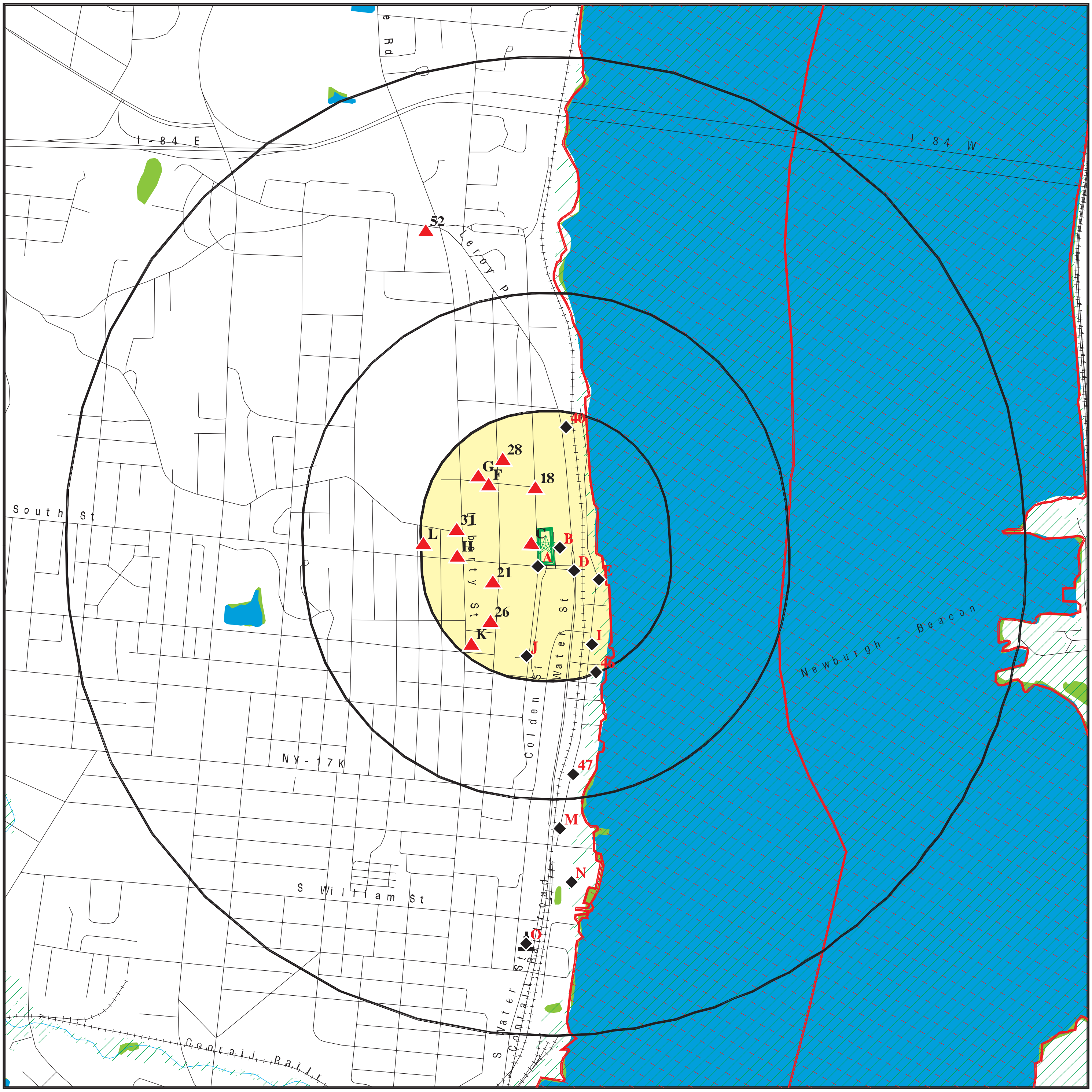
Lower Elevation	Address	Direction / Distance	Map ID	Page
CONSOLIDATED IRON &	1 WASHINGTON STREET	S 1/2 - 1 (0.676 mi.)	N51	136

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 8 records.

Site Name	Database(s)
CH - NEWBURGH MGP	RGA HWS
CH - WATER ST. - NEWBURGH MGP	RGA HWS
CH - MGP - BEACON STREET	SHWS
MONTGOMERY OVERALL SERVICE	SHWS
CENTRAL HUDSON G & E /NEWBURGH GAS	SEMS-ARCHIVE
TOWN OF NEWBURGH OVERFLOW	NY Spills
NEWBURGH SEWER	NY Spills
PHELPS & SONS	HSWDS

OVERVIEW MAP - 07146887.2R



0 1/4 1/2 1 Miles

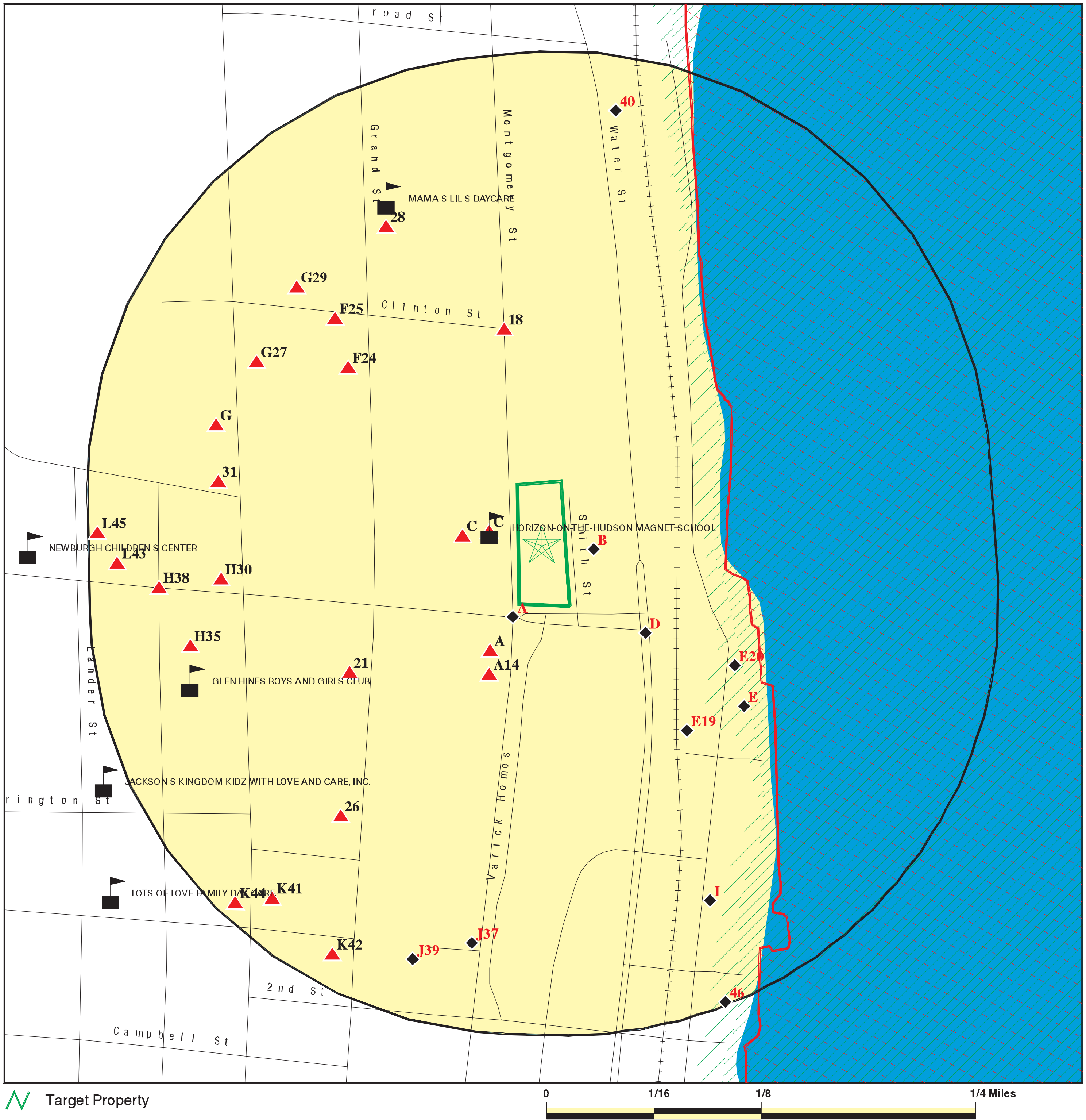
- Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Manufactured Gas Plants
- ▨ National Priority List Sites
- ▨ Dept. Defense Sites

- ▨ Indian Reservations BIA
- County Boundary
- ▨ Special Flood Hazard Area (1%)
- ▨ 0.2% Annual Chance Flood Hazard
- 🟩 National Wetland Inventory
- 🟩 State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	The Green - Newburgh	CLIENT:	Gallagher Bassett Technical Services
ADDRESS:	137 Smith St	CONTACT:	Megan King
	Newburgh NY 12550	INQUIRY #:	07146887.2r
LAT/LONG:	41.507274 / 74.00724	DATE:	December 06, 2022 4:01 pm

DETAIL MAP - 07146887.2R



- Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- ▨ National Priority List Sites
- ▨ Dept. Defense Sites
- ▨ Indian Reservations BIA
- ▨ Special Flood Hazard Area (1%)
- ▨ 0.2% Annual Chance Flood Hazard
- 🟩 National Wetland Inventory
- 🟩 State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	The Green - Newburgh	CLIENT:	Gallagher Bassett Technical Services
ADDRESS:	137 Smith St Newburgh NY 12550	CONTACT:	Megan King
LAT/LONG:	41.507274 / 74.00724	INQUIRY #:	07146887.2r
		DATE:	December 06, 2022 4:03 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Lists of Federal NPL (Superfund) sites								
NPL	1.000		1	0	0	0	NR	1
Proposed NPL	TP		NR	NR	NR	NR	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Lists of Federal Delisted NPL sites								
Delisted NPL	1.000		0	0	0	1	NR	1
Lists of Federal sites subject to CERCLA removals and CERCLA orders								
FEDERAL FACILITY	1.000		0	0	0	0	NR	0
SEMS	0.500		2	0	0	NR	NR	2
Lists of Federal CERCLA sites with NFRAP								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA facilities undergoing Corrective Action								
CORRACTS	1.000		0	0	0	0	NR	0
Lists of Federal RCRA TSD facilities								
RCRA-TSDF	1.000		0	0	0	0	NR	0
Lists of Federal RCRA generators								
RCRA-LQG	0.125		1	NR	NR	NR	NR	1
RCRA-SQG	0.125		0	NR	NR	NR	NR	0
RCRA-VSQG	0.125		0	NR	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		1	0	0	NR	NR	1
US INST CONTROLS	0.500		1	0	0	NR	NR	1
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
Lists of state- and tribal hazardous waste facilities								
SHWS	1.000		0	0	0	2	NR	2
Lists of state and tribal landfills and solid waste disposal facilities								
SWF/LF	0.500		0	0	0	NR	NR	0
Lists of state and tribal leaking storage tanks								
INDIAN LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LTANKS	0.250		6	0	NR	NR	NR	6
HIST LTANKS	0.500		0	0	0	NR	NR	0
Lists of state and tribal registered storage tanks								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.125		3	NR	NR	NR	NR	3
CBS UST	0.125		0	NR	NR	NR	NR	0
MOSF UST	0.500		0	0	0	NR	NR	0
MOSF	0.500		0	0	0	NR	NR	0
CBS	0.125		0	NR	NR	NR	NR	0
AST	0.125		0	NR	NR	NR	NR	0
CBS AST	0.125		0	NR	NR	NR	NR	0
MOSF AST	0.500		0	0	0	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
TANKS	0.125		0	NR	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
RES DECL	0.125		0	NR	NR	NR	NR	0
ENG CONTROLS	0.125		0	NR	NR	NR	NR	0
INST CONTROL	0.125		0	NR	NR	NR	NR	0
Lists of state and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
Lists of state and tribal brownfield sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ERP	0.500		0	1	0	NR	NR	1
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	TP		NR	NR	NR	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWTIRE	TP		NR	NR	NR	NR	NR	0
SWRCY	TP		NR	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	TP		NR	NR	NR	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
DEL SHWS	1.000		0	0	0	1	NR	1
US CDL	TP		NR	NR	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
HIST UST	0.125		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
HIST AST	0.125		0	NR	NR	NR	NR	0
Local Land Records								
LIENS	TP		NR	NR	NR	NR	NR	0
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
NY Spills	0.250		16	16	NR	NR	NR	32
NY Hist Spills	0.125		0	NR	NR	NR	NR	0
SPILLS 90	0.250		0	0	NR	NR	NR	0
SPILLS 80	0.250		0	0	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	TP		NR	NR	NR	NR	NR	0
FUDS	1.000		0	0	1	1	NR	2
DOD	TP		NR	NR	NR	NR	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		1	0	0	1	NR	2
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		1	0	0	0	NR	1
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	TP		NR	NR	NR	NR	NR	0
ABANDONED MINES	TP		NR	NR	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
PFAS	0.500		0	0	0	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	1	NR	NR	NR	1
E DESIGNATION	TP		NR	NR	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
HSWDS	1.000		0	0	0	1	NR	1
MANIFEST	0.125		0	NR	NR	NR	NR	0
SPDES	0.125		0	NR	NR	NR	NR	0
VAPOR REOPENED	1.000		0	0	0	0	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
COOLING TOWERS	TP		NR	NR	NR	NR	NR	0
LEAD	TP		NR	NR	NR	NR	NR	0
MINES MRDS	TP		NR	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	1	NR	1
EDR Hist Auto	0.250		0	2	NR	NR	NR	2
EDR Hist Cleaner	0.250		0	2	NR	NR	NR	2
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	1.000		0	0	0	1	NR	1
RGA LF	0.500		0	0	0	NR	NR	0
- Totals --		0	33	22	1	9	0	65

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

APPENDIX H

Scope of Services

Phase I Environmental Site Assessment
Scope of Services

Task 1.0 Description of Subject Property and Surrounding Area Physical Settings

1.1 Description of property location, topography, geology, hydrogeology, surface hydrology and wetlands
1.2 Identification of adjoining and surrounding area properties

Task 2.0 Historic Investigation (Review of Applicable, Reasonably Ascertainable Sources)

2.1 Review of historic maps and plans (to the earliest date of available maps)
2.2 Review of aerial photographs
2.3 Review of local records (e.g., building department), including cursory ownership information and City Directories, if applicable.
2.4 Interviews with User, Key Site Manager, and other knowledgeable individuals
2.5 Review of User or property owner provided documents and/or analytical results

Task 3.0 Federal and State Regulatory Agency Records Review

3.1 Review of ASTM-required federal, state, and/or tribal databases at required search distances and analysis of the relationship of each Site (e.g., upgradient, downgradient) to the Subject Property;

- Federal NPL (1.0 mile) and delisted NPL sites (0.5 mile)
- Federal SEMS list and CERCLIS NFRAP site list (0.5 mile)
- Federal RCRA CORRACTS facilities list (1.0 mile)
- Federal RCRA non-CORRACTS TSD facilities list (0.5 mile)
- Federal RCRA generators list (subject/adjoining properties)
- Federal ERNS list (subject property)
- Federal, state, and tribal institutional control/engineering control registries (subject property)
- State- and tribal-equivalent NPL (1.0 mile)
- State- and tribal-equivalent SEMS (0.5 mile)
- State and tribal Brownfield and voluntary cleanup sites (0.5 mile)
- State and tribal leaking storage tank lists (0.5 mile)
- State (including locally administered) and tribal registered storage tank lists (subject/adjoining)
- State and tribal landfill and/or solid waste disposal site lists (0.5 mile)
- NYC E-Designation List

3.2 Review of additional federal and state environmental databases:

- State spill file records (0.5 mile)
- State MOSF list (0.5 mile)
- State radon data (by local municipality as available)
- Federal and state wastewater discharge permits (subject/adjoining properties)

3.3 Interviews (as applicable) with government representative regarding regulatory compliance

Task 4.0 Physical Inspection

4.1 Inspection of property and structures for potential contamination and contaminant sources, including:

- Hazardous/medical/radioactive waste storage and disposal areas
- Petroleum and/or chemical storage (including tanks and associated piping)
- Spatial extent and current condition of suspect asbestos-containing materials (ACM), suspect lead-based paint (LBP) and mold
- Site conditions that may indicate the potential for radon and lead in drinking water
- If ACM or LBP is identified as presumed or suspect, provide estimates of the quantity of such material and costs for abasement to the extent feasible.
- Wastewater and stormwater discharge systems
- Equipment potentially containing polychlorinated biphenyls (PCBs)

4.2 Inspection of property for the following:

- Presence of contamination (e.g., debris, soil staining)
- Evidence of prior structures and uses
- Unusual or man-made topographical formations (e.g., berms, sinkholes)
- On-site surface water quality
- Evidence and location of wells
- Vegetative stress

4.3 Identification of overt on-site sensitive environmental receptors (e.g., wetlands)
4.4 Limited inspection of adjoining and nearby properties for:

- Potential off-site sources of contamination
- Sensitive environmental receptors

4.5 If appropriate, interviews with owners/tenants/operators and other available knowledgeable individuals present during physical inspection

Task 5.0 Preparation of Written Summary Report

5.1 Summary of findings of Tasks 1.0 through 4.0
5.2 Identification of any Recognized Environmental Conditions and/or other potential concerns
5.3 Conclusions and Recommendations, including any specific additional investigatory or remedial work
5.4 Production and transmission of the final Phase I ESA to Client in PDF format, and hard copy if requested.

APPENDIX I

Qualifications of Environmental Professionals

Scott Spitzer
Director of Environmental Investigations
scott_spitzer@gbtpa.com

PROFESSIONAL EXPERIENCE

Director of Environmental Investigations, Gallagher Bassett Services Inc., Poughkeepsie, NY 2019- present
Director of Environmental Investigations, WCD Group, Poughkeepsie, NY 2017 - 2019
Director of Environmental Investigations, Ecosystems Strategies, Poughkeepsie, NY 2013 - 2017

Management and quality review of environmental site assessments, technical environmental investigations, and remedial projects including Brownfield sites. Conducts research to obtain field and regulatory information about the environmental status of a designated area. Reviews all documents prepared by GBSI Poughkeepsie Office to ensure consistency and technical accuracy. Responsibilities associated with the preparation of site assessments include: investigating site histories, conducting facility inspections, reviewing regulatory agency records, documenting facility compliance with relevant State and Federal regulations, and preparing reports. Management of complex technical environmental investigations (including sites currently on the NYSDEC Registry of Inactive Hazardous Waste Sites), including coordinating subcontractors, overseeing fieldwork, designing and implementing sampling plans, preparing technical reports, and interfacing with regulatory agency personnel.

Senior Project Manager, Long-Form Reports, The 451 Group, Inc., New York, NY 2008-2011

- Managed the production of over 150 technical white papers.

Senior Project Manager, Ecosystems Strategies, Inc., Poughkeepsie, NY 2001 - 2008

- Conducted Environmental Site Investigations and prepared final site assessment reports. Over 300 Investigations and Final Reports completed as lead manager.
- Investigated site histories.
- Conducted facility inspections.
- Reviewed regulatory agency records.
- Documented facility compliance with relevant State and Federal regulations.
- Conducted Phase II Technical Environmental Investigations and prepared technical reports.
- Researched field and regulatory information.
- Managed tank removals.
- Coordinated subcontractors.
- Oversaw fieldwork and handled collection of material, soil and water samples.

Select Projects

Scenic Hudson Land Trust, Inc., Beacon Waterfront Project, Beacon, NY

ESI conducted soil and groundwater investigations on a former MOSF and adjacent scrap yard. Projects involved soil remediation of both petroleum and PCB-contaminated soils and long-term groundwater monitoring. Both projects were classified as Voluntary Clean-Up projects by the NYSDEC and closure status was attained.

Sakmann Restaurant Corporation Site, Fort Montgomery, NY

Conducted Phase I Environmental Site Assessment and Phase II Subsurface Investigations for former filling station and automotive repair garage contaminated by solvent and waste-oil discharges to an on-site drywell.

Designed and implemented a sampling plan for soils impacted by chlorinated hydrocarbons, petroleum, and metals. Created Workplan (in coordination with the NYSDEC Voluntary Cleanup Program) for remediation of on-site contamination and long-term sampling of on-site groundwater monitoring wells.

Staten Island Marina Site, Staten Island, NY

Conducted Phase I Environmental Site Assessment and Phase II Subsurface Investigation for an active marine facility engaged in boat painting and engine maintenance activities. Coordinated the delineation of metals contamination over a three-acre area and analyzed potential impacts from on-site fill materials. Submitted remedial and budgetary analysis in support of regulatory agency approval for conversion of boatyard into a public park.

Octagon House Development Site, Roosevelt Island, NY

Conducted Phase I Environmental Site Assessment and Phase II Subsurface Investigations at the former site of a large, urban hospital. Interpreted the results of geotechnical studies, extended test pits, and conducted extensive soil sampling, to document subsurface soil conditions in support of client's application to the U.S. Housing and Urban Development Agency (HUD). Created Workplan (in coordination with the NYCDEP Office of Environmental Planning and Assessment) for site-wide remediation of contaminated soils and secured NYCDEP approval for site remediation as required by HUD.

Camp Glen Gray Boy Scout Facility, Mahwah, NJ

Conducted Phase I Environmental Site Assessment and Phase II Subsurface Investigations at an approximately 800-acre campground containing numerous structures. Documented subsurface soil conditions at the locations of aboveground and underground storage tanks, and delineated lead contamination at a former firing range. Assisted in design and implementation of remediation plans for removal of petroleum and lead contaminated soils, and obtained NJDEP approvals.

EDUCATION

SUNY at Stony Brook, Bachelor of Science - Biology, SUNY at Stony Brook *May 1992*
SUNY at Purchase, extensive studies in Environmental Science

PROFESSIONAL CERTIFICATIONS

OSHA Hazardous Waste Site Operations and Emergency Response (HAZWOPER) – 40 hr

GALLAGHER BASSETT | TECHNICAL SERVICES

SUMMARY REPORT

OF

SUBSURFACE INVESTIGATION

137 Smith Street,
140 and 146 Montgomery Street

City of Newburgh
Orange County, New York

January 9, 2023

GBTS Project: 22003-0092

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Poughkeepsie, NY 12601
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GALLAGHER BASSETT | TECHNICAL SERVICES

SUMMARY REPORT OF

SUBSURFACE INVESTIGATION

January 9, 2023

GBTS Project: 22003-0092

Prepared By:

Gallagher Bassett Technical Services
22 IBM Road – Suite 101
Poughkeepsie, New York 12601

Prepared For:

Kearney Realty & Development Group
57 Route 6, Suite 207
Baldwin Place, New York 10505

Environmental investigation services were performed by Gallagher Bassett Technical Services (GBTS). The undersigned have reviewed this Summary Report of Subsurface Investigation and certify to Kearney Realty & Development Group that the information provided in this document is accurate as of the date of issuance by this office.

Jennifer Gonzalez
Gallagher Bassett Technical Services
Environmental Scientist

Scott Spitzer

Scott Spitzer
Gallagher Bassett Technical Services
Technical Director – Environmental Consulting

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APPENDICES

1.0 INTRODUCTION

1.1 Purpose

This Summary Report of Subsurface Investigation (Report) documents environmental fieldwork performed by Gallagher Bassett Technical Services (GBTS), and subcontractors under the direction of GBTS, at The Green – Newburgh property located at 137 Smith Street, and 140 and 146 Montgomery Street, City of Newburgh, Orange County, New York (the "Site"). This Report references 137 Smith Street as "Lot 4.1," 140 Montgomery Street as "Lot 10" and 146 Montgomery Street as "Lot 2.1". Investigative work was performed to screen for potential on-Site soil contamination.

This Report describes all fieldwork methodologies for the work conducted by GBTS, includes discussions of the resulting analytical data from collected samples and provides conclusions and recommendations drawn from the fieldwork and analytical data.

1.2 Limitations

This written analysis summarizes environmental fieldwork activities conducted at the Site during the indicated fieldwork dates, and is not relevant to any other property. Environmental services were performed in accordance with generally accepted practices and protocols established by the New York State Department of Environmental Conservation (NYSDEC). Findings, conclusions, and recommendations provided by GBTS are based on professional judgement.

1.3 Site Location and Description

The property is a 1.16-acre vacant parcel located on the western side of Smith Street, northern side of South Street, and the eastern side of Montgomery Street. A Fieldwork Map indicating specific Site characteristics is provided in Appendix A.

1.4 Previous Environmental Reports

A Phase I Environmental Site Assessment (Phase I ESA), performed on the property by GBTS in November 2022, identified the following Site history:

- The Site was formerly used for residential purposes and has been vacant since on-site structures were demolished sometime between 1971 and 1992. The potential exists that debris from the demolition of former on-site structures may be present in the subsurface (such debris could contain lead, asbestos, or other regulated materials); and,
- Review of municipal records indicated several violations and complaints related to on-site debris and dumping of construction related debris, which could contain lead, asbestos, or other regulated materials.

2.0 SUBSURFACE INVESTIGATION

2.1 Summary of Services

GBTS advanced nine (9) mechanized borings at the Site and collected soil samples from each boring location, as well as from an additional five (5) surface locations, on November 11, 2022 to document the presence or absence of subsurface contamination. This Report documents all fieldwork methodology (Section 2.2) and laboratory results (Section 2.3), and present GBTS's conclusions and recommendations (Section 3.0). A map indicating all fieldwork locations and selected Site features is provided in Appendix A.

2.2 Fieldwork Activities

2.2.1 Site Preparation Services

GBTS requested a complete utility markout (as required by New York State Department of Labor regulations) and on-site personnel reviewed the markout and underground utility locations prior to the initiation of fieldwork.

2.2.2 Fieldwork Methodology

General Protocols

Encountered material was screened (as appropriate) with a properly calibrated MiniRAE Lite (Model PGM 7300) photo-ionization detector (PID) for volatile organic vapors. GBTS documented field observations in log books, including any indications of contamination). Relevant information from GBTS logs for each fieldwork location is summarized in Appendix B.

GBTS collected samples in general conformance with NYSDEC and NYSDOH fieldwork protocols. All field personnel wore dedicated, disposable gloves during relevant fieldwork activities, and any non-dedicated sampling instruments were decontaminated prior to media collection. Soil was collected utilizing clean, disposable equipment.

All samples were collected into appropriately-sized containers provided by the laboratory and were maintained at proper temperatures (using ice-packs and coolers as needed) while in GBTS's custody. Samples were transported on November 14, 2022 via courier to York Analytical Laboratories, Inc., a New York State Department of Health-certified laboratory (ELAP Certification 10854) for chemical analyses. Appropriate chain-of-custody procedures were followed.

Collection of Soil Samples

Nine (9) mechanized soil borings were advanced throughout the Site by personnel from Core Down Drilling, LLC using a track-mounted Geoprobe direct-push corer equipped with a 5-foot barrel lined with disposable acetate sleeves (used to prevent the cross contamination of soil samples). Soil was recovered to a maximum depth of 12 feet below surface grade (bsg) and collected directly from the cut sleeves. Refusal (potentially on bedrock or the remains of former building foundations) was encountered at each boring location (from 4.5 to 12 feet bsg).

GBTS collected five (5) surface soil samples throughout the Site from the upper 6 inches of soil (immediately beneath the vegetative layer).

Surface soils generally consisted of brown, dry medium to fine sands (with organic matter, gravel, brick fragments and concrete fragments). Soils encountered at boring locations generally consisted of brown, dry to moist medium sands (with gravel and brick and concrete fragments) overlying variable texture glacial till (unsorted, clay, cobbles, sand and gravel).

No field evidence of contamination (staining, odors, PID readings) was observed at any sampling location.

Saturated soil was not encountered during the extension of the soil borings at approximately 10 feet bsg at location SB-05.

2.3 Laboratory Analysis

2.3.1 Standards, Criteria and/or Guidance

Laboratory results are compared to NYSDEC Remedial Program Soil Cleanup Objectives (SCOs) for Unrestricted Use (UU) and Restricted-Residential Use (RRU) as provided in 6 NYCRR Subpart 375, Tables 375-6.8(a) and 375-6.8(b).

2.3.2 Sample Submission

Soil samples were analyzed for pesticides using USEPA Method 8081 and Target Analyte List (TAL) metals using USEPA Method 6010/7043.

2.3.3 Laboratory Results

A summary of the results of the laboratory analyses is presented below. Results are referenced as parts per million (ppm, equivalent to milligrams per kilogram). Data summary tables and the laboratory report are provided as Appendices C and D, respectively.

<u>TAL Metals</u>

With the exception of sample SB-09 0-5c, metals were detected above RRU SCOs in all samples, including:

- Arsenic (8 samples), 19 to 51.9 ppm (RRU SCO: 16 ppm)
- Barium (1 sample), 544 ppm (RRU SCO: 400 ppm)
- Cadmium (1 sample), 4.66 ppm (RRU SCO: 4.3 ppm)
- Lead (9 samples), 457 to 3,050 ppm (RRU SCO: 400 ppm)
- Mercury (7 samples) 0.884 to 2.87 ppm (RRU SCO: 0.81 ppm)

All exceedances of RRU SCOs were reported in samples from the upper 5 feet of soil, with exception of elevated arsenic at SB-03 5-7 and mercury at SB-06 5-6.5, reported for the 5-10 feet soil interval.

Copper, nickel, selenium and zinc were detected above UU SCOs in one or more samples. Trace to low levels of several other metals were detected in all samples.

Pesticides

Four pesticides were detected above UU SCOs (but well below RRU SCOs) in samples SB-01 0-5c, SB-04 5-6.5, SB-07 0-5c, SB-08 1-2c, SS-01, SS-04 and SS-05. Pesticides included (peak values given):

- 4,4'-DDD (0.0191 ppm at SB-04 5-6.5; UU SCO: 0.0033 ppm)
- 4,4'-DDE (0.0815 ppm at SB-04 5-6.5; UU SCO: 0.0033 ppm)
- 4,4'-DDT (0.216 ppm at SB-04 5-6.5; UU SCO: 0.0033 ppm)
- Dieldrin (0.0211 ppm at SS-01; UU SCO: 0.005 ppm)

Trace to low levels of several pesticides were detected in one or more samples.

3.0 CONCLUSIONS AND RECOMMENDATIONS

GBTS has completed the services summarized in Section 2.0 on specified portions of the property located at 137 Smith Street, and 140 and 146 Montgomery Street, City of Newburgh, Orange County, New York. Fieldwork included the collection of soil from nine (9) soil borings and five (5) surface locations.

Conclusions and recommendations (in **bold**), based on the fieldwork services and laboratory data, are as follows:

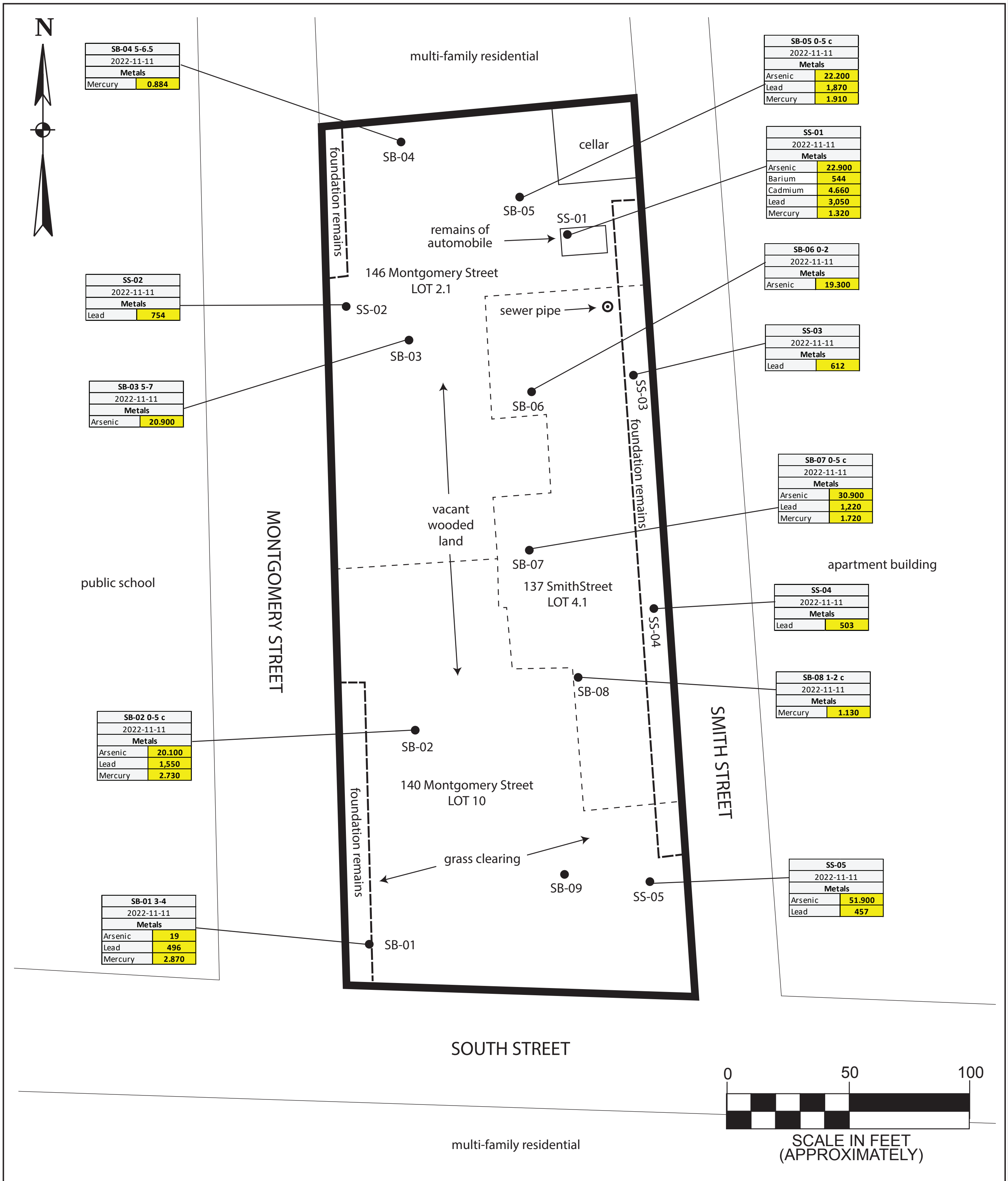
Heavy metals (including arsenic, lead, and mercury) were detected in 13 of 14 samples at concentrations above RRU SCOs, and several pesticides are present in soil above UU SCOs. These findings are consistent with impacts from demolition debris, and from debris materials historically dumped on-Site (including at least one former automobile).

It is recommended that additional investigation be conducted to fully characterize Site contamination.

APPENDIX A

Fieldwork Map

GALLAGHER BASSETT | TECHNICAL SERVICES



SB-04 5-6.5	
2022-11-11	
Metals	
Mercury	0.884

SB-05 0-5 c	
2022-11-11	
Metals	
Arsenic	22.200
Lead	1,870
Mercury	1.910

SS-01	
2022-11-11	
Metals	
Arsenic	22.900
Barium	544
Cadmium	4.660
Lead	3,050
Mercury	1.320

SB-06 0-2	
2022-11-11	
Metals	
Arsenic	19.300

SS-02	
2022-11-11	
Metals	
Lead	754

SS-03	
2022-11-11	
Metals	
Lead	612

SB-03 5-7	
2022-11-11	
Metals	
Arsenic	20.900

SB-07 0-5 c	
2022-11-11	
Metals	
Arsenic	30.900
Lead	1,220
Mercury	1.720

SS-04	
2022-11-11	
Metals	
Lead	503

SB-08 1-2 c	
2022-11-11	
Metals	
Mercury	1.130

SB-02 0-5 c	
2022-11-11	
Metals	
Arsenic	20.100
Lead	1,550
Mercury	2.730

SS-05	
2022-11-11	
Metals	
Arsenic	51.900
Lead	457

SB-01 3-4	
2022-11-11	
Metals	
Arsenic	19
Lead	496
Mercury	2.870

All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Fieldwork Map

137 Smith Street
140 and 146 Montgomery Street
City of Newburgh
Orange County, New York

Legend:

▬	subject property border
- - -	lot lines
●	soil sample location

All data in mg/Kg (ppm)
Analyte Above RRU SCO

File: 22003-0092

January 2023

Scale as shown

Appendix A

APPENDIX B

Boring Logs

Soil Boring Log

GALLAGHER BASSETT | TECHNICAL SERVICES

SB-01 (SHEET 1 OF 1)	**Subsurface Investigation** **137 Smith Street, 140 & 146 Montgomery Street** **Newburgh, New York**	*GBTS PROJECT* *22003-0092*
	DATE: 2022-11-11 GBTS STAFF: J. Gonzalez	DRILLER (RIG) Core Down (6610DT Geoprobe, 5' macro-core) WEATHER: overcast, 50s F

BORING INTERVAL (RECOVERY)	SURFACE MATERIAL: TOPSOIL (6") **SOIL / MATERIAL DESCRIPTION**	MOISTURE	PID (PPM)	ODORS	STAINING	NAPL	SAMPLES COLLECTED
0 – 5' (75%)	(36") brown M SAND, trace brick	Dry	0.0	ND	ND	ND	**SB-01 3-4**
	(12") light brown CLAY, with some organics, shale cobbles	Moist	0.0	ND	ND	ND	
5 – 8' (100%)	(5-7') light brown CLAY, with some organics, shale cobbles	Moist	0.0	ND	ND	ND	
	(7-8') shale cobbles with CLAY						
	****** End of Boring (Refusal) at 8' *****						

Notes

Fill Materials

0 – 5' interval

Field Evidence of Contamination

Not encountered

Saturated Soils

Not encountered

Additional Field Notes

None

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic) **SI** (slight)

Soil Boring Log

GALLAGHER BASSETT | TECHNICAL SERVICES

SB-02 (SHEET 1 OF 1)	**Subsurface Investigation** **137 Smith Street, 140 & 146 Montgomery Street** **Newburgh, New York**						*GBTS PROJECT 22003-0092*
	DATE: 2022-11-11 GBTS STAFF: J. Gonzalez	DRILLER (RIG): Core Down (6610DT Geoprobe, 5' macro-core) WEATHER: overcast, 50s F					
BORING INTERVAL (RECOVERY)	SURFACE MATERIAL: TOPSOIL (6") **SOIL / MATERIAL DESCRIPTION**	MOISTURE	PID (PPM)	ODORS	STAINING	NAPL	SAMPLES COLLECTED
0 – 5' (60%)	light brown to brown M-C SAND with some brick, cobbles, glass, concrete ****** End of Boring (Refusal) at 5' *****	Dry	0.0	ND	ND	ND	SB-02 0-5c
Notes	**Fill Materials** 0 – 5' interval **Field Evidence of Contamination** Not encountered **Saturated Soils** Not encountered **Additional Field Notes** None						

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic) **SI** (slight)

Soil Boring Log

GALLAGHER BASSETT | TECHNICAL SERVICES

SB-03 (SHEET 1 OF 1)	**Subsurface Investigation** **137 Smith Street, 140 & 146 Montgomery Street** **Newburgh, New York**	*GBTS PROJECT* *22003-0092*
	DATE: 2022-11-11 GBTS STAFF: J. Gonzalez	DRILLER (RIG) Core Down (6610DT Geoprobe, 5' macro-core) WEATHER: overcast, 50s F

BORING INTERVAL (RECOVERY)	SURFACE MATERIAL: TOPSOIL (6") **SOIL / MATERIAL DESCRIPTION**	MOISTURE	PID (PPM)	ODORS	STAINING	NAPL	SAMPLES COLLECTED
0 – 5' (40%)	(8") orange-brown F SAND, with clay, gravel, cobbles, some brick (16") light brown F SAND, with cobbles, some clay	Dry	0.0	ND	ND	ND	
5 – 7' (75%)	(13.5") light brown F SAND, with cobbles, some clay (13.5") gray-brown M-C SAND, gray slate fragments ****** End of Boring (Refusal) at 7' *****	Dry	0.0	ND	ND	ND	**SB-03 5-7**

Notes

Fill Materials

0 – 5' interval

Field Evidence of Contamination

Not encountered

Saturated Soils

Not encountered

Additional Field Notes

Bedrock (gray slate or shale) encountered 7' (refusal)

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic) **SI** (slight)

Soil Boring Log

SB-04 (SHEET 1 OF 1)	**Subsurface Investigation** **137 Smith Street, 140 & 146 Montgomery Street** **Newburgh, New York**	*GBTS PROJECT* *22003-0092*
	DATE: 2022-11-11 GBTS STAFF: J. Gonzalez	DRILLER (RIG) Core Down (6610DT Geoprobe, 5' macro-core) WEATHER: overcast, 50s F

BORING INTERVAL (RECOVERY)	SURFACE MATERIAL: TOPSOIL (6") **SOIL / MATERIAL DESCRIPTION**	MOISTURE	PID (PPM)	ODORS	STAINING	NAPL	SAMPLES COLLECTED
0 – 5' (25%)	brown M-C SAND with abundant brick, with some gravel, some cobbles	Dry	0.0	ND	ND	ND	
5 – 9.5' (100%)	(5-6.5') brown M-C SAND with abundant brick, with some gravel, some cobbles (6.5-7.5') brown CLAY with some gravel (7.5-8.5') gray-brown M-C SAND, gray slate fragments (8.5-9.5') brown to gray CLAY with some gravel ****** End of Boring (Refusal) at 9.5' *****	Dry Moist Dry Moist	0.0	ND	ND	ND	SB-04 5-6.5

Notes

Fill Materials

0 – 6.5'

Field Evidence of Contamination

Not encountered

Saturated Soils

Not encountered

Additional Field Notes

Bedrock (gray slate or shale) encountered 9.5' (refusal)

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic) **SI** (slight)

Soil Boring Log

SB-05	**Subsurface Investigation** **137 Smith Street, 140 & 146 Montgomery Street** **Newburgh, New York**	*GBTS Project* *22003-0092*
(Sheet 1 of 1)	Date: 2022-11-11 GBTS Staff: J. Gonzalez	Driller (Rig) Core Down (6610DT Geoprobe, 5' macro-core) Weather: overcast, 50s F

Boring Interval (Recovery)	Surface Material: Topsoil (6") **Soil / Material Description**	Moisture	PID (ppm)	Odors	Staining	NAPL	Samples Collected
0 – 5' (80%)	(28") gray to-brown M SAND, with clay, some gravel, trace brick (20") light brown F-M SAND, some silt, gravel	Dry	0.0	ND	ND	ND	SB-05 0-5c
5 – 10' (50%)	light brown F-M SAND, some silt, gravel	Moist	0.0	ND	ND	ND	
10 – 12' (100%)	light brown F-M SAND, some silt, gravel ****** End of Boring (Refusal) at 12' *****	Wet	0.0	ND	ND	ND	

Notes

Fill Materials

0 – 5' interval

Field Evidence of Contamination

Not encountered

Saturated Soils

~10-12'

Additional Field Notes

Bedrock (gray slate or shale) encountered 12' (refusal)

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic) **SI** (slight)

Soil Boring Log

GALLAGHER BASSETT | TECHNICAL SERVICES

SB-06 (SHEET 1 OF 1)	**Subsurface Investigation** **137 Smith Street, 140 & 146 Montgomery Street** **Newburgh, New York**						*GBTS PROJECT* *22003-0092*
	DATE: 2022-11-11 GBTS STAFF: J. Gonzalez	DRILLER (RIG): Core Down (6610DT Geoprobe, 5' macro-core) WEATHER: overcast, 50s F					
BORING INTERVAL (RECOVERY)	SURFACE MATERIAL: TOPSOIL (6") **SOIL / MATERIAL DESCRIPTION**	MOISTURE	PID (PPM)	ODORS	STAINING	NAPL	SAMPLES COLLECTED
0 – 4.5' (75%)	brown to light brown F-M SAND, with some silt, gravel, cobbles ****** End of Boring (Refusal) at 4.5' *****	Dry	0.0	ND	ND	ND	**SB-06 0-2**

Notes

Fill Materials

0 – 5' interval

Field Evidence of Contamination

Not encountered

Saturated Soils

Not encountered

Additional Field Notes

None

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic) **SI** (slight)

Soil Boring Log

GALLAGHER BASSETT | TECHNICAL SERVICES

SB-07 (SHEET 1 OF 1)	**Subsurface Investigation** **137 Smith Street, 140 & 146 Montgomery Street** **Newburgh, New York**					*GBTS PROJECT 22003-0092*	
	DATE: 2022-11-11	DRILLER (RIG) Core Down (6610DT Geoprobe, 5' macro-core)					
	GBTS STAFF: J. Gonzalez	WEATHER: overcast, 50s F					

BORING INTERVAL (RECOVERY)	SURFACE MATERIAL: TOPSOIL (6") **SOIL / MATERIAL DESCRIPTION**	MOISTURE	PID (PPM)	ODORS	STAINING	NAPL	SAMPLES COLLECTED
0 – 5' (60%)	light brown F-M SAND, with gravel, cobbles, trace brick	Dry	0.0	ND	ND	ND	SB-07 0-5c
5 – 7.5' (100%)	(5-6.5') brown F-M SAND, abundant slate cobbles (6.5-7.5') light brown F SAND, with gravel ****** End of Boring (Refusal) at 7.5' *****	Dry	0.0	ND	ND	ND	

Notes

Fill Materials

0 – 5' interval

Field Evidence of Contamination

Not encountered

Saturated Soils

Not encountered

Additional Field Notes

Bedrock (gray slate or shale) encountered 7.5' (refusal)

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic) **SI** (slight)

Soil Boring Log

SB-08 (SHEET 1 OF 1)	**Subsurface Investigation** **137 Smith Street, 140 & 146 Montgomery Street** **Newburgh, New York** *GBTS PROJECT 22003-0092*
	DATE: 2022-11-11 DRILLER (RIG) Core Down (6610DT Geoprobe, 5' macro-core) GBTS STAFF: J. Gonzalez WEATHER: overcast, 50s F

BORING INTERVAL (RECOVERY)	SURFACE MATERIAL: TOPSOIL (6") **SOIL / MATERIAL DESCRIPTION**	MOISTURE	PID (PPM)	ODORS	STAINING	NAPL	SAMPLES COLLECTED
0 – 5' (75%)	light brown F-M SAND, with gravel, cobbles, trace brick	Dry	0.0	ND	ND	ND	SB-08 1-2c
	****** End of Boring (Refusal) at 5' *****						

Notes

Fill Materials

0 – 5' interval

Field Evidence of Contamination

Not encountered

Saturated Soils

Not encountered

Additional Field Notes

None

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic) **SI** (slight)

Soil Boring Log

GALLAGHER BASSETT | TECHNICAL SERVICES

SB-09 (SHEET 1 OF 1)	**Subsurface Investigation** **137 Smith Street, 140 & 146 Montgomery Street** **Newburgh, New York**	*GBTS PROJECT* *22003-0092*

DATE: 2022-11-11 DRILLER (RIG) Core Down (6610DT Geoprobe, 5' macro-core)

GBTS STAFF: J. Gonzalez WEATHER: overcast, 50s F

BORING INTERVAL (RECOVERY)	SURFACE MATERIAL: TOPSOIL (6") **SOIL / MATERIAL DESCRIPTION**	MOISTURE	PID (PPM)	ODORS	STAINING	NAPL	SAMPLES COLLECTED
0 – 5' (50%)	BRICK fragments with cobbles, topsoil	Dry	0.0	ND	ND	ND	SB-09 0-5c
	****** End of Boring (Refusal) at 5' *****						

Notes

Fill Materials

0 – 5' interval

Field Evidence of Contamination

Not encountered

Saturated Soils

Not encountered

Additional Field Notes

Likely foundations encountered 5' (refusal)

ND (non-detect) **PID** (photoionization detector) **ppm** (parts per million) **NAPL** (non-aqueous phase liquid)
F (fine) **M** (medium) **C** (coarse) **P** (plastic) **LP** (low plastic) **NP** (non-plastic) **SI** (slight)

APPENDIX C

Data Summary Tables

Table 1: TAL Metals in Soil

Site ID: 137 Smith Street, 140 Montgomery Street and 146 Montgomergy Street
GBTS Project: 22003-0092

		Sample	**SB-01 3-4**		**SB-02 0-5c**		**SB-03 5-7**		**SB-04 5-6.5**		**SB-05 0-5c**	
U= Not Detected ≥ value		Date	2022-11-11		2022-11-11		2022-11-11		2022-11-11		2022-11-11	
All data in mg/Kg (ppm)		Dilution	1		1		1		1		1	
Metals, 6010 and 7473	**UU SCO**	**RRU SCO**	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*
Aluminum	NA	NA	14,100	*B*	14,900	*B*	17,500	*B*	13,600	*B*	13,300	*B*
Antimony	NA	NA	2.37	*U*	2.27	*U*	2.24	*U*	2.39	*U*	2.29	*U*
Arsenic	13	16	**19**		**20.1**		**20.9**		12.2		**22.2**	
Barium	350	400	153		319		60.7		117		315	
Beryllium	7.2	72	0.438	*B*	0.266	*B*	0.536	*B*	0.23	*B*	0.046	*U*
Cadmium	2.5	4.3	0.364		0.742		0.358		0.341		1.12	
Calcium	NA	NA	2,280	*B*	13,400	*B*	4,730	*B*	18,000	*B*	10,100	*B*
Chromium	30	180	19	*B*	23.6	*B*	21.7	*B*	16.3	*B*	17.5	*B*
Cobalt	NA	NA	11	*B*	10	*B*	15.4	*B*	9	*B*	9.64	*B*
Copper	50	270	39.1	*B*	65.7	*B*	28.9	*B*	28.1	*B*	62.4	*B*
Iron	NA	NA	23,900	*B*	26,000	*B*	35,800	*B*	22,600	*B*	26,700	*B*
Lead	63	400	**496**	*B*	**1,550**	*B*	38.7	*B*	172	*B*	**1,870**	*B*
Magnesium	NA	NA	4,300	*B*	5,960	*B*	7,160	*B*	8,280	*B*	4,490	*B*
Manganese	1,600	2,000	722	*B*	545	*B*	1,170	*B*	604	*B*	704	*B*
Mercury	0.18	0.81	**2.87**		**2.73**		0.086		**0.884**		**1.91**	
Nickel	30	310	22.8	*B*	24.7	*B*	31.4	*B*	22	*B*	21.9	*B*
Potassium	NA	NA	934		1,120		1,070		1,360		1,060	
Selenium	3.9	180	4.94		5.73		7		3.4		5.39	
Silver	2	180	0.477	*U*	0.458	*U*	0.453	*U*	0.482	*U*	0.461	*U*
Sodium	NA	NA	108		601		44.9	*U*	47.8	*U*	722	
Thallium	NA	NA	2.37	*U*	2.27	*U*	2.24	*U*	2.39	*U*	2.29	*U*
Vanadium	NA	NA	19.5		24.1		24.6		16.4		19.8	
Zinc	109	10,000	179	*B*	422	*B*	76.7	*B*	119	*B*	478	*B*

Analyte Detected
Analyte Above UU SCO
Analyte Above RRU SCO

Notes: SCOs based on NYSDEC Part 375-6.8 and CP-51   NA = not available
Result Qualifiers: J = approximate E = estimated B = detected in blank D = diluted

Table 1: TAL Metals in Soil

Site ID: 137 Smith Street, 140 Montgomery Street and 146 Montgomergy Street

GBTS Project: 22003-0092

		Sample	**SB-06 0-2**		**SB-07 0-5c**		**SB-08 1-2c**		**SB-09 0-5c**		**SS-01**	
U= Not Detected ≥ value		Date	2022-11-11		2022-11-11		2022-11-11		2022-11-11		2022-11-11	
All data in mg/Kg (ppm)		Dilution	1		1		1		1		1	
Metals, 6010 and 7473	**UU SCO**	**RRU SCO**	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*
Aluminum	NA	NA	15,800	*B*	13,400	*B*	14,900	*B*	10,900	*B*	9,200	*B*
Antimony	NA	NA	2.41	*U*	2.38	*U*	2.3	*U*	2.33	*U*	2.77	*U*
Arsenic	13	16	**19.3**		**30.9**		14.9		4.56		**22.9**	
Barium	350	400	101		218		168		109		**544**	
Beryllium	7.2	72	0.364	*B*	0.159	*B*	0.38	*B*	0.047	*U*	0.056	*U*
Cadmium	2.5	4.3	0.289	*U*	0.406		0.276	*U*	0.28	*U*	**4.66**	
Calcium	NA	NA	1,190	*B*	12,500	*B*	5,160	*B*	45,900	*B*	11,400	*B*
Chromium	30	180	19.2	*B*	18.6	*B*	16.8	*B*	11.5	*B*	28.9	
Cobalt	NA	NA	11	*B*	9.3	*B*	8.89	*B*	5.46	*B*	8.28	
Copper	50	270	42.2	*B*	50.2	*B*	28.2	*B*	18.4	*B*	78.2	
Iron	NA	NA	27,600	*B*	30,900	*B*	21,100	*B*	14,400	*B*	32,900	
Lead	63	400	309	*B*	**1,220**	*B*	398	*B*	317	*B*	**3,050**	
Magnesium	NA	NA	5,810	*B*	4,850	*B*	4,140	*B*	8,410	*B*	3,960	
Manganese	1,600	2,000	692	*B*	579	*B*	740	*B*	429	*B*	554	
Mercury	0.18	0.81	0.477		**1.72**		**1.13**		0.0889		**1.32**	
Nickel	30	310	27.6	*B*	25.9	*B*	21.4	*B*	13.2	*B*	33	
Potassium	NA	NA	1,210		1,070		852		889		1,010	
Selenium	3.9	180	7.27		7.76		5.22		2.62		8.9	
Silver	2	180	0.485	*U*	0.479	*U*	0.463	*U*	0.47	*U*	0.559	*U*
Sodium	NA	NA	48.2	*U*	164		46	*U*	179		1,770	
Thallium	NA	NA	2.41	*U*	2.38	*U*	2.3	*U*	2.33	*U*	2.77	*U*
Vanadium	NA	NA	19.3		22.6		20.8		15.2		28.2	
Zinc	109	10,000	109	*B*	282	*B*	150	*B*	94.3	*B*	848	*B*

Analyte Detected

Analyte Above UU SCO

Analyte Above RRU SCO

Notes: SCOs based on NYSDEC Part 375-6.8 and CP-51   NA = not available

Result Qualifiers: J = approximate E = estimated B = detected in blank D = diluted

Table 1: TAL Metals in Soil

Site ID: 137 Smith Street, 140 Montgomery Street and 146 Montgomergy Street

GBTS Project: 22003-0092

		Sample	**SS-02**		**SS-03**		**SS-04**		**SS-05**	
U= Not Detected ≥ value		Date	2022-11-11		2022-11-11		2022-11-11		2022-11-11	
All data in mg/Kg (ppm)		Dilution	1		1		1		1	
Metals, 6010 and 7473	**UU SCO**	**RRU SCO**	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*
Aluminum	NA	NA	11,400	*B*	10,700	*B*	13,200	*B*	19,500	*B*
Antimony	NA	NA	2.38	*U*	2.54	*U*	2.41	*U*	4.41	
Arsenic	13	16	12.9		10.3		11.5		**51.9**	
Barium	350	400	153		148		194		151	
Beryllium	7.2	72	0.183		0.169		0.246		0.313	
Cadmium	2.5	4.3	0.505		0.31		0.378		0.385	
Calcium	NA	NA	9,840	*B*	11,900	*B*	25,600	*B*	8,960	*B*
Chromium	30	180	15.4		15.3		17.6		25.5	
Cobalt	NA	NA	8.35		7.14		8.13		14.4	
Copper	50	270	41.5		36.8		31.7		64	
Iron	NA	NA	18,900		16,600		21,800		35,300	
Lead	63	400	**754**		**612**		**503**		**457**	
Magnesium	NA	NA	3,690		4,200		7,770		7,930	
Manganese	1,600	2,000	526		471		631		1,060	
Mercury	0.18	0.81	0.467		0.542		0.355		0.455	
Nickel	30	310	27.6		21.5		24.4		37	
Potassium	NA	NA	1,160		1,080		1,090		1,710	
Selenium	3.9	180	3.95		3.62		3.61		8.16	
Silver	2	180	0.481	*U*	0.512	*U*	0.486	*U*	0.634	*U*
Sodium	NA	NA	96.3		251		135		201	
Thallium	NA	NA	2.38	*U*	2.54	*U*	2.41	*U*	3.15	*U*
Vanadium	NA	NA	27.5		27.9		24.3		32	
Zinc	109	10,000	183	*B*	232	*B*	215	*B*	335	*B*

Analyte Detected

Analyte Above UU SCO

Analyte Above RRU SCO

Notes: SCOs based on NYSDEC Part 375-6.8 and CP-51   NA = not available

Result Qualifiers: J = approximate E = estimated B = detected in blank D = diluted

Table 2: Pesticides in Soil

Site ID: 137 Smith Street, 140 Montgomery Street and 146 Montgomergy Street
GBTS Project: 22003-0092

		Sample	**SB-01 3-4**		**SB-02 0-5c**		**SB-03 5-7**		**SB-04 5-6.5**	
U= Not Detected ≥ value		Date	2022-11-11		2022-11-11		2022-11-11		2022-11-11	
All data in mg/Kg (ppm)		Dilution	5		5		5		5	
Pesticides, 8081	**UU SCO**	**RRU SCO**	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*
4,4'-DDD	0.0033	13	0.00183	*U*	0.00418	*D*	0.00177	*U*	0.0191	*D*
4,4'-DDE	0.0033	8.9	0.00183	*U*	0.0247	*D*	0.00177	*U*	0.0815	*D*
4,4'-DDT	0.0033	7.9	0.002	*D*	0.0374	*D*	0.00177	*U*	0.216	*D*
Aldrin	0.005	0.097	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
alpha-BHC	0.02	0.48	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
alpha-Chlordane	0.094	4.2	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.0297	*D*
beta-BHC	0.036	0.36	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
Chlordane (total)	NA	NA	0.0366	*U*	NT	*U*	0.0353	*U*	0.0994	*D*
delta-BHC	0.04	100	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
Dieldrin	0.005	0.2	0.00183	*U*	0.00199	*D*	0.00177	*U*	0.0197	*D*
Endosulfan I	2.4	24	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
Endosulfan II	2.4	24	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
Endosulfan sulfate	2.4	24	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
Endrin	0.014	11	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
Endrin aldehyde	NA	NA	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
Endrin ketone	NA	NA	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
gamma-BHC (Lindane)	0.1	1.3	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
gamma-Chlordane	NA	NA	0.00183	*U*	NT	*U*	0.00177	*U*	0.0149	*D*
Heptachlor	0.042	2.1	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
Heptachlor Epoxide	NA	NA	0.00183	*U*	0.00176	*U*	0.00177	*U*	0.00188	*U*
Methoxychlor	NA	NA	0.00916	*U*	0.0088	*U*	0.00883	*U*	0.0094	*U*
Toxaphene	NA	NA	0.0927	*U*	0.089	*U*	0.0894	*U*	0.0951	*U*

Analyte Detected
Analyte Above UU SCO
Analyte Above RRU SCO

Notes: SCOs based on NYSDEC Part 375-6.8 and CP-51 NA = not available
Result Qualifiers: J = approximate E = estimated B = detected in blank D = diluted

Table 2: Pesticides in Soil

Site ID: 137 Smith Street, 140 Montgomery Street and 146 Montgomergy Street
GBTS Project: 22003-0092

		Sample	**SB-05 0-5c**		**SB-06 0-2**		**SB-07 0-5c**		**SB-08 1-2c**	
U= Not Detected ≥ value		Date	2022-11-11		2022-11-11		2022-11-11		2022-11-11	
All data in mg/Kg (ppm)		Dilution	5		5		5		5	
Pesticides, 8081	**UU SCO**	**RRU SCO**	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*
4,4'-DDD	0.0033	13	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
4,4'-DDE	0.0033	8.9	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.00324	*D*
4,4'-DDT	0.0033	7.9	0.0018	*U*	0.00189	*U*	0.00204	*D*	0.00658	*D*
Aldrin	0.005	0.097	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
alpha-BHC	0.02	0.48	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
alpha-Chlordane	0.094	4.2	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
beta-BHC	0.036	0.36	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Chlordane (total)	NA	NA	0.036	*U*	0.0378	*U*	0.0375	*U*	0.0359	*U*
delta-BHC	0.04	100	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Dieldrin	0.005	0.2	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Endosulfan I	2.4	24	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Endosulfan II	2.4	24	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Endosulfan sulfate	2.4	24	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Endrin	0.014	11	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Endrin aldehyde	NA	NA	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Endrin ketone	NA	NA	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
gamma-BHC (Lindane)	0.1	1.3	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
gamma-Chlordane	NA	NA	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Heptachlor	0.042	2.1	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Heptachlor Epoxide	NA	NA	0.0018	*U*	0.00189	*U*	0.00188	*U*	0.0018	*U*
Methoxychlor	NA	NA	0.00899	*U*	0.00944	*U*	0.00938	*U*	0.00898	*U*
Toxaphene	NA	NA	0.091	*U*	0.0956	*U*	0.0949	*U*	0.0909	*U*

Analyte Detected
Analyte Above UU SCO
Analyte Above RRU SCO

Notes: SCOs based on NYSDEC Part 375-6.8 and CP-51   NA = not available
Result Qualifiers: J = approximate E = estimated B = detected in blank D = diluted

Table 2: Pesticides in Soil

Site ID: 137 Smith Street, 140 Montgomery Street and 146 Montgomergy Street
GBTS Project: 22003-0092

		Sample	**SB-09 0-5c**		**SS-01**		**SS-02**		**SS-03**	
U= Not Detected ≥ value		Date	2022-11-11		2022-11-11		2022-11-11		2022-11-11	
All data in mg/Kg (ppm)		Dilution	5		5		5		5	
Pesticides, 8081	**UU SCO**	**RRU SCO**	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*	*Result*	*Qualifier*
4,4'-DDD	0.0033	13	0.00182	*U*	0.00431	*D*	0.00188	*U*	0.00198	*U*
4,4'-DDE	0.0033	8.9	0.00182	*U*	0.0224	*D*	0.00188	*U*	0.00198	*U*
4,4'-DDT	0.0033	7.9	0.00182	*U*	0.0757	*D*	0.00188	*U*	0.00198	*U*
Aldrin	0.005	0.097	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
alpha-BHC	0.02	0.48	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
alpha-Chlordane	0.094	4.2	0.00182	*U*	0.0197	*D*	0.00188	*U*	0.00198	*U*
beta-BHC	0.036	0.36	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
Chlordane (total)	NA	NA	0.0363	*U*	0.135	*D*	0.0375	*U*	0.0396	*U*
delta-BHC	0.04	100	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
Dieldrin	0.005	0.2	0.00182	*U*	0.0211	*D*	0.00188	*U*	0.00198	*U*
Endosulfan I	2.4	24	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
Endosulfan II	2.4	24	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
Endosulfan sulfate	2.4	24	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
Endrin	0.014	11	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
Endrin aldehyde	NA	NA	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
Endrin ketone	NA	NA	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
gamma-BHC (Lindane)	0.1	1.3	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
gamma-Chlordane	NA	NA	0.00182	*U*	0.018	*D*	0.00188	*U*	0.00198	*U*
Heptachlor	0.042	2.1	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
Heptachlor Epoxide	NA	NA	0.00182	*U*	0.00216	*U*	0.00188	*U*	0.00198	*U*
Methoxychlor	NA	NA	0.00908	*U*	0.0108	*U*	0.00938	*U*	0.00989	*U*
Toxaphene	NA	NA	0.0919	*U*	0.109	*U*	0.095	*U*	0.1	*U*

Analyte Detected
Analyte Above UU SCO
Analyte Above RRU SCO

Notes: SCOs based on NYSDEC Part 375-6.8 and CP-51   NA = not available
Result Qualifiers: J = approximate E = estimated B = detected in blank D = diluted

Table 2: Pesticides in Soil

Site ID: 137 Smith Street, 140 Montgomery Street and 146 Montgomergy Street
GBTS Project: 22003-0092

		Sample	**SS-04**		**SS-05**	
U= Not Detected ≥ value		Date	2022-11-11		2022-11-11	
All data in mg/Kg (ppm)		Dilution	5		5	
Pesticides, 8081	**UU SCO**	**RRU SCO**	*Result*	*Qualifier*	*Result*	*Qualifier*
4,4'-DDD	0.0033	13	0.00189	*U*	0.00243	*U*
4,4'-DDE	0.0033	8.9	0.00213	*D*	0.00243	*U*
4,4'-DDT	0.0033	7.9	0.00466	*D*	0.00806	*D*
Aldrin	0.005	0.097	0.00189	*U*	0.00243	*U*
alpha-BHC	0.02	0.48	0.00189	*U*	0.00243	*U*
alpha-Chlordane	0.094	4.2	0.00189	*U*	0.00243	*U*
beta-BHC	0.036	0.36	0.00189	*U*	0.00243	*U*
Chlordane (total)	NA	NA	0.0378	*U*	0.0487	*U*
delta-BHC	0.04	100	0.00189	*U*	0.00243	*U*
Dieldrin	0.005	0.2	0.00189	*U*	0.00243	*U*
Endosulfan I	2.4	24	0.00189	*U*	0.00243	*U*
Endosulfan II	2.4	24	0.00189	*U*	0.00243	*U*
Endosulfan sulfate	2.4	24	0.00189	*U*	0.00243	*U*
Endrin	0.014	11	0.00189	*U*	0.00243	*U*
Endrin aldehyde	NA	NA	0.00189	*U*	0.00243	*U*
Endrin ketone	NA	NA	0.00189	*U*	0.00243	*U*
gamma-BHC (Lindane)	0.1	1.3	0.00189	*U*	0.00243	*U*
gamma-Chlordane	NA	NA	0.00189	*U*	0.00243	*U*
Heptachlor	0.042	2.1	0.00189	*U*	0.00243	*U*
Heptachlor Epoxide	NA	NA	0.00189	*U*	0.00243	*U*
Methoxychlor	NA	NA	0.00946	*U*	0.0122	*U*
Toxaphene	NA	NA	0.0957	*U*	0.123	*U*

Analyte Detected
Analyte Above UU SCO
Analyte Above RRU SCO

Notes: SCOs based on NYSDEC Part 375-6.8 and CP-51 NA = not available
Result Qualifiers: J = approximate E = estimated B = detected in blank D = diluted

APPENDIX D

Laboratory Report

Technical Report

prepared for:

Gallagher Bassett - Poughkeepsie, NY
22 IBM Road, Suite 101
Poughkeepsie NY, 12601
Attention: Erick Salazar

Report Date: 11/29/2022
Client Project ID: 22003-0092
York Project (SDG) No.: 22K0754

CT Cert. No. PH-0723 New Jersey Cert. No. CT005 and NY037 New York Cert. Nos. 10854 and 12058 PA Cert. No. 68-04440

Report Date: 11/29/2022
Client Project ID: 22003-0092
York Project (SDG) No.: 22K0754

Gallagher Bassett - Poughkeepsie, NY
22 IBM Road, Suite 101
Poughkeepsie NY, 12601
Attention: Erick Salazar

Purpose and Results

This report contains the analytical data for the sample(s) identified on the attached chain-of-custody received in our laboratory on November 14, 2022 and listed below. The project was identified as your project: **22003-0092**.

The analyses were conducted utilizing appropriate EPA, Standard Methods, and ASTM methods as detailed in the data summary tables.

All samples were received in proper condition meeting the customary acceptance requirements for environmental samples except those indicated under the Sample and Analysis Qualifiers section of this report.

All analyses met the method and laboratory standard operating procedure requirements except as indicated by any data flags, the meaning of which are explained in the Sample and Data Qualifiers Relating to This Work Order section of this report and case narrative if applicable.

The results of the analyses, which are all reported on dry weight basis (soils) unless otherwise noted, are detailed in the following pages.

Please contact Client Services at 203.325.1371 with any questions regarding this report.

York Sample ID	Client Sample ID	Matrix	Date Collected	Date Received
22K0754-01	**SB-01 3-4**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-02	**SB-02 0-5 c**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-03	**SB-03 5-7**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-04	**SB-04 5-6.5**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-05	**SB-05 0-5 c**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-06	**SB-06 0-2**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-07	**SB-07 0-5 c**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-08	**SB-08 1-2 c**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-09	**SB-09 0-5 c**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-10	**SS-01**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-11	**SS-02**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-12	**SS-03**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-13	**SS-04**	**Soil**	**11/11/2022**	**11/14/2022**
22K0754-14	**SS-05**	**Soil**	**11/11/2022**	**11/14/2022**

General Notes for York Project (SDG) No.: 22K0754

1. The RLs and MDLs (Reporting Limit and Method Detection Limit respectively) reported are adjusted for any dilution necessary due to the levels of target and/or non-target analytes and matrix interference. The RL(REPORTING LIMIT) is based upon the lowest standard utilized for the calibration where applicable.
2. Samples are retained for a period of thirty days after submittal of report, unless other arrangements are made.
3. York's liability for the above data is limited to the dollar value paid to York for the referenced project.
4. This report shall not be reproduced without the written approval of York Analytical Laboratories, Inc.
5. All analyses conducted met method or Laboratory SOP requirements. See the Sample and Data Qualifiers Section for further information.
6. It is noted that no analyses reported herein were subcontracted to another laboratory, unless noted in the report.
7. This report reflects results that relate only to the samples submitted on the attached chain-of-custody form(s) received by York.
8. Analyses conducted at York Analytical Laboratories, Inc. Stratford, CT are indicated by NY Cert. No. 10854; those conducted at York Analytical Laboratories, Inc., Richmond Hill, NY are indicated by NY Cert. No. 12058.

Approved By: Cassie L Mosher **Date:** 11/29/2022

Cassie L. Mosher
Laboratory Manager

Sample Information

Client Sample ID: **SB-01 3-4**

York Sample ID: **22K0754-01**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
72-55-9	4,4'-DDE	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
50-29-3	**4,4'-DDT**	**0.00200**		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
309-00-2	Aldrin	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0366	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
959-98-8	Endosulfan I	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 03:04	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00183	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00916	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0927	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:04	BJ-

Surrogate Recoveries	Result	Acceptance Range

Sample Information

Client Sample ID: **SB-01 3-4** **York Sample ID:** **22K0754-01**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
2051-24-3	*Surrogate: Decachlorobiphenyl*	*78.6 %*		*30-150*						
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*80.8 %*		*30-150*						

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**14100**	B	mg/kg dry	4.73	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-36-0	Antimony	ND		mg/kg dry	2.37	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-38-2	**Arsenic**	**19.0**		mg/kg dry	1.42	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-39-3	**Barium**	**153**		mg/kg dry	2.36	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-41-7	**Beryllium**	**0.438**	B	mg/kg dry	0.048	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-43-9	**Cadmium**	**0.364**		mg/kg dry	0.284	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-70-2	**Calcium**	**2280**	B	mg/kg dry	4.74	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-47-3	**Chromium**	**19.0**	B	mg/kg dry	0.474	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-48-4	**Cobalt**	**11.0**	B	mg/kg dry	0.378	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-50-8	**Copper**	**39.1**	B	mg/kg dry	1.89	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7439-89-6	**Iron**	**23900**	B	mg/kg dry	23.7	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7439-92-1	**Lead**	**496**	B	mg/kg dry	0.474	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7439-95-4	**Magnesium**	**4300**	B	mg/kg dry	4.74	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7439-96-5	**Manganese**	**722**	B	mg/kg dry	0.474	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-02-0	**Nickel**	**22.8**	B	mg/kg dry	0.943	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-09-7	**Potassium**	**934**		mg/kg dry	4.74	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7782-49-2	**Selenium**	**4.94**		mg/kg dry	2.37	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-22-4	Silver	ND		mg/kg dry	0.477	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL

Sample Information

Client Sample ID: **SB-01 3-4** **York Sample ID:** **22K0754-01**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metalsers, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7440-23-5	**Sodium**	**108**		mg/kg dry	47.4	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-28-0	Thallium	ND		mg/kg dry	2.37	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-62-2	**Vanadium**	**19.5**		mg/kg dry	0.943	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL
7440-66-6	**Zinc**	**179**	B	mg/kg dry	2.36	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:41	AJL

Mercury by 7473

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**2.87**		mg/kg dry	0.0341	1	EPA 7473 Certifications: CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP	11/25/2022 09:36	11/25/2022 12:01	KT

Total Solids

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**88.0**		%	0.100	1	SM 2540G Certifications: CTDOH-PH-0723	11/23/2022 12:52	11/23/2022 15:45	MCS

Sample Information

Client Sample ID: **SB-02 0-5 c** **York Sample ID:** **22K0754-02**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	**4,4'-DDD**	**0.00418**		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
72-55-9	**4,4'-DDE**	**0.0247**		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
50-29-3	**4,4'-DDT**	**0.0374**		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-

Sample Information

Client Sample ID: **SB-02 0-5 c** **York Sample ID:** **22K0754-02**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
309-00-2	Aldrin	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
57-74-9	* Chlordane, total [2C]	ND		mg/kg dry	0.0352	5	EPA 8081B Certifications:	11/23/2022 08:17	11/29/2022 03:20	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
60-57-1	**Dieldrin**	**0.00199**		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
959-98-8	Endosulfan I	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 03:20	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
5566-34-7	**gamma-Chlordane [2C]**	**0.00176**		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00176	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00880	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0890	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:20	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*58.5 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*44.8 %*	*30-150*

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Information

Client Sample ID: **SB-02 0-5 c** **York Sample ID:** **22K0754-02**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**14900**	B	mg/kg dry	4.55	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-36-0	Antimony	ND		mg/kg dry	2.27	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-38-2	**Arsenic**	**20.1**		mg/kg dry	1.36	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-39-3	**Barium**	**319**		mg/kg dry	2.27	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-41-7	**Beryllium**	**0.266**	B	mg/kg dry	0.046	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-43-9	**Cadmium**	**0.742**		mg/kg dry	0.273	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-70-2	**Calcium**	**13400**	B	mg/kg dry	4.55	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-47-3	**Chromium**	**23.6**	B	mg/kg dry	0.455	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-48-4	**Cobalt**	**10.0**	B	mg/kg dry	0.363	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-50-8	**Copper**	**65.7**	B	mg/kg dry	1.82	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-89-6	**Iron**	**26000**	B	mg/kg dry	22.7	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-92-1	**Lead**	**1550**	B	mg/kg dry	0.455	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-95-4	**Magnesium**	**5960**	B	mg/kg dry	4.55	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-96-5	**Manganese**	**545**	B	mg/kg dry	0.455	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-02-0	**Nickel**	**24.7**	B	mg/kg dry	0.906	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-09-7	**Potassium**	**1120**		mg/kg dry	4.55	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7782-49-2	**Selenium**	**5.73**		mg/kg dry	2.27	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-22-4	Silver	ND		mg/kg dry	0.458	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-23-5	**Sodium**	**601**		mg/kg dry	45.5	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-28-0	Thallium	ND		mg/kg dry	2.27	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-62-2	**Vanadium**	**24.1**		mg/kg dry	0.906	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-66-6	**Zinc**	**422**	B	mg/kg dry	2.26	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:44	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Sample Information

Client Sample ID: **SB-02 0-5 c** **York Sample ID:** **22K0754-02**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Mercury by 7473

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**2.73**		mg/kg dry	0.0327	1	EPA 7473 Certifications: CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP	11/25/2022 09:36	11/25/2022 12:36	KT

Total Solids

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**91.7**		%	0.100	1	SM 2540G Certifications: CTDOH-PH-0723	11/23/2022 12:52	11/23/2022 15:45	MCS

Sample Information

Client Sample ID: **SB-03 5-7** **York Sample ID:** **22K0754-03**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
72-55-9	4,4'-DDE	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
50-29-3	4,4'-DDT	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
309-00-2	Aldrin	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0353	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-

Sample Information

Client Sample ID:	**SB-03 5-7**	**York Sample ID:**	**22K0754-03**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
959-98-8	Endosulfan I	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 03:37	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00177	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00883	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0894	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:37	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*80.7 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*70.6 %*	*30-150*

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**17500**	B	mg/kg dry	4.49	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:48	AJL
7440-36-0	Antimony	ND		mg/kg dry	2.24	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:48	AJL
7440-38-2	**Arsenic**	**20.9**		mg/kg dry	1.35	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:48	AJL
7440-39-3	**Barium**	**60.7**		mg/kg dry	2.24	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:48	AJL
7440-41-7	**Beryllium**	**0.536**	B	mg/kg dry	0.045	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:48	AJL
7440-43-9	**Cadmium**	**0.358**		mg/kg dry	0.269	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:48	AJL

Sample Information

Client Sample ID: **SB-03 5-7**

York Sample ID: **22K0754-03**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7440-70-2	**Calcium**	**4730**	B	mg/kg dry	4.49	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-47-3	**Chromium**	**21.7**	B	mg/kg dry	0.449	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-48-4	**Cobalt**	**15.4**	B	mg/kg dry	0.359	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-50-8	**Copper**	**28.9**	B	mg/kg dry	1.80	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7439-89-6	**Iron**	**35800**	B	mg/kg dry	22.4	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7439-92-1	**Lead**	**38.7**	B	mg/kg dry	0.449	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7439-95-4	**Magnesium**	**7160**	B	mg/kg dry	4.49	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7439-96-5	**Manganese**	**1170**	B	mg/kg dry	0.449	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-02-0	**Nickel**	**31.4**	B	mg/kg dry	0.894	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-09-7	**Potassium**	**1070**		mg/kg dry	4.49	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7782-49-2	**Selenium**	**7.00**		mg/kg dry	2.24	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-22-4	Silver	ND		mg/kg dry	0.453	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-23-5	Sodium	ND		mg/kg dry	44.9	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-28-0	Thallium	ND		mg/kg dry	2.24	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-62-2	**Vanadium**	**24.6**		mg/kg dry	0.894	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			
7440-66-6	**Zinc**	**76.7**	B	mg/kg dry	2.24	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:48	AJL
							Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP			

Mercury by 7473

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**0.0860**		mg/kg dry	0.0323	1	EPA 7473	11/25/2022 09:36	11/25/2022 12:48	KT
							Certifications: CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP			

Total Solids

Log-in Notes:

Sample Notes:

Sample Information

Client Sample ID:	**SB-03 5-7**			**York Sample ID:**	**22K0754-03**
York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time		Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm		11/14/2022

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**92.8**		%	0.100	1	SM 2540G	11/23/2022 12:52	11/23/2022 15:45	MCS
							Certifications:	CTDOH-PH-0723		

Sample Information

Client Sample ID:	**SB-04 5-6.5**			**York Sample ID:**	**22K0754-04**
York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time		Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm		11/14/2022

Pesticides, 8081 target list **Log-in Notes:** **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	**4,4'-DDD**	**0.0191**		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
72-55-9	**4,4'-DDE**	**0.0815**		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
50-29-3	**4,4'-DDT**	**0.216**		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
309-00-2	Aldrin	ND		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
319-84-6	alpha-BHC	ND		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
5103-71-9	**alpha-Chlordane**	**0.0297**		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	NELAC-NY10854,NJDEP		
319-85-7	beta-BHC	ND		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
12789-03-6	**Chlordane, total**	**0.0994**		mg/kg dry	0.0376	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
319-86-8	delta-BHC	ND		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
60-57-1	**Dieldrin**	**0.0197**		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
959-98-8	Endosulfan I	ND		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854		
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
72-20-8	Endrin	ND		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00188	5	EPA 8081B	11/23/2022 08:17	11/29/2022 03:54	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Sample Information

Client Sample ID:	SB-04 5-6.5	York Sample ID:	22K0754-04

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:54	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:54	BJ-
5566-34-7	**gamma-Chlordane**	**0.0149**		mg/kg dry	0.00188	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 03:54	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:54	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:54	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00940	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:54	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0951	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 03:54	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*80.9 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*78.5 %*	*30-150*

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**13600**	B	mg/kg dry	4.78	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-36-0	Antimony	ND		mg/kg dry	2.39	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-38-2	**Arsenic**	**12.2**		mg/kg dry	1.43	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-39-3	**Barium**	**117**		mg/kg dry	2.39	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-41-7	**Beryllium**	**0.230**	B	mg/kg dry	0.048	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-43-9	**Cadmium**	**0.341**		mg/kg dry	0.287	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-70-2	**Calcium**	**18000**	B	mg/kg dry	4.78	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-47-3	**Chromium**	**16.3**	B	mg/kg dry	0.478	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-48-4	**Cobalt**	**9.00**	B	mg/kg dry	0.382	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-50-8	**Copper**	**28.1**	B	mg/kg dry	1.91	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7439-89-6	**Iron**	**22600**	B	mg/kg dry	23.9	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL

Sample Information

Client Sample ID: **SB-04 5-6.5** **York Sample ID:** **22K0754-04**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-92-1	**Lead**	**172**	B	mg/kg dry	0.478	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7439-95-4	**Magnesium**	**8280**	B	mg/kg dry	4.78	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7439-96-5	**Manganese**	**604**	B	mg/kg dry	0.478	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-02-0	**Nickel**	**22.0**	B	mg/kg dry	0.952	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-09-7	**Potassium**	**1360**		mg/kg dry	4.78	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7782-49-2	**Selenium**	**3.40**		mg/kg dry	2.39	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-22-4	Silver	ND		mg/kg dry	0.482	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-23-5	Sodium	ND		mg/kg dry	47.8	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-28-0	Thallium	ND		mg/kg dry	2.39	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-62-2	**Vanadium**	**16.4**		mg/kg dry	0.952	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL
7440-66-6	**Zinc**	**119**	B	mg/kg dry	2.38	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:51	AJL

Mercury by 7473

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**0.884**		mg/kg dry	0.0344	1	EPA 7473 Certifications: CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP	11/25/2022 09:36	11/25/2022 12:58	KT

Total Solids

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**87.2**		%	0.100	1	SM 2540G Certifications: CTDOH-PH-0723	11/23/2022 12:52	11/23/2022 15:45	MCS

Sample Information

Client Sample ID:	**SB-05 0-5 c**		**York Sample ID:**	**22K0754-05**
York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
72-55-9	4,4'-DDE	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
50-29-3	4,4'-DDT	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
309-00-2	Aldrin	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0360	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
959-98-8	Endosulfan I	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 04:11	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00899	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0910	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:11	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*87.5 %*	*30-150*

Sample Information

Client Sample ID:	SB-05 0-5 c		York Sample ID:	22K0754-05
York Project (SDG) No.	**Client Project ID**	**Matrix**	**Collection Date/Time**	**Date Received**
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*83.1 %*		*30-150*						

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**13300**	B	mg/kg dry	4.57	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-36-0	Antimony	ND		mg/kg dry	2.29	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-38-2	**Arsenic**	**22.2**		mg/kg dry	1.37	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-39-3	**Barium**	**315**		mg/kg dry	2.28	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-41-7	Beryllium	ND		mg/kg dry	0.046	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-43-9	**Cadmium**	**1.12**		mg/kg dry	0.274	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-70-2	**Calcium**	**10100**	B	mg/kg dry	4.57	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-47-3	**Chromium**	**17.5**	B	mg/kg dry	0.457	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-48-4	**Cobalt**	**9.64**	B	mg/kg dry	0.365	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-50-8	**Copper**	**62.4**	B	mg/kg dry	1.83	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7439-89-6	**Iron**	**26700**	B	mg/kg dry	22.9	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7439-92-1	**Lead**	**1870**	B	mg/kg dry	0.457	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7439-95-4	**Magnesium**	**4490**	B	mg/kg dry	4.57	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7439-96-5	**Manganese**	**704**	B	mg/kg dry	0.457	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-02-0	**Nickel**	**21.9**	B	mg/kg dry	0.911	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-09-7	**Potassium**	**1060**		mg/kg dry	4.57	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7782-49-2	**Selenium**	**5.39**		mg/kg dry	2.29	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL
7440-22-4	Silver	ND		mg/kg dry	0.461	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 16:55	AJL

Sample Information

Client Sample ID: **SB-05 0-5 c** **York Sample ID:** **22K0754-05**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7440-23-5	**Sodium**	**722**		mg/kg dry	45.7	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:55	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-28-0	Thallium	ND		mg/kg dry	2.29	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:55	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-62-2	**Vanadium**	**19.8**		mg/kg dry	0.911	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:55	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-66-6	**Zinc**	**478**	B	mg/kg dry	2.28	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:55	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Mercury by 7473

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**1.91**		mg/kg dry	0.0329	1	EPA 7473	11/25/2022 09:36	11/25/2022 13:07	KT
							Certifications:	CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP		

Total Solids

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**91.2**		%	0.100	1	SM 2540G	11/23/2022 12:52	11/23/2022 15:45	MCS
							Certifications:	CTDOH-PH-0723		

Sample Information

Client Sample ID: **SB-06 0-2** **York Sample ID:** **22K0754-06**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00189	5	EPA 8081B	11/23/2022 08:17	11/29/2022 04:28	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
72-55-9	4,4'-DDE	ND		mg/kg dry	0.00189	5	EPA 8081B	11/23/2022 08:17	11/29/2022 04:28	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
50-29-3	4,4'-DDT	ND		mg/kg dry	0.00189	5	EPA 8081B	11/23/2022 08:17	11/29/2022 04:28	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Sample Information

Client Sample ID: **SB-06 0-2** **York Sample ID:** **22K0754-06**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
309-00-2	Aldrin	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0378	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
959-98-8	Endosulfan I	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 04:28	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00944	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0956	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 04:28	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*78.2 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*78.9 %*	*30-150*

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst

Sample Information

Client Sample ID: **SB-06 0-2** **York Sample ID:** **22K0754-06**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

7429-90-5	**Aluminum**	**15800**	B	mg/kg dry	4.82	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-36-0	Antimony	ND		mg/kg dry	2.41	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-38-2	**Arsenic**	**19.3**		mg/kg dry	1.44	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-39-3	**Barium**	**101**		mg/kg dry	2.40	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-41-7	**Beryllium**	**0.364**	B	mg/kg dry	0.049	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-43-9	Cadmium	ND		mg/kg dry	0.289	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-70-2	**Calcium**	**1190**	B	mg/kg dry	4.82	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-47-3	**Chromium**	**19.2**	B	mg/kg dry	0.482	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-48-4	**Cobalt**	**11.0**	B	mg/kg dry	0.385	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-50-8	**Copper**	**42.2**	B	mg/kg dry	1.93	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-89-6	**Iron**	**27600**	B	mg/kg dry	24.1	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-92-1	**Lead**	**309**	B	mg/kg dry	0.482	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-95-4	**Magnesium**	**5810**	B	mg/kg dry	4.82	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-96-5	**Manganese**	**692**	B	mg/kg dry	0.482	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-02-0	**Nickel**	**27.6**	B	mg/kg dry	0.959	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-09-7	**Potassium**	**1210**		mg/kg dry	4.82	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7782-49-2	**Selenium**	**7.27**		mg/kg dry	2.41	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-22-4	Silver	ND		mg/kg dry	0.485	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-23-5	Sodium	ND		mg/kg dry	48.2	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-28-0	Thallium	ND		mg/kg dry	2.41	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-62-2	**Vanadium**	**19.3**		mg/kg dry	0.959	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-66-6	**Zinc**	**109**	B	mg/kg dry	2.40	1	EPA 6010D	11/17/2022 18:29	11/23/2022 16:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Mercury by 7473

Log-in Notes: **Sample Notes:**

Sample Information

Client Sample ID: **SB-06 0-2** **York Sample ID:** **22K0754-06**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**0.477**		mg/kg dry	0.0347	1	EPA 7473 Certifications: CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP	11/25/2022 09:36	11/25/2022 13:20	KT

Total Solids **Log-in Notes:** **Sample Notes:**

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**86.5**		%	0.100	1	SM 2540G Certifications: CTDOH-PH-0723	11/23/2022 12:52	11/23/2022 15:45	MCS

Sample Information

Client Sample ID: **SB-07 0-5 c** **York Sample ID:** **22K0754-07**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list **Log-in Notes:** **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
72-55-9	4,4'-DDE	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
50-29-3	**4,4'-DDT**	**0.00204**		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
309-00-2	Aldrin	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0375	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
959-98-8	Endosulfan I	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-

Sample Information

Client Sample ID:	**SB-07 0-5 c**			**York Sample ID:**	**22K0754-07**
York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received	
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022	

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 05:19	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00938	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0949	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:19	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*74.6 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*69.3 %*	*30-150*

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**13400**	B	mg/kg dry	4.75	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:02	AJL
7440-36-0	Antimony	ND		mg/kg dry	2.38	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:02	AJL
7440-38-2	**Arsenic**	**30.9**		mg/kg dry	1.43	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:02	AJL
7440-39-3	**Barium**	**218**		mg/kg dry	2.37	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:02	AJL
7440-41-7	**Beryllium**	**0.159**	B	mg/kg dry	0.048	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:02	AJL
7440-43-9	**Cadmium**	**0.406**		mg/kg dry	0.285	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:02	AJL
7440-70-2	**Calcium**	**12500**	B	mg/kg dry	4.75	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:02	AJL

Sample Information

Client Sample ID: **SB-07 0-5 c**

York Sample ID: **22K0754-07**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7440-47-3	**Chromium**	**18.6**	B	mg/kg dry	0.475	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-48-4	**Cobalt**	**9.30**	B	mg/kg dry	0.380	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-50-8	**Copper**	**50.2**	B	mg/kg dry	1.90	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-89-6	**Iron**	**30900**	B	mg/kg dry	23.8	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-92-1	**Lead**	**1220**	B	mg/kg dry	0.475	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-95-4	**Magnesium**	**4850**	B	mg/kg dry	4.75	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-96-5	**Manganese**	**579**	B	mg/kg dry	0.475	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-02-0	**Nickel**	**25.9**	B	mg/kg dry	0.946	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-09-7	**Potassium**	**1070**		mg/kg dry	4.75	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7782-49-2	**Selenium**	**7.76**		mg/kg dry	2.38	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-22-4	Silver	ND		mg/kg dry	0.479	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-23-5	**Sodium**	**164**		mg/kg dry	47.5	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-28-0	Thallium	ND		mg/kg dry	2.38	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-62-2	**Vanadium**	**22.6**		mg/kg dry	0.946	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-66-6	**Zinc**	**282**	B	mg/kg dry	2.37	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:02	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Mercury by 7473

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**1.72**		mg/kg dry	0.0342	1	EPA 7473	11/25/2022 09:36	11/25/2022 13:29	KT
							Certifications:	CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP		

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst

Sample Information

Client Sample ID: **SB-07 0-5 c**

York Sample ID: **22K0754-07**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**87.7**		%	0.100	1	SM 2540G Certifications: CTDOH-PH-0723	11/23/2022 12:52	11/23/2022 15:45	MCS

Sample Information

Client Sample ID: **SB-08 1-2 c**

York Sample ID: **22K0754-08**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
72-55-9	**4,4'-DDE**	**0.00324**		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
50-29-3	**4,4'-DDT**	**0.00658**		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
309-00-2	Aldrin	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
319-84-6	alpha-BHC	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 13:20	BJ
319-85-7	beta-BHC	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0359	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
319-86-8	delta-BHC	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
60-57-1	Dieldrin	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
959-98-8	Endosulfan I	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 13:20	BJ
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
72-20-8	Endrin	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ

Sample Information

Client Sample ID:	**SB-08 1-2 c**	**York Sample ID:**	**22K0754-08**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 13:20	BJ
76-44-8	Heptachlor	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00180	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
72-43-5	Methoxychlor	ND		mg/kg dry	0.00898	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ
8001-35-2	Toxaphene	ND		mg/kg dry	0.0909	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:20	BJ

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*58.5 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*44.5 %*	*30-150*

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**14900**	B	mg/kg dry	4.60	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-36-0	Antimony	ND		mg/kg dry	2.30	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-38-2	**Arsenic**	**14.9**		mg/kg dry	1.38	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-39-3	**Barium**	**168**		mg/kg dry	2.29	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-41-7	**Beryllium**	**0.380**	B	mg/kg dry	0.046	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-43-9	Cadmium	ND		mg/kg dry	0.276	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-70-2	**Calcium**	**5160**	B	mg/kg dry	4.60	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-47-3	**Chromium**	**16.8**	B	mg/kg dry	0.460	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-48-4	**Cobalt**	**8.89**	B	mg/kg dry	0.367	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-50-8	**Copper**	**28.2**	B	mg/kg dry	1.84	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL

Sample Information

Client Sample ID: **SB-08 1-2 c**　　**York Sample ID:** **22K0754-08**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-89-6	**Iron**	**21100**	B	mg/kg dry	23.0	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7439-92-1	**Lead**	**398**	B	mg/kg dry	0.460	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7439-95-4	**Magnesium**	**4140**	B	mg/kg dry	4.60	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7439-96-5	**Manganese**	**740**	B	mg/kg dry	0.460	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-02-0	**Nickel**	**21.4**	B	mg/kg dry	0.916	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-09-7	**Potassium**	**852**		mg/kg dry	4.60	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7782-49-2	**Selenium**	**5.22**		mg/kg dry	2.30	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-22-4	Silver	ND		mg/kg dry	0.463	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-23-5	Sodium	ND		mg/kg dry	46.0	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-28-0	Thallium	ND		mg/kg dry	2.30	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-62-2	**Vanadium**	**20.8**		mg/kg dry	0.916	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL
7440-66-6	**Zinc**	**150**	B	mg/kg dry	2.29	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/17/2022 18:29	11/23/2022 17:14	AJL

Mercury by 7473

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**1.13**		mg/kg dry	0.0331	1	EPA 7473 Certifications: CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP	11/25/2022 09:36	11/25/2022 13:41	KT

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**90.6**		%	0.100	1	SM 2540G Certifications: CTDOH-PH-0723	11/23/2022 12:52	11/23/2022 15:45	MCS

Sample Information

Client Sample ID: **SB-09 0-5 c** **York Sample ID:** **22K0754-09**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
72-55-9	4,4'-DDE	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
50-29-3	4,4'-DDT	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
309-00-2	Aldrin	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0363	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
959-98-8	Endosulfan I	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 05:36	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00182	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00908	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0919	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:36	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*67.6 %*	*30-150*

Sample Information

Client Sample ID: **SB-09 0-5 c** **York Sample ID:** **22K0754-09**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*72.7 %*		*30-150*						

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**10900**	B	mg/kg dry	4.66	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-36-0	Antimony	ND		mg/kg dry	2.33	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-38-2	**Arsenic**	**4.56**		mg/kg dry	1.40	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-39-3	**Barium**	**109**		mg/kg dry	2.33	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-41-7	Beryllium	ND		mg/kg dry	0.047	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-43-9	Cadmium	ND		mg/kg dry	0.280	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-70-2	**Calcium**	**45900**	B	mg/kg dry	4.66	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-47-3	**Chromium**	**11.5**	B	mg/kg dry	0.467	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-48-4	**Cobalt**	**5.46**	B	mg/kg dry	0.373	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-50-8	**Copper**	**18.4**	B	mg/kg dry	1.86	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-89-6	**Iron**	**14400**	B	mg/kg dry	23.3	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-92-1	**Lead**	**317**	B	mg/kg dry	0.467	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-95-4	**Magnesium**	**8410**	B	mg/kg dry	4.67	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-96-5	**Manganese**	**429**	B	mg/kg dry	0.467	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-02-0	**Nickel**	**13.2**	B	mg/kg dry	0.929	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-09-7	**Potassium**	**889**		mg/kg dry	4.67	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7782-49-2	**Selenium**	**2.62**		mg/kg dry	2.33	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-22-4	Silver	ND		mg/kg dry	0.470	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Sample Information

Client Sample ID: **SB-09 0-5 c** **York Sample ID:** **22K0754-09**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7440-23-5	**Sodium**	**179**		mg/kg dry	46.6	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-28-0	Thallium	ND		mg/kg dry	2.33	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-62-2	**Vanadium**	**15.2**		mg/kg dry	0.929	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-66-6	**Zinc**	**94.3**	B	mg/kg dry	2.32	1	EPA 6010D	11/17/2022 18:29	11/23/2022 17:17	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Mercury by 7473

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**0.0889**		mg/kg dry	0.0336	1	EPA 7473	11/25/2022 09:36	11/25/2022 13:53	KT
							Certifications:	CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP		

Total Solids

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**89.4**		%	0.100	1	SM 2540G	11/23/2022 12:52	11/23/2022 15:45	MCS
							Certifications:	CTDOH-PH-0723		

Sample Information

Client Sample ID: **SS-01** **York Sample ID:** **22K0754-10**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	**4,4'-DDD**	**0.00431**		mg/kg dry	0.00216	5	EPA 8081B	11/23/2022 08:17	11/29/2022 13:38	BJ
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
72-55-9	**4,4'-DDE**	**0.0224**		mg/kg dry	0.00216	5	EPA 8081B	11/23/2022 08:17	11/29/2022 13:38	BJ
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
50-29-3	**4,4'-DDT**	**0.0757**		mg/kg dry	0.00216	5	EPA 8081B	11/23/2022 08:17	11/29/2022 13:38	BJ
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Sample Information

Client Sample ID: **SS-01** **York Sample ID:** **22K0754-10**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
309-00-2	Aldrin	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
319-84-6	alpha-BHC	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
5103-71-9	**alpha-Chlordane**	**0.0197**		mg/kg dry	0.00216	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 13:38	BJ
319-85-7	beta-BHC	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
12789-03-6	**Chlordane, total**	**0.135**		mg/kg dry	0.0432	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
319-86-8	delta-BHC	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
60-57-1	**Dieldrin**	**0.0211**		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
959-98-8	Endosulfan I	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 13:38	BJ
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
72-20-8	Endrin	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
5566-34-7	**gamma-Chlordane**	**0.0180**		mg/kg dry	0.00216	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 13:38	BJ
76-44-8	Heptachlor	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00216	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
72-43-5	Methoxychlor	ND		mg/kg dry	0.0108	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ
8001-35-2	Toxaphene	ND		mg/kg dry	0.109	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 13:38	BJ

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*72.9 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*57.4 %*	*30-150*

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Information

Client Sample ID:	**SS-01**			**York Sample ID:**	**22K0754-10**
York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received	
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022	

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**9200**	B	mg/kg dry	5.55	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-36-0	Antimony	ND		mg/kg dry	2.77	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-38-2	**Arsenic**	**22.9**		mg/kg dry	1.66	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-39-3	**Barium**	**544**		mg/kg dry	2.77	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-41-7	Beryllium	ND		mg/kg dry	0.056	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-43-9	**Cadmium**	**4.66**		mg/kg dry	0.333	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-70-2	**Calcium**	**11400**	B	mg/kg dry	5.55	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-47-3	**Chromium**	**28.9**		mg/kg dry	0.555	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-48-4	**Cobalt**	**8.28**		mg/kg dry	0.443	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-50-8	**Copper**	**78.2**		mg/kg dry	2.22	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-89-6	**Iron**	**32900**		mg/kg dry	27.7	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-92-1	**Lead**	**3050**		mg/kg dry	0.555	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-95-4	**Magnesium**	**3960**		mg/kg dry	5.55	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-96-5	**Manganese**	**554**		mg/kg dry	0.555	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-02-0	**Nickel**	**33.0**		mg/kg dry	1.11	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-09-7	**Potassium**	**1010**		mg/kg dry	5.55	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7782-49-2	**Selenium**	**8.90**		mg/kg dry	2.77	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-22-4	Silver	ND		mg/kg dry	0.559	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-23-5	**Sodium**	**1770**		mg/kg dry	55.5	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-28-0	Thallium	ND		mg/kg dry	2.77	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-62-2	**Vanadium**	**28.2**		mg/kg dry	1.11	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-66-6	**Zinc**	**848**	B	mg/kg dry	2.76	1	EPA 6010D	11/18/2022 13:14	11/23/2022 17:59	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Sample Information

Client Sample ID: SS-01 **York Sample ID:** 22K0754-10

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Mercury by 7473

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**1.32**		mg/kg dry	0.0399	1	EPA 7473 Certifications: CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP	11/25/2022 09:36	11/25/2022 14:03	KT

Total Solids

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**75.1**		%	0.100	1	SM 2540G Certifications: CTDOH-PH-0723	11/23/2022 12:52	11/23/2022 15:45	MCS

Sample Information

Client Sample ID: SS-02 **York Sample ID:** 22K0754-11

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
72-55-9	4,4'-DDE	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
50-29-3	4,4'-DDT	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
309-00-2	Aldrin	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0375	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-

Sample Information

Client Sample ID: **SS-02** **York Sample ID:** **22K0754-11**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
959-98-8	Endosulfan I	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 05:52	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00188	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00938	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0950	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 05:52	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*69.8 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*60.7 %*	*30-150*

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**11400**	B	mg/kg dry	4.77	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-36-0	Antimony	ND		mg/kg dry	2.38	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-38-2	**Arsenic**	**12.9**		mg/kg dry	1.43	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-39-3	**Barium**	**153**		mg/kg dry	2.38	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-41-7	**Beryllium**	**0.183**		mg/kg dry	0.048	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-43-9	**Cadmium**	**0.505**		mg/kg dry	0.286	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL

Sample Information

Client Sample ID: **SS-02**

York Sample ID: **22K0754-11**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7440-70-2	**Calcium**	**9840**	B	mg/kg dry	4.77	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-47-3	**Chromium**	**15.4**		mg/kg dry	0.477	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-48-4	**Cobalt**	**8.35**		mg/kg dry	0.381	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-50-8	**Copper**	**41.5**		mg/kg dry	1.91	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7439-89-6	**Iron**	**18900**		mg/kg dry	23.8	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7439-92-1	**Lead**	**754**		mg/kg dry	0.477	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7439-95-4	**Magnesium**	**3690**		mg/kg dry	4.77	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7439-96-5	**Manganese**	**526**		mg/kg dry	0.477	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-02-0	**Nickel**	**27.6**		mg/kg dry	0.950	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-09-7	**Potassium**	**1160**		mg/kg dry	4.77	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7782-49-2	**Selenium**	**3.95**		mg/kg dry	2.38	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-22-4	Silver	ND		mg/kg dry	0.481	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-23-5	**Sodium**	**96.3**		mg/kg dry	47.7	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-28-0	Thallium	ND		mg/kg dry	2.38	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-62-2	**Vanadium**	**27.5**		mg/kg dry	0.950	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL
7440-66-6	**Zinc**	**183**	B	mg/kg dry	2.38	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:02	AJL

Mercury by 7473

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**0.467**		mg/kg dry	0.0343	1	EPA 7473 Certifications: CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP	11/25/2022 09:36	11/25/2022 14:50	KT

Total Solids

Log-in Notes:

Sample Notes:

Sample Information

Client Sample ID: **SS-02** **York Sample ID:** **22K0754-11**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**87.4**		%	0.100	1	SM 2540G Certifications: CTDOH-PH-0723	11/23/2022 12:52	11/23/2022 15:45	MCS

Sample Information

Client Sample ID: **SS-03** **York Sample ID:** **22K0754-12**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list **Log-in Notes:** **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
72-55-9	4,4'-DDE	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
50-29-3	4,4'-DDT	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
309-00-2	Aldrin	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0396	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
959-98-8	Endosulfan I	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 06:09	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-

Sample Information

Client Sample ID:	SS-03	York Sample ID:	22K0754-12

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00198	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00989	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.100	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:09	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*66.5 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*61.8 %*	*30-150*

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**10700**	B	mg/kg dry	5.08	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-36-0	Antimony	ND		mg/kg dry	2.54	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-38-2	**Arsenic**	**10.3**		mg/kg dry	1.52	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-39-3	**Barium**	**148**		mg/kg dry	2.53	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-41-7	**Beryllium**	**0.169**		mg/kg dry	0.051	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-43-9	**Cadmium**	**0.310**		mg/kg dry	0.305	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-70-2	**Calcium**	**11900**	B	mg/kg dry	5.08	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-47-3	**Chromium**	**15.3**		mg/kg dry	0.508	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-48-4	**Cobalt**	**7.14**		mg/kg dry	0.406	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-50-8	**Copper**	**36.8**		mg/kg dry	2.03	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7439-89-6	**Iron**	**16600**		mg/kg dry	25.4	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL

Sample Information

Client Sample ID: **SS-03** **York Sample ID:** **22K0754-12**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-92-1	**Lead**	**612**		mg/kg dry	0.508	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7439-95-4	**Magnesium**	**4200**		mg/kg dry	5.08	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7439-96-5	**Manganese**	**471**		mg/kg dry	0.508	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-02-0	**Nickel**	**21.5**		mg/kg dry	1.01	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-09-7	**Potassium**	**1080**		mg/kg dry	5.08	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7782-49-2	**Selenium**	**3.62**		mg/kg dry	2.54	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-22-4	Silver	ND		mg/kg dry	0.512	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-23-5	**Sodium**	**251**		mg/kg dry	50.8	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-28-0	Thallium	ND		mg/kg dry	2.54	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-62-2	**Vanadium**	**27.9**		mg/kg dry	1.01	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL
7440-66-6	**Zinc**	**232**	B	mg/kg dry	2.53	1	EPA 6010D Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/18/2022 13:14	11/23/2022 18:06	AJL

Mercury by 7473

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**0.542**		mg/kg dry	0.0366	1	EPA 7473 Certifications: CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP	11/25/2022 09:36	11/25/2022 14:58	KT

Total Solids

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**82.1**		%	0.100	1	SM 2540G Certifications: CTDOH-PH-0723	11/23/2022 12:52	11/23/2022 15:45	MCS

Sample Information

Client Sample ID: **SS-04** **York Sample ID:** **22K0754-13**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list **Log-in Notes:** **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
72-55-9	**4,4'-DDE**	**0.00213**		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
50-29-3	**4,4'-DDT**	**0.00466**		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
309-00-2	Aldrin	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0378	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
959-98-8	Endosulfan I	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 06:26	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00189	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.00946	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.0957	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:26	BJ-

Surrogate Recoveries **Result** **Acceptance Range**

Sample Information

Client Sample ID: **SS-04** **York Sample ID:** **22K0754-13**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
2051-24-3	*Surrogate: Decachlorobiphenyl*	*77.1 %*		*30-150*						
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*75.2 %*		*30-150*						

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7429-90-5	**Aluminum**	**13200**	B	mg/kg dry	4.82	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-36-0	Antimony	ND		mg/kg dry	2.41	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-38-2	**Arsenic**	**11.5**		mg/kg dry	1.45	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-39-3	**Barium**	**194**		mg/kg dry	2.41	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-41-7	**Beryllium**	**0.246**		mg/kg dry	0.049	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-43-9	**Cadmium**	**0.378**		mg/kg dry	0.289	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-70-2	**Calcium**	**25600**	B	mg/kg dry	4.83	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-47-3	**Chromium**	**17.6**		mg/kg dry	0.483	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-48-4	**Cobalt**	**8.13**		mg/kg dry	0.386	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-50-8	**Copper**	**31.7**		mg/kg dry	1.93	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-89-6	**Iron**	**21800**		mg/kg dry	24.1	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-92-1	**Lead**	**503**		mg/kg dry	0.483	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-95-4	**Magnesium**	**7770**		mg/kg dry	4.83	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-96-5	**Manganese**	**631**		mg/kg dry	0.483	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-02-0	**Nickel**	**24.4**		mg/kg dry	0.961	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-09-7	**Potassium**	**1090**		mg/kg dry	4.83	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7782-49-2	**Selenium**	**3.61**		mg/kg dry	2.41	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-22-4	Silver	ND		mg/kg dry	0.486	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Sample Information

Client Sample ID: **SS-04** **York Sample ID:** **22K0754-13**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Metals, Target Analyte

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7440-23-5	**Sodium**	**135**		mg/kg dry	48.3	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-28-0	Thallium	ND		mg/kg dry	2.41	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-62-2	**Vanadium**	**24.3**		mg/kg dry	0.961	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-66-6	**Zinc**	**215**	B	mg/kg dry	2.40	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:10	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Mercury by 7473

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**0.355**		mg/kg dry	0.0347	1	EPA 7473	11/25/2022 09:36	11/25/2022 15:07	KT
							Certifications:	CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP		

Total Solids

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**86.4**		%	0.100	1	SM 2540G	11/23/2022 14:23	11/23/2022 16:18	MCS
							Certifications:	CTDOH-PH-0723		

Sample Information

Client Sample ID: **SS-05** **York Sample ID:** **22K0754-14**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes: **Sample Notes:**

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
72-54-8	4,4'-DDD	ND		mg/kg dry	0.00243	5	EPA 8081B	11/23/2022 08:17	11/29/2022 06:43	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
72-55-9	4,4'-DDE	ND		mg/kg dry	0.00243	5	EPA 8081B	11/23/2022 08:17	11/29/2022 06:43	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
50-29-3	**4,4'-DDT**	**0.00806**		mg/kg dry	0.00243	5	EPA 8081B	11/23/2022 08:17	11/29/2022 06:43	BJ-
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Sample Information

Client Sample ID: **SS-05**

York Sample ID: **22K0754-14**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Pesticides, 8081 target list

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
309-00-2	Aldrin	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
319-84-6	alpha-BHC	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
5103-71-9	alpha-Chlordane	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
319-85-7	beta-BHC	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
12789-03-6	Chlordane, total	ND		mg/kg dry	0.0487	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
319-86-8	delta-BHC	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
60-57-1	Dieldrin	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
959-98-8	Endosulfan I	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
33213-65-9	Endosulfan II	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854	11/23/2022 08:17	11/29/2022 06:43	BJ-
1031-07-8	Endosulfan sulfate	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
72-20-8	Endrin	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
7421-93-4	Endrin aldehyde	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
53494-70-5	Endrin ketone	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
58-89-9	gamma-BHC (Lindane)	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
5566-34-7	gamma-Chlordane	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: NELAC-NY10854,NJDEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
76-44-8	Heptachlor	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
1024-57-3	Heptachlor epoxide	ND		mg/kg dry	0.00243	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
72-43-5	Methoxychlor	ND		mg/kg dry	0.0122	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-
8001-35-2	Toxaphene	ND		mg/kg dry	0.123	5	EPA 8081B Certifications: CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP	11/23/2022 08:17	11/29/2022 06:43	BJ-

	Surrogate Recoveries	Result	Acceptance Range
2051-24-3	*Surrogate: Decachlorobiphenyl*	*56.5 %*	*30-150*
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*66.9 %*	*30-150*

Metals, Target Analyte

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3050B

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst

Sample Information

Client Sample ID: SS-05 **York Sample ID:** 22K0754-14

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

7429-90-5	**Aluminum**	**19500**	B	mg/kg dry	6.29	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-36-0	**Antimony**	**4.41**		mg/kg dry	3.15	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-38-2	**Arsenic**	**51.9**		mg/kg dry	1.89	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-39-3	**Barium**	**151**		mg/kg dry	3.14	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-41-7	**Beryllium**	**0.313**		mg/kg dry	0.063	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-43-9	**Cadmium**	**0.385**		mg/kg dry	0.377	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-70-2	**Calcium**	**8960**	B	mg/kg dry	6.29	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-47-3	**Chromium**	**25.5**		mg/kg dry	0.630	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-48-4	**Cobalt**	**14.4**		mg/kg dry	0.503	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-50-8	**Copper**	**64.0**		mg/kg dry	2.52	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-89-6	**Iron**	**35300**		mg/kg dry	31.5	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-92-1	**Lead**	**457**		mg/kg dry	0.630	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-95-4	**Magnesium**	**7930**		mg/kg dry	6.30	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7439-96-5	**Manganese**	**1060**		mg/kg dry	0.630	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-02-0	**Nickel**	**37.0**		mg/kg dry	1.25	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-09-7	**Potassium**	**1710**		mg/kg dry	6.30	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7782-49-2	**Selenium**	**8.16**		mg/kg dry	3.15	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-22-4	Silver	ND		mg/kg dry	0.634	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-23-5	**Sodium**	**201**		mg/kg dry	62.9	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-28-0	Thallium	ND		mg/kg dry	3.15	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-62-2	**Vanadium**	**32.0**		mg/kg dry	1.25	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		
7440-66-6	**Zinc**	**335**	B	mg/kg dry	3.13	1	EPA 6010D	11/18/2022 13:14	11/23/2022 18:14	AJL
							Certifications:	CTDOH-PH-0723,NELAC-NY10854,NJDEP,PADEP		

Mercury by 7473 **Log-in Notes:** **Sample Notes:**

Sample Information

Client Sample ID: **SS-05** **York Sample ID:** **22K0754-14**

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
22K0754	22003-0092	Soil	November 11, 2022 3:00 pm	11/14/2022

Sample Prepared by Method: EPA 7473 soil

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
7439-97-6	**Mercury**	**0.455**		mg/kg dry	0.0453	1	EPA 7473	11/25/2022 09:36	11/25/2022 15:16	KT
							Certifications:	CTDOH-PH-0723,NJDEP,NELAC-NY10854,PADEP		

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	*** % Solids**	**66.2**		%	0.100	1	SM 2540G	11/23/2022 14:23	11/23/2022 16:18	MCS
							Certifications:	CTDOH-PH-0723		

Analytical Batch Summary

Batch ID: BK21139 **Preparation Method:** EPA 3050B **Prepared By:** FK

YORK Sample ID	Client Sample ID	Preparation Date
22K0754-01	SB-01 3-4	11/17/22
22K0754-02	SB-02 0-5 c	11/17/22
22K0754-03	SB-03 5-7	11/17/22
22K0754-04	SB-04 5-6.5	11/17/22
22K0754-05	SB-05 0-5 c	11/17/22
22K0754-06	SB-06 0-2	11/17/22
22K0754-07	SB-07 0-5 c	11/17/22
22K0754-08	SB-08 1-2 c	11/17/22
22K0754-09	SB-09 0-5 c	11/17/22
BK21139-BLK1	Blank	11/17/22
BK21139-DUP1	Duplicate	11/17/22
BK21139-MS1	Matrix Spike	11/17/22
BK21139-PS1	Post Spike	11/17/22
BK21139-SRM1	Reference	11/17/22

Batch ID: BK21189 **Preparation Method:** EPA 3050B **Prepared By:** KMQ

YORK Sample ID	Client Sample ID	Preparation Date
22K0754-10	SS-01	11/18/22
22K0754-11	SS-02	11/18/22
22K0754-12	SS-03	11/18/22
22K0754-13	SS-04	11/18/22
22K0754-14	SS-05	11/18/22
BK21189-BLK1	Blank	11/18/22
BK21189-DUP1	Duplicate	11/18/22
BK21189-MS1	Matrix Spike	11/18/22
BK21189-PS1	Post Spike	11/18/22
BK21189-SRM1	Reference	11/18/22

Batch ID: BK21451 **Preparation Method:** EPA 3550C **Prepared By:** FK

YORK Sample ID	Client Sample ID	Preparation Date
22K0754-01	SB-01 3-4	11/23/22
22K0754-02	SB-02 0-5 c	11/23/22
22K0754-03	SB-03 5-7	11/23/22
22K0754-04	SB-04 5-6.5	11/23/22
22K0754-05	SB-05 0-5 c	11/23/22
22K0754-06	SB-06 0-2	11/23/22
22K0754-07	SB-07 0-5 c	11/23/22
22K0754-08	SB-08 1-2 c	11/23/22
22K0754-09	SB-09 0-5 c	11/23/22
22K0754-10	SS-01	11/23/22
22K0754-11	SS-02	11/23/22
22K0754-12	SS-03	11/23/22
22K0754-13	SS-04	11/23/22

22K0754-14	SS-05	11/23/22
BK21451-BLK1	Blank	11/22/22
BK21451-BS1	LCS	11/22/22

Batch ID: BK21497 **Preparation Method:** % Solids Prep **Prepared By:** MCS

YORK Sample ID	Client Sample ID	Preparation Date
22K0754-01	SB-01 3-4	11/23/22
22K0754-02	SB-02 0-5 c	11/23/22
22K0754-03	SB-03 5-7	11/23/22
22K0754-04	SB-04 5-6.5	11/23/22
22K0754-05	SB-05 0-5 c	11/23/22
22K0754-06	SB-06 0-2	11/23/22
22K0754-07	SB-07 0-5 c	11/23/22
22K0754-08	SB-08 1-2 c	11/23/22
22K0754-09	SB-09 0-5 c	11/23/22
22K0754-10	SS-01	11/23/22
22K0754-11	SS-02	11/23/22
22K0754-12	SS-03	11/23/22
BK21497-DUP1	Duplicate	11/23/22

Batch ID: BK21504 **Preparation Method:** % Solids Prep **Prepared By:** MCS

YORK Sample ID	Client Sample ID	Preparation Date
22K0754-13	SS-04	11/23/22
22K0754-14	SS-05	11/23/22
BK21504-DUP1	Duplicate	11/23/22

Batch ID: BK21542 **Preparation Method:** EPA 7473 soil **Prepared By:** K T

YORK Sample ID	Client Sample ID	Preparation Date
22K0754-01	SB-01 3-4	11/25/22
22K0754-02	SB-02 0-5 c	11/25/22
22K0754-03	SB-03 5-7	11/25/22
22K0754-04	SB-04 5-6.5	11/25/22
22K0754-05	SB-05 0-5 c	11/25/22
22K0754-06	SB-06 0-2	11/25/22
22K0754-07	SB-07 0-5 c	11/25/22
22K0754-08	SB-08 1-2 c	11/25/22
22K0754-09	SB-09 0-5 c	11/25/22
22K0754-10	SS-01	11/25/22
22K0754-11	SS-02	11/25/22
22K0754-12	SS-03	11/25/22
22K0754-13	SS-04	11/25/22
22K0754-14	SS-05	11/25/22
BK21542-BLK1	Blank	11/25/22
BK21542-DUP1	Duplicate	11/25/22
BK21542-MS1	Matrix Spike	11/25/22
BK21542-SRM1	Reference	11/25/22

Organochlorine Pesticides by GC/ECD - Quality Control Data

York Analytical Laboratories, Inc. - Stratford

Batch BK21451 - EPA 3550C

Blank (BK21451-BLK1) Prepared: 11/22/2022 Analyzed: 11/29/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
4,4'-DDD	ND	0.00165	mg/kg wet								
4,4'-DDE	ND	0.00165	"								
4,4'-DDT	ND	0.00165	"								
Aldrin	ND	0.00165	"								
alpha-BHC	ND	0.00165	"								
alpha-Chlordane	ND	0.00165	"								
beta-BHC	ND	0.00165	"								
Chlordane, total	ND	0.0330	"								
delta-BHC	ND	0.00165	"								
Dieldrin	ND	0.00165	"								
Endosulfan I	ND	0.00165	"								
Endosulfan II	ND	0.00165	"								
Endosulfan sulfate	ND	0.00165	"								
Endrin	ND	0.00165	"								
Endrin aldehyde	ND	0.00165	"								
Endrin ketone	ND	0.00165	"								
gamma-BHC (Lindane)	ND	0.00165	"								
gamma-Chlordane	ND	0.00165	"								
Heptachlor	ND	0.00165	"								
Heptachlor epoxide	ND	0.00165	"								
Methoxychlor	ND	0.00825	"								
Toxaphene	ND	0.0835	"								
Surrogate: Decachlorobiphenyl	*0.0439*		*"*	*0.0667*		*65.9*	*30-150*				
Surrogate: Tetrachloro-m-xylene	*0.0470*		*"*	*0.0667*		*70.5*	*30-150*				

LCS (BK21451-BS1) Prepared: 11/22/2022 Analyzed: 11/29/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
4,4'-DDD	0.0250	0.00165	mg/kg wet	0.0333		75.1	40-140				
4,4'-DDE	0.0245	0.00165	"	0.0333		73.6	40-140				
4,4'-DDT	0.0212	0.00165	"	0.0333		63.6	40-140				
Aldrin	0.0254	0.00165	"	0.0333		76.2	40-140				
alpha-BHC	0.0262	0.00165	"	0.0333		78.6	40-140				
alpha-Chlordane	0.0256	0.00165	"	0.0333		76.9	40-140				
beta-BHC	0.0296	0.00165	"	0.0333		88.8	40-140				
delta-BHC	0.0267	0.00165	"	0.0333		80.2	40-140				
Dieldrin	0.0251	0.00165	"	0.0333		75.2	40-140				
Endosulfan I	0.0257	0.00165	"	0.0333		77.1	40-140				
Endosulfan II	0.0250	0.00165	"	0.0333		75.1	40-140				
Endosulfan sulfate	0.0253	0.00165	"	0.0333		75.8	40-140				
Endrin	0.0241	0.00165	"	0.0333		72.3	40-140				
Endrin aldehyde	0.0264	0.00165	"	0.0333		79.2	40-140				
Endrin ketone	0.0250	0.00165	"	0.0333		75.2	40-140				
gamma-BHC (Lindane)	0.0263	0.00165	"	0.0333		79.0	40-140				
gamma-Chlordane	0.0255	0.00165	"	0.0333		76.5	40-140				
Heptachlor	0.0254	0.00165	"	0.0333		76.1	40-140				
Heptachlor epoxide	0.0262	0.00165	"	0.0333		78.5	40-140				
Methoxychlor	0.0244	0.00825	"	0.0333		73.3	40-140				
Surrogate: Decachlorobiphenyl	*0.0547*		*"*	*0.0667*		*82.1*	*30-150*				
Surrogate: Tetrachloro-m-xylene	*0.0484*		*"*	*0.0667*		*72.7*	*30-150*				

Batch BK21139 - EPA 3050B

Blank (BK21139-BLK1) Prepared: 11/17/2022 Analyzed: 11/22/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Aluminum	14.8	4.17	mg/kg wet								
Antimony	ND	2.08	"								
Arsenic	ND	1.25	"								
Barium	ND	2.08	"								
Beryllium	0.196	0.042	"								
Cadmium	ND	0.250	"								
Calcium	39.4	4.17	"								
Chromium	0.629	0.417	"								
Cobalt	0.334	0.333	"								
Copper	3.03	1.67	"								
Iron	26.9	20.8	"								
Lead	0.496	0.417	"								
Magnesium	5.17	4.17	"								
Manganese	1.23	0.417	"								
Nickel	0.853	0.830	"								
Potassium	ND	4.17	"								
Selenium	ND	2.08	"								
Silver	ND	0.420	"								
Sodium	ND	41.7	"								
Thallium	ND	2.08	"								
Vanadium	ND	0.830	"								
Zinc	3.07	2.08	"								

Duplicate (BK21139-DUP1) *Source sample: 22K0800-46 (Duplicate) Prepared: 11/17/2022 Analyzed: 11/23/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Aluminum	3120	4.63	mg/kg dry		3710				17.5	35	
Antimony	ND	2.32	"		ND					35	
Arsenic	8.95	1.39	"		8.79				1.85	35	
Barium	107	2.31	"		95.8				11.0	35	
Beryllium	ND	0.047	"		ND					35	
Cadmium	ND	0.278	"		ND					35	
Calcium	14200	4.64	"		18200				24.8	35	
Chromium	9.73	0.464	"		10.6				8.79	35	
Cobalt	4.58	0.370	"		4.78				4.13	35	
Copper	52.7	1.85	"		57.9				9.39	35	
Iron	17300	23.2	"		19200				10.5	35	
Lead	131	0.464	"		133				1.52	35	
Magnesium	6570	4.64	"		9070				32.0	35	
Manganese	115	0.464	"		119				2.79	35	
Nickel	15.1	0.923	"		15.3				0.784	35	
Potassium	492	4.64	"		536				8.67	35	
Selenium	3.82	2.32	"		3.18				18.3	35	
Silver	ND	0.467	"		ND					35	
Sodium	ND	46.4	"		ND					35	
Thallium	ND	2.32	"		ND					35	
Vanadium	31.0	0.923	"		32.8				5.67	35	
Zinc	58.2	2.31	"		56.4				3.04	35	

Batch BK21139 - EPA 3050B

Matrix Spike (BK21139-MS1) *Source sample: 22K0800-46 (Matrix Spike) Prepared: 11/17/2022 Analyzed: 11/23/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Aluminum	3510	4.63	mg/kg dry	185	3710	NR	75-125	Low Bias			
Antimony	10.5	2.32	"	23.2	ND	45.4	75-125	Low Bias			
Arsenic	188	1.39	"	185	8.79	96.7	75-125				
Barium	283	2.31	"	185	95.8	101	75-125				
Beryllium	2.59	0.047	"	4.64	ND	55.8	75-125	Low Bias			
Cadmium	4.16	0.278	"	4.64	ND	89.8	75-125				
Calcium	23800	4.64	"	92.7	18200	NR	75-125	High Bias			
Chromium	26.6	0.464	"	18.5	10.6	86.1	75-125				
Cobalt	46.5	0.370	"	46.4	4.78	90.1	75-125				
Copper	74.2	1.85	"	23.2	57.9	70.1	75-125	Low Bias			
Iron	18500	23.2	"	92.7	19200	NR	75-125	Low Bias			
Lead	174	0.464	"	46.4	133	88.3	75-125				
Magnesium	11300	4.64	"	92.7	9070	NR	75-125	High Bias			
Manganese	162	0.464	"	46.4	119	92.9	75-125				
Nickel	55.9	0.923	"	46.4	15.3	87.8	75-125				
Potassium	750	4.64	"	92.7	536	231	75-125	High Bias			
Selenium	176	2.32	"	185	3.18	93.1	75-125				
Silver	4.78	0.467	"	4.64	ND	103	75-125				
Sodium	ND	46.4	"	92.7	ND		75-125	Low Bias			
Thallium	124	2.32	"	185	ND	67.1	75-125	Low Bias			
Vanadium	69.7	0.923	"	46.4	32.8	79.7	75-125				
Zinc	84.6	2.31	"	46.4	56.4	60.8	75-125	Low Bias			

Post Spike (BK21139-PS1) *Source sample: 22K0800-46 (Post Spike) Prepared: 11/17/2022 Analyzed: 11/23/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Aluminum	42.9		ug/mL	2.00	40.1	141	75-125	High Bias			
Antimony	0.307		"	0.250	0.023	114	75-125				
Arsenic	2.33		"	2.00	0.095	112	75-125				
Barium	3.24		"	2.00	1.03	110	75-125				
Beryllium	0.035		"	0.0500	-0.019	70.5	75-125	Low Bias			
Cadmium	0.053		"	0.0500	0.0002	106	75-125				
Calcium	195		"	1.00	197	NR	75-125	Low Bias			
Chromium	0.325		"	0.200	0.115	105	75-125				
Cobalt	0.579		"	0.500	0.052	105	75-125				
Copper	0.927		"	0.250	0.625	121	75-125				
Iron	205		"	1.00	207	NR	75-125	Low Bias			
Lead	1.98		"	0.500	1.43	109	75-125				
Magnesium	97.1		"	1.00	97.8	NR	75-125	Low Bias			
Manganese	1.82		"	0.500	1.28	107	75-125				
Nickel	0.689		"	0.500	0.165	105	75-125				
Potassium	6.80		"	1.00	5.79	101	75-125				
Selenium	2.23		"	2.00	0.034	110	75-125				
Silver	0.050		"	0.0500	-0.009	99.6	75-125				
Sodium	0.767		"	1.00	-1.31	76.7	75-125				
Thallium	2.13		"	2.00	-0.003	107	75-125				
Vanadium	0.891		"	0.500	0.354	107	75-125				
Zinc	1.11		"	0.500	0.609	99.6	75-125				

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Batch BK21139 - EPA 3050B											
Reference (BK21139-SRM1)							Prepared: 11/17/2022 Analyzed: 11/22/2022				
Aluminum	7600	4.17	mg/kg wet	7970		95.3	49.7-150.6				
Antimony	67.6	2.08	"	136		49.7	20.4-249.3				
Arsenic	90.9	1.25	"	87.4		104	70-130.4				
Barium	349	2.08	"	347		101	75.2-130.3				
Beryllium	97.1	0.042	"	103		94.2	74.8-132				
Cadmium	151	0.250	"	160		94.2	75-145.6				
Calcium	4040	4.17	"	4100		98.4	71.7-139.3				
Chromium	220	0.417	"	231		95.4	70.1-134.2				
Cobalt	234	0.333	"	241		97.0	75.1-141.5				
Copper	155	1.67	"	144		108	75-126.4				
Iron	11900	20.8	"	14200		83.5	35.3-164.8				
Lead	260	0.417	"	266		97.7	74.1-125.9				
Magnesium	2140	4.17	"	2220		96.6	61.3-138.7				
Manganese	540	0.417	"	555		97.3	77.3-132.8				
Nickel	340	0.830	"	350		97.3	70-144				
Potassium	1950	4.17	"	1940		101	58.2-141.8				
Selenium	140	2.08	"	130		107	66.9-133.8				
Silver	59.9	0.420	"	57.1		105	70.2-129.8				
Sodium	44.1	41.7	"	117		37.6	30.5-170.1				
Thallium	75.8	2.08	"	75.4		101	64.3-135.3				
Vanadium	78.9	0.830	"	88.6		89.0	65.6-134.3				
Zinc	150	2.08	"	160		93.5	70-130				
Batch BK21189 - EPA 3050B											
Blank (BK21189-BLK1)							Prepared: 11/18/2022 Analyzed: 11/22/2022				
Aluminum	8.95	4.17	mg/kg wet								
Antimony	ND	2.08	"								
Arsenic	ND	1.25	"								
Barium	ND	2.08	"								
Beryllium	ND	0.042	"								
Cadmium	ND	0.250	"								
Calcium	29.6	4.17	"								
Chromium	ND	0.417	"								
Cobalt	ND	0.333	"								
Copper	ND	1.67	"								
Iron	ND	20.8	"								
Lead	ND	0.417	"								
Magnesium	ND	4.17	"								
Manganese	ND	0.417	"								
Nickel	ND	0.830	"								
Potassium	ND	4.17	"								
Selenium	ND	2.08	"								
Silver	ND	0.420	"								
Sodium	ND	41.7	"								
Thallium	ND	2.08	"								
Vanadium	ND	0.830	"								
Zinc	2.46	2.08	"								

Batch BK21189 - EPA 3050B

Duplicate (BK21189-DUP1) *Source sample: 22K0865-01 (Duplicate) Prepared: 11/18/2022 Analyzed: 11/23/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Aluminum	14600	5.31	mg/kg dry		14600				0.0257	35	
Antimony	ND	2.66	"		ND					35	
Arsenic	ND	1.59	"		ND					35	
Barium	67.4	2.65	"		62.0				8.32	35	
Beryllium	ND	0.054	"		ND					35	
Cadmium	ND	0.319	"		ND					35	
Calcium	1350	5.32	"		1200				12.3	35	
Chromium	28.1	0.532	"		30.4				7.88	35	
Cobalt	9.90	0.425	"		10.9				9.48	35	
Copper	25.1	2.13	"		25.3				0.982	35	
Iron	21600	26.6	"		22800				5.21	35	
Lead	41.4	0.532	"		15.3				92.2	35	Non-dir.
Magnesium	4650	5.32	"		4970				6.63	35	
Manganese	359	0.532	"		440				20.5	35	
Nickel	21.1	1.06	"		22.4				6.23	35	
Potassium	1370	5.32	"		1480				7.84	35	
Selenium	4.18	2.66	"		3.18				27.3	35	
Silver	ND	0.536	"		ND					35	
Sodium	ND	53.2	"		ND					35	
Thallium	ND	2.66	"		ND					35	
Vanadium	36.2	1.06	"		38.4				5.87	35	
Zinc	65.5	2.65	"		53.3				20.6	35	

Matrix Spike (BK21189-MS1) *Source sample: 22K0865-01 (Matrix Spike) Prepared: 11/18/2022 Analyzed: 11/23/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Aluminum	14800	5.31	mg/kg dry	213	14600	71.8	75-125	Low Bias			
Antimony	7.85	2.66	"	26.6	ND	29.5	75-125	Low Bias			
Arsenic	181	1.59	"	213	ND	85.4	75-125				
Barium	260	2.65	"	213	62.0	93.0	75-125				
Beryllium	ND	0.054	"	5.32	ND		75-125	Low Bias			
Cadmium	4.62	0.319	"	5.32	ND	86.9	75-125				
Calcium	1270	5.32	"	106	1200	64.1	75-125	Low Bias			
Chromium	47.3	0.532	"	21.3	30.4	79.6	75-125				
Cobalt	56.5	0.425	"	53.2	10.9	85.9	75-125				
Copper	51.0	2.13	"	26.6	25.3	96.7	75-125				
Iron	21400	26.6	"	106	22800	NR	75-125	Low Bias			
Lead	88.0	0.532	"	53.2	15.3	137	75-125	High Bias			
Magnesium	4650	5.32	"	106	4970	NR	75-125	Low Bias			
Manganese	415	0.532	"	53.2	440	NR	75-125	Low Bias			
Nickel	68.0	1.06	"	53.2	22.4	85.6	75-125				
Potassium	1410	5.32	"	106	1480	NR	75-125	Low Bias			
Selenium	191	2.66	"	213	3.18	88.5	75-125				
Silver	4.12	0.536	"	5.32	ND	77.5	75-125				
Sodium	ND	53.2	"	106	ND		75-125	Low Bias			
Thallium	182	2.66	"	213	ND	85.4	75-125				
Vanadium	81.6	1.06	"	53.2	38.4	81.3	75-125				
Zinc	102	2.65	"	53.2	53.3	92.5	75-125				

Batch BK21189 - EPA 3050B

Post Spike (BK21189-PS1) *Source sample: 22K0865-01 (Post Spike) Prepared: 11/18/2022 Analyzed: 11/23/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Aluminum	140		ug/mL	2.00	137	137	75-125	High Bias			
Antimony	0.298		"	0.250	0.023	110	75-125				
Arsenic	2.08		"	2.00	-0.106	104	75-125				
Barium	2.74		"	2.00	0.583	108	75-125				
Beryllium	-0.011		"	0.0500	-0.062		75-125	Low Bias			
Cadmium	0.053		"	0.0500	0.001	104	75-125				
Calcium	11.4		"	1.00	11.3	9.53	75-125	Low Bias			
Chromium	0.499		"	0.200	0.286	107	75-125				
Cobalt	0.626		"	0.500	0.102	105	75-125				
Copper	0.532		"	0.250	0.238	117	75-125				
Iron	217		"	1.00	214	251	75-125	High Bias			
Lead	0.692		"	0.500	0.144	110	75-125				
Magnesium	48.9		"	1.00	46.7	212	75-125	High Bias			
Manganese	4.70		"	0.500	4.14	112	75-125				
Nickel	0.740		"	0.500	0.211	106	75-125				
Potassium	15.3		"	1.00	14.0	131	75-125	High Bias			
Selenium	2.19		"	2.00	0.030	108	75-125				
Silver	0.036		"	0.0500	-0.014	71.8	75-125	Low Bias			
Sodium	-4.57		"	1.00	-6.57		75-125	Low Bias			
Thallium	2.08		"	2.00	-0.037	104	75-125				
Vanadium	0.879		"	0.500	0.361	104	75-125				
Zinc	1.02		"	0.500	0.501	105	75-125				

Reference (BK21189-SRM1) Prepared: 11/18/2022 Analyzed: 11/22/2022

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Aluminum	7640	4.17	mg/kg wet	7970		95.8	49.7-150.6				
Antimony	70.7	2.08	"	136		52.0	20.4-249.3				
Arsenic	90.3	1.25	"	87.4		103	70-130.4				
Barium	340	2.08	"	347		97.9	75.2-130.3				
Beryllium	96.4	0.042	"	103		93.6	74.8-132				
Cadmium	150	0.250	"	160		94.0	75-145.6				
Calcium	3900	4.17	"	4100		95.1	71.7-139.3				
Chromium	220	0.417	"	231		95.4	70.1-134.2				
Cobalt	233	0.333	"	241		96.6	75.1-141.5				
Copper	155	1.67	"	144		108	75-126.4				
Iron	12400	20.8	"	14200		87.6	35.3-164.8				
Lead	262	0.417	"	266		98.6	74.1-125.9				
Magnesium	2100	4.17	"	2220		94.5	61.3-138.7				
Manganese	545	0.417	"	555		98.1	77.3-132.8				
Nickel	341	0.830	"	350		97.3	70-144				
Potassium	1920	4.17	"	1940		99.1	58.2-141.8				
Selenium	132	2.08	"	130		102	66.9-133.8				
Silver	59.3	0.420	"	57.1		104	70.2-129.8				
Sodium	ND	41.7	"	117			30.5-170.1	Low Bias			
Thallium	72.3	2.08	"	75.4		95.9	64.3-135.3				
Vanadium	79.9	0.830	"	88.6		90.1	65.6-134.3				
Zinc	151	2.08	"	160		94.3	70-130				

Mercury by EPA 7000/200 Series Methods - Quality Control Data

York Analytical Laboratories, Inc. - Stratford

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Batch BK21542 - EPA 7473 soil											
Blank (BK21542-BLK1)								Prepared & Analyzed: 11/25/2022			
Mercury	ND	0.0300	mg/kg wet								
Duplicate (BK21542-DUP1)	*Source sample: 22K0754-01 (SB-01 3-4)							Prepared & Analyzed: 11/25/2022			
Mercury	2.22	0.0341	mg/kg dry		2.87				25.6	35	
Matrix Spike (BK21542-MS1)	*Source sample: 22K0754-01 (SB-01 3-4)							Prepared & Analyzed: 11/25/2022			
Mercury	2.34		mg/kg	0.500	2.52	NR	75-125	Low Bias			
Reference (BK21542-SRM1)								Prepared & Analyzed: 11/25/2022			
Mercury	19.428		mg/kg	27.2		71.4	59.9-140.1				

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
Batch BK21497 - % Solids Prep											
Duplicate (BK21497-DUP1)	*Source sample: 22K0822-01 (Duplicate)							Prepared & Analyzed: 11/23/2022			
% Solids	92.4	0.100	%		92.7				0.323	20	
Batch BK21504 - % Solids Prep											
Duplicate (BK21504-DUP1)	*Source sample: 22K0880-04 (Duplicate)							Prepared & Analyzed: 11/23/2022			
% Solids	84.6	0.100	%		83.4				1.38	20	

Sample and Data Qualifiers Relating to This Work Order

M-SPKM	The spike recovery is not within acceptance windows due to sample non-homogeneity, or matrix interference.
M-DUPS	The RPD between the native sample and the duplicate is outside of limits due to sample non-homogeneity
M-BLK	The target analyte was detected above the RL in the batch method blank. All samples showed >10x the concentration in the blank for this analyte. Data are reported.
B	Analyte is found in the associated analysis batch blank. For volatiles, methylene chloride and acetone are common lab contaminants.

Definitions and Other Explanations

*	Analyte is not certified or the state of the samples origination does not offer certification for the Analyte.
ND	NOT DETECTED - the analyte is not detected at the Reported to level (LOQ/RL or LOD/MDL)
RL	REPORTING LIMIT - the minimum reportable value based upon the lowest point in the analyte calibration curve.
LOQ	LIMIT OF QUANTITATION - the minimum concentration of a target analyte that can be reported within a specified degree of confidence. This is the lowest point in an analyte calibration curve that has been subjected to all steps of the processing/analysis and verified to meet defined criteria. This is based upon NELAC 2009 Standards and applies to all analyses.
LOD	LIMIT OF DETECTION - a verified estimate of the minimum concentration of a substance in a given matrix that an analytical process can reliably detect. This is based upon NELAC 2009 Standards and applies to all analyses conducted under the auspices of EPA SW-846.
MDL	METHOD DETECTION LIMIT - a statistically derived estimate of the minimum amount of a substance an analytical system can reliably detect with a 99% confidence that the concentration of the substance is greater than zero. This is based upon 40 CFR Part 136 Appendix B and applies only to EPA 600 and 200 series methods.
Reported to	This indicates that the data for a particular analysis is reported to either the LOD/MDL, or the LOQ/RL. In cases where the "Reported to" is located above the LOD/MDL, any value between this and the LOQ represents an estimated value which is "J" flagged accordingly. This applies to volatile and semi-volatile target compounds only.
NR	Not reported
RPD	Relative Percent Difference
Wet	The data has been reported on an as-received (wet weight) basis
Low Bias	Low Bias flag indicates that the recovery of the flagged analyte is below the laboratory or regulatory lower control limit. The data user should take note that this analyte may be biased low but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.
High Bias	High Bias flag indicates that the recovery of the flagged analyte is above the laboratory or regulatory upper control limit. The data user should take note that this analyte may be biased high but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.
Non-Dir.	Non-dir. flag (Non-Directional Bias) indicates that the Relative Percent Difference (RPD) (a measure of precision) among the MS and MSD data is outside the laboratory or regulatory control limit. This alerts the data user where the MS and MSD are from site-specific samples that the RPD is high due to either non-homogeneous distribution of target analyte between the MS/MSD or indicates poor reproducibility for other reasons.

If EPA SW-846 method 8270 is included herein it is noted that the target compound N-nitrosodiphenylamine (NDPA) decomposes in the gas chromatographic inlet and cannot be separated from diphenylamine (DPA). These results could actually represent 100% DPA, 100% NDPA or some combination of the two. For this reason, York reports the combined result for n-nitrosodiphenylamine and diphenylamine for either of these compounds as a combined concentration as Diphenylamine.

If Total PCBs are detected and the target aroclors reported are "Not detected", the Total PCB value is reported due to the presence of either or both Aroclors 1262 and 1268 which are non-target aroclors for some regulatory lists.

2-chloroethylvinyl ether readily breaks down under acidic conditions. Samples that are acid preserved, including standards will exhibit breakdown. The data user should take note.

Certification for pH is no longer offered by NYDOH ELAP.

Semi-Volatile and Volatile analyses are reported down to the LOD/MDL, with values between the LOD/MDL and the LOQ being "J" flagged as estimated results.

For analyses by EPA SW-846-8270D, the Limit of Quantitation (LOQ) reported for benzidine is based upon the lowest standard used for calibration and is not a verified LOQ due to this compound's propensity for oxidative losses during extraction/concentration procedures and non-reproducible chromatographic performance.

YORK
ANALYTICAL LABORATORIES INC

Field Chain-of-Custody Record

York Analytical Laboratories, Inc. (YORK)'s Standard Terms & Conditions are listed on the back side of this document.
This document serves as your written authorization for YORK to proceed with the analyses requested below.
Your signature binds you to YORK's Standard Terms & Conditions.

120 Research Drive Stratford, CT 06615 132-02 89th Ave Queens, NY 11418 clientservices@yorklab.com www.yorklab.com 800-306-YORK 800-306-9675

YORK Project No. 22KC754

Page 1 of 3

YOUR Information	Report To:	Invoice To:
Company: GBTS	Company:	Company:
Address: 22 IBM Rd, Ste 101 Poughkeepsie NY 12601	Address: Same	Address: Same
Phone:	Phone:	Phone:
Contact:	Contact:	Contact: Brenda
E-mail:	E-mail:	E-mail:

YOUR Project Number: 22003-0092

YOUR Project Name: 22003-0092

YOUR PO#:

Turn-Around Time

- RUSH - Next Day ☐
- RUSH - Two Day ☐
- RUSH - Three Day ☐
- RUSH - Four Day ☐
- Standard (5-7 Day) ☒

Please print clearly and legibly. All information must be complete. Samples will not be logged in and the turn-around-time clock will not begin until any questions by YORK are resolved.

ERICK SALAZAR

Samples Collected by: (print AND sign your name)

Matrix Codes

- S - soil / solid
- GW - groundwater
- DW - drinking water
- WW - wastewater
- O - Oil | Other

Samples From

- New York ☒
- New Jersey ☐
- Connecticut ☐
- Pennsylvania ☐
- Other:

Report / EDD Type (circle selections)

- [✓ Summary Report]
- QA Report
- NY ASP A Package
- NY ASP B Package
- CT RCP
- CT RCP DQA/DUE
- NJDEP Reduced Deliverables
- NJDKQP
- [✓ Standard Excel EDD]
- EQuIS (Standard)
- NYSDEC EQuIS
- NJDEP SRP HazSite
- Other:

YORK Reg. Comp.

Compared to the following Regulation(s): (please fill in)
Part 375

Sample Identification	Sample Matrix	Date/Time Sampled	Analysis Requested	Container Description
SB-01 3-4	S	11/11/22	TAL Metals; pesticides	1x 8oz jar
SB-02 0-5C				
SB-03 5-7				
SB-04 5-6.5				
SB-05 0-5C				
SB-06 0-2				
SB-07 0-5C				
SB-08 1-2C				
SB-09 0-5C				
SS-01				

Comments: Surface samples (SS) collected from 0-4"
all samples frozen w/in 24 hours

Samples iced/chilled at time of lab pickup? circle Yes or No

Preservation: (check all that apply)
HCl ___ MeOH ___ HNO3 ___ H2SO4 ___ NaOH ___
ZnAc ___ Ascorbic Acid ___ Other: ___

Special Instruction
Field Filtered ☐
Lab to Filter ☐

mples Relinquished by / Company	Date/Time 11/14/22 9:50	1. Samples Received by / Company Chris C York	Date/Time 11-14-22 9:50
2. Samples Relinquished by / Company Chris C York	Date/Time 11-14-22 1735	mples Received by / Company	Date/Time
3. Samples Relinquished by / Company	Date/Time	3. Samples Received by / Company	Date/Time
mples Relinquished by / Company	Date/Time	4. Samples Received by / Company	Date/Time
Samples Received in LAB by	Date/Time 11/14/22 1735	Temperature 1.4 Degrees C	

YORK
ANALYTICAL LABORATORIES INC

Field Chain-of-Custody Record

York Analytical Laboratories, Inc. (YORK)'s Standard Terms & Conditions are listed on the back side of this document.
This document serves as your written authorization for YORK to proceed with the analyses requested below.
Your signature binds you to YORK's Standard Terms & Conditions.

120 Research Drive Stratford, CT 06615 - 132-02 89th Ave Queens, NY 11418 - 56 Church Hill Rd. #2 Newtown, CT 06470 clientservices@yorklab.com www.yorklab.com 800-306-YORK

YORK Project No. 22K0754

Page 2 of 3

YOUR Information	Report To:	Invoice To:	
Company: GBTS	Company:	Company:	**YOUR Project Number** 22003-0092
Address: 22 IBM Rd Ste 101 Poughkeepsie NY 12601	Address: Same	Address: Same	**YOUR Project Name** 22003-0092
Phone.:	Phone.:	Phone.:	
Contact: Erick SALAZAR	Contact:	Contact: Brenda	
E-mail:	E-mail:	E-mail:	**YOUR PO#:**

Turn-Around Time
- RUSH - Next Day ☐
- RUSH - Two Day ☐
- RUSH - Three Day ☐
- RUSH - Four Day ☐
- Standard (5-7 Day) ☒
- (7-10 for PFAS)

Please print clearly and legibly. All information must be complete. Samples will not be logged in and the turn-around-time clock will not begin until any questions by YORK are resolved.

ERICK SALAZAR

Samples Collected by: (print AND sign your name)

Matrix Codes
- S - soil / solid
- GW - groundwater
- DW - drinking water
- WW - wastewater
- O - Oil
- Other

Samples From
- New York ☒
- New Jersey ☐
- Connecticut ☐
- Pennsylvania ☐
- Other:

Report / EDD Type (circle selections)
- [✓ Summary Report]
- QA Report
- [✓ Standard Excel EDD]
- NY ASP B Package
- CT RCP
- CT RCP DQA/DUE
- NJDEP Reduced Deliverables
- EQuIS (Standard)
- NYSDEC EQuIS
- NJDKQP
- NJDEP SRP HazSite
- Other:

YORK Reg. Comp.
Compared to the following Regulation(s): (please fill in)
Part 375

Sample Identification	Sample Matrix	Date/Time Sampled	Analyses Requested	Container Type	No.
SS-02	S	11/11/22	TAL Metals; pesticides	1x 8oz jar	
SS-03			↓	↓	
SS-04			↓	↓	
SS-05			↓	↓	
SB-01 3.5			HOLD	1x VOA kit	
SB-02 0-5V			↓	↓	
SB-03 6			↓	↓	
SB-04 5			↓	↓	
SB-05 0-5V			↓	↓	
SB-06 1			↓	↓	

Comments: Surface samples (SS) collected from 0-4"
all samples frozen w/in 24 hours

Samples iced/chilled at time of lab pickup? circle Yes or No

Preservation: (check all that apply)
HCl ___ MeOH ___ HNO3 ___ H2SO4 ___ NaOH ___
ZnAc ___ Ascorbic Acid ___ Other: ___

Special Instruction
Field Filtered ☐
Lab to Filter ☐

Samples Relinquished by / Company	Date/Time 11/14/22 9:50	1. Samples Received by / Company Chris C York	Date/Time 11-14-22 9:50	2. Samples Relinquished by / Company Chris C York	Date/Time 11-14-22 1738
Samples Received by / Company	Date/Time	3. Samples Relinquished by / Company	Date/Time	3. Samples Received by / Company	Date/Time
Samples Relinquished by / Company	Date/Time	4. Samples Received by / Company	Date/Time	Samples Received in LAB by	Date/Time 11/14/22 1738

Temperature 1.4 Degrees C

YORK ANALYTICAL LABORATORIES INC

Field Chain-of-Custody Record

York Analytical Laboratories, Inc. (YORK)'s Standard Terms & Conditions are listed on the back side of this document.
This document serves as your written authorization for YORK to proceed with the analyses requested below.
Your signature binds you to YORK's Standard Terms & Conditions.

120 Research Drive Stratford, CT 06615 - 132-02 89th Ave Queens, NY 11418 - 56 Church Hill Rd. #2 Newtown, CT 06470 clientservices@yorklab.com www.yorklab.com 800-306-YORK

YORK Project No. 22KC754

Page 3 of 3

YOUR Information	Report To:	Invoice To:
Company: GBTS	Company:	Company:
Address: 22 IBM Rd Ste 101 Poughkeepsie NY 12601	Address: Same	Address: Same
Phone.:	Phone.:	Phone.:
Contact: Erick Salazar	Contact:	Contact: Brenda Wells
E-mail:	E-mail:	E-mail:

YOUR Project Number: 22003-0092

YOUR Project Name: 22003-0092

YOUR PO#:

Turn-Around Time

RUSH - Next Day	☐
RUSH - Two Day	☐
RUSH - Three Day	☐
RUSH - Four Day	☐
Standard (5-7 Day)	☒
(7-10 for PFAS)	

Please print clearly and legibly. All information must be complete. Samples will not be logged in and the turn-around-time clock will not begin until any questions by YORK are resolved.

Erick Salazar

Samples Collected by: (print AND sign your name)

Matrix Codes

- S - soil / solid
- GW - groundwater
- DW - drinking water
- WW - wastewater
- O - Oil
- Other

Samples From

New York	☒
New Jersey	☐
Connecticut	☐
Pennsylvania	☐
Other:	

Report / EDD Type (circle selections)

[✓ Summary Report]	CT RCP	EQuIS (Standard)
QA Report	CT RCP DQA/DUE	NYSDEC EQuIS
[✓ Standard Excel EDD]	NJDEP Reduced Deliverables	NJDKQP
NY ASP B Package		NJDEP SRP HazSite
Other:		

YORK Reg. Comp.
Compared to the following Regulation(s): (please fill in)
Part 375

Sample Identification	Sample Matrix	Date/Time Sampled	Analyses Requested	Container Type	No.
SB-07 0-5 ✓	S	11/11/22	HOLD	1x VOA kit	
SB-08 1-2 ✓	↓	↓	↓	↓	
SB-09 0-5 ✓					

Comments:
all samples Frozen w/in 24 hours

Samples iced/chilled at time of lab pickup? circle Yes or No

Preservation: (check all that apply)
HCl ___ MeOH ___ HNO3 ___ H2SO4 ___ NaOH ___
ZnAc ___ Ascorbic Acid ___ Other: ___

Special Instruction

Field Filtered	☐
Lab to Filter	☐

Samples Relinquished by / Company	Date/Time 11/14/22 9:50	1. Samples Received by / Company Chris C York	Date/Time 11-14-22	2. Samples Relinquished by / Company Chris C York	Date/Time 11-14-22 1731
Samples Received by / Company	Date/Time	3. Samples Relinquished by / Company	Date/Time	3. Samples Received by / Company	Date/Time
Samples Relinquished by / Company	Date/Time	4. Samples Received by / Company	Date/Time	Samples Received in LAB by	Date/Time 11/14/22 1731 Temperature 1.4 Degrees C