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ENVIRONMENT
& HEALTH

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Vanadium Corporation of America Site OU#3 (#932001)
Baseline Sampling Plan

Dear Mr. Zwack:

On behalf of National Grid and the New York Power Authority (NYPA), this letter details the Work Plan for the collection and analysis of groundwater and surface water samples at the Vanadium Corporation of America Site located in Niagara Falls, NY. The purpose of the efforts identified in the Work Plan is to collect baseline water quality information for use in establishing parameters to be used in the post-closure monitoring program that will be documented in the Site Management Plan (SMP).

Date March 4, 2021

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Monitoring Well Network

As outlined in the Work Plan dated April 5, 2019, eleven groundwater monitoring wells were installed at the site between December 1, 2020 and December 9, 2020. Approximate locations of these wells are shown on **Figure 1**. Nine of the wells were constructed to screen the upper portion of a glacio-lacustrine deposit layer consisting primarily of clays, silts, sands, and gravels. Three of the wells were constructed to screen the interface between the glacial till unit and the bedrock surface. **Table 1** below details well construction information.

Table 1 Well Construction Information

Location ID	Ground Surface Elevation	Total Depth (ft bgs)	Diameter	Screened Interval (ft bgs)	
				Top	Bottom
MW-30	TBD	9	2″	5	9
MW-31	TBD	17	2″	14	17
MW-18R	TBD	11	2″	6	11
MW-26R	TBD	13	2″	8	13
MW-29R	TBD	9	2″	6	9
MW-16R	TBD	11	2″	6	11
MW-24R	TBD	10	2″	8	10
MW-32	TBD	11	2″	8	11
MW-16RI	TBD	17	2″	14	17
MW-24RI	TBD	16.5	2″	14.5	16.5
MW-32I	TBD	18	2″	16	18

Of note, four of the shallow wells (*MW-18R, MW-26R, MW-29R, MW-16R*) were noted as having no water present following installation. This was not unexpected as the upper water bearing unit was noted to be a perched groundwater condition in the 2006 Remedial Investigation (RI) report prepared by CRA and the original shallow wells intersected the overlying fill material. In addition, the site conditions were noticeably dry in December. It is expected that these wells will contain water during wet seasons.

Baseline Sampling

The baseline sampling will consist of two sets of groundwater samples and one set of surface water samples. Groundwater samples from the first sampling event will be analyzed for volatile organic compounds (VOCs), Resource Conservation and Recovery Act (RCRA)-list metals, hexavalent chromium and pH (field measurement). The data from the first event will be used to select the parameters for the second sampling event and three wells which be analyzed for emerging contaminants (PFAS and 1,4 Dioxane). The surface water sampling event will coincide with the second groundwater sampling event. Three surface water samples will be collected and analyzed for RCRA metals, hexavalent chromium and pH (field measurement). Details pertaining to the sampling and analysis procedures are provided below.

Groundwater Sampling Procedures

Water levels will be measured at each of the monitoring wells prior to collection of the groundwater samples. Groundwater samples will be collected using low-flow methods with a peristaltic pump and associated tubing. Each well will be purged and sampled at a flow rate between 100 milliliters per minute (ml/min) and 500 ml/min. During purging, depth to water will be measured every 3 to 5 minutes. The flow rate will be adjusted such that purging does not induce drawdown greater than 0.3 feet. Water quality parameters will be measured during purging using an in-line flow cell equipped with temperature, conductivity, pH, oxidation-reduction potential (ORP), and, dissolved oxygen (DO) probes. Turbidity readings will also be obtained from groundwater prior to the flow cell via an in-line bypass valve. The water quality measurements will be recorded at the same frequency as the depth to water measurements. Purging will be deemed complete when the water quality parameters are consistent for at least three consecutive measurements in accordance with the following stabilization criteria:

- pH within ±0.1 Standard Units (SU)
- Specific conductivity within ±3%
- ORP within ±10 millivolts (mV)
- DO within ±10%
- Turbidity within ±10% (ideally less than 50 nephelometric turbidity units [NTUs])

Visual and olfactory observations will also be noted at the start and end of purging. The field observations and measurements will be recorded on a low-flow groundwater sampling form.

Should the well yield be insufficient to maintain the water level within 0.3 ft of static at a flow rate of 100 ml/min, the well will be purged to dryness and the sample will be collected following recovery of a sufficient volume of water.

After stabilization, the flow cell will be detached from the discharge tubing and samples will be collected directly from the tubing into pre-labelled containers provided by the laboratory.

Quality Assurance/Quality Control (QA/QC) samples consisting of a field duplicate, matrix spike and matrix spike duplicate will be collected for analysis at a frequency of 1 per 20 samples. In addition, trip blanks will accompany each shipment of samples containing VOC samples. Trip blanks will only be analyzed for VOCs.

The sample identifier, location, date, time, and sample collector will be recorded on a groundwater sampling form and a chain-of-custody form. The collected groundwater samples will be hand delivered to the Eurofins laboratory in Amherst, New York for analysis. As the samples for hexavalent chromium has a holding time of 24 hours, the samples will be delivered daily.

Emerging Contaminant Sampling and Handling Requirements

The following procedures will also be followed during the sampling event that includes analysis of select wells for emerging contaminant analysis. The groundwater samples will be collected using low-flow methods as outlined for the normal sampling events.

After stabilization, the flow-thru cell will be detached from the discharge tubing and samples will be collected directly from the tubing into pre-labelled, polypropylene or high-density polyethylene (HDPE), Teflon®-free laboratory-provided containers. The 1,4-dioxane samples will be collected after the PFAS sample has been collected. The samples will be collected while wearing appropriate personal protective equipment (PPE). A list of PFAS-related precautions for sample collection to minimize sample contamination is detailed in the Field Guidance Document (FGD) provided in **Attachment 1**.

One set of quality control (QC) samples will be collected for the PFAS and 1,4-dioxane analyses. The QC samples for the PFAS and 1,4-dioxane analyses will each include one field duplicate sample, one matrix spike/matrix spike duplicate (MS/MSD) sample pair, and one equipment blank[1]. In addition, one field reagent blank[2] will be collected as part of the PFAS QC samples.

The sample identifier, location, date, time, and sample collector will be recorded on a groundwater sampling form and a chain-of-custody form. The collected samples will be hand delivered to the Eurofins TestAmerica (Eurofins) laboratory in Amherst, New York for analysis.

Surface Water Sampling

Information contained in the RI Report prepared by Conestoga, Rovers & Associates in 2006 indicates that surface water generally flows across the northern end of the fill area from the west and east and then southward along a drainage channel on located on the western property boundary to a culvert on the southwest corner of the Site. Although the remedy altered and channelized some of the drainage, the general surface water flow configuration has not changed.

Surface water samples will be collected from three locations, two of which have been selected based on field inspection and subsequent discussions with NYSDEC. One sample will be collected from the wetland area on the northeast end of the site, and a second sample will be collected from the ditch near the culvert on the southwest corner of the site. The location of the third sample will be identified in the field

[1] One equipment blank will be collected by passing PFAS-free water through an unused section of tubing.

[2] The field reagent blank is PFAS-free water supplied by the laboratory in a sample container that is transferred into an empty laboratory-supplied container in the field at the same location and time that one of the water samples is collected.

at the time the samples are collected with concurrence by NYSDEC. Approximate locations of the two identified surface water samples are shown on Figure 1.

Surface water samples will be collected from downstream to upstream. Samples will be collected using a clean jar or other disposable sampling device. pH and conductivity measurements will be made using field instruments at the time of sample collection. The collected samples will be transferred to laboratory containers and placed into a cooler for shipment to the laboratory for analysis.

The sample identifier, location, date, time, and sample collector will be recorded on a groundwater sampling form and a chain-of-custody form. The collected samples will be hand delivered to the Eurofins laboratory in Amherst, NY for analysis. As the samples for hexavalent chromium has a holding time of 24 hours the samples will be delivered daily.

Sample Analysis
Table 2 summarizes number of parent samples and associated QA/QC samples that will be collected for analysis during each sampling event.

The laboratory will provide a deliverable package that conforms to the requirements of New York State ASP Category B as well as an EQuIS 4-file electronic data deliverable (EDD). The data will be reviewed by a data validator and a Data Usability Summary Report (DUSR) will be prepared. Once validated, the EDD will be updated and data will be uploaded to the NYSDEC EQuIS database.

Reporting
A letter report will be prepared following receipt of the DUSR for the first set of groundwater analyses. This letter will include a table summarizing the constituents detected in each of the samples and as proposed analytical suite for the second set of groundwater samples. In addition, this letter will identify the three monitoring wells that will be sampled and analyzed for emerging contaminants.

A baseline summary report will be prepared following completion of the DUSR for the samples collected during the second sampling event. This document will include:

- An overview of the sampling event including number of wells sampled, the dates during which sampling events were conducted, and a discussion of any problems encountered, or deviations made to the program during a particular sampling event.
- A summary table of pH and validated analytical results compared to groundwater criteria
- A summary table of well construction information and groundwater elevation measurements
- Groundwater level elevation contour maps for each of the aquifer horizons.
- A discussion of the results compared to groundwater criteria
- An overview of the sampling and analysis plan to be included in the SMP.

Ground water sampling logs and analytical reports will be provided as attachments.

Should you have any questions pertaining to this information or the project in general, please contact Ed Holman of NYPA or Brian Stearns of National Grid.

Yours sincerely

William Monette, P.E.
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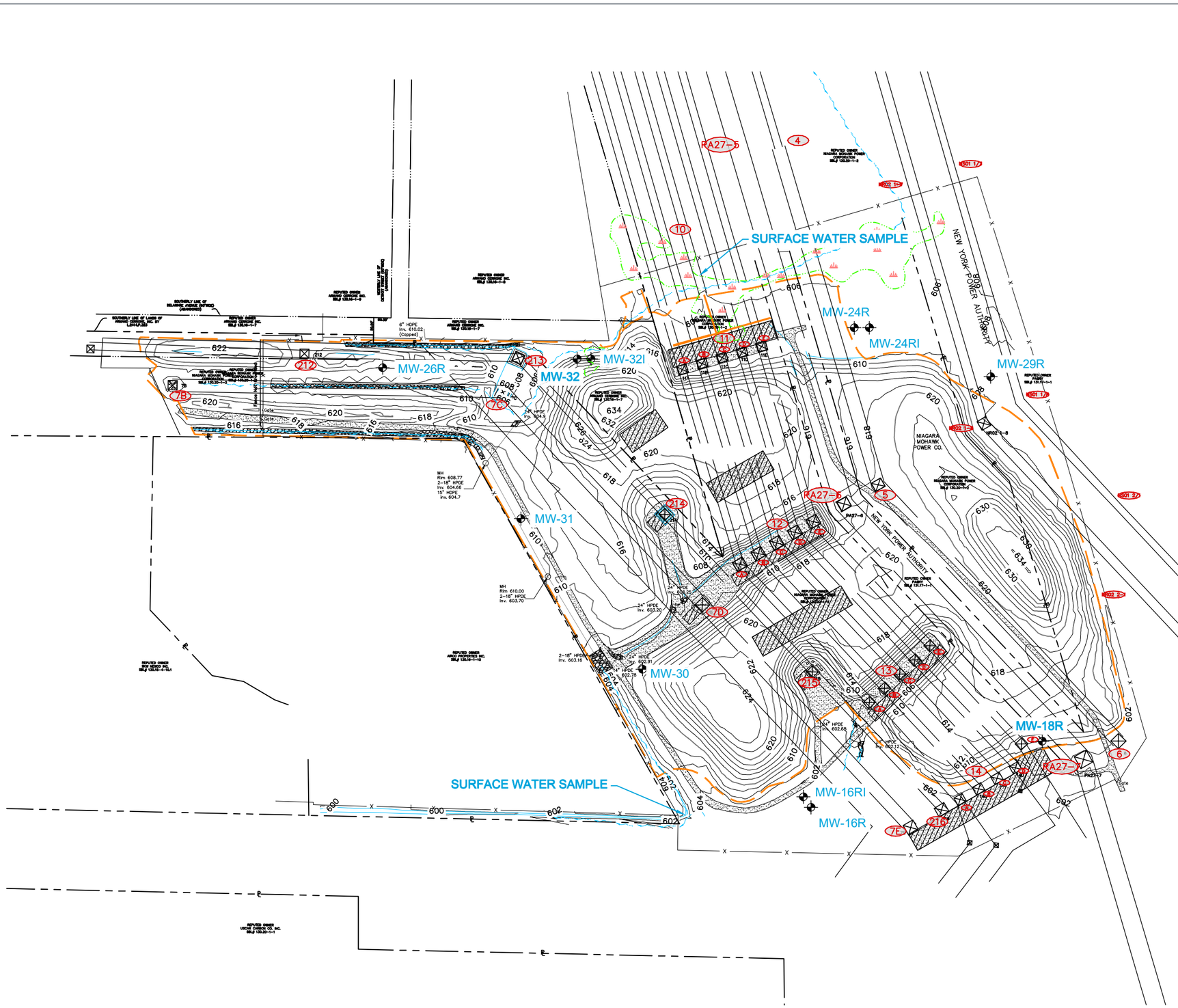
Table 2
Analytical Summary
Baseline Sampling Program

Vanadium Corporation of America OU3
Niagara Falls, NY

Samples	Matrix	Laboratory Analysis	Method	No. of Samples	Trip Blank	Field Duplicate	MS	MSD	Reagent Blank	Equip Blank	Total
Groundwater First Event	Water	RCRA Metals	6010C/ 7470A	11		1	1	1			14
		Hexavalent Chromium	7196A	11		1	1	1			14
		VOCs	8260	11	5	1	1	1			19
Groundwater Second Event	Water	RCRA Metals	6010C/ 7470A	TBD							0
		Hexavalent Chromium	7196A	TBD							0
		VOCs	8260	TBD							0
		PFAS	537.1	3		1	1	1	1	1	6
		1,4 Dioxane	8270-**SIM**	3		1	1	1		1	6
Surface Water	Water	RCRA Metals	6010C	3		1	1	1			6
		Mercury	7470A	3		1	1	1			6
		Hexavalent Chromium	7196A	3		1	1	1			6



NORTH

LEGEND

- MW-29R — MONITORING WELL
- UTILITY TOWER
- RIP-RAP
- GRAVEL ROAD/PULL PAD
- LIMITS OF CAP
- CHAIN LINK FENCE
- PROPERTY BOUNDARY

300' 0 300'

MONITORING WELL LOCATION PLAN
VANADIUM CORPORATION OF AMERICA

NIAGARA FALLS, NEW YORK

FIGURE 1

O'BRIEN & GERE ENGINEERS
A RAMBOLL COMPANY
333 WEST WASHINGTON ST SYRACUSE, NY 13202
315-956-6100

RAMBOLL

C:\Div71\National Grid Vanadium\Well Locations\Monitoring Well Location Plan - FIG1 with wires.dwg
PROJECT: 1118.50443 DATED: 2/18/2021 11:50 AM DESIGNER: HULLMW

PFAS Sampling Field Guidance Document

FIELD GUIDANCE DOCUMENT

PFAS SAMPLING

CONTENTS

ATTACHMENTS

1. INTRODUCTION

This Field Guidance Document (FGD) supplements and modifies the general guidelines provided in other FGDs developed by Ramboll US Corporation (Ramboll) where environmental samples are to be collected for laboratory analysis of per- and polyfluoroalkyl substances (PFAS). These supplemental guidelines are based on evolving recommendations being developed by various regulatory agencies (refer to **Attachment A**). While this document focuses primarily on groundwater sampling procedures, the guidelines presented in this FGD can be readily applied to sampling of other media (i.e., soil, surface water, sediment, storm and sanitary sewers). Consult with the PFAS Subject Matter Expert (SME) team (refer to **Attachment B**) to develop site-specific procedures for these media and other associated activities (e.g., drilling, well installation).

Due to the widespread use of PFAS (applications include food wrappers, water repellent outdoor gear, firefighting foams, mist suppressants, wire/cable coatings, specialty fabrics, and even car wash and ski wax materials) and the very low target detection limits (nanograms per liter, ng/L), specific measures should be implemented during sampling for PFAS to enhance sample integrity and generate representative data. Potential causes of non-representative PFAS results stem from (a) most commonly, the inadvertent introduction of PFAS into the sample through sampling equipment/supplies, personal care products (PCPs) and personnel protective equipment (PPE), or (b) the inadvertent loss of PFAS to the environment or equipment used in sample collection, which is less common but still requires diligence on the part of the sampling team. The procedures outlined in this FGD are to be used along with the latest versions of the PFAS Pre-Sampling Checklist in **Attachment C**.

Although this FGD supplements guidelines for collection of samples associated with typical field activities and projects, it should be understood that for certain projects, more specific sampling procedures, including site-specific or state-specific or regulatory program-specific guidelines, requirements, or procedures may be applicable. Specific requirements for each project will be reviewed by the Ramboll Project Officer/Director and Project Manager (PM) in consultation with the PFAS SME team (refer to **Attachment B**), and any additional requirements will be defined in a project-specific Work Plan, Field Sampling Plan, or Quality Assurance Project Plan (QAPP). It should be emphasized that this FGD is not meant to serve as a project-specific work plan, but as a reference for developing project- specific requirements.

This FGD does not supersede Ramboll health and safety procedures or site-specific Health and Safety Plan (HASP) requirements; in the event of conflict between this FGD and the site-specific HASP, the procedures outlined in the HASP shall prevail. Ramboll employees shall follow the guidelines, rules, and procedures contained in the site-specific HASP, followed by approved site-specific procedures, which may include those in this FGD. The Ramboll Project Officer/Director and/or PM shall verify that project field personnel review and sign the applicable HASP, and that the signed HASP and relevant project information are maintained in the project file for the duration of the project, or as established by Ramboll's applicable document handling and retention policies. The signatures of the Project Officer/Director and/or PM indicate approval of the methods and precautions outlined in the site-specific HASP.

For ease of reference, the procedures outlined in this FGD are color coded as follows:

- A red dot (●) identifies items or materials that are understood to contain PFAS or that PFAS are used in their manufacture and **should not be used** when sampling for PFAS.
- A yellow triangle (▲) identifies items or materials for which the potential for PFAS bias or cross-contamination is not fully understood and **may be allowable with special considerations** and/or adjustment to protocols after consultation with the PFAS SME team (refer to **Attachment B**).
- A green square (■) identifies items or materials that are understood to not be sources of PFAS bias or cross-contamination and are **allowed or preferred** when sampling.

2. EQUIPMENT/MATERIALS

Equipment and materials required for environmental sampling for PFAS analyses are generally the same as those typically required for collection of environmental samples for other analyses, except that PFAS sampling will impose certain restrictions to avoid use of PFAS containing items or material to avoid potential PFAS bias or cross-contamination. Refer to Equipment/Materials requirements detailed in the FGD for the specific sampling activity being performed, as modified in **Section 3.1** below.

Additional equipment may be specified in the site-specific HASP, Work Plan, Field Sampling Plan, or QAPP. More specialized sampling equipment may be required depending on the media being sampled, site conditions, and project-specific needs. Field personnel should understand and be familiar with the operation and safe handling of the equipment and materials that are required for PFAS sampling. A PFAS Pre-Sampling Checklist is provided in **Attachment C**. Refer to **Section 3.1** of this FGD regarding specific sampling equipment and material limitations.

3. PROCEDURES

3.1 Planning and Design Considerations

Strategic decisions will be approved by the Project Officer/Director and/or PM in consultation with the PFAS SME team before the initiation of associated field activities, and will be documented in the Work Plan, Field Sampling Plan, and/or QAPP. The Work Plan, Field Sampling Plan, and/or QAPP will be designed for the collection of quality data to meet the objectives of the site activities and will include information such as the location, depth, number of samples per location, and the laboratory analyses to be performed on each sample, as well as quality assurance/quality control (QA/QC) requirements. The Work Plan, Field Sampling Plan, and/or QAPP will generally provide some discretion in the field depending on the conditions encountered; however, significant departure from prescribed sampling activities should be discussed with and approved by the Project Officer/Director and/or PM.

When planning a PFAS sampling event, the following should be considered:

- *Laboratory Analysis*. The current state of practice for laboratory analysis for PFAS is continuing to evolve. The United States Environmental Protection Agency's (EPA's) third Unregulated Contaminant Monitoring Rule (UCMR3) required that Method 537 be used to analyze UCMR3 samples for perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), and four other PFAS in drinking water. Since then, Method 537.1 has been developed to quantify 18 PFAS in drinking water (including HFPO-DA or "GenX") using solid phase extraction (SPE) and liquid chromatography/tandem mass spectrometry (LC/MS/MS). EPA has also developed Method 533 to quantify 25 PFAS in drinking water by isotope dilution, anion exchange, SPE, and LC/MS/MS.

  The EPA is currently in the process of validating laboratory methodology for analysis of PFAS in non-drinking water matrices, including surface water, groundwater, wastewater, and solids. For non-drinking water samples, some U.S. laboratories have been commonly using "modified" methods based on Method 537.1. These modified methods often lack consistent sample collection or analytical guidelines and have not been validated or systematically assessed for data quality by a regulatory agency. However, most well-known laboratories can provide analysis of non-drinking water matrices using a modified Method 537.1 where the precision and accuracy are typically suitable to meet Ramboll's project objectives, with reporting limits typically in the ng/L or micrograms per kilogram (ug/kg) range for liquids and solids, respectively. For analyzing matrices other than drinking water, regulatory acceptance may be enhanced if the laboratory complies with quality control requirements provided in Table B-15 of the United States Department of Defense and Department of Energy Consolidated Quality Systems Manual (QSM) for Laboratories Version 5.3 dated 2019 (or later).

  As of the date of this document, EPA is currently developing several analytical methods for media other than drinking water, including:

  - **Method 8327**, which is designed to measure a group of 24 PFAS compounds in groundwater, surface water, and wastewater samples and is expected to:
    - Incorporate direct injection instead of SPE.
    - Retain LC/MS/MS for analyte resolution.
    - Not incorporate isotope dilution.

        - Be similar to American Society for Testing and Materials (ASTM) Method D7979 (a currently validated method for non-potable media).
        - Include a 24-analyte target compound list, including HFPO-DA ("Gen-X").
        - Allow sample holding times of 28 days.
        - Have target quantitation limits of 10 ng/L.
    - **Method 8328**, which is being developed to measure PFAS compounds in groundwater, surface water, wastewater and solid (soils, sediments, biosolids) samples expected to:
        - Retain SPE and therefore be a more complex method relative to direct injection.
        - Retain LC/MS/MS for analyte resolution.
        - Incorporate isotope dilution to account for matrix effects (e.g., sorption).
        - Intended to be more robust for complex matrices (e.g., wastewater influents, biosolids).
        - Include a 24-analyte target compound list, including HFPO-DA ("Gen-X").
        - Allow sample holding times of 28 days.
        - Have target quantitation limits of 10 ng/L.
    - **Method 3512**, which is a preparation procedure for diluting non-potable water samples with an organic solvent prior to analysis by the appropriate determinative method for PFAS in order to minimize sample size and solvent usage. The method is currently an appendix to Method 8327, but is expected to eventually become a standalone method.

  The laboratory methods to be used in support of a site-specific PFAS sampling program should be evaluated at the earliest stages of sampling program development, and should be discussed with the PFAS SME Team and/or the local regulatory agency(ies), as appropriate (refer to **Attachment B**).

  In addition, as outlined in **Section 3.8** below, consideration for QC sampling should be discussed with the laboratory at the early stages of planning or designing a PFAS sampling program.

- *PFAS-Free Water*. Water used for equipment decontamination should be "PFAS-free." For the purpose of this FGD, PFAS-free water is defined as water that does not contain any site-specific target PFAS analytes above laboratory detection limits. Since site or public water supplies have been identified in many instances to contain detectable levels of PFAS, confirmation of PFAS-free public water, if public water will be used for equipment decontamination on the project, through laboratory analysis should be performed prior to the commencement of work. Alternatively, laboratory-supplied and verified PFAS-free water can be used for sampling equipment decontamination.
- *Sampling Equipment*. PFAS sampling equipment can be divided into three major groups:
    - Equipment and materials to be **avoided**, which include:
        - Polytetrafluoroethylene (PTFE), including the trademarks Teflon® and Hostaflon®.
        - Fluorinated ethylene propylene (FEP), including the trademarks Teflon® FEP, Hostaflon® FEP, and Neoflon®.
        - Polyvinylidene fluoride (PVDF), including the trademark Kynar®.

- Polychlorotrifluoroethylene (PCTFE), including the trademark Neoflon®.
- Ethylene-tetrafluoroethylene (ETFE), including the trademark Tefzel®.
- Trademarks Viton®, Gore-Tex® and Decon 90® products with the term "fluoro" in the product name.
- Waterproof field notebooks.
- New clothing, as it may have fabric treatment applied.
- Post-It® notes or similar.
- Decon 90®.

– Equipment and materials that **may be permissible** pending discussion with a PFAS SME team member, which include:

▲ Chemical or blue ice is not known to be manufactured with PFAS-containing compounds; however, its use is to be avoided because blue ice packs are typically used across multiple sites and sampling events and may cross-contaminate samples from prior exposure to PFAS.

▲ Aluminum foil.

▲ Low-density polyethylene (LDPE) does not contain PFAS in the raw material but may contain PFAS contamination from the manufacturing process and should be avoided unless: (a) the manufacturer certifies the LDPE as PFAS-free; (b) it has been previously tested and demonstrated not to contain PFAS; and/or (c) an equipment blank of the product has been collected before initiation of field work to confirm the LDPE product does not impart measurable PFAS mass to the sample. For example, Ramboll has found equipment blanks performed on the LDPE double-bonded tubing from Leroy Plastics used for operating bladder pumps has consistently yielded non-detection results.

▲ Glass can sorb PFAS mass (specifically PFOS and other higher molecular weight PFSAs), potentially suppressing the analytical results. Unless alternate materials are not available, sample contact with glass surfaces should be avoided.

▲ Rental equipment, pumps, pressure washers, etc., where prior uses, care of maintenance, and an understanding or control of all relevant internal parts are not known.

▲ Permanent markers (e.g., Sharpies®) may be used in the staging area, but not the sampling area.

– Equipment and materials that are **preferred for use**, which include:

■ Loose-leaf paper, or notebooks that have not been coated with waterproofing materials may be used to record field notes.

■ LDPE storage bags (e.g., Ziploc®) that do not come into direct contact with the sample media may be used.

■ High-density polyethylene (HDPE), polypropylene, silicone, or acetate may be used.

■ HDPE, polypropylene, polyurethane, polyvinylchloride (PVC), silicone, stainless steel, neoprene, and nylon twine a permissible to come in contact with sampling media.

■ Alconox®, Liquinox® and Citranox® branded products may be used for equipment

decontamination.

- Waxed fabrics and well-washed cotton fabrics are preferred materials for clothing.
- Double-bagged water ice.
- Ball point pens or pencils are preferred for taking notes or writing in the sampling zone.
- Hercules Megaloc® thread compound by Oatey.
- Poly-Sal® brand drilling fluid additive/lubricant and PFAS-free pipe thread compounds that contain degradable guar gums are preferred materials to be used by drillers.

- *Field Clothing and Personal Protective Equipment*. Due to the extensive use of PFAS in many industries and products, and their unique properties in water and oil repellency, clothing (e.g., pants, jackets, boots, shoes, gloves, and jackets) and PPE may contain PFAS. During a PFAS investigation, clothing and PPE containing PFAS should be avoided to prevent cross-contamination. While preparing for sampling and to the extent reasonably possible, avoid clothing that has been advertised as having waterproof, water-repellant, or dirt and/or stain resistant characteristics as these types of clothing are more likely to have had PFAS used in their manufacturing. Consult with a PFAS SME as necessary, and allow common sense to prevail. For instance, a treated insulating undergarment used in the winter and covered by layers of well-washed over garments should be of little concern. Well-worn, treated work boots should likewise be of limited concern, provided typical care is taken to avoid excessive boot-to-equipment contact and boots are kept away from environmental samples or clean equipment when not being worn. Conversely, use of a brand-new treated rain jacket or newly treated boots should be avoided.

  Unless required by the site-specific HASP, field clothing and PPE to be **avoided** include:

  - Clothing that has recently been washed with fabric softener.
  - Coated (i.e., yellow) Tyvek®.
  - Clothing chemically treated for insect resistance and ultraviolet protection.
  - Clothing that has been treated with water and/or stain resistant coatings such as:
    - Any Teflon® fabric protectors (e.g., Gore Tex)
    - Any Scotchgard™ fabric protectors
    - Bionic Finish®
    - GreenShield®
    - High-Performance Release Teflon®
    - Lurotex Protector RL ECO®
    - NK Guard S series
    - Oleophobol CP®
    - Repel Teflon® fabric protector
    - Repellan KFC®
    - Resists Spills™ and Releases Stains™
    - RUCO®
    - RUCO-COAT®
    - RUCO-GUARD®
    - RUCO-PROTECT®
    - RUCOSTAR®
    - Rucostar® EEE6
    - RUCOTEC®
    - Ultra Release Teflon®
    - Unidyne™

The types of field clothing and PPE that are **permissible** include:

- ▲ Latex gloves may be used if necessary to satisfy site-specific HASP requirements; however, large sampling programs should consider submitting a sample of the glove material for testing of PFAS content. Further, some regulatory agencies or states (e.g., California) prohibit the use of latex sampling gloves, and latex gloves should not be used by individuals who are sensitive or allergic to latex.
- ▲ Weather-proof boots may be used as they are not likely to be in significant contact or proximity to sampling equipment (assuming best practices are followed).
- Powderless nitrile gloves.
- PVC or wax-coated fabrics.
- Clothing made from, containing, or treated with neoprene, polyurethane, or PVC.
- Synthetic and natural fibers (preferably cotton) that are well-laundered (more than six times with no fabric softener) clothes and cotton overalls.
- Non-coated (i.e., white) Tyvek.

- *Sun and Biological Protection*. Because sun and biological hazards (sunburn, mosquitos, ticks, etc.) may be encountered during sampling, the elimination of specific clothing materials or PPE (sunscreens and insect repellants) could pose a health and safety hazard to staff. The safety of field and contract staff must be the primary focus of decisions around site-specific field procedures and selection of sun and biological protection. With that in mind, however, any necessary deviations from this PFAS FGD must be made in consultation with a member of the Ramboll PFAS SME team.

  Ideally, rather than repellants and sunscreens, the preferences are (a) tucking pant legs into socks and/or boots to reduce exposed skin and reduce the risk of being bitten by ticks; (b) wearing well-washed, light-colored clothing to easily see ticks during field activities; and (c) wearing light-colored clothing, long sleeves, and large-brimmed hats to avoid sunburn. However, if it is necessary to use sunscreens and insect repellants, the following guidance is provided: (a) do not apply products near the sample collection area; (b) wash hands well following application or handling of sunscreen and/or repellents, and (c) subsequently don powderless nitrile gloves for the sampling activities.

  Other entities (e.g., the states of California, Michigan and New Hampshire) are constantly testing and updating products, the most recent of which have been listed below, to evaluate PFAS content. If required, sun and biological protection products **preferred for use** (however, care should be taken to use these exact products because similar products from the same brand may contain PFAS) include:

  - Alba Organics Natural Sunscreen
  - Aubrey Organics
  - Avon Skin So Soft Bug Guard-SPF 30
  - Baby Ganics
  - 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

- California Baby Natural Bug Spray
- Coppertone Sport High-Performance AccuSpray Sunscreen SPF 30
- Coppertone Sunscreen Lotion Ultra Guard Broad Spectrum SPF 50
- Coppertone Sunscreen Stick Kids SPF 55
- Herbal Armor
- Jason Natural Quit Bugging Me
- Jason Natural Sun Block
- Kiss My Face
- L'Oréal Silky Sheer Face Lotion 50+
- 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 Ultra-Sheer Dry-Touch Sunscreen Broad Spectrum SPF 30
- Repel Lemon Eucalyptus
- Sawyer Permethrin
- Yes To Cucumbers

▲ In addition, products listed as "baby-safe, "free," or "natural" are typically PFAS-free, however any of the above products are preferred

Some sampling guidance documents recommend that personal hygiene and personal care products (PCPs; e.g., cosmetics, shampoo, sunscreens, dental floss, toothpaste, etc.) not be used prior to and on the day(s) of sampling over concerns regarding the potential presence of PFAS in these products. If sampling protocols are followed however, these items should not come into contact with sampling equipment or samples being collected, and employing best practices while sampling will minimize the potential that these products, PFAS-containing or not, bias the PFAS analytical results. The following precautions should be taken when dealing with personal hygiene or PCPs before sampling:

- Do not handle or apply PCPs in the sampling area.
- Do not handle or apply PCPs while wearing PPE that will also be worn during sampling.

▲ For best practices, shower at the end of the workday.

▲ Hair nets can be used if hair care products are a concern as a potential PFAS source.

- Move to the staging area and remove PPE if applying PCPs becomes necessary.
- Wash hands after the handling or application of PCPs and, when finished, put on a fresh pair of powderless nitrile gloves.

- *Food Packaging*. PFAS have been used by the paper industry as a special protective coating against grease, oil, and water for paper and paperboards, including food packaging, since the late 1950s. PFAS application for food packaging includes paper

products that come into contact with food such as paper plates, food containers, bags, and wraps. In January 2016, the Food and Drug Administration banned the use of PFAS having eight or more carbon atoms (e.g., PFOA, PFOS and PFNA); however, short-chain PFAS have not been banned for use in the manufacturing of contact food materials in the U.S. and may still be present in the coating materials of some food wrappers.

When staff require a break to eat or drink, they must remove their gloves, coveralls, and any other PPE in the staging area and move to the designated area for food and beverage consumption (e.g., the "clean zone"). When finished, staff must wash their hands, then don any coveralls or other PPE, and, lastly, put on a fresh pair of powderless nitrile gloves immediately before sampling.

Other procedures to be followed include:

- Avoid handling, consuming, or otherwise interacting with pre-wrapped food or snacks, carry-out food, fast food, or other food items while on-site during sampling events.
- Move to the staging area and remove PPE prior to leaving the sampling and staging areas if consuming food on site becomes necessary.

- *Filtration*. Field-filtration must be avoided as field filtering may result in potential cross contamination. Further, PFOS and higher molecular weight PFSAs may sorb onto glass filters in the field or in the lab. If field-filtered samples for PFAS or other analytes are to be collected because of a client or regulator request:
  - Request clarification from the client or regulator regarding the intent of collecting filtered results (field or laboratory) and whether those results will be meaningful and/or necessary to meet the overall project goals for the PFAS sampling program.
  - Use low-flow sampling to the extent practical to avoid field-filtration.
  - Consider the use of centrifugation by the laboratory instead of filtration.
  - If filtering cannot be avoided, do not use glass, and control for the use of field-filtration by collection of equipment blanks from the filters and filtering equipment in contact with the samples and, if possible, a spiked (positive) control provided by the laboratory.

3.2 Pre-Field Work Preparation Guidelines

Before initiating field activities, field staff should review and complete pertinent tasks. Further, to the extent that non-dedicated, non-disposable equipment is to be used (e.g., water level indicator, trowel), to minimize potential cross-contamination between sampling locations (e.g., monitoring wells, soil borings), such equipment should be decontaminated before use as described in **Section 3.4** of this FGD. Used disposable equipment (e.g., tubing) that is considered investigation derived waste (IDW) should be managed in accordance with the Waste Handling FGD following the sampling event.

At a minimum, the following tasks should be completed to prepare field staff for implementation of the work:

- Review and sign the site-specific HASP.
- Comply with **SPI 27**.
- Coordinate and obtain permission for site access (as necessary).
- Review the project-specific Work Plan, Field Sampling Plan, and/or QAPP, where applicable.

- Review and discuss with the Project Officer/Director and/or PM the proposed Work Plan, Field Sampling Plan, QAPP or other sampling and testing strategy documentation.
- Document that the equipment and materials required to complete the work have been secured and packed prior to travel.
- Confirm sampling locations.

When ordering equipment or sampling materials, be sure to specify with the rental company and laboratory representative that the equipment is to be used for a PFAS sampling program. Analytical laboratories will need to supply suitable containers without affecting the concentration of constituents in the sample. Reputable field equipment rental companies will have their own protocols for preparing and supplying equipment intended for use in PFAS sampling programs, including such things as supplying multiparameter probes and water level meters that have been modified or specially manufactured to be Teflon-free and PFAS-free. Similarly, confirm that drillers and other subcontractors are aware that the proposed field activities will include sampling for PFAS constituents, and that all materials brought on site are to be PFAS- and Teflon-free. For example, a potable or non-potable water source to be used for equipment decontamination on a drilling program may need to be pre-tested to demonstrate that it is PFAS-free.

For large sites where equipment is driven from sampling location to sampling location, consider using two dedicated vehicles – a "dirty" vehicle used for transport and handling of ancillary equipment, and a "clean" vehicle used for transport and handling lab water, unused tubing, ice packs, bottleware, and coolers with samples.

Prior to initiating groundwater sampling activities, field personnel should field-verify the well identity and construction against available documentation (site plans, well construction logs, etc.). Typically, groundwater sampling or testing FGDs recommend "tagging" the bottom of the well as one means to verify the correct well is being sampled. In order to minimize introduction of materials and equipment into wells during PFAS sampling, it is recommended that for PFAS sampling depth-to-water readings necessary for low-flow sampling be collected first, followed by sampling for PFAS and any other required analytes, and last of all the well bottom be "tagged" for identification verification if necessary. If the well is found to have been incorrectly sampled, discard or relabel the samples, note in the field log, and notify the PM accordingly.

If dedicated equipment is encountered inside a monitoring well, obtain depth-to-water readings prior to disturbing the equipment, remove all equipment prior to sampling, and document (with photos, recommended) equipment encountered and measures taken prior to sampling. If the equipment or materials of construction are suspected of potentially compromising the PFAS sample integrity, contact the PM and PFAS SME team. Further, prior to the commencement of the field effort, field personnel should inspect, test, and/or calibrate equipment that may be used to take field measurements.

A preferred sampling sequence should be established in the Work Plan, Field Sampling Plan, and/or QAPP before the sampling event to reduce the risk of cross-contamination. In general, sampling should begin in areas where PFAS concentrations are known or expected to be lowest (i.e., upgradient or farthest downgradient), proceeding systematically to areas known or expected to have the highest PFAS concentrations (i.e., source areas). Samples known to be upgradient from all source areas should be sampled first, followed by those lateral to the suspected source areas, and then by those that are farthest downgradient from the suspected sources. Remaining locations should be progressively sampled from the most

distant downgradient to those closer to the known PFAS source, moving upgradient. Bear in mind "upgradient" may mean relative to groundwater movement and/or dominant air depositional directions.

When evaluating multiple aqueous media, consider carefully the order of sample collection. Assuming "typical" levels of PFAS in the environment, a multi-media sample collection scheme could be in the following order:

- Drinking water (e.g., residential wells).
- Surface water.
- Groundwater.
- Wastewater and/or leachate waters.

If collecting surface water and sediment samples, the surface water sample at a given location should be collected before the sediment sample, and the sampling should proceed from downstream sampling locations to upstream sampling locations. Since the concentration of PFAS at the air-water interface may be higher than the concentration within the water column, surface water samples should be generally be collected from below the air-water interface unless defined otherwise in the Work Plan, Field Sampling Plan, and/or QAPP.

3.3 General PFAS Sampling Guidelines

This FGD provides recommended practices for sampling of environmental media for PFAS analysis in addition to those related to the sampling activity itself.

- When sampling for PFAS, avoid placing samples in direct contact with cloth surfaces inside vehicles, especially newer vehicles.

- Subcontractors, as for Ramboll staff, are required to abide to the PFAS sampling requirements and restrictions outlined in the Work Plan, Field Sampling Plan, and/or QAPP. Once on site, inspect all lubricants, detergents, and any other equipment that will or could come in contact with environmental media to confirm that the subcontractor has understood and conforms to the requirements and restrictions outlined in the Work Plan, Field Sampling Plan and/or QAPP.

- Work areas may be covered areas with plastic (HDPE or LDPE) as long as no direct contact is made with the sampled media.
- If dedicated sampling equipment is found in a well, avoid using any in-well dedicated equipment for PFAS sampling until it is established to be PFAS-free. The equipment needs should be evaluated to see if it could be a source for PFAS as follows:
  - Retrieve the equipment from the well and collect an equipment blank from the equipment.
  - Sample the well using non-dedicated equipment brought to the site for the PFAS sampling program.
- At a minimum, change gloves between each sampling location, after collecting each QC sample, and after handling any non-sampling equipment (i.e., clipboards, coolers, sample labels, etc.).

3.4 Decontamination

All non-disposable equipment to be used in a PFAS sampling event should be decontaminated prior to first use, between sampling locations, and at end of each workday as described in the Sampling Equipment Decontamination, the project-specific Work Plan, Field Sampling Plan, and/or QAPP. In addition:

- Laboratory-supplied, PFAS-free water should be used for decontamination; commercially available deionized water in an HDPE container, or municipal drinking water, may be used for decontamination if the water is verified to be PFAS-free ahead of the field sampling program.
- Alconox®, Liquinox®, and Citranox® should be used as surfactants for equipment decontamination.
- Decon 90® should **not** be used.
- If sampling equipment requires manual scrubbing, use a polyethylene or PVC brush.
- Decontamination procedures should include a final triple-rinse with PFAS-free water.

When sampling sources (e.g., soil and/or groundwater in source areas, tanks, etc.), a more thorough decontamination should be performed between samples. In addition, increasing the frequency of equipment blanks should also be considered.

3.5 Sample Containers

As outlined in the Sample Handling, Shipping and Chain of Custody FGD, equipment and sample containers that will come into contact with aqueous, solid or gas media should be constructed of materials that will not affect the concentration of constituents in the sample. The sample container requirements should be outlined in the project-specific Work Plan, Field Sampling Plan, and/or QAPP.

All bottles used for PFAS sampling should come from the laboratory that will also be performing the PFAS analysis. Each sample container must be kept sealed at all times and only opened during the sample collection. The sampling container cap or lid must never be placed directly on the ground or on a surface that is not known to be PFAS-free.

The current standard is for samples to be submitted in containers (including caps/lids) made of polypropylene or HDPE. Glass sample containers should not be used due to potential loss of analyte through adsorption to glass. Most laboratories require a minimum volume of 250 milliliters (mL) to perform an analysis, with a duplicate bottle held in reserve in the event of analytical loss of the first bottle. This may change however when other methods are adopted (e.g., 15 ml vials are proposed for Method 8327, and ASTM D7979 requires the use of three vials). Coordination with the laboratory is recommended if collecting samples in an area or from a location where elevated PFAS concentrations are known or expected to occur.

3.6 Sample Preservation

Method 537.1 is a drinking water method and specifies the use of Trizma as a preservative for PFAS samples to remove any residual free chlorine. Trizma does not have a functional purpose for environmental samples, so it is not recommended for preservation of non-drinking water samples, and the "modified" Method 537.1 protocols of most laboratories allow for collection of non-reagent preserved samples. Although private supply wells

(residential, commercial or industrial) are used for drinking water, samples collected from private groundwater wells should not be preserved with Trizma because the well is not likely disinfected with a chlorine-containing product on a regular basis. However, it is good practice to ask if the supply well has recently been disinfected before collecting a sample from the supply well, and if so, then Trizma should be used as a preservative for that sample.

Samples should be chilled to 4˚C to 6˚C for preservation, using water ice that is double-bagged in polyethylene plastic (i.e., Ziploc®). To avoid potential cross-contamination, reusable chemical or gel-based cooling products should not be used. Samples should be transported to the laboratory daily to maintain sample temperatures near the target preservation temperature.

3.7 Sample Transport and Storage

Samples shall be handled, transported and stored in an attempt to maintain the structural integrity of the container and chemical qualities of the samples. Sample bottles should be handled as outlined in the Sample Handling, Shipping and Chain of Custody FGD. Samples should be kept in an ice-filled transport container during field work and covered to limit light penetration. As a typical procedure, laboratories will supply a thick plastic liner with each cooler to keep samples from contacting the inside of the cooler. Field samples and any ice are kept within the liner, which is then tucked and folded so that nothing else can contact the samples, and the Chain of Custody (COC) is placed in a polyethylene (i.e., Ziploc®) resealable storage bag that is placed on the bag and inside the cooler.

3.8 Quality Assurance/Quality Control

The QA/QC procedures should be outlined in the project-specific Work Plan, Field Sampling Plan, and/or QAPP and must be followed throughout the sample collection, processing, handling, and analysis process.

- *Trip Blanks*. The Trip Blank (TB) consists of a bottle of PFAS-free water that is prepared by the laboratory, shipped to the site (but not opened), and then returned to the laboratory for analysis. TBs are typically not required by regulatory agencies for PFAS analyses, and typically do not yield results meaningfully different from the field reagent blanks (below), but can be collected if requested or required by a specific agency or client.
- *Field Reagent Blanks*. Field Reagent Blanks (FRBs) should be collected during PFAS sampling events. An FRB is generated by manually pouring PFAS-free water in one sample container that is provided by the laboratory into an empty sample container that is also supplied by the laboratory in the field at the location of an environmental sample. An FRB differs from a TB in that the laboratory PFAS-free water is exposed to the sampling environment during the bottle-to-bottle transfer process. The purpose of an FRB is to quantify whether target analytes or other interferences are present in the field environment, and can help provide insight if PFAS analytes are found in the associated Equipment Blank (EB) but not the TB.

  FRBs are helpful in assessing whether the PFAS-free water supplied by the lab remains "PFAS-free" throughout the sampling event and confirming that the bottleware remains PFAS-free as well. One FRB should be collected for every 20 samples of a given medium, or once per event regardless of the number of media sampled if the sampling event is limited to one day. However, the frequency of collecting FRBs is a project-specific decision, and the location(s) of the FRB(s) should be considered in advance of the sampling event in consultation with a PFAS SME team member, with intentional bias

towards location(s) where the possibility of introducing ambient PFAS is/are highest.

- *Equipment Blanks*. EBs are used to assess the potential contamination of samples by the equipment used at the site to collect those samples. To collect an EB, PFAS-free water provided by the laboratory is poured over, in, or through a particular piece of sampling equipment (for example, a new, disposable bailer, or a pump that has been decontaminated after its prior use) and collected in a sample container. Conceptually, field crews should attempt to transfer laboratory-supplied PFAS-free water to the EB sample container using the part of the equipment that comes in direct contact with the environmental samples.

  Like FRBs, one EB should be collected for every 20 samples of a given medium, or at least once per event regardless of the number of media sampled if the sampling event is limited to one day. However, the frequency of collecting EBs is a project-specific decision and when considering the number of EBs to collect, in consultation with a PFAS SME team member, thought should be given to the range of concentrations expected to be encountered (e.g., are there orders of magnitude between highest and lowest expected concentrations), the complexity of the field event (e.g., sampling of a limited number of wells, or sampling of multiple media types using multiple sampling devices and techniques), and whether EBs should be collected at the beginning, end, or randomly in the middle of the work day.

  EBs collected adequately through a sampling event can greatly increase data reliability by confirming the adequacy of decontamination methods when laboratory-reported results are consistently non-detect, and by providing insight to where, when and how any systematic issues with field procedures may have arisen if EB analytical results contain detections. For example, and as discussed in **Section 3.4**, it may be advisable to collect EBs at a higher frequency when sampling in a suspected or known source area to minimize the potential for having to qualify or discard an excessive amount of laboratory reported data.

- *Field Duplicates*. Field Duplicate (FD) samples should be collected in accordance with the site-specific QAPP. In general, the frequency of FD collection for PFAS should be one per every 20 environmental samples of a given medium, or once per event regardless of the number of samples if the sampling event is limited to one day.

- *Matrix Spike and Matrix Spike Duplicates*. The Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples should be collected in accordance with the site-specific QAPP, and are samples into which the laboratory adds a known mass of specific PFAS after receipt and log-in, but prior to analysis. Essentially, collecting an MS/MSD sample pair is the same as collecting two field duplicate samples at a sampling location except that these containers are identified with the sampling location as MS and MSD samples and are not "blind" to the laboratory. Laboratories add known amounts of analytes (typically concentrations at or near the middle of the calibration range) when they perform MS and MSD analyses, so it is often most useful to use locations that are known or believed to have relatively moderate analyte concentrations for collecting the MS/MSD samples such that the laboratory results remain within the instrument calibration limits. The necessity for and frequency of collecting MS/MSD sample pairs is a project-specific decision and depends on several factors (e.g., client, regulatory agency, or regulatory program directives). However, if required or if data validation is to be performed, then a frequency of one MS/MSD sample pair for every 20 environmental samples for each medium, or once per event per sampled media if the sampling event is limited to one day, is recommended.

- *Temperature Blanks*. When used on a project, temperature blanks must be provided by

the lab in a new (not previously used) sample bottle of the same type and size of the other aqueous field samples collected during the sampling program. The bottle must be filled with PFAS-free water, must be labeled clearly as the temperature blank, and should remain in the cooler throughout the sampling event.

4. PRECAUTIONS AND OTHER CONSIDERATIONS

Precautions to be taken during environmental sampling for PFAS analyses are generally the same as those typically required for collection of environmental samples for other analyses. Refer to the Precautions and Other Considerations Section of relevant FGDs for the specific sampling activity being performed. For PFAS sampling, the following additional considerations are provided:

- There are far more individual PFAS than can be currently quantitated. Determining which PFAS to quantitate during the analysis is a project-specific determination based on several factors. One important factor to consider is guidance from the relevant regulatory agency. For example, some states have a standard PFAS list (e.g., New York is currently asking for 21 PFAS, and Michigan is currently asking for 28 PFAS). Another factor is the time period of the release and whether it was a legacy event, or possibly a more recent event where quantification of replacement chemicals (e.g., GenX instead of PFOA) could require the use of an expanded analyte list.
- Some states require that only personnel licensed or certified in the state where the work is being performed perform groundwater sampling. Therefore, state regulations and guidance governing groundwater should be consulted prior to conducting the work. In addition, local Ramboll staff should be contacted for any other regional or local requirements.

5. RECORDKEEPING

Document all sampling locations in accordance with relevant FGDs, the site-specific Work Plan, and QAPP.

6. REFERENCES

California State Water Quality Control Board Division of Water Quality, Per- and Polyfluoroalkyl Substances (PFAS) Sampling Guidelines, March 20, 2019.

Department of Defense (DoD) Environmental Data Quality Workgroup and Department of Energy Consolidated Audit Program Data Quality Workgroup, United States Department of Defense and Department of Energy Consolidated Quality Systems Manual (QSM) for Environmental Laboratories Version 5.3, May 2019.

ITRC, Site Characterization Considerations, Sampling Precautions, and Laboratory Analytical Methods for Per- and Polyfluoroalkyl Substances (PFAS), March 2018.

Michigan Department of Environmental Quality, General PFAS Sampling Guidance, October 16, 2018.

U.S. Environmental Protection Agency, Validated Test Method 8327: Per-and Polyfluoroalkyl Substances (PFAS) Using External Standard Calibration and Multiple Reaction Monitoring (MRM) Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS), June 2019.

U.S. Environmental Protection Agency Office of Research and Development, EPA Method Development Update: Per- and Polyfluoroalkyl Substances (PFAS), April 16, 2019.

ATTACHMENT A
AVAILABLE PFAS SAMPLING REGULATORY GUIDANCE

Regulatory requirements and guidance related to the sampling and analysis of PFAS are continuously evolving. Thus, recent changes to sampling procedures, target analyte lists, or regulatory requirements in the state where sampling is to occur should be confirmed. Following are links to some of the more active regulatory programs. However, please confirm through internet searches and contact with the relevant regulatory agency that the latest state-specific guidance is being considered and incorporated into the sampling effort:

CA: https://www.waterboards.ca.gov/pfas/

MA: https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas

MI: https://www.michigan.gov/documents/pfasresponse/General_PFAS_Sampling_Guidance_634597_7.pdf

NH: https://www4.des.state.nh.us/nh-pfas-investigation/

NJ: https://www.nj.gov/dep/srp/emerging-contaminants/

NY: https://www.dec.ny.gov/chemical/108831.html

PA: https://www.dep.pa.gov/Citizens/My-Water/drinking_water/PFAS/Pages/default.aspx

WI: https://dnr.wi.gov/topic/contaminants/PFAS.html

Interstate Technology & Regulatory Council: https://pfas-1.itrcweb.org/

US Department of Defense and Department of Energy: https://denix.osd.mil/edqw/documents/manuals/qsm-version-5-3-final/

US Environmental Protection Agency: https://www.epa.gov/water-research/pfas-methods-and-guidance-sampling-and-analyzing-water-and-other-environmental-media or https://www.epa.gov/pfas

ATTACHMENT B
PFAS SME TEAM

PFAS Subject Matter Expert Team		
Name	**Location**	**Primary Expertise**
Mark Nielsen*	Princeton, NJ	Site Investigation/Remediation
Jim Fenstermacher*	E Norriton, PA	Site Investigation/Remediation
Linda Dell	Amherst, MA	Epidemiology
Janet Egli	Nashville, TN	Water, wastewater
Paul Hare	Albany, NY	Site Investigation/Remediation
Debra Kaden	Boston, MA	Toxicology
Denise Kay	Lansing, MI	Ecological Risk, PFAS Research
Matt Longnecker	Raleigh, NC	Epidemiology
John Newsted	Lansing, MI	Ecological Risk, Site Investigation, Transport
Jaana Pietari	Westford, MA	Forensics
Imants Reks	Syracuse, NY	Growth Team Lead
Sonja Sax	Amherst, MA	Epidemiology
Rebecca Siebenaler	Princeton, NJ	Human Health/Eco Risk and Due Diligence
Sarah Stoneking	Arlington, VA	Due Diligence
Matthew Traister	Cincinnati, OH	Air Transport
Scott Warner	Emeryville, CA	Site Investigation/Remediation
Steve Washburn	Emeryville, CA	Site Investigation/Remediation
Jason Wilkinson	Westford, MA	Site Investigation/Remediation
Annette Nolan	New South Wales, AUS	PFAS Research, Investigation, Analysis
Gerd Van Den Daele	Sao Paulo, Brazil	PFAS in South America
Dorte Harrekilde	Odense, Denmark	Site Investigation/Remediation
Aldo Trezzi	Milan, Italy	Site Investigation/Remediation
Notes: * PFAS SME team co-leaders.		

ATTACHMENT C
PFAS PRE-SAMPLING CHECKLIST

RAMBØLL

ENVIRONMENT
& HEALTH

PFAS Pre-Sampling Checklist

Site Name:_____ Task:_____

Weather (temp/precip):_____ Date: _____

Pre-Mobilization:

- ☐ The QAPP or other site-specific field guidance has been consulted for sample locations, QC sampling requirements, and sample nomenclature

Field Clothing and PPE:

- ☐ Using white Tyvek®; not using yellow Tyvek®
- ☐ Clothing has not been most recently washed with fabric softeners or other treatments
- ☐ Clothing has not been permanently chemically treated for insect resistance or UV protection
- ☐ Clothing has not been treated with materials or formulations potentially containing PTFE or other PFAS products listed in Section 3.1 of this FGD
- ☐ Any personal care products, if used, have been applied outside sampling zone, hands have been washed, and new nitrile gloves are being used
- ☐ Any use of sunscreens or insect repellants is consistent with the commercial products named in Section 3.1 of this FGD

Field Equipment:

- ☐ Subcontractor (e.g., driller) materials and equipment conform to the requirements of this FGD
- ☐ Sampling equipment is free of PTFE and other potentially PFAS-containing components listed in Section 3.1 of this FGD
- ☐ Sampling equipment is made from stainless steel, HDPE, acetate, silicon, high-density polypropylene, or nylon
- ☐ Waterproof field books, waterproof paper, and Post-It Notes® are not used
- ☐ Markers (e.g., Sharpies®) are used only in the staging area or are not used

Sample Containers:

- ☐ Water ice is in use only, not chemical (blue) ice packs
- ☐ Sample containers have been received and are made of HDPE or polypropylene
- ☐ Bottleware for non-drinking water samples do not contain preservative
- ☐ Caps are unlined and made of HDPE or polypropylene

Wet Weather (as applicable):

- ☐ Wet weather gear made of polyurethane and PVC only, or is being worn under white Tyvek® covering

Equipment Decontamination:

- ☐ On-site or off-site public or private water, if to be used for equipment decontamination, has been analyzed and is "PFAS-free," as defined in Section 3.1 of this FGD
- ☐ Alconox®, Liquinox®, or Citranox® are being used as decontamination cleaning agents; Decon 90® is not being used

Food Considerations:

- ☐ Any pre-wrapped food or snacks, carry-out food, fast food, or other food items will remain in the staging area
- ☐ Any food items, will be consumed outside the sampling zone, hands will be washed, and new PPE and nitrile gloves will be used

Work Area and Vehicle Considerations:

- ☐ Work areas, including vehicle interiors if used for sample handling, are covered with HDPE or LDPE plastic to prevent contact with potentially PFAS-containing materials and surfaces

If any applicable boxes cannot be checked, describe deviations below and work with field personnel to address issues prior to commencement of that day's work. Materials present and identified as potentially containing PFAS through use of this checklist should be relocated to the support area or other area of the site away from the sampling locations and noted below.

_____ _____

Field Team Leader Name and Signature Time