OBG | Baker Environmental Solutions Joint Venture

GROUNDWATER MONITORING WORK PLAN
FINAL

SAEGERTOWN PFAS SITE

CRAWFORD COUNTY, PENNSYLVANIA

PADEP Contract No.: SAP4000023226
General Environmental Technical Assistance Contract
Work Requisition No.: GTAC7-6-182

Prepared for:

Commonwealth of Pennsylvania
Department of Environmental Protection

Submitted by:

OBG | Baker Environmental Solutions Joint Venture
Moon Township, Pennsylvania

July 2022

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SAEGERTOWN BOROUGH
CRAWFORD COUNTY, PENNSYLVANIA

PADEP Contract No. SAP4000023226
Work Requisition No. 7-6-182

Submitted to:

Commonwealth of Pennsylvania
Department of Environmental Protection
Northwest Regional Office
Environmental Cleanup and Brownfields Program
Hazardous Sites Cleanup Section
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July 2022

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The information in this document has been funded by the Pennsylvania Department of Environmental Protection (PADEP) under Contract No. SAP4000023226 to OBG | Baker Environmental Solutions Joint Venture (OBG | Baker). This document has been formally released by OBG | Baker to the PADEP.

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1.0 INTRODUCTION

OBG | Baker Environmental Solutions Joint Venture (OBG | Baker) has prepared this Groundwater Monitoring Work Plan for the Pennsylvania Department of Environmental Protection (PADEP or Department) as authorized by PADEP Work Requisition, Number 7-6-182, Contract Number SAP4000023226 (GTAC-7), pursuant to the Pennsylvania Hazardous Sites Cleanup Act (HSCA), Act 108, October 18, 1988. This Work Plan presents the scope of work and schedule to perform comprehensive groundwater sampling and monitoring activities at the Saegertown Per- and Polyfluoroalkyl Substances (PFAS) Site (site), located in Saegertown Borough, Crawford County, Pennsylvania (Figure 1).

The Work Plan was prepared based on a cursory review of available historical information and a scoping meeting/site visit with the Department. The associated Field Sampling and Analysis Plan (FSAP) and Quality Assurance Project Plan (QAPP) are included in Attachment A. Project personnel are required to review the information presented in this Work Plan/FSAP/QAPP, as well as the site-specific Health and Safety Plan (HASP), prior to conducting the field activities.

2.0 SITE DESCRIPTION AND BACKGROUND

The Saegertown PFAS Site (site) is located in a former industrial park in the Borough of Saegertown (Borough), Crawford County, Pennsylvania. The property was formerly owned by the General American Transportation Company (GATX) and had been declared a U.S. Environmental Protection Agency (EPA) Superfund Site in 1993 until a remedial action was completed in 1996, and the site was delisted in 1997. The site is within the historical boundaries of the Saegertown Industrial Area Superfund Site but is on a parcel that was remediated by EPA and released for unrestricted use. The remaining active portion of the Superfund Site is the adjacent Parker/Lord property. The Department is aware that Lord Corp. has Chlorinated Volatile Organic Compound (CVOC) groundwater contamination issues but cannot confirm if they also have PFAS contamination issues. Lord Corp. uses 90% of the water pumped from all the Saegertown Borough supply wells.

Saegertown Borough purchased the delisted property and started work on installing and permitting two public water supply wells (PW-6 and PW-7) on the property around 2008. The two wells were approved by the Department for construction in July 2010, and for operation in October 2011.

Although it was reported that two sludge ponds were remediated by the EPA (shown on historical drawings), the Department believes these are points of interest that warrant further investigation. The sludge pond source is believed to be from washing out rail cars over several years.

In October 2020, representatives from the Department's Bureau of Safe Drinking Water conducted a site visit at the Borough's water system to collect samples to be analyzed for the presence of PFAS in the drinking water supply. PFAS is a large group of man-made chemicals that include Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA). The samples were analyzed by the Department's Bureau of Laboratories (BOL).

The results of the sampling indicated PFOS levels of 187.1 nanograms per liter (ng/L) and PFOA levels of 5.5 ng/L for a total of 192.6 ng/L of PFAS at Entry Point 105, which is an entry point to the general drinking water distribution line that consists of water collected alternately from either PW-6 or PW-7.

At the time of the collection, water was being pumped from PW-6. The sum of the analytical results exceeded the EPA's Combined Lifetime Health Advisory Level (HAL) for PFOS and PFOA of 70 ng/L. None of the Borough's other entry points had detections of PFAS.

Samples were also collected from both PW-6 and PW-7 in November 2020 with both wells exhibiting exceedances of the combined HAL with concentrations of 90 ng/L and 174.8 ng/L, respectively. Per Department mandates, the Borough completed follow up confirmation sampling. In January 2021, the Borough collected a sample from Entry Point 105, which was again using PW-6 at the time of sampling. The sample results contained one data qualifier that required additional information to be submitted by the Department-accredited laboratory. The results indicated PFOS levels of 120.0 ng/L and PFOA levels of Non-Detect (ND) for a total of 120.0 ng/L of PFAS. This total confirmed an exceedance of the EPA HAL for PFOS and PFOA at Entry Point 105 receiving water from PW-6.

PFAS levels in Saegertown Borough Public Water Supply Well #6 (Well #6) have been decreasing and could be attributed to a reduced pumping rate (future review of historical pumping records may provide more information). Wells #6 and #7 are currently offline and are only used in high demand (Wells #1 and #2 are primary producers in interim, although others are used) since testing positive for PFAS.

Quarterly sampling of the wells has been completed since the PFAS detections. The initial event was completed by the Department and all ensuing events have been completed by Groundwater Resources, LLC. Samples from Saegertown Borough wells #6 and #7 are identified as Entry Point ('EP') -105 sample ID (Note; effluent is from each well, is not blended, and operates independently of each other). The 'EP' samples were collected after chlorination of the line and have been collected from a spigot in the adjacent fire department building. Observation wells near wells #6 and #7 were installed to monitor drawdown when pumping tests were performed on wells #6 and #7. Pumping tests were part of the drinking water permit process and not part of the investigation.

A Department presentation during the kickoff described potential PFAS sources as the firefighter training area and two former sludge lagoons (PFAS no longer used by fire dept. in training). The Department did not rule out there could be other PFAS sources in the site area. Groundwater flow is believed to be toward French Creek as stated by Groundwater Resources and historical documents from the Superfund investigation.

2.1 Project Objectives

With the limited scope of work, the primary project objectives are to:

- Perform two rounds of groundwater gauging and sampling of the 14 Department-designated wells for 24 PFAS constituents.
- Prepare and submit a Groundwater Sampling Report detailing the groundwater sample results and the hydrogeologic conditions of the site.
- Provide recommendations for further groundwater investigations.

3.0 SCOPE OF WORK

To accomplish the overall project objectives and to facilitate project planning and management, this project will be performed in accordance with the following tasks:

- Task 1000 – Project Management
- Task 1010 – Project Planning
- Task 1040 – Procurement
- Task 1050 – Mobilization/Demobilization
- Task 2000 – Data Evaluation
- Task 2070 – Report Preparation
- Task 3000 – Site Survey
- Task 3020 – Laboratory Analysis
- Task 3060 – Groundwater Monitoring
- Task 3080 – Investigation Derived Waste Management

Field activities will generally be performed in accordance with OBG | Baker's Standard Operating Procedures (SOPs).

3.1 Task 1000 - Project Management

The Project Management task involves activities associated with the overall technical and administrative aspects of the project. These activities may include, but are not limited to, the following:

- Internal communication and coordination with project staff
- Control budget and schedule and track progress of work tasks
- Change order preparation (if required) and personnel, laboratory, and subcontractor scheduling/planning for assignments
- Monthly progress report preparation
- Communications and meetings with the Department

In addition, this task includes program management efforts by OBG | Baker's Program Manager, Scott Moffett. Under this task, Mr. Moffett will provide technical oversight and program support including reviewing activities and resolution of issues (as necessary) to be consistent with overall Department expectations and requirements. For cost estimating purposes, this task is assumed to start from the notice to proceed through completion of the scope of work included herein.

3.2 Task 1010 - Project Planning

Project Planning primarily includes the efforts associated with development of the draft and final versions of the Groundwater Monitoring Work Plan, Cost Estimate, HASP, and FSAP/QAPP, as well as the completion of all project-planning documents. The HASP will be prepared as a standalone document to this Work Plan and the FSAP/QAPP are included herein as Attachment A.

Project Planning also includes the labor and materials (including transportation) associated with the project setup, the site scoping meeting/site visit, and a cursory review of pertinent historical data to aid in the development of this Work Plan and associated documents.

3.3 Task 1040 – Procurement

Procurement activities under this task will consist of securing subcontractors required by OBG | Baker to complete the activities associated with the scope of work. Separate bid packages, including a Request for Quote (RFQ), will be prepared for the laboratory analytical testing and the Investigation-Derived Waste (IDW) management activities. No pre-bid meeting at the site will be required to complete either of these subcontracted activities.

Subcontractor bids will be evaluated and documented (Subcontractor Abstract) and recommendations will be presented (Subcontractor Approval Form) to the Department Regional Project Officer and Contract Manager for approval in accordance with Department guidelines for both subcontracted activities.

3.4 Task 1050 – Mobilization / Demobilization

This task will include the mobilization and demobilization (mob/demob) of OBG | Baker personnel and equipment to the site for the field activities. This task will also include the associated field vehicle charges with not only the mob/demob from OBG | Baker's office (Moon Township, Pennsylvania), but also charges associated with the daily use of field vehicles on site during the field activities.

Prior to mobilization, a brief orientation/kickoff meeting with OBG | Baker personnel will be held to review project objectives, site history, property layout/boundaries, health and safety issues and field procedures. In addition, other ancillary activities in this task include equipment acquisition/coordination, subsequent equipment cleaning/restocking, and inventory review for the subsequent sampling activities.

A summary of the anticipated mob/demobs that will take place through completion of the field activities is summarized below.

- One mob/demob for Groundwater Monitoring Event #1
- One mob/demob for surveying of the 14 site wells
- One mob/demob for Groundwater Monitoring Event #2 (waste removal oversight during this mob/demob).

3.5 Task 2000 – Data Evaluation

This task involves data management activities and evaluation of the data collected during the two comprehensive groundwater sampling events. One of the objectives of this task is to ensure proper sample analysis and data generation to provide appropriate information for the sufficient characterization of current site conditions. Data evaluation will take place once all analytical and hydrogeological data are received and tabulated by OBG | Baker at the end of the field activities. This task may include, but not be limited to, the following activities:

- Communications and coordination of data with the Department Regional Project Officer.
- Database preparation and population using an electronic deliverable format.
- Data and Quality Assurance/Quality Control (QA/QC) evaluation.
- Create project-specific tables and figures (e.g., 'hits' tables, etc.).
- Comparison of groundwater analytical results to EPA's HAL.
- Verification and completeness of well survey data.
- Development of a groundwater elevation contour maps from both groundwater sampling events.
- Development of other associated figures (e.g., contaminant 'hits box' figures).
- Evaluation and interpretation of geologic, hydrogeologic, field, QA/QC, and laboratory analytical data.

The groundwater analytical results will be compared to the EPA HAL for the 24 PFAS constituents. 'Top assay' testing is recommended to further identify PFAS parameter precursors and total fluorine to evaluate what the gross fluorine availability may be in the investigation area.

Furthermore, as agreed to during the site scoping meeting, a separate data evaluation will take place in an internal memorandum that will also compare the groundwater analytical results against pending PFAS criteria. This evaluation will provide the Department an early evaluation of potential PFAS impact issues in the future. Because it was agreed between the Department and OBG | Baker that the internal memo would be limited to only a presentation of data, no formal description of site activities, findings, conclusions, or recommendations will be provided in the internal memo.

3.6 Task 2070 – Report Preparation

This task includes work efforts related to preparation of the Groundwater Monitoring Report requested by the Department in the scope of work. The report will include a summary of the field sampling activities and the methodologies for the collection of the groundwater samples.

The Groundwater Monitoring Report will essentially be a data summary of the current site conditions. This will include groundwater flow mapping, analytical summary tables compared to applicable criteria, and a summary of site activities. Conclusions and recommendations will also be included in the report, as well as a brief evaluation of the need for further investigation activities to aid in better characterization of current site conditions.

As noted in the Data Evaluation (Task 2000) above, a separate report will be developed as an internal memorandum that will essentially be limited to a data deliverable. This internal memo will compare the PFAS laboratory analytical results from both groundwater sampling events to pending PFAS criteria. This memo will allow the Department to make better strategic decisions on moving forward with the investigation phase of this project. As noted above, no formal descriptions of site activities, findings, conclusions, or recommendations will be included with the internal memo data deliverable.

3.7 Task 3000 – Site Survey

With limited survey data available for the 14 wells included in the groundwater monitoring scope of work, the Department requested that OBG | Baker include survey of the wells in the scope of work. The wells to be surveyed are listed in the Groundwater Monitoring section below (3.9 – Task 3060- Groundwater Monitoring) with the exception of the Saegertown Beverage well (13 wells total for survey).

Each of the monitoring wells will be opened and assessed for competency and functionality (mostly applicable to the monitoring wells). Because most of the wells are locked, OBG | Baker will arrange with the Department to have an applicable representative (e.g., Groundwater Resources, LLC) unlock the wells and remove the caps, etc. to allow for an adequate survey and collection of representative groundwater levels in the wells. No meters will be lowered into any of the pumping wells to avoid possible entanglement with the pumping equipment installed in the wells.

A water level indicator and well depth tape will be used to document depth to groundwater and well depth in each well. Readings will be documented in the field notebook. If it appears that it may be too difficult to advance the water level indicator or depth tape beyond the pump and associated piping/wiring in the casing, the measurements will not be collected from that well.

The well survey activities under this task will include locating the horizontal position and establishing elevations of the monitoring and supply wells. The horizontal data will be to the nearest 0.1-foot and referenced to the Pennsylvania State Plane Coordinate System, North American Datum (NAD) 1983. The vertical data will be to the nearest 0.01-foot and referenced to the North American Vertical Datum (NAVD) 1988. These surveying activities also will be conducted under the direction of a professional land surveyor licensed to practice surveying in the Commonwealth of Pennsylvania.

3.8 Task 3020 – Laboratory Analysis

All groundwater samples (including QA/QC samples) will be submitted to a subcontracted laboratory for analysis that is accredited by the Department's Laboratory Accreditation Program. It is assumed that the laboratory will supply the coolers and bottleware needed to store and ship the samples to the laboratory and also provide lab-grade PFAS free certified water for quality control samples.

All groundwater samples will be analyzed for 24 PFAS analytes using an appropriate USEPA method with low-level detections. The laboratory will also perform 'Total Oxidizable Precursors (TOP) assay' testing to further identify PFAS parameter precursors and total fluorine to identify gross fluorine availability in the investigation area. Since the 24 PFAS parameter list is a small fraction of the total picture, the TOP assay results will help to complete the mass balance for PFAS. In addition, the total fluorine will aid in completing the mass balance evaluation by calculating the extractable organic fluorine and adsorbable organic fluorine measurements. The TOP assay can help determine the concentration of innumerable PFAS that cannot be covered by conventional analytical methods. OBG | Baker proposes to sample for TOP assay and total fluorine during the first round of sampling and evaluating the need for sampling in the second round depending on the results of the first round.

In addition, one composited, aqueous waste profile sample will also be collected for an extensive analytical suite from the drummed purge water/decontamination fluids of the first sampling event. The anticipated analyses are presented in the IDW section of the Work Plan.

Sample tracking and management will involve coordinating with the laboratory and tracking the samples from the time of collection through receipt of analytical results. OBG | Baker will coordinate daily sample shipments to the lab and track sample data to ensure the samples have been received and processed in a timely manner. Therefore, this task will involve the following specific activities in the preparation for, and collection of, the laboratory analyses described above.

- Pre-field coordination with lab over analyses, bottleware, coolers, preservatives, etc.
- Accepting bottleware delivery and sample bottle count for completeness, breakage assessment, sorting, and labeling
- Communications and coordination with the laboratory contact
- Sample shipment/delivery to the lab
- Sample tracking and management
- Laboratory analyses
- Monitoring incoming data for completeness

It is anticipated that the standard 14-day turnaround time on analyses will be completed by the subcontracted laboratory.

3.8.1 Quality Assurance/Quality Control

In addition to the groundwater and waste profile samples designated for laboratory analysis, QA/QC samples also will be collected for analysis. The analytical suite for the QA/QC samples will be consistent with the associated investigative samples. A description of the anticipated QA/QC samples to be collected during the sampling activities is provided below.

Duplicates: Duplicate analytical samples are proposed to be collected at an approximate rate of ten percent of investigative samples per sampling media. Therefore, a total of two duplicate samples are proposed to be collected during each of the two groundwater sampling events (four duplicate samples total).

Field Blanks – To document both the quality of the PFAS free certified water used for the decontamination activities, verify laboratory analysis integrity, and document the quality of the water provided by the laboratory, a total of two field blanks will be collected as part of the sampling activities. One PFAS free certified water field blank will be collected for analysis during each of the two groundwater sampling events. The analysis of this field blank will document the integrity/quality of the water used for the decontamination process.

The field blanks will be collected during each of the two groundwater sampling events by pouring laboratory-grade, PFAS free certified water (supplied by the laboratory) into the appropriate sample containers for laboratory analyses. The analysis of the field blanks from each event will document the integrity/quality of the water supplied by the lab in case erroneous detections are observed from the laboratory analytical results of the equipment rinsate samples.

Equipment Rinsates: To document sufficient decontamination practices of non-disposable sampling equipment, one equipment rinsate sample will be collected for each non-disposable sampling device used during each of the two sampling events. Equipment rinsate samples are proposed to be collected at an approximate rate of five percent of investigative samples. Rinsate samples will be collected using PFAS free certified water supplied by the laboratory.

For the current scope, it is anticipated that one equipment rinsate sample will be collected for laboratory analysis from each of the two sampling events. If disposable bailers are used to sample the wells instead of low-flow pumping (based on aquifer production), an equipment rinsate will still be collected during the groundwater sampling activities.

MS/MSD Samples: Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be prepared in the field using the same procedures as duplicate samples and analyzed for the same parameters as the corresponding original samples. MS/MSD samples will be prepared at a frequency of approximately 5 percent for each group of samples of a similar matrix. Therefore, one MS and one MSD sample will be collected for each of the two sampling events. The laboratory will use the samples for internal QA/QC. In addition, the results will be used to evaluate the matrix effect of the sample upon the analytical methodology.

3.9 Task 3060 – Groundwater Monitoring

As presented above and shown on Figure 2, the 14 wells identified for the groundwater monitoring activities include:

- Saegertown Borough Public Water Supply Well #1
- Saegertown Borough Public Water Supply Well #2
- Saegertown Borough Public Water Supply Well #6
- Saegertown Borough Public Water Supply Well #7
- Saegertown Borough Monitoring Well OB-6-50
- Saegertown Borough Monitoring Well OB-6-100
- Saegertown Borough Monitoring Well OB-7-50
- Saegertown Borough Monitoring Well OB-7-100
- Saegertown Borough Monitoring Well MW-1
- Parker/Lord Monitoring Well GM-24S
- Parker/Lord Monitoring Well GM-24I (a.k.a., GM-24D moving forward to avoid confusion)
- Parker/Lord Monitoring Well GM-15S
- Parker/Lord Monitoring Well GM-15D
- Saegertown Beverage Well (SBW)

At the request of the Department, two groundwater sampling events will be included in the groundwater monitoring scope of work. Both sampling events will include all 14 of the wells cited above. A summary of the proposed sampling activities is presented in Table 1.

Two methodologies will be used to collect the samples from the 14 wells based on their construction and appurtenances; one method will be samples collected from taps previously and recently installed on the four Saegertown public supply wells (#1, #2, #6, and #7) and the Saegertown Beverage supply well. The second methodology will be using low-flow sampling techniques described in the ensuing section of the Work Plan to sample OB-6-50, OB-6-100, OG-7-50, OB-7-100, MW-1, GM-24S, GM-24D, GM-15S, and GM-15D.

The collection at the taps is able to be completed as all of five of the wells have pumping systems and discharge lines. Before sample collection, it will be confirmed that all sample taps are in line prior to the chlorination treatment of the pumping effluent. At each of these five well locations, the pump will be allowed to run for several minutes prior to collecting a representative sample. Field personnel will estimate the pumping timeframe by the well’s construction and also the appearance of the effluent.

Regardless of the sample collection methodology, special care must be taken when sampling for PFAS constituents. Some typical sampling equipment/materials and personnel protective equipment are known to contain PFAS and must not be used during the sampling activities. A PFAS Sampling Checklist and sample collection considerations page have been provided as Attachment B to this Work Plan. The considerations and checklist will be reviewed by field personnel, and the subcontracted laboratory also will be made aware that the scope includes PFAS analyses (special bottleware/caps must be used for sample collection and internal specialized equipment).

Since supply well #6 and #7 share the same effluent discharge piping and sample tap, Groundwater Resources, LLC (Borough consultant) will be on site during the sampling and will be responsible for operating each of the pumps individually to allow OBG | Baker personnel to collect the representative groundwater samples from the one sample tap. The tap is located prior to the chlorination process.

In the section below, multiple options are available to purge and sample the monitoring wells. In instances where non-dedicated, non-disposable sampling equipment is used (e.g., submersible bladder pump), all equipment that comes in contact with the groundwater will need to be decontaminated before the purging / sampling of the well. Decontamination activities are performed to mitigate the potential for cross contamination between wells during groundwater monitoring. Each piece of sampling equipment that contacts the groundwater will be decontaminated by placing the equipment in a bucket filled with non-phosphate soap and potable water and scrubbed thoroughly followed by a thorough potable water rinse. These wash waters will be containerized for later characterization and appropriate disposal. If dedicated purge methods are used (peristaltic pump, disposable bailer, etc.), no decontamination of equipment will be needed between wells.

As summarized in the IDW Management section of the Work Plan (Section 3.10), the purged groundwater and decontamination fluids will be containerized in steel, properly-labeled, 55-gallon drums for later disposal by the IDW subcontractor. The drums will be temporarily housed in a conex box on site for storage until disposal.

3.9.1 Groundwater Sampling Methodology

A complete round of groundwater level measurements from the monitoring wells will be collected and recorded in the field notebook prior to initiating the purging and sampling activities for both rounds of sampling. As noted above, care will be taken to collect the water levels from wells with dedicated pump systems. In all instances, Groundwater Resources, LLC will be on site to open the wells for access to the inner casing. The owner to Saegertown Beverage will need to provide access to his well for the measurements.

Of the 14 wells designated to be sampled in the scope, nine of the monitoring/observation wells will be purged and sampled following typical sampling methodologies as described below. These nine wells include Saegertown monitoring well MW-1, GM-24S, GM-24D (a.k.a., GM-24I), GM-15S, GM-15D, OB-6-50, OB-6-100, OB-7-50, and OB-7-100.

The monitoring wells will be purged prior to sampling to collect a representative groundwater sample from the aquifer. It is understood that the nine wells are two-inch diameter and will be able to be purged and sampled following the same methodologies.

To mitigate the volume of waste (purge) water generated for (potential) disposal, groundwater purging and sampling activities will initially be attempted using a peristaltic pump with dedicated discharge tubing. At each well, the tubing will be lowered to the approximate mid-point of the well's screened interval (determined through review of well construction diagrams). If construction specs are not available, the pump system will be placed approximately five feet from the well bottom with the assumption that the well was constructed with a 10-foot long well screen.

The pumping rate will be set to create a low sustainable flow. A water level meter will be used concurrently to monitor the water level within the well casing. Ideally, the water level should remain in 'steady state' during low-flow pumping and not be drawn down. If drawdown in the well occurs, the pump flow rate will be reduced until the water level in the well casing stabilizes. Typically, flow rates of less than one liter per minute are used initially. However, the flow is dependent upon the hydrogeologic characteristics of the well sampled.

Water Quality Parameters (WQPs) including pH, Oxidation-Reduction Potential (ORP), specific conductance, dissolved oxygen, temperature, and turbidity will be measured at approximate five-minute intervals during purging and recorded in the field logbook. The field testing will be conducted within a flow-through cell that limits exposure of the groundwater to the atmosphere while the field measurements (including flow rate calculated with a graduated bucket and stopwatch) are recorded. These same field measurements also will be collected at each of the five water supply wells immediately after sample collection.

In general, purging will be considered complete when three successive WQP readings have stabilized within 0.1 Standard Units for pH, 10 millivolts for ORP, 3% for specific conductance, 10% for dissolved oxygen, and turbidity is less than 10 Nephelometric Turbidity Units (NTUs). Temperature readings will be recorded, but not used for stabilization evaluation. Temperatures measured at the surface are affected to some extent by the difference between ambient air and groundwater temperatures and thus can vary over short periods. If after two hours of purging (or three well volumes, whichever is sooner), the WQPs have not reached a stable plateau, purging will be discontinued, and the sample will be collected.

Upon WQP stabilization, the groundwater samples will be collected from the end of the pump tubing and placed into appropriate sample containers with the appropriate preservatives (HCl for VOCs, nitric acid for metals). For low-flow sampling, the same equipment used for purging will also be used for sampling.

If purging and sampling are not capable of being completed with the peristaltic pump, purging will attempt to be completed with a submersible bladder pump system. If used, the submersible pump installation and operational methodology is consistent with the peristaltic pump description above.

If low-flow techniques are not viable in a particular well, purging and sampling of the well may be performed with dedicated, disposable polyethylene bailers with dedicated, disposable retrieval line. A minimum of three well volumes will be evacuated from the well prior to sampling. However, if production is insufficient, the well will be bailed (purged) dry and allow time to recover (at least 75% of lost head) prior to initiating groundwater sampling. It is not believed this methodology will need to be implemented as groundwater production is believed to be sufficient in the area to support low-flow purging techniques.

At the direction of the Department, each of the groundwater samples will be analyzed for 24 PFAS using USEPA Method 537.1. 'Top Assay' and total fluorene analyses will also be performed on the samples as described above.

The appropriate sample containers will be filled and subsequently placed on ice in a cooler immediately after collection for shipment via overnight courier (e.g., FedEx) to the subcontracted laboratory. As noted in the checklist and considerations attachment, chemical or blue ice must not be used for sample shipment as well as any other PFAS-containing items (e.g., sharpies for marking cooler).

3.10 <u>Task 3080 – Investigation-Derived Waste Management</u>

Waste will be generated from completion of the project tasks described herein. A summary of the wastes anticipated to be generated during the well purging and sampling activities is provided below:

- Ancillary wastes (disposable gloves, paper towels, tubing, filters, bailers, etc.) from the well purging and sampling activities that are not believed to pose a threat to the environment will be disposed as municipal trash by OBG | Baker at the completion of the field activities.

- Liquids generated from the decontamination of non-disposable sampling equipment used during the groundwater sampling events will be placed in a properly-labeled, steel, 55-gallon drum on site for later characterization by OBG | Baker personnel and disposal by the IDW subcontractor.

- All purge water generated from the monitoring well sampling activities will be containerized in properly-labeled, steel, 55-gallon drums on site for later characterization and disposal by the IDW subcontractor (same drum as decontamination fluids).

- All purge water generated from the pumping well sampling activities will be allowed to discharge to the drain in the respective pump house buildings.

At the request of the Department, the drummed purge water will be containerized in a conex box on site until disposal. It was agreed during the site kickoff meeting that the conex box and drums would be staged at the edge of the gravel parking lot of the Saegertown Borough building.

Due to the anticipated high transportation disposal costs for PFAS-impacted water (more than $1,100 for transportation alone to Michigan), the drummed purge water and conex box will remain on site until completion of the second round of groundwater sampling. At that time, the OBG | Baker field personnel will be on site to oversee the removal of the drums and conex box.

For estimation purposes, it is anticipated that two drums will be needed for each of the two groundwater sampling events (four drums total).

Because the IDW subcontractor has yet to be identified, the analytical suite necessary for the IDW characterization is currently unknown. However, it is anticipated that the IDW aqueous samples will be analyzed minimally for 24 PFAS analytes, TAL Metals, TCL VOCs, TCL SVOCs, general chemistry, flashpoint, pH, reactive cyanide, reactive sulfide, corrosivity, and specific gravity. One composite, representative aqueous sample will be collected from the two IDW drums generated from the initial groundwater sampling event. No characterization sample of the drums from the second round of sampling will be needed as the waste profile will already be in place from the first sampling event.

4.0 HEALTH AND SAFETY

Due to the limited scope, a formal Hazardous Waste Operations and Emergency Response (HAZWOPER)HASP will not be developed. Rather, an abbreviated Field Site Safety Plan (FSSP) with Project Hazard Analysis (PHA) form will be prepared to address site-specific concerns/hazards and establish safety protocols to be followed during the field activities. Appropriate safety guidelines and SOPs for selective equipment will also be referenced, as necessary.

5.0 PROJECT SCHEDULE

The proposed project schedule is presented in Figure 3. Included in this schedule is a breakdown of the major field tasks and their estimated start and completion dates. Assuming a Notice-To-Proceed is received from the Department by early August 2022, both rounds of groundwater sampling are anticipated to be completed in 2022.

TABLES

Table 1

Proposed Groundwater Sampling Summary
Saegertown PFAS Site
Crawford County, Pennsylvania

TASK	SAMPLE TYPE	MATRIX	ESTIMATED NUMBER OF PFAS SAMPLES FOR ANALYSIS [1]						NOTES / COMMENTS
			Investigative	Duplicates	Field Blanks	Equipment Rinsate	MS/MSD	Waste Characterization	
Groundwater Well Sampling - Round #1 [1]	Investigative	Groundwater	14						Saegertown Supply Wells #1, #2, #6, #7, OB-6-50, OB-6-100, OB-7-50, OB-7-100, MW-1, GM-15S, GM-15D, GM-24S, GM-24D, Saegertown Beverage Well
	QA/QC			2	1	1	1/1		
Groundwater Well Sampling - Round #2	Investigative	Groundwater	14						Saegertown Supply Wells #1, #2, #6, #7, OB-6-50, OB-6-100, OB-7-50, OB-7-100, MW-1, GM-15S, GM-15D, GM-24S, GM-24D, Saegertown Beverage Well
	QA/QC			2	1	1	1/1		
IDW Characterization	Investigative	Aqueous	1					1	24 PFAS analytes, flashpoint, pH, reactive cyanide, reactive sulfide, TAL Metals, TCL SVOCs, TCL VOCs, corrosivity, specific gravity (potential additional analyses if requested by subcontractor)

QA/QC - Quality Assurance / Quality Control
IDW - Investigation Derived Waste
RCRA - Resource Conservation and Recovery Act
(1) - TOP Assay and Total Fluorene analyses will also be performed on all samples during Round #1 minimally.

FIGURES

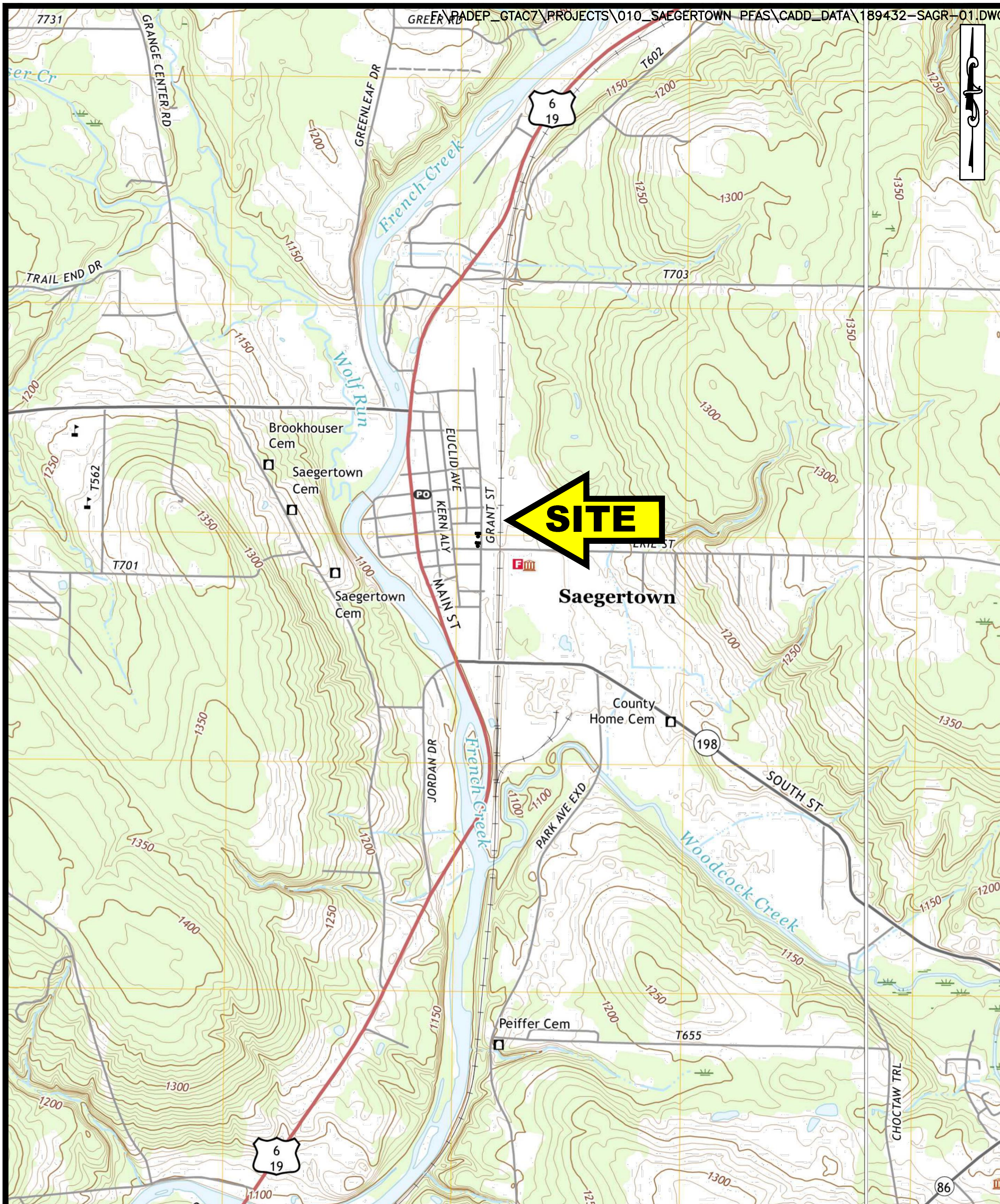


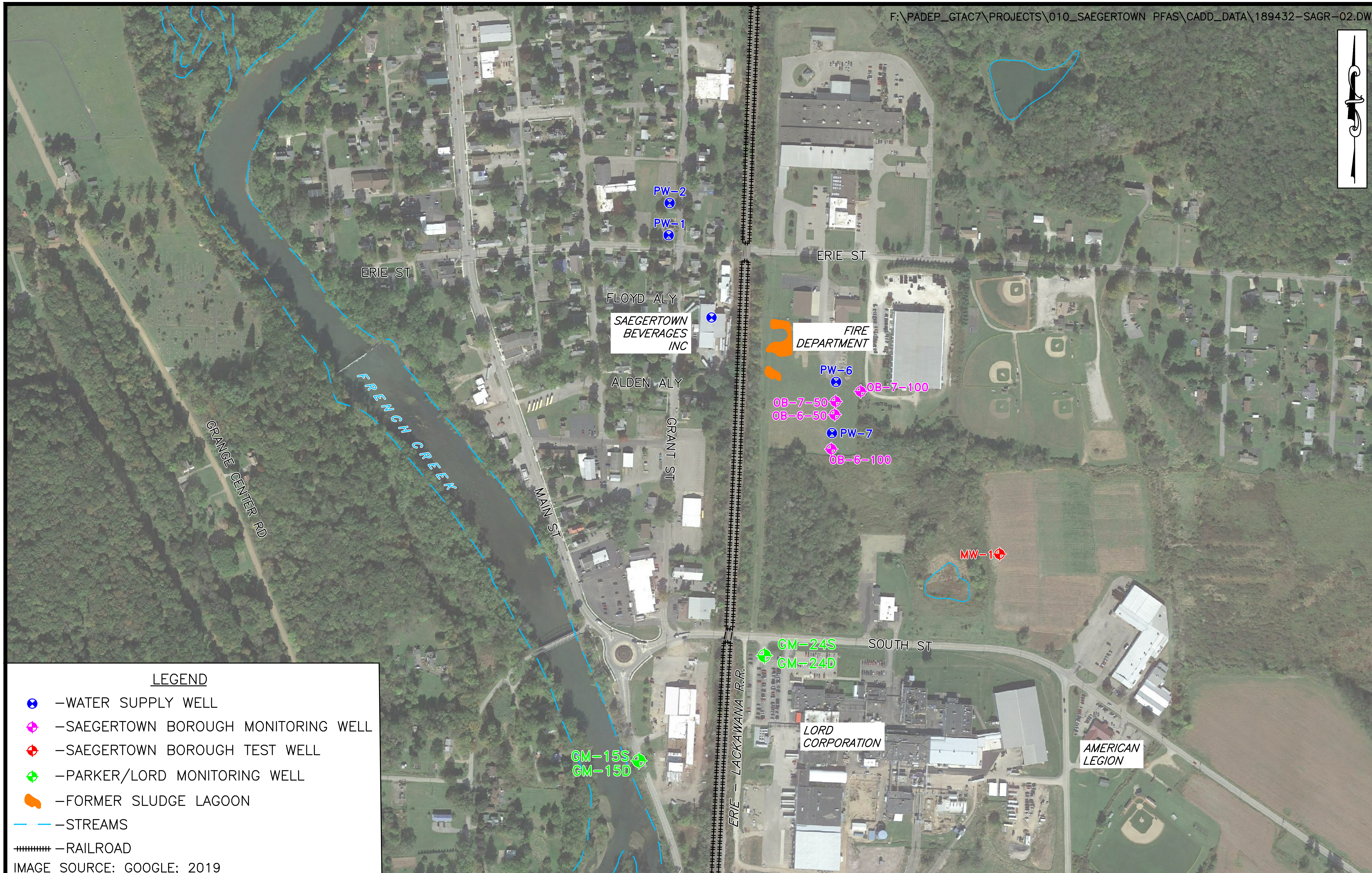
FIGURE 1
GENERAL SITE LOCATION MAP
SAEGERTOWN PFAS SITE
SAEGERTOWN BOROUGH,
CRAWFORD COUNTY, PENNSYLVANIA

SOURCE:
USGS: MEADVILLE, PA, 2019
BLOOMING VALLEY PA, 2019

QUADRANGLE LOCATION

SCALE: 0 2000
S.O. NO.: 189432
DSN/DWN: CHK/RRR
DATE: JUNE 2022
FILE: 189432-SAGR-01
CHK: CHK

OBG Part of Ramboll
Michael Baker INTERNATIONAL
OBG|Baker Environmental Solutions Joint Venture



SCALE: 0 400

S.O. NO.: 189432

DSN/DWN: CHK/RRR

DATE: JULY 2022

FILE: 189432-SAGR-02

CHK: CHK

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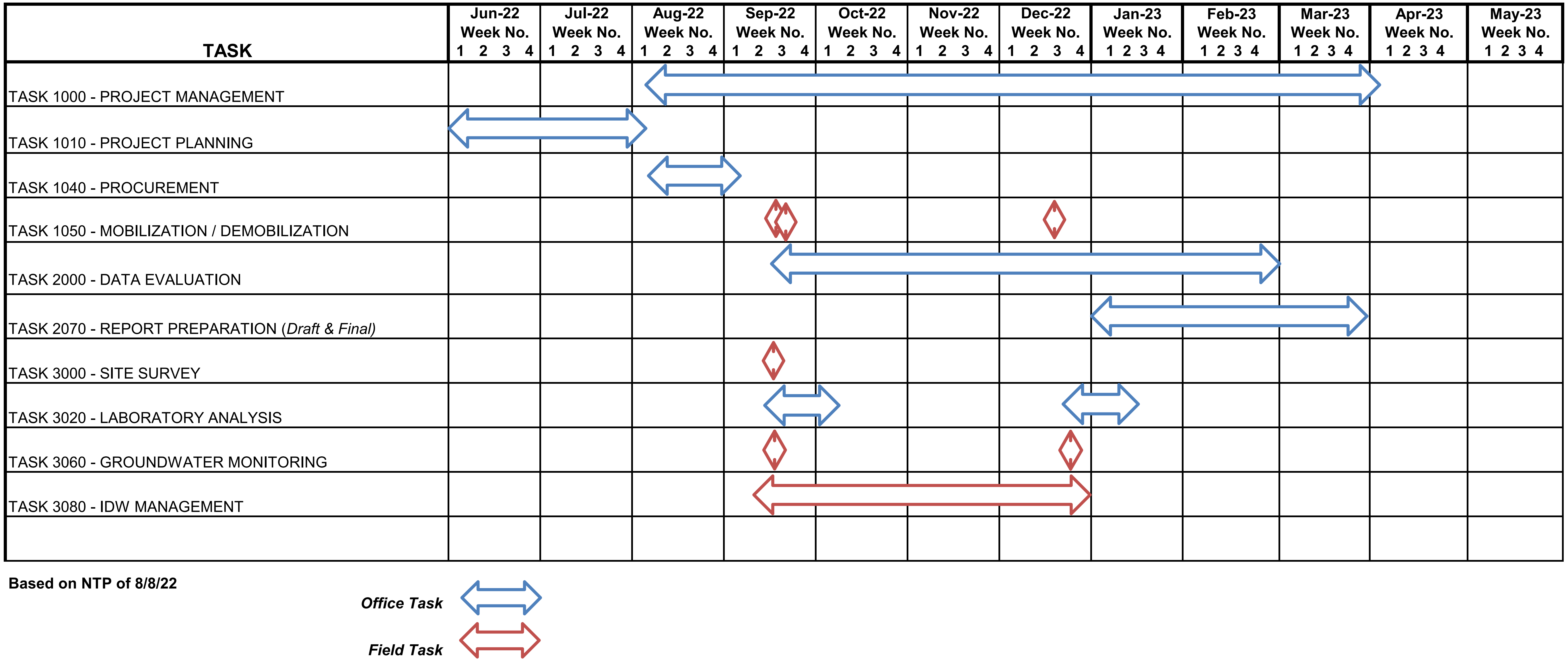
FIGURE 2
WELL LOCATION MAP
SAEGERTOWN PFAS SITE
SAEGERTOWN BOROUGH,
CRAWFORD COUNTY, PENNSYLVANIA

Figure 3

Proposed Project Schedule
Groundwater Monitoring
Saegertown PFAS Site



ATTACHMENT A

Sampling and Analysis Plan and Quality Assurance Protocols

FINAL
SAMPLING AND ANALYSIS PLAN
AND QUALITY ASSURANCE PROTOCOLS

SAEGERTOWN PFAS SITE

SAEGERTOWN BOROUGH
CRAWFORD COUNTY, PENNSYLVANIA

PADEP Contract No.: SAP4000023226
Interim Response and Remediation Services Contract
Work Requisition No.: 7-6-182

Prepared for:

Commonwealth of Pennsylvania
Department of Environmental Protection
Hazardous Sites Cleanup Section
Environmental Cleanup and Brownfields Program
230 Chestnut Street
Meadville, Pennsylvania 16335

Submitted by:

OBG | Baker Environmental Solutions Joint Venture
Airside Business Park, 100 Airside Drive
Moon Township, Pennsylvania 15108

OBG | Baker Project No. 189432

July 2022

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NOTICE

The Pennsylvania Department of Environmental Protection (Department) has funded the information in this document under Contract No. SAP 4000023226 to OBG | Baker Environmental Solutions Joint Venture (OBG | Baker). This document has been formally released by OBG | Baker to the Department.

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1.0 INTRODUCTION

OBG | Baker Environmental Solutions Joint Venture (OBG | Baker) has prepared this Sampling and Analysis Plan (SAP) and Quality Assurance Protocols (QAP) for the Pennsylvania Department of Environmental Protection (Department), as authorized by Work Requisition Number 7-6-182, Contract Number SAP4000023226 (GTAC-7), pursuant to the Pennsylvania Hazardous Sites Cleanup Act (HSCA), Act 108, October 18, 1988. The Plan is associated with the comprehensive groundwater sampling activities to be conducted at the Saegertown Per- and Polyfluoroalkyl Substances (PFAS) Site (site) located in Saegertown Borough, Crawford County, Pennsylvania.

1.1 Site Description and Background

Pertinent information related to the site description and background is presented in the Work Plan.

1.2 Plan Purpose and Objectives

The primary purpose of this SAP/QAP is to: (1) provide guidance and establish requirements for groundwater sampling at the site and (2) establish laboratory Quality Assurance (QA)/Quality Control (QC) protocols associated with the sampling. The SAP/QAP is to be used in conjunction with the Work Plan and Health and Safety Plan (HASP).

1.3 Key Personnel and Responsibilities

The following personnel are designated to carry out the stated job functions for both on-site and off-site activities associated with implementing this SAP/QAP. The Environmental Specialist listed as "To Be Determined" will be filled with a qualified person available at the time of project start.

- Project Manager: Mr. Christopher Kupfer, P.G.
- Project QC Officer: Mr. Joe Burawa, P.G.
- Health and Safety Manager: Mr. Matthew Guard, C.S.P., A.S.P.
- Environmental Specialist To Be Determined

Project Manager. The Project Manager, Mr. Christopher Kupfer, is responsible for managing the overall technical and administrative efforts associated with this project including implementing this SAP/QAP. The Project Manager will serve as the Department Regional Project Officer's single-point-of-contact for this project and provide the managerial administrative skills to ensure that resource allocations, planning, execution, and reporting meet the Department's expectations. In addition, the Project Manager will be readily available to respond to Department questions, concerns, and comments and be proactive in alerting the Department to potential project issues. Project personnel and specialty subcontractors working on the project will report to the Project Manager and act under his direction.

Project QC Officer. The Project QC Officer, Mr. Joe Burawa, will report functionally to the Project Manager and provide overall direction to the field QC function, monitor and report adherence to project-required plans, and conduct audits and surveillance as necessary. The Project Manager will empower the Project QC Officer to enforce QC issues in the field including the authority to suspend work if QC issues are being compromised. Any deficiencies will be immediately reported for consultation and assignment of corrective actions.

Health and Safety Manager. The Health and Safety Manager, Mr. Matthew Guard, has overall responsibility for administering and directing OBG | Baker's Corporate Health and Safety Program including ensuring that personnel working on this project are in compliance with project and corporate health and safety requirements. In addition, the Health and Safety Manager has the requisite authority to oversee and execute health and safety activities for this project.

Environmental Specialist. The Environmental Specialist will report directly to the Project Manager and be responsible for completing the groundwater sampling activities and managing all aspects of project implementation in the field including quality, safety, and coordination of activities associated with task-specific groups or specialty subcontractors.

2.0 SAMPLING AND ANALYSIS PLAN

The following sections discuss the field activities necessary to complete the comprehensive groundwater sampling activities. The 14 wells identified for the groundwater monitoring activities include:

- Saegertown Borough Public Water Supply Well #1
- Saegertown Borough Public Water Supply Well #2
- Saegertown Borough Public Water Supply Well #6
- Saegertown Borough Public Water Supply Well #7
- Saegertown Borough Monitoring Well OB-6-50
- Saegertown Borough Monitoring Well OB-6-100
- Saegertown Borough Monitoring Well OB-7-50
- Saegertown Borough Monitoring Well OB-7-100
- Saegertown Borough Monitoring Well MW-1
- Parker/Lord Monitoring Well GM-24S
- Parker/Lord Monitoring Well GM-24I (a.k.a., GM-24D)
- Parker/Lord Monitoring Well GM-15S
- Parker/Lord Monitoring Well GM-15D
- Saegertown Beverage Well (SBW)

At the request of the Department, two groundwater sampling events will be included in the groundwater monitoring scope of work. Both sampling events will include all 14 of the wells cited above.

Two methodologies will be used to collect the samples from the 14 wells based on their construction and appurtenances; one method will be samples collected from taps previously and recently installed on the four Saegertown public supply wells (#1, #2, #6, and #7) and the Saegertown Beverage supply well. The second methodology will be using low-flow sampling techniques described in the ensuing section of the Work Plan to sample OB-6-50, OB-6-100, OG-7-50, OB-7-100, MW-1, GM-24S, GM-24D, GM-15S, and GM-15D.

The collection at the taps is able to be completed as all of five of the wells have pumping systems and discharge lines. Before sample collection, it will be confirmed that all sample taps are in line prior to the chlorination treatment of the pumping effluent. At each of these five well locations, the pump will be allowed to run for several minutes prior to collecting a representative sample. Field personnel will estimate the pumping timeframe by the well's construction and also the appearance of the effluent.

Regardless of the sample collection methodology, special care must be taken when sampling for PFAS constituents. Some typical sampling equipment/materials and personnel protective equipment are known to contain PFAS and must not be used during the sampling activities. A PFAS Sampling Checklist and sample collection considerations page have been provided as

Attachment B to this Work Plan. The considerations and checklist will be reviewed by field personnel, and the subcontracted laboratory also will be made aware that the scope includes PFAS analyses (special bottleware/caps must be used for sample collection and internal specialized equipment).

Since supply well #6 and #7 share the same effluent discharge piping and sample tap, Groundwater Resources, LLC (Borough consultant) will be on site during the sampling and will be responsible for operating each of the pumps individually to allow OBG | Baker personnel to collect the representative groundwater samples from the one sample tap. The tap is located prior to the chlorination process.

In the section below, multiple options are available to purge and sample the monitoring wells. In instances where non-dedicated, non-disposable sampling equipment is used (e.g., submersible bladder pump), all equipment that comes in contact with the groundwater will need to be decontaminated before the purging / sampling of the well. Decontamination activities are performed to mitigate the potential for cross contamination between wells during groundwater monitoring. Each piece of sampling equipment that contacts the groundwater will be decontaminated by placing the equipment in a bucket filled with non-phosphate soap and potable water and scrubbed thoroughly followed by a thorough PFAS-free water rinse. These wash waters will be containerized for later characterization and appropriate disposal. If dedicated purge methods are used (peristaltic pump, disposable bailer, etc.), no decontamination of equipment will be needed between wells.

As summarized in the IDW Management section of the Work Plan (Section 3.10), the purged groundwater and decontamination fluids will be containerized in steel, properly-labeled, 55-gallon drums for later disposal by the IDW subcontractor. The drums will be temporarily housed in a conex box on site for storage until disposal.

2.1 Groundwater Sampling Methodology

A complete round of groundwater level measurements from the monitoring wells will be collected and recorded in the field notebook prior to initiating the purging and sampling activities for both rounds of sampling. As noted above, care will be taken to collect the water levels from wells with dedicated pump systems. In all instances, Groundwater Resources, LLC will be on site to open the wells for access to the inner casing. The owner to Saegertown Beverage will need to provide access to his well for the measurements.

Of the 14 wells designated to be sampled in the scope, nine of the monitoring/observation wells will be purged and sampled following typical sampling methodologies as described below. These nine wells include Saegertown monitoring well MW-1, GM-24S, GM-24D (a.k.a., GM-24I), GM-15S, GM-15D, OB-6-50, OB-6-100, OB-7-50, and OB-7-100.

The monitoring wells will be purged prior to sampling to collect a representative groundwater sample from the aquifer. It is understood that the nine wells are two-inch diameter and will be able to be purged and sampled following the same methodologies.

To mitigate the volume of waste (purge) water generated for (potential) disposal, groundwater purging and sampling activities will initially be attempted with a peristaltic pump with dedicated discharge tubing. At each well, the tubing will be lowered to the approximate mid-point of the well's screened interval (determined through review of well construction diagrams). If construction specs are not available, the pump system will be placed approximately five feet from the well bottom with the assumption that the well was constructed with a 10-foot long well screen.

The pumping rate will be set to create a low sustainable flow. A water level meter will be used concurrently to monitor the water level within the well casing. Ideally, the water level should remain in 'steady state' during low-flow pumping and not be drawn down. If drawdown in the well occurs, the pump flow rate will be reduced until the water level in the well casing stabilizes. Typically, flow rates of less than one liter per minute are used initially. However, the flow is dependent upon the hydrogeologic characteristics of the well sampled.

Water Quality Parameters (WQPs) including pH, Oxidation-Reduction Potential (ORP), specific conductance, dissolved oxygen, temperature, and turbidity will be measured at approximate five-minute intervals during purging and recorded in the field logbook. The field testing will be conducted within a flow-through cell that limits exposure of the groundwater to the atmosphere while the field measurements (including flow rate calculated with a graduated bucket and stopwatch) are recorded. These same field measurements also will be collected at each of the five water supply wells immediately after sample collection.

In general, purging will be considered complete when three successive WQP readings have stabilized within 0.1 Standard Units for pH, 10 millivolts for ORP, 3% for specific conductance, 10% for dissolved oxygen, and turbidity is less than 10 Nephelometric Turbidity Units (NTUs). Temperature readings will be recorded, but not used for stabilization evaluation. Temperatures measured at the surface are affected to some extent by the difference between ambient air and groundwater temperatures and thus can vary over short periods. If after two hours of purging (or three well volumes, whichever is sooner), the WQPs have not reached a stable plateau, purging will be discontinued, and the sample will be collected.

Upon WQP stabilization, the groundwater samples will be collected from the end of the pump tubing and placed into appropriate sample containers with the appropriate preservatives (HCl for VOCs, nitric acid for metals). For low-flow sampling, the same equipment used for purging will also be used for sampling.

If purging and sampling are not capable of being completed with the peristaltic pump, purging will attempt to be completed with a submersible bladder pump system. If used, the submersible pump installation and operational methodology is consistent with the peristaltic pump description above.

If low-flow techniques are not viable in a particular well, purging and sampling of the well may be performed with dedicated, disposable polyethylene bailers with dedicated, disposable retrieval line. A minimum of three well volumes will be evacuated from the well prior to sampling.

However, if production is insufficient, the well will be bailed (purged) dry and allow time to recover (at least 75% of lost head) prior to initiating groundwater sampling. It is not believed this methodology will need to be implemented as groundwater production is believed to be sufficient in the area to support low-flow purging techniques.

At the direction of the Department, each of the groundwater samples will be analyzed for 24 PFAS using USEPA Method 537.1. 'Top Assay' and total fluorene analyses will also be performed on the samples as described above.

The appropriate sample containers will be filled and subsequently placed on ice in a cooler immediately after collection for shipment via overnight courier (e.g., FedEx) to the subcontracted laboratory. As noted in the checklist and considerations attachment, chemical or blue ice must not be used for sample shipment as well as any other PFAS-containing items (e.g., sharpies for marking cooler).

2.1.1 Quality Assurance/Quality Control

In addition to the groundwater and waste profile samples designated for laboratory analysis, QA/QC samples also will be collected for analysis. The analytical suite for the QA/QC samples will be consistent with the associated investigative samples. A description of the anticipated QA/QC samples to be collected during the sampling activities is provided below.

Duplicates: Duplicate analytical samples are proposed to be collected at an approximate rate of ten percent of investigative samples per sampling media. Therefore, a total of two duplicate samples are proposed to be collected during each of the two groundwater sampling events (four duplicate samples total).

Field Blanks – To document both the quality of the PFAS free certified water used for the decontamination activities, verify laboratory analysis integrity, and document the quality of the water provided by the laboratory, a total of two field blanks will be collected as part of the sampling activities. One PFAS free certified water field blank will be collected for analysis during each of the two groundwater sampling events. The analysis of this field blank will document the integrity/quality of the water used for the decontamination process.

The field blank will be collected during each of the two groundwater sampling events by pouring laboratory-grade, PFAS free certified water (supplied by the laboratory) into the appropriate sample containers for laboratory analyses. The analysis of the field blank from each event will document the integrity/quality of the water supplied by the lab in case erroneous detections are observed from the laboratory analytical results of the equipment rinsate samples.

Equipment Rinsates: To document sufficient decontamination practices of non-disposable sampling equipment, one equipment rinsate sample will be collected for each non-disposable sampling device used during each of the two sampling events. Equipment rinsate samples are proposed to be collected at an approximate rate of five percent of investigative samples. Rinsate samples will be collected using PFAS free certified water supplied by the laboratory.

For the current scope, it is anticipated that one equipment rinsate sample will be collected for laboratory analysis from each of the two sampling events. However, if disposable bailers are used to sample the wells instead of low-flow pumping (based on aquifer production), no equipment rinsate will be collected during the groundwater sampling activities.

<u>MS/MSD Samples</u>: Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be prepared in the field using the same procedures as duplicate samples and analyzed for the same parameters as the corresponding original samples. MS/MSD samples will be prepared at a frequency of approximately 5 percent for each group of samples of a similar matrix. Therefore, one MS and one MSD sample will be collected for each of the two sampling events. The laboratory will use the samples for internal QA/QC. In addition, the results will be used to evaluate the matrix effect of the sample upon the analytical methodology.

2.2 Sample Designation

In order to identify and accurately track the various samples that may be collected during groundwater sampling activities, the samples will be designated with a unique identification number, which will be recorded in the field logbook, on the chain-of-custody form, and the label affixed to the sample container(s).

2.3 Decontamination

It is anticipated that reusable sampling equipment will be used for a majority of the groundwater sampling. Reusable sampling equipment will be decontamination will be as follows:

- Wash equipment thoroughly with laboratory detergent and potable water using a brush to remove any particulate matter or surface film.
- Rinse equipment thoroughly with PFAS-free water.

2.4 Site Management

The responsibilities and reporting requirements of on-site personnel are discussed below.

2.4.1 Field Team Responsibilities

The sampling activities will be coordinated and conducted by the Environmental Specialist. The Environmental Specialist will ensure that these activities are conducted in accordance with the Work Plan, HASP, and this SAP/QAP.

2.4.2 Reporting Requirements

The Environmental Specialist will report a summary of each day's field activities to the Project Manager in a Daily Activity Report (DAR), which will include, but not be limited to, the following information:

- Personnel onsite
- Description of work performed
- Problems encountered, and solutions identified/employed
- Equipment onsite
- Summary of travel expenses
- Summary of materials or purchases
- Subcontractor quantities

The Project Manager will in turn review the DAR and submit the DAR to the Department's Regional Project Officer. The Environmental Specialist will receive direction from the Project Manager regarding any changes in the scope of work. Any changes in scope will be discussed with and agreed upon with the Regional Project Officer.

3.0 QUALITY ASSURANCE/QUALITY CONTROL PROTOCOLS

This section presents the organization, objectives, functional activities, and specific QA/QC activities associated with the comprehensive groundwater sampling activities.

3.1 Organization and Responsibility

The OBG | Baker project management organization is designed to provide a line of functional responsibility and authority supported by a management control structure and independent quality assurance review. This control structure provides for:

- Clearly identified lines of communication and coordination
- Project budget and schedule monitoring
- Key technical resources management
- Financial management and progress reporting
- Quality control

Key project personnel and their responsibilities are presented in Section 1.3.

3.2 Data Quality Objectives

DQOs are qualitative or quantitative statements developed by the users to specify the quality of data needed from a particular data collection activity to support specific uses. DQOs consider analytical method precision, accuracy, representativeness, completeness, and comparability as discussed below.

Precision

Precision is a measure of the amount of variability and bias inherent in a data set. Furthermore, precision describes the reproducibility of measurements of the same parameter for samples collected under similar conditions.

Field duplicate precision monitors the consistency with which environmental samples were obtained and analyzed. In general, field duplicate results for solid matrix and aqueous matrix samples are precise if the Relative Percent Difference (RPD) is less than or equal to 35 percent and 20 percent, respectively. Field precision will be assessed through collection and measurement of field duplicate samples at a rate of 1 duplicate per 10 analytical samples per matrix.

Laboratory precision QC samples will be analyzed with a minimum frequency of 5 percent (i.e., 1 QC sample per 20 environmental samples per matrix). Laboratory precision will be measured via comparison of RPD values and precision control limits specified in the analytical method or by the laboratory's QA/QC program. Laboratory limits at the time of analysis will be used to assess the data.

The RPD between the sample (or spike) and duplicate (or duplicate spike) will be calculated using the following formula:

$$RPD = \frac{\text{Amount in Sample 1} - \text{Amount in Sample 2}}{0.5(\text{Amount in Sample 1} + \text{Amount in Sample 2})} \times 100$$

Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference value. Accuracy in the field will be assessed using equipment Rinsate and field blanks and will be ensured through adherence to all sample handling, preservation, and holding time requirements.

Accuracy in the laboratory will be measured through the comparison of a spiked sample result with a known or calculated value and is expressed as a percent recovery (%R). Percent recoveries will be derived from the analysis of known amounts of compounds spiked into deionized water (i.e., Laboratory Control Sample [LCS] analysis) or into actual samples (i.e., surrogate or internal MS analysis). LCS analysis, which may also be referred to as blank spike analysis, measures the accuracy of laboratory operations. Surrogate and MS analyses measure the accuracy of laboratory operations as affected by sample matrix. LCS and MS analyses will be performed at a frequency of 1 per 20 associated samples of similar matrix. Surrogate spike analysis is performed for all organic chromatographic analyses. Laboratory accuracy will be assessed via comparison of calculated %R values with accuracy control limits specified in the analytical method or by the laboratory's QA/QC program. Laboratory recovery limits at the time of analysis will be used to assess the data.

The %R for a spiked sample will be calculated by using the following formula:

$$\%R = \frac{\text{Amount in Spiked Sample} - \text{Amount in Sample}}{\text{Known Amount Added}} \times 100$$

The %R for LCS and surrogate compound results will be determined according to the following equation:

$$\%R = \frac{\text{Experimental Concentration}}{\text{Known Amount Added}} \times 100$$

Completeness

Completeness is a measure of the amount of usable, valid, analytical data obtained, compared with the amount expected to be obtained. Completeness is typically expressed as a percentage.

The ideal objective for completeness is 100 percent (i.e., every sample planned to be collected is collected; every sample submitted for analysis yields valid data). However, samples can be rendered unusable during shipping or preparation (e.g., bottles broken or extracts accidentally destroyed), errors can be introduced during analysis (e.g., loss of instrument sensitivity, introduction of ambient laboratory contamination), or strong matrix effects can become apparent (e.g., extremely low MS recovery). These instances result in data that do not meet QC criteria. Completeness will be calculated for each chemical category (e.g., VOCs, SVOCs, metals, etc.) per media. If critical data points are lost, re-sampling and/or re-analysis may be required. For this project, the completeness goal is 95 percent or greater.

Following completion of the analytical testing, the percent completeness will be calculated using the following equation:

$$\text{Completeness} = \frac{\text{(Number of Valid Measurements)}}{\text{(Number of Measurements Planned)}} \times 100$$

Representativeness

Representativeness is an expression of the degree to which the data accurately and precisely depict the actual characteristics of a population or environmental condition existing at an individual sampling point. Use of standardized sampling, handling, analytical, and reporting procedures ensures that the final data accurately represent actual site conditions.

Representativeness in this sampling and analysis program will be ensured by following the Work Plan, SAP, and QAP and using proper sampling techniques. From the analytical end, representativeness will be ensured by using the proper analytical procedures, meeting sample holding times, and analyzing and assessing field duplicate samples.

Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., between sampling points; between sampling events). Comparability will be achieved by using standardized sampling and analysis methods and data reporting formats (including use of consistent units of measure). In addition, consideration will be given to seasonal conditions and other environmental variations that could exist to influence analytical results.

3.3 Sampling Procedures

Specific sampling procedures will be determined at the time of sample collection based on site-specific conditions. However, it is anticipated that the groundwater samples will be collected from taps at wells with dedicated pumping systems and using a peristaltic pump as the default option from the monitoring wells (low-flow pumping techniques as a backup). Detailed sampling procedures are presented above in Section 2.1 (Groundwater Sampling Methodology).

3.4 Sample Custody Procedures

Each sample will be given a unique designation, which will be recorded in the field logbook, on the chain-of-custody form, and the label affixed to the sample container(s). The samples will be stored on ice in coolers at approximately 4° Celsius and submitted to a qualified laboratory for analysis. Chain-of-custody forms and the PFAS sampling checklist will be completed and enclosed in the shipping packages. In addition, chain-of-custody seals will be used in accordance with the selected laboratory's requirements.

3.5 Analytical Procedures

General procedures for field analyses and laboratory analyses are provided below.

3.5.1 Field Analyses

Field instruments will be used to support the sampling activities presented herein. Any required instrumentation will be operated in accordance with the manufacturer's instructions.

3.5.2 Laboratory Analyses

The proposed laboratory analyses of groundwater will be exclusively for 24 PFAS constituents. 'TOP Assay' analysis and total fluorene analysis will also be collected to aid in site characterization for the first round of sampling minimally. Sample analyses will be conducted in accordance with standard U.S. Environmental Protection Agency (USEPA) methods and procedures.

3.6 Data Reduction, Validation, and Reporting

Data reduction, validation, and reporting will ensure that documents produced as part of the sampling investigation can be accounted for upon project completion. Accountable documents include, but are not limited to, field logbooks, correspondence, chain-of-custody forms, data packages, and photographs. The Project Manager will be responsible for maintaining a project file in which all accountable documents will be inventoried. The project records will be retained for the period required by the Master Agreement.

3.6.1 Field Data Procedures

Field sampling activities will be documented in bound field logbooks in which information pertinent to sample collection will be entered in indelible ink. Appropriate information, as applicable, will be entered to reconstruct the sampling event including site name at the top of each page, names of field personnel and visitors on site, sample identification, brief descriptions of samples collected, date and time of collection, sampling methodology, sampling remarks and observations, field measurements, conditions and observations, description of activities, list of photographs taken, sketch of site conditions, and sampler's initials and date at the bottom of each page.

3.6.2 Laboratory Data Procedures

The following procedures summarize practices routinely used by laboratory staff for data reduction, validation, and reporting. Numerical analyses, including manual calculations, will be documented and subjected to QC review. Records of analyses must be legible and complete enough to permit reconstruction of the work by a qualified individual other than the originator.

Laboratory Data Validation

Laboratory data validation begins with the receipt of samples and documentation of proper sample custody. It continues with raw data reduction to the reporting of data.

Data processing will be checked by an individual other than the analyst who performed the data processing. The checker will review the data for the following:

- Use of proper equations
- Correctness of numerical input
- Correctness of computations
- Correct interpretation of raw data (e.g., chromatographs, strip charts, etc.)

Entries made in bench books, data sheets, computation sheets, etc. will be made in ink. No entry will be rendered unreadable, and changes will be lined-through and initialed by the person making the correction.

Analytical Data Package Requirements

For each analytical method run, the laboratory will report all required analytes for each sample as a detected concentration or as not detected at the specific limits of quantitation. In addition, applicable method detection limits and instrument detection limits will be required for every analysis. Each analytical method run will be clearly identified as belonging to a specific analytical batch. Samples must be reported with dates of collection, preparation, and analysis. The laboratory also will report dilution factors for each sample.

3.7 Preventative Action Procedures

General preventative action procedures for field instruments and laboratory instruments are provided below.

3.7.1 Field Instruments

Specific preventive maintenance procedures recommended by the manufacturer will be followed for field instruments. The instruments will be checked and calibrated before use. In addition, the calibration will be checked anytime there is a questionable response from the instrument. Calibration will be documented in the field logbooks or on appropriate forms.

3.7.2 Laboratory Instruments

A routine preventive maintenance program will be implemented by the laboratory to minimize the occurrence of instrument failure and other system malfunctions. Section supervisors and/or analysts (organic, inorganic) will perform routine scheduled maintenance and coordinate with the vendor for the repair of instruments. Laboratory instruments will be maintained in accordance with the manufacturer's specifications and the requirements of the specific method employed. This maintenance will be carried out on a regular, scheduled basis and documented in the laboratory instrument service logbook for each instrument. Emergency repair or scheduled manufacturer's maintenance will be provided under a repair and maintenance contract with factory representatives.

3.8 <u>Corrective Action Procedures</u>

A corrective action protocol that is both technically effective and administratively compatible to ensure accurate and timely correction of non-conformance is imperative.

3.8.1 Field Procedures

The Environmental Specialist is responsible for coordination and implementation of the sampling activities and may be required to adjust the field program to accommodate site-specific needs. If it becomes necessary to modify the program, the Environmental Specialist will consult the Project Manager and the Department's Regional Project Officer regarding an appropriate corrective action. Agreed upon corrective actions for the program will be documented in the field logbook.

3.8.2 Laboratory Procedures

Non-conformance is any event which is beyond the limits established for laboratory performance such as data which fall outside accepted bounds for accuracy and precision due to improper equipment calibration/maintenance or improper data verification. Any activity in the laboratory which affects data quality can result in a non-conformance.

Non-conformance associated with the statistical analysis and review of data are straightforward to identify. The Laboratory QA Coordinator will be responsible for the assessment of QC sample information. The Project Manager and the Department's Regional Project Officer will be notified of any non-conformances.

Corrective actions will be designed to correct the associated problems and to minimize the possibility of their recurrence. Examples of corrective actions include modifying non-conforming procedures; tagging, repairing, or replacing deficient equipment; training or replacing unqualified personnel; re-analyzing affected samples; marking rejected data; and re-issuing affected reports.

3.9 Quality Assurance Reports

The Project Manager will be responsible for assessing the performance of measurement systems and data quality. The Project Manager will keep in contact with the Department's Regional Project Officer through informal verbal reports (or other appropriate means) during the project as well as through routine progress reports.

ATTACHMENT B
PFAS Sampling Checklist and Considerations

PFAS Sampling Checklist

Date: ______________________

Weather (*temp./precipitation*): _______________________ Site Name: ________________________________

Field Clothing and PPE:

- ☐ No clothing or boots containing Gore-Tex™
- ☐ All safety boots made from polyurethane and PVC
- ☐ No materials containing Tyvek®
- ☐ Field crew has not used fabric softener on clothing
- ☐ Field crew has not used cosmetics, moisturizers, hand cream, or other related products this morning
- ☐ Field crew has not applied unauthorized sunscreen or insect repellant

Field Equipment:

- ☐ No Teflon® or LDPE containing materials on-site
- ☐ All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene
- ☐ No waterproof field books on-site
- ☐ No plastic clipboards, binders, or spiral hard cover notebooks on-site
- ☐ Coolers filled with regular ice only. No chemical (blue) ice packs in possession

Sample Containers:

- ☐ All sample containers made of HDPE or polypropylene
- ☐ Caps are unlined and made of HDPE or polypropylene

Wet Weather (as applicable):

- ☐ Wet weather gear made of polyurethane and PVC only

Equipment Decontamination:

- ☐ "PFC-free" water on-site for decontamination of sample equipment. No other water sources to be used.
- ☐ Alconox and Liquinox to be used as decontamination materials

Food Considerations:

- ☐ No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

If any applicable boxes cannot be checked, the Field Lead shall describe the noncompliance issues below and work with field personnel to address noncompliance issues prior to commencement of that day's work. Corrective action shall include removal of noncompliance items from the site or removal of worker offsite until in compliance.

Describe the noncompliance issues (include personnel not in compliance) and action/outcome of noncompliance:

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Field Lead Name: _________________________________

Field Lead Signature: ________________________________ Time: ______________________

PFAS Sampling – Prohibited and Acceptable Items

Prohibited	Acceptable
Field Equipment	
Teflon® containing materials	High-density polyethylene (HDPE) materials
Low density polyethylene (LDPE) materials	Acetate Liners
	Silicon Tubing
Waterproof field books	Loose paper (non-waterproof)
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
Chemical (blue) ice packs	Regular ice
Field Clothing and PPE	
New cotton clothing or synthetic water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing made of natural fibers (preferable cotton)
Clothing laundered using fabric softener	No fabric softener
Boots containing Gore-Tex™	Boots made with polyurethane and PVC
Tyvek®	Cotton clothing
No cosmetics, moisturizers, hand cream, or other related products as part of personal cleaning/showering routine on the morning of sampling	**Sunscreens** - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are "free" or "natural" **Insect Repellents** - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics **Sunscreen and insect repellant -** Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion
Sample Containers	
LDPE or glass containers	HDPE or polypropylene
Teflon-lined caps	Unlined polypropylene caps
Rain Events	
Waterproof or resistant rain gear	Gazebo tent that is only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90®	Alconox® and/or Liquinox®
Water from an on-site well	Potable water from municipal drinking water supply
Food Considerations	
All food and drink, with exceptions noted on right	Bottled water and hydration fluids (i.e, Gatorade® and Powerade®) to be brought and consumed only in the staging areas