I MBL
FLYmanistee.com

MANISTEE BLACKER AIRPORT AUTHORITY
COMMERCIAL AIRLINE SERVICE | GENERAL AVIATION | RENTAL SERVICES | FLIGHT SCHOOL
2323 Airport Road
Manistee, MI 49660
231.723.4351
manisteeairport@gmail.com

AIRPORT AUTHORITY AGENDA
SPECIAL MEETING

September 4, 2020
12:00 P.M.

Manistee County Blacker Airport
Conference Room & via Zoom
2323 Airport Road, Manistee, MI 49660

1. Call to Order
2. Roll Call
3. Public Comment
4. Review/Approve PFAS Testing Grant Agreement (APPENDIX A)
5. Adjournment

[js h:\airport authority\agendas\airport authority 090420 special]

Michigan Department
of Transportation
2122 (04/18)

MDOT DIGITAL SIGNATURE CERTIFICATE REQUEST FORM

INSTRUCTIONS:
The information on this form is required by the Michigan Department of Transportation (MDOT) to verify the identity of the applicant requesting a digital signature certificate. The supplied information ensures the returned digital signature certificate matches the identity of the signer. The assigned signature is eligible for use on all applicable MDOT documents.

This completed form will remain valid until the signer's digital signature certificate expires or until such time as the signer needs to create a new digital signature. Each digital signature is unique. If another digital signature is used, even though it appears similar, it will not validate as the encrypted data within the signature will not match the previously validated signature information. This will result in the rejection of any document on which the non-validated signature has been used.

It is the responsibility of the applicant and/or associated company/agency to notify MDOT of any change in employment status, signing authority, or e-mail address that may impact the validity of the assigned signature. Note: Applicants and associated company/agencies may be directly contacted to further authenticate the identity of the applicant and/or confirm signing authority.

Completed forms must be returned electronically to: MDOT-eSign@Michigan.gov

SIGNATURE APPLICANT SECTION	
APPLICANT NAME (LEGAL NAME)	COMPANY/AGENCY asdf
APPLICANT NAME AS TO APPEAR ON SIGNATURE (IF DIFFERENT THAN FIELD ABOVE)	TITLE
PROFESSIONAL LICENSURE (PE, PS, AIA, etc.)	LICENSE NUMBER
E-MAIL	PHONE NUMBER

CERTIFICATION AFFIDAVIT:
The undersigned affirms all information provided on this form is true and correct. I agree to supply and receive information electronically. I agree to utilize MDOT's current digital signing software as the legal equivalent of my hand-written signature on all required transactions. I also understand by signing below, the digital signature certificate assigned will be used exclusively for State of Michigan contracting and/or authorized use only.

PRINT OR TYPE NAME, SAME AS SIGNATURE BELOW	TITLE
APPLICANT SIGNATURE	DATE

AIRPORT PFAS TESTING GRANT AGREEMENT
BETWEEN THE
MICHIGAN DEPARTMENT OF TRANSPORTATION
AND

MANISTEE COUNTY-BLACKER AIRPORT

This Grant Agreement ("Agreement") is made between the Michigan Department of Transportation, Office of Aeronautics ("AERO"), and Manistee County-Blacker Airport ("Grantee").

The purpose of this Agreement is to provide funding in exchange for work to be performed for the project named below. AERO is authorized to provide grant assistance pursuant to Public Act 154 of 2019 Legislative appropriation of Funds for grant assistance is set forth in **Public Act 154 of 2019** This Agreement is subject to the terms and conditions specified herein.

Project Name: Airport PFAS Testing Grant

Project #: MBL-PFAS 2020

Amount of grant: $ 237,300.00

% of grant state 100%

Start Date (date executed by MDOT):

End Date (18 months after date executed):

GRANTEE CONTACT:

Barry Lind, Airport Director
Name/Title

Manistee County-Blacker Airport
Organization

2323 Airport Rd.
Address

Manistee, MI 49660
Address

(231) 723-4351, ext. 4
Telephone number

Fax number

manisteeairport@gmail.com
E-mail address

382169455
Federal ID number – (Required for Federal Funding)

94-886-8799
Grantee DUNS number - (Required for Federal Funding)

AERO'S CONTACT:

Steve Houtteman, Environmental Specialist
Name/Title

Office of Aeronautics
Division/Bureau/Office

2700 Port Lansing Road
Address

Lansing, MI 48906
Address

(616) 299-2654
Telephone number

Fax number

houttemans@michigan.gov
E-mail address

[Program will add a Remittance address if different than the above.]

The individuals signing below certify by their signatures that they are authorized to sign this Agreement on behalf of their agencies and that the parties will fulfill the terms of this Agreement, including any attached appendices, as set forth herein.

FOR THE GRANTEE:

Signature

Name/Title

Date

FOR THE OFFICE OF AERONAUTICS:

Signature

Name/Title

Date

I. PROJECT SCOPE

This Agreement and its appendices constitute the entire Agreement between AERO and the Grantee and may be modified only by written agreement between AERO and the Grantee.

(A) The scope of this project is limited to the activities specified in Appendix A and such activities as are authorized by AERO under this Agreement – including the approved attached work plan. Any change in project scope requires prior written approval in accordance with Section III, Changes, in this Agreement.

(B) By acceptance of this Agreement, the Grantee commits to complete the project identified in Appendix A within the time period allowed for in this Agreement and in accordance with the terms and conditions of this Agreement.

II. AGREEMENT PERIOD

Upon signature by AERO, the Agreement shall be effective from the Start Date until the End Date on page 1. AERO shall have no responsibility to provide funding to the Grantee for project work performed except between the Start Date and the End Date specified on page 1. Expenditures made by the Grantee prior to the Start Date or after the End Date of this Agreement are not eligible for payment under this Agreement.

III. CHANGES

Any changes to this Agreement shall be requested by the Grantee or AERO in writing and implemented only upon approval in writing by AERO. AERO reserves the right to deny requests for changes to the Agreement or to the appendices. No changes can be implemented without approval by AERO.

IV. GRANTEE DELIVERABLES AND REPORTING REQUIREMENTS

The Grantee shall submit deliverables and follow reporting requirements specified in Appendix A of this Agreement.

(A) The Grantee must complete and submit [quarterly] [financial and/or progress] reports according to a form and format prescribed by AERO [and must include supporting documentation of eligible project expenses]. These reports shall be due according to the following:

Reporting Period	Due Date
January 1 – March 31	April 30
April 1 – June 30	July 31
July 1 – September 30	Before October 15*
October 1 – December 31	January 31

*Due to AERO's year-end closing procedures, there will be an accelerated due date for the report covering July 1 – September 30. Advance notification regarding the due date for the quarter ending September 30 will be sent to the Grantee. If the Grantee is unable to submit a report in early October for the quarter ending September 30, an estimate of expenditures through September 30 must be submitted to allow AERO to complete its accounting for that fiscal year.

The forms provided by AERO shall be submitted to AERO's contact at the address on page 1. [All required supporting documentation (invoices, proof of payment, etc.) for expenses must be included with the report.]

(B) The Grantee shall provide a final project report in a format prescribed by AERO. The Grantee must provide a draft final report 45 days prior to the end date of the agreement. The Grantee shall submit the final status report, including all supporting documentation for expenses, along with the final project report and any other outstanding products within 30 days from the End Date of the Agreement.

(C) The Grantee must provide electronic copies of all products and deliverables in accordance with Appendix A.

(D) All products shall acknowledge that the project was supported in whole or in part by [Airport PFAS Testing Program], EGLE and MDOT, per the guidelines provided by the program Request for Proposals

V. GRANTEE RESPONSIBILITIES

(A) The Grantee agrees to abide by all applicable local, state, and federal laws, rules, ordinances, and regulations in the performance of this grant.

(B) All local, state, and federal permits, if required, are the responsibility of the Grantee. Award of this grant is not a guarantee of permit approval by AERO.

(C) The Grantee shall be solely responsible to pay all applicable taxes and fees, if any, that arise from the Grantee's receipt or execution of this grant.

(D) The Grantee is responsible for the professional quality, technical accuracy, timely completion, and coordination of all designs, drawings, specifications, reports, and other services submitted to AERO under this Agreement. The Grantee shall, without additional compensation, correct or revise any errors, omissions, or other deficiencies in drawings, designs, specifications, reports, or other services.

(E) AERO's approval of drawings, designs, specifications, reports, and incidental work or materials furnished hereunder shall not in any way relieve the Grantee of responsibility for the technical adequacy of the work. AERO's review, approval, acceptance, or payment for any of the services shall not be construed as a waiver of any rights under this Agreement or of any cause of action arising out of the performance of this Agreement.

(F) The Grantee acknowledges that it is a crime to knowingly and willingly file false information with AERO for the purpose of obtaining this Agreement or any payment under the Agreement, and that any such filing may subject the Grantee, its agents, and/or employees to criminal and civil prosecution and/or termination of the grant.

VI. USE OF MATERIAL

Unless otherwise specified in this Agreement, the Grantee shall release information or material developed under this Agreement, provided it is acknowledged that AERO funded all or a portion of its development.

AERO, and federal awarding agency, if applicable, retains a royalty-free, nonexclusive and irrevocable right to reproduce, publish, and use in whole or in part, and authorize others to do so, any copyrightable material or research data submitted under this grant whether or not the material is copyrighted by the Grantee or another person. The Grantee will only submit materials that AERO can use in accordance with this paragraph.

VII. ASSIGNABILITY

The Grantee shall not assign this Agreement or assign or delegate any of its duties or obligations under this Agreement to any other party without the prior written consent of AERO. AERO does not assume responsibility regarding the contractual relationships between the Grantee and any subcontractor.

VIII. SUBCONTRACTS

AERO reserves the right to deny the use of any consultant, contractor, associate, or other personnel to perform any portion of the project. The Grantee is solely responsible for all contractual activities performed under this Agreement. Further, AERO will consider the Grantee to be the sole point of contact with regard to contractual matters, including payment of any and all charges resulting from the anticipated Grant. All subcontractors used by the Grantee in performing the project shall be subject to the provisions of this Agreement and shall be qualified to perform the duties required.

IX. NON-DISCRIMINATION

The Grantee shall comply with the Elliott Larsen Civil Rights Act, 1976 PA 453, as amended, MCL 37.2101 *et seq.*, the Persons with Disabilities Civil Rights Act, 1976 PA 220, as amended, MCL 37.1101 *et seq.*, and all other federal, state, and local fair employment practices and equal opportunity laws and covenants that it shall not discriminate against any employee or applicant for employment, to be employed in the performance of this Agreement, with respect to his or her hire, tenure, terms, conditions, or privileges of employment, or any matter directly or indirectly related to employment, because of his or her race, religion, color, national origin, age, sex, height, weight, marital status, or physical or mental disability that is unrelated to the individual's ability to perform the duties of a particular job or position. The Grantee agrees to include in every subcontract entered into for the performance of this Agreement this covenant not to discriminate in employment. A breach of this covenant is a material breach of this Agreement.

X. UNFAIR LABOR PRACTICES

The Grantee shall comply with the Employers Engaging in Unfair Labor Practices Act, 1980 PA 278, as amended, MCL 423.321 *et seq.*

XI. LIABILITY

(A) Each party to this Contract will remain responsible for any claims arising out of that party's performance of this Contract as provided by this Contract or by law. The Grantee, not the State of Michigan, is responsible for all liabilities as a result of claims, judgments, or costs arising out of activities to be carried out by the Grantee under this Agreement, if the liability is caused by the Grantee, or any employee or agent of the Grantee acting within the scope of their employment or agency.

(B) Nothing in this Agreement should be construed as a waiver of any governmental immunity by the Grantee, the State of Michigan, its agencies, or their employees as provided by statute or court decisions.

XII. CONFLICT OF INTEREST

No government employee, or member of the legislative, judicial, or executive branches, or member of the Grantee's Board of Directors, its employees, partner agencies, or their families shall benefit financially from any part of this Agreement.

XIII. ANTI-LOBBYING

If all or a portion of this Agreement is funded with federal funds, then in accordance with 2 CFR 200, as appropriate, the Grantee shall comply with the Anti-Lobbying Act, which prohibits the use of all project funds regardless of source, to engage in lobbying the State of Michigan or federal government or in litigation against the State of Michigan. Further, the Grantee shall require that the language of this assurance be included in the award documents of all subawards at all tiers.

If all or a portion of this Agreement is funded with state funds, then the Grantee shall not use any of the grant funds awarded in this Agreement for the purpose of lobbying as defined in the State of Michigan's lobbying statute, MCL 4.415(2). "'Lobbying' means communicating directly with an official of the executive branch of state government or an official in the legislative branch of state government for the purpose of influencing legislative or administrative action." The Grantee shall not use any of the grant funds awarded in this Agreement for the purpose of litigation against the State of Michigan. Further, the Grantee shall require that language of this assurance be included in the award documents of all subawards at all tiers.

XIV. DEBARMENT AND SUSPENSION

By signing this Agreement, the Grantee certifies that it has checked the federal debarment/suspension list at www.SAM.gov to verify that its agents, and its subcontractors:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any federal department or the State of Michigan.

(2) Have not within a three-year period preceding this Agreement been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state, or local) transaction or contract under a public transaction, as defined in 45 CFR 1185; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

(3) Are not presently indicted or otherwise criminally or civilly charged by a government entity (federal, state, or local) with commission of any of the offenses enumerated in subsection (2).

(4) Have not within a three-year period preceding this Agreement had one or more public transactions (federal, state, or local) terminated for cause or default.

(5) Will comply with all applicable requirements of all other state or federal laws, executive orders, regulations, and policies governing this program.

XV. AUDIT AND ACCESS TO RECORDS

AERO reserves the right to conduct a programmatic and financial audit of the project, and AERO may withhold payment until the audit is satisfactorily completed. The Grantee will be required to maintain all pertinent records and evidence pertaining to this Agreement, including grant and any required matching funds, in accordance with generally accepted accounting principles and other procedures specified by AERO. AERO or any of its duly authorized representatives must have access, upon reasonable notice, to such books, records, documents, and other evidence for the purpose of inspection, audit, and copying. The Grantee will provide proper facilities for such access and inspection. All records must be maintained for a minimum of [five] years after the final payment has been issued to the Grantee by AERO.

XVI. INSURANCE

(A) The Grantee must maintain insurance or self-insurance that will protect it from claims that may arise from the Grantee's actions under this Agreement.

(B) The Grantee must comply with applicable workers' compensation laws while engaging in activities authorized under this Agreement.

XVII. OTHER SOURCES OF FUNDING

The Grantee guarantees that any claims for reimbursement made to AERO under this Agreement must not be financed by any source other than AERO under the terms of this Agreement. If funding is received through any other source, the Grantee agrees to delete from Grantee's billings, or to immediately refund to AERO, the total amount representing such duplication of funding.

XVIII. COMPENSATION

(A) A breakdown of costs allowed under this Agreement is identified in Appendix A. AERO will pay the Grantee a total amount not to exceed the amount on page 1 of this Agreement, in accordance with Appendix A, and only for expenses incurred [and paid]. All other costs necessary to complete the project are the sole responsibility of the Grantee.

(B) Expenses incurred by the Grantee prior to the Start Date or after the End Date of this Agreement are not allowed under the Agreement, [unless otherwise specified in Appendix A].

(C) AERO will approve payment requests after approval of reports and related documentation as required under this Agreement.

(D) AERO reserves the right to request additional information necessary to substantiate payment requests.

(E) Payments under this Agreement should be processed using MDOT's Electronic Invoicing (E-invoicing) system . The Grantee shall process invoices/payments/reimbursements consistent with other project payments through MDOT's ProjectWise system. .

(F) An amount equal to 10 percent of the grant award] will be withheld by AERO until the project is completed in accordance with Section XIX, Closeout, and Appendix A.

XIX. CLOSEOUT

(A) A determination of project completion, which may include a site inspection and an audit, shall be made by AERO after the Grantee has satisfactorily completed the activities, and provided products and deliverables described in Appendix A.

(B) Upon issuance of final payment from AERO, the Grantee releases AERO of all claims against AERO arising under this Agreement. Unless otherwise provided in this Agreement or by State law, final payment under this Agreement shall not constitute a waiver of AERO's claims against the Grantee.

(C) The Grantee shall immediately refund to AERO any payments in excess of the costs allowed by this Agreement.

XX. CANCELLATION

This Agreement may be canceled by AERO, upon 30 days written notice, due to Executive Order, budgetary reduction, other lack of funding, upon request by the Grantee, or upon mutual agreement by AERO and Grantee. AERO may honor requests for just and equitable compensation to the Grantee for all satisfactory and eligible work completed under this Agreement up until 30 days after written notice, upon which time all outstanding reports and documents are due to AERO and AERO will no longer be liable to pay the grantee for any further charges to the grant.

XXI. TERMINATION

(A) This Agreement may be terminated by AERO as follows.

(1) Upon 30 days written notice to the Grantee:

a. If the Grantee fails to comply with the terms and conditions of the Agreement, or with the requirements of the authorizing legislation cited on page 1, or the rules promulgated thereunder, or other applicable law or rules.
b. If the Grantee knowingly and willingly presents false information to AERO for the purpose of obtaining this Agreement or any payment under this Agreement.
c. If AERO finds that the Grantee, or any of the Grantee's agents or representatives, offered or gave gratuities, favors, or gifts of monetary value to any official, employee, or agent of AERO in an attempt to secure a subcontract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Agreement.
d. If the Grantee or any subcontractor, manufacturer, or supplier of the Grantee appears in the register of persons engaging in unfair labor practices that is compiled by the Michigan Department of Licensing and Regulatory Affairs or its successor.
e. During the 30-day written notice period, AERO shall withhold payment for any findings under subparagraphs a through d, above and the Grantee will immediately cease charging to the grant and stop earning match for the project (if applicable).

(2) Immediately and without further liability to AERO if the Grantee, or any agent of the Grantee, or any agent of any subcontract is:

a. Convicted of a criminal offense incident to the application for or performance of a State, public, or private contract or subcontract;
b. Convicted of a criminal offense, including but not limited to any of the following: embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property, or attempting to influence a public employee to breach the ethical conduct standards for State of Michigan employees;
c. Convicted under State or federal antitrust statutes; or
d. Convicted of any other criminal offense that, in the sole discretion of AERO, reflects on the Grantee's business integrity.
e. Added to the federal or state Suspension and Debarment list.

(B) If a grant is terminated, AERO reserves the right to require the Grantee to repay all or a portion of funds received under this Agreement.

XXII. IRAN SANCTIONS ACT

By signing this Agreement the Grantee is certifying that it is not an Iran linked business, and that its contractors are not Iran linked businesses, as defined in MCL 129.312.

PROJECT-SPECIFIC REQUIREMENTS – APPENDIX A

XXIII. Sampling Protocols: Grantees must adhere to EGLE PFAS sampling guidance documents.

XXIV. Sharing Results of Phase Investigations. Grantees whose work plans include phased investigations agree to share and discuss their results with MDOT and EGLE and obtain agreement from EGLE on their Phase 2 plans.

MDOT

Appendix A

1 GRANT INFORMATION

Project Name	Manistee Blacker Airport (MBL) PFAS Investigation
Project Location	Manistee County, Manistee, Michigan
Grant Amount Requested	$237,300
Contact for the Airport	Barry Lind
Contact Phone Number	231-723-4351 x4
Contact Email	manisteeairport@gmail.com

2 PROJECT SUMMARY

The proposed PFAS investigation at Manistee Blacker Airport (the Airport) is intended to meet the following objectives:

1. Identify source areas where past use of aqueous film-forming foam (AFFF) has resulted in PFAS impacts to the environment.
2. Identify significant transport pathways of PFAS in the environment between source areas and potential receptors.
3. Within the extent practical through available funding, determine the nature and extent of potential PFAS in the environment at the Airport.

The proposed investigation will use a data-driven, phased approach to the investigation. The first phase of work will involve sampling at the past AFFF use location, identified by the Airport, to meet the first objective listed above. Subsequent phases of the investigation will be informed by the findings of this first phase.

3 AIRPORT BACKGROUND

The Manistee Blacker Airport has selected the team of Prein&Newhof and Limnotech to assist with this testing program. The Prein&Newhof team's relationship to personnel, ready access to as-built documentation for the airport, and leadership in PFAS testing provide the best starting point for successful development of a testing program. The Manistee Blacker Airport has been a client of P&N's since 2011. Based upon initial conversations with the airport staff, historical locations of AFFF use have been identified. A testing program for the Manistee Blacker is important due to its proximity to wetlands along its South Boundary which are directly adjacent to the Manistee River. The City of

Manistee also has municipal wells on the airport's East side, but initial records review indicates that testing of that water source has not identified any PFAS\PFOA compounds.

4 SCOPE OF WORK

The scope of work includes the following tasks:

Task 1. Initial Investigation – This first phase of the investigation will consist of one (1) set (two borings total) at a past AFFF use location at the Airport (Exhibit A and B). Soil and groundwater samples will be collected from each boring; with two (2) soil samples being collected from the unsaturated zone (one immediately below ground surface and one above the saturated zone) and one (1) groundwater sample collected at each boring. One (1) of these soil borings will be converted to a monitoring well, which will allow for the collection of static groundwater levels for determining groundwater flow direction.

Two (2) additional borings and monitoring wells will be installed south/southwest of the main terminal building (Exhibit C and D), which will allow for the collection of static groundwater levels for determining groundwater flow direction. One (1) groundwater sample will also be collected at each additional monitoring well. A detailed work plan will be prepared describing this phase. A brief letter report to MDOT & EGLE will be prepared to describe initial investigation findings.

Finally, eight (8) surface water samples will be collected from the two (2) unnamed tributaries to the Manistee River located south/southeast of airport property (Exhibit E). For the purposes of this proposal, the two unnamed tributaries will be named East Tributary (a.k.a. "ET") and West Tributary (a.k.a. "WT"). Four (4) samples will be collected from the headwaters or upgradient (a.k.a. "UP"), two (2) samples from the middle (a.k.a. "MID-01" and "MID-02"), and mouth or downgradient (a.k.a. "DWN") section of each tributary.

Due to their location inside the AOA, all wells will be airspaced and a CSPP coordinated with the airport's Part 139 inspector per ARP SOP 1.00. Given the proximity to the runway and runway safety area, night work and runway closures will be required. Additionally, coordination with airport operations and the FAA SSC in Traverse City are anticipated. Work in the movement area will require a Limnotech staff member to be posted to coordinate with local traffic and coordination with airport staff. Runway 28 work will require night work. Wells, when finalized, will be surveyed.

Upon completion of the initial investigation, a brief letter report will be prepared and submitted to EGLE summarizing the initial investigation activities and findings, including tabulated sample results and maps showing key results. It is anticipated that submittal of this report will be followed by a

conference call/internet meeting with EGLE to discuss the initial investigation findings, as well as the scope of the next phase of investigation.

Task 2. Supplemental Groundwater Investigations – Based on discussions with EGLE following initial investigation activities, a supplemental investigation work plan will be prepared and submitted to EGLE, describing planned field activities at the Airport. This will insure that all parties are agree on the scope and objectives of these supplemental investigation activities.

Subsequent phases of investigation will include additional groundwater sampling to define transport pathways and extent of potential PFAS impacts. This will include additional soil borings and installation of additional monitoring wells, and may include vertical aquifer sampling and nested monitoring wells. In addition, supplemental sampling of soil, sediment, or surface water may be appropriate. As it is not possible to accurately estimate quantities for this supplemental work at this time, the following rounded values have been included in this grant request to cover supplemental sampling:

- $60,000 is included in this task for drilling costs in supplemental investigations.
- $18,000 is included for laboratory analysis which is enough for approximately 60 additional samples for PFAS analysis.
- Ten (10) additional field person days are included for supplemental investigations.

The exact scope of this task will be defined after completion of Task 1.

Task 3. Monitoring Well Sampling – Under this task, the groundwater monitoring wells installed under Tasks 1 and 2 will be resampled, up to three (3) additional times. It is expected that this will occur roughly every three (3) months. These data are intended to provide information on seasonal variability and plume movement.

Task 4. Quarterly Status Reports – Development and submittal of the required quarterly status reports following MDOT guidance will be performed under this task.

Task 5. Final Report – A final report will be prepared and submitted to MDOT and EGLE under this task, describing the investigation completed using grant funds. This final report will be submitted within 30 days of the end of the grant.

5 QAPP

1. Who will do the sampling?

   All sampling will be performed by LimnoTech, an environmental consulting firm based in Ann Arbor, and managed by Scott Bell, senior environmental engineer for LimnoTech. LimnoTech

has conducted PFAS investigations at several industrial and municipal airport sites, including Gerald R. Ford International Airport and Bishop International Airport in Michigan. Other airport PFAS investigations include South Bend International Airport, Dane County Regional Airport (Madison, Wisconsin), Buchanan Field (Concord, California), and a major commercial airport in Utah. Additional detail on LimnoTech's qualifications for PFAS sampling can be provided upon request.

2. Sampling Protocols

   LimnoTech will follow its internal standard operating procedure (SOP) for PFAS environmental sampling (attached), which has been compared to the Michigan sampling guidance and found to be consistent. In addition, standard quality assurance samples will be collected including field blanks, equipment blanks, and duplicates.

3. Analytical Laboratory

   All samples will be shipped to the SGS North America (SGS) lab in Orlando, Florida, for PFAS analysis. SGS's Orlando lab is accredited by the U.S. Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) for PFAS analysis in accordance with DoD ELAP's Quality Systems Manual (QSM).

4. Analytical Method

   SGS's Orlando lab will analyze all soil and aqueous samples for PFAS with a modified Method 537 method (liquid chromatography, double mass spectrometry) using isotope dilution. All twenty eight (28) PFAS parameters on Michigan's analyte list will be reported.

6 REPORTING

Quarterly reporting will be provided based upon the schedule identified. A final report will be submitted no later than 30 days after end of the grant.

7 MAPPING

Please see attached Exhibit A through Exhibit E for the approximate locations and types of sampling proposed.

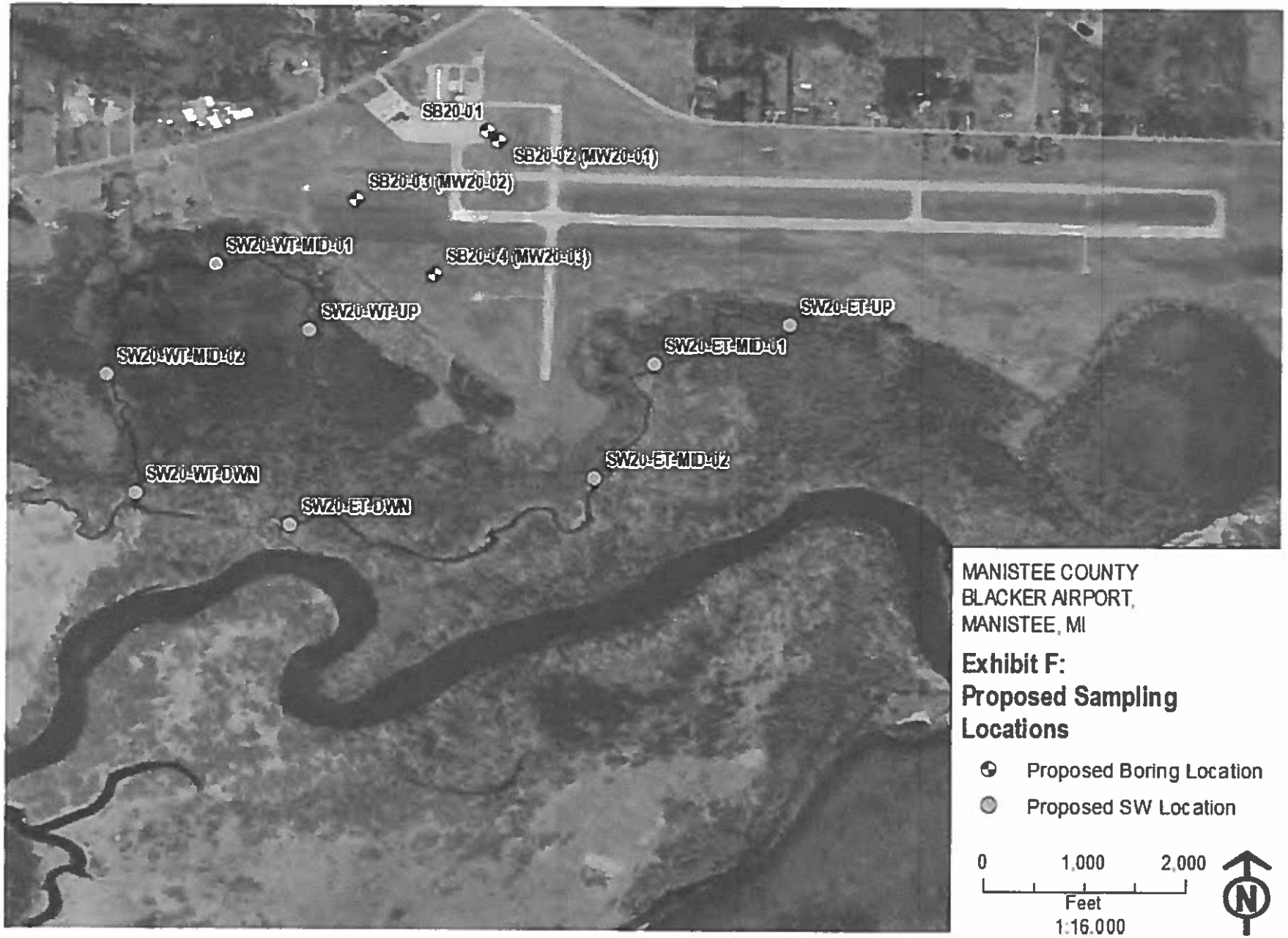
8 FEE PROPOSAL

The proposed investigation will be done on a time and materials basis with not to exceed fees for each task using standard rate structures published by each firm. The estimated project cost and requested grant amount is broken down in the table below by task.

Task	Prein & Newhof Costs	LimnoTech Costs	Laboratory	Drilling Subcontractor	Total by Subtask
1. Phase 1 Investigation	$8,500	$28,600	$8,000	$7,500	$52,600
2. Phase 2 Investigation	$8,500	$40,100	$18,000	$60,000	$126,600
3. Supplemental MW sampling	$0	$19,600	$11,100	$0	$30,700
4. Quarterly status reports	$1,000	$8,000	$0	$0	$9,000
5. Final report	$2,000	$16,400	$0	$0	$18,400
				Estimated Total:	**$237,300**

9 CONTRACT DESCRIPTION

The initial contract for Phase 1 Investigation will be composed of Tasks 1, 4, and 5, for a time and materials fee not to exceed eighty thousand dollars ($80,000). After review of Phase 1, an amendment for Phase 2 investigations (Tasks 2 & 3) will be scoped.


SB20-01
SB20-02 (MW20-01)
SB20-03 (MW20-02)
SB20-04 (MW20-03)
SW20-WT-MID-01
SW20-WT-UP
SW20-WT-MID-02
SW20-WT-DWN
SW20-ET-DWN
SW20-ET-MID-02
SW20-ET-MID-01
SW20-ET-UP
MANISTEE COUNTY
BLACKER AIRPORT,
MANISTEE, MI
Exhibit F:
Proposed Sampling
Locations
Proposed Boring Location
Proposed SW Location
0
1,000
2,000
Feet
1:16,000
N

N
Chippewa Hwy.
31
River Rd.
AFFF
Discharge Area
Manistee River
MANISTEE COUNTY
BLACKER AIRPORT,
MANISTEE, MI
Exhibit A:
Site Map
Reported AFFF
Use Location
0
0.25
mi
LimnoTech

MANISTEE COUNTY
BLACKER AIRPORT,
MANISTEE, MI

Exhibit B: Proposed Borings

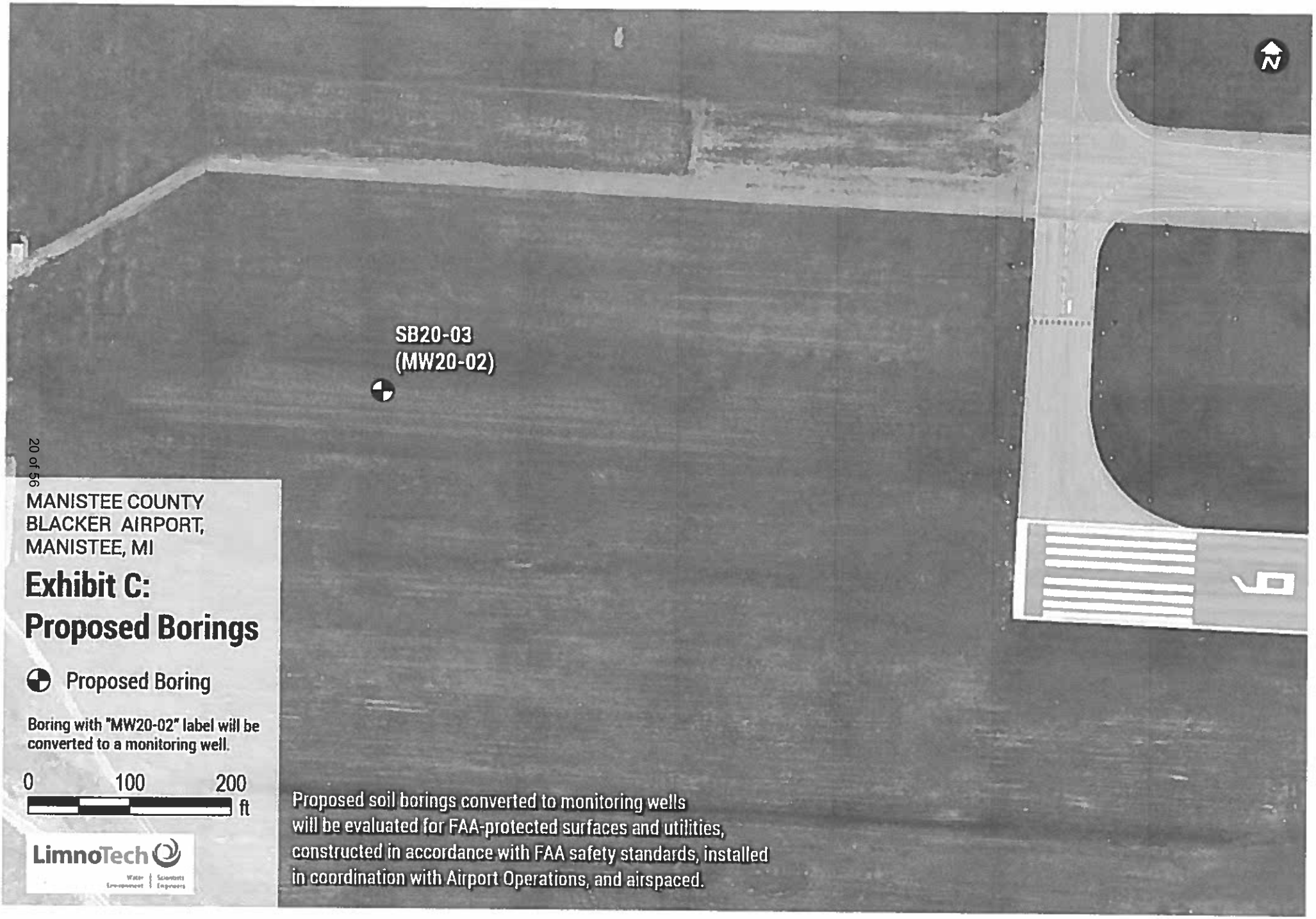
Proposed Boring

Boring with "MW20-01" label will be converted to a monitoring well.

0 100 200 ft

LimnoTech

Proposed soil borings converted to monitoring wells will be evaluated for FAA-protected surfaces and utilities, constructed in accordance with FAA safety standards, installed in coordination with Airport Operations, and airspaced.



MANISTEE COUNTY
BLACKER AIRPORT,
MANISTEE, MI

Exhibit C: Proposed Borings

Proposed Boring

Boring with "MW20-02" label will be converted to a monitoring well.

0 100 200 ft

LimnoTech

Proposed soil borings converted to monitoring wells will be evaluated for FAA-protected surfaces and utilities, constructed in accordance with FAA safety standards, installed in coordination with Airport Operations, and airspaced.

MANISTEE COUNTY
BLACKER AIRPORT,
MANISTEE, MI

Exhibit D: Proposed Borings

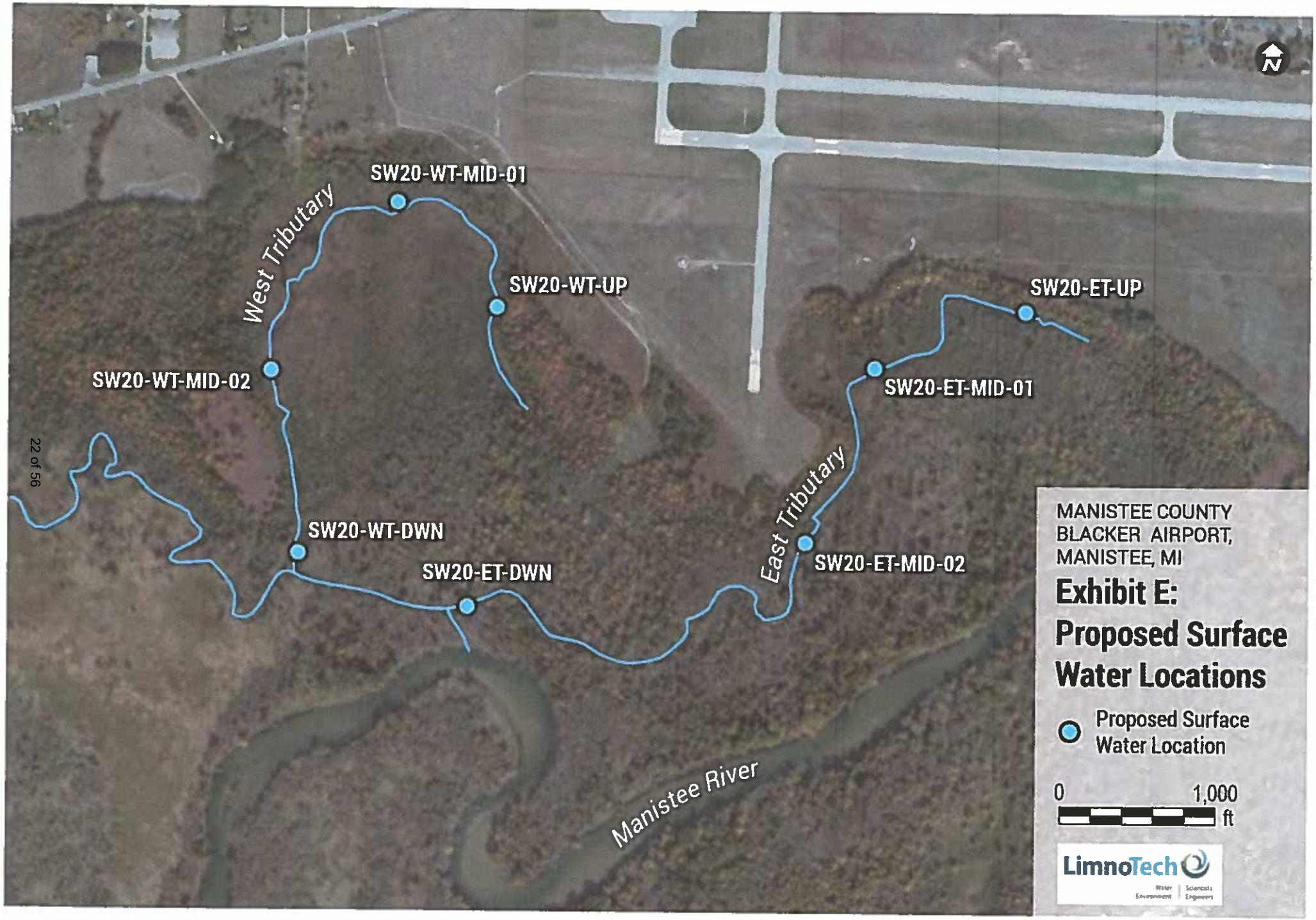
Proposed Boring

Boring with "MW20-03" label will be converted to a monitoring well.

0 100 200 ft

LimnoTech

Proposed soil borings converted to monitoring wells will be evaluated for FAA-protected surfaces and utilities, constructed in accordance with FAA safety standards, installed in coordination with Airport Operations, and airspaced.


SW20-WT-MID-01
West Tributary
SW20-WT-UP
SW20-ET-UP
SW20-WT-MID-02
SW20-ET-MID-01
East Tributary
SW20-WT-DWN
SW20-ET-DWN
SW20-ET-MID-02
Manistee River
N
MANISTEE COUNTY
BLACKER AIRPORT,
MANISTEE, MI
Exhibit E:
Proposed Surface
Water Locations
Proposed Surface
Water Location
0
1,000
ft
LimnoTech

I. INTRODUCTION

This standard operating procedure (SOP) is applicable to the collection of representative samples for analysis of per- and polyfluoroalkyl substances (PFAS; also referred to as and subsets of perfluorinated chemicals (PFCs)). The procedures described are intended to be applicable to most environmental media and sampling methods, although they were developed with an emphasis on water samples (e.g., drinking water, ground water, surface water). These typically applicable procedures have been adapted from a number of sources and may be varied or changed as required, dependent upon site conditions or equipment and procedural limitations, as long as the goal of collecting representative samples is maintained. The actual procedures used should be documented in the field notes, especially if changes are made. This SOP is designed to be used in conjunction with another SOP that describes the specific sampling methods for a specific environmental medium.

PFAS are a large group of chemicals used in many consumer, commercial, and industrial products, and processes, and include water-, stain-, and oil-repelling coatings and fire-fighting foams. Some chemicals in this group (e.g., perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA)) have been identified as persistent, bioaccumulative, and toxic chemicals. PFOS, PFOA, and their known precursors were largely phased out in the United States in the mid-2000s and early 2010s. Sample analytical reporting for PFAS analytes is usually at very low concentrations (parts per trillion, ppt), which can exacerbate problems with cross-contamination of samples.

There are two primary interferences or potential problems with representative sampling. These include cross contamination of samples and improper sample collection. Following proper decontamination procedures and minimizing disturbance of the sample site will minimize these problems as follows:

- Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment for each location. If this is not possible or practical, then decontamination of sampling equipment is necessary. Refer to the Equipment Cleaning SOP.
- Conduct sampling beginning in areas of known or suspected lowest concentrations and progressing to areas of highest concentrations.
- Improper sample collection can involve using contaminated equipment, disturbance of stream or impoundment substrate, and sampling in an obviously disturbed area.

To collect a representative sample, the hydrology and morphometrics of a stream or impoundment should be determined prior to sampling. This will aid in determining the presence of phases or layers in lagoons or impoundments, flow patterns in streams, and appropriate sampling locations and depths. In addition, water quality indicator data may be collected, if necessary, in water bodies to determine if stratification is present. Measurements such as dissolved oxygen, pH, temperature, and redox potential can indicate if strata exist which would affect analytical results.

II.MATERIALS

A wide range of products commonly used in site investigations are known or suspected to

contain PFAS. It is critical that the sampling program design consider as many sources of PFAS contamination as practicable to minimize cross contamination during a sampling event. All field equipment, supplies, materials, and personnel clothing used during sampling operations shall be PFAS free as noted below and in Tables 1 and 2.

- All sampling, monitoring and drilling equipment (e.g., field filters, tubing, pumps, lubricants, packers, transducers, liners, O-rings, pipe-thread pastes, tapes, sealants, valves, and wiring) must be constructed of materials that are free from the following:
  a) Polytetrafluorethylene (PTFE), trademark Teflon®;
  b) Ethylene tetrafluoroethylene (ETFE), trademark Tefzel®;
  c) Polyvinylidene fluoride (PVDF), trademark Kynar®;
  d) Fluorinated ethylene propylene (FEP), trademark Neoflon®.
- Personal protective equipment, clothing, and hygiene products should be free of PFAS (e.g., fluoropolymer linings used on Tyvek, Nomex, and Viton materials, Gore-Tex linings, water resistant/waterproof/stain resistant treatments, sunblock, insect repellants, cosmetics/hand creams, food packaging protective of water and grease).
- Sample containers should be polypropylene or HDPE and/or as specified/provided by the laboratory; do not use glass to avoid analyte adsorption.
- Sample transfer to the laboratory should be conducted at 4°C ± 2°C or as specified by the laboratory using ice in double-bagged polyethylene plastic; do not use chemical- or gel-based cooling products.
- Use only laboratory-supplied PFAS-free water for preparation of field reagent blanks and equipment blanks.
- Water from any other sources, including public water supplies, used for any other purposes must be pre-determined to be PFAS-free.
- Deionized (DI) water will not be used to clean equipment due to the possible contamination from polytetrafluoroethylene material used in the DI water purification system.

III. PREPARATIONS

- Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.
- Obtain the necessary sampling and monitoring equipment to suit the task. Consider sample volume, depth, deployment circumstances (shore, wading, boat, currents), type of sample, sampler composition materials, and analyses to be conducted.
- Decontaminate or pre-clean equipment and ensure that it is in working order.
- Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.
- Perform a general site survey prior to site entry, in accordance with the site specific Health and Safety Plan.
- Use stakes, flagging, or buoys to identify and mark all sampling locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.
- If collecting sediment or near-shore soil samples, develop procedures that will eliminate interferences with collection of representative water samples.

- The field team leader will work with field personnel to assure compliance with PFAS-free guidelines (see Table 1) prior to commencement of field activities. Table 2 provides a list of prohibited and acceptable items for a PFAS field investigation. Daily compliance inspections will be conducted prior to beginning field activities. Corrective action will include removal of noncompliance items or workers from the site until in compliance.

IV. GENERAL SAMPLE COLLECTION PROCEDURES

1. Record pertinent data on the field log (see attached Surface Water Sampling Field Log, or equivalent).
2. Label all sample containers with the date, time, well number, site location, sampling personnel, and other requested information.
3. Don appropriate personal protective equipment (as required by the Health and Safety Plan).
   - Do not sample without powderless nitrile gloves.
4. Clean all sampling equipment prior to sample collection according to the procedures described in Section V.
5. Sample collection (see Tables 1 and 2 for complete lists of acceptable and unacceptable attire, materials, etc.):
   - The sample cap should never be placed directly on the ground during sampling.
   - Markers (Sharpie® or otherwise) are to be avoided.
   - Bottles should only be opened immediately prior to sampling.
   - Dust and fibers must be kept out of sample bottles.
   - Ballpoint pens may be used to label sample containers.
   - Samples should be double-bagged using resealable low density polyethylene (LDPE) bags (e.g. Ziploc®.
   - If possible, collect PFAS samples prior to collecting samples for other, non-PFAS analytes (e.g., VOCs) or field parameters (temperature, pH, etc.).
6. For samples requiring field filtering, use the appropriate PFAS-free equipment and, if possible, collect the sample directly into the sample container.
7. If field preservation is required (see SAP and/or QAPP), place appropriate preservative into the sample container prior to sample collection. Note the preservative used on the sample container and sampling log.
8. Quality control samples are normally specified and described (i.e., collection procedures, frequencies) in the work plans (SAP and/or QAPP), and for PFAS sampling they may include trip blanks, field reagent blanks, field equipment blanks, field duplicate samples, and matrix spike/matrix spike duplicate samples. These samples should be collected in the following manner:
   - Trip blanks should be prepared by the laboratory using PFAS-free water at the time sample bottleware is prepared for delivery to the field. Trip blank containers shall be of the same type of sample container as

those used for investigative samples collected for PFAS analysis. A laboratory-supplied trip blank (comprised of the same sample containers, containing the same reagents, preservatives and other consumables used for investigative PFAS analysis) shall be placed in the environmental sample cooler immediately after the first sample collected for PFAS analysis is placed in the cooler. Trip blank samples shall be given a sample date and time of when the trip blank is placed in the environmental sample cooler. Trip blank samples shall accompany investigatory sample containers collected for PFAS analysis from collection, during the duration of the sample event, and during shipment to the laboratory. At no time after preparation and prior to arriving at the laboratory shall trip blanks be opened.

- Field reagent blanks should be collected using two appropriate laboratory-supplied containers (one containing PFAS-free water and the other empty). During the sampling event, field personnel transfer the preserved PFAS-free water from one container into the other container, screw on the laboratory-supplied caps, and place the sample containers into the cooler for submittal with the samples collected that day.
- Field equipment or rinse blanks should be collected by pouring PFAS-free water through/over the decontaminated sampling device into the sample container in the field, preserved and shipped to the laboratory with the field samples. Generally, equipment blanks are only collected if reusable sampling equipment is employed.
- Field duplicate samples should be collected into two distinct sample containers at the same time or immediately following one another in accordance with procedures described in the SAP or QAPP. Each sample of a field duplicate pair employs the same type of sample container, preservatives and other additives used. If blind duplicate samples are specified, one of the duplicate samples should be labelled so that it does not identify the other sample of the duplicate pair to the laboratory. For example, one sample of the duplicate pair would be labelled following the normal protocol, while the second would be labelled with a sample ID of "DUPLICATE" and a blank line placed in the location, date and time boxes of the sample label. It is important that the duplicate pair samples are identified separately in the field notes with information including location, sample ID (as entered on the sample container label and COC), sample date and time so that analytical results can be paired after received from the laboratory.
- Matrix spike (MS) and matrix spike duplicate (MSD) samples include two additional volumes of sample material collected in the field at the same time as an investigative sample (similar to field duplicate sampling), or may be collected by the laboratory from an existing investigative sample submitted from the field.

9. Record sample collection information on the field log and store the samples in an

iced cooler according to the PFAS-free guidelines described herein and in the Standard Operating Procedure for the Shipping and Handling of Samples.

10. Handle, pack, and ship samples according to the PFAS-free guidelines described herein and in Standard Operating Procedure for the Shipping and Handling of Samples.
    - Do not use chemical or blue ice.
    - Refresh with regular ice double bagged in Ziploc® bags
    - Chain of Custody should be bagged in Ziploc® storage bags and taped to the inside of the cooler lid.
    - The cooler should be taped closed with a custody seal and shipped by overnight courier.

V. EQUIPMENT DECONTAMINATION

Field sampling equipment used multiple times can become contaminated with PFAS. Decontamination procedures should be implemented to prevent cross-contamination.

The following procedures must be followed:

- Do not use Decon 90®
- Laboratory supplied PFAS-free water is preferred for decontamination.
- Water from any other sources, including public water supplies, used for any other purposes must be pre-determined to be PFAS-free.
- Deionized (DI) water will not be used to clean equipment due to the possible contamination from polytetrafluoroethylene material used in the DI water purification system.
- Alconox®, Liquinox® and Citranox® can be used for equipment decontamination.
- Sampling equipment can be scrubbed using a polyethylene or PVC brush to remove particulates.
- Decontaminated sampling equipment should be triple rinsed using PFAS-free water.

VI. EQUIPMENT-SPECIFIC SAMPLE COLLECTION PROCEDURES

See appropriate equipment- and medium-specific sample collection SOP and/or sampling equipment operation manual, as specified in the SAP or QAPP.

Table 1. PFAS-Free Guidelines.

PFAS-Free Guidelines (source: USEPA, DoD and ITRC)
Field Clothing and PPE: (see reference at bottom for acceptable products)
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
No adhesives (Post-It Notes) on-site
No Sharpies and permanent markers allowed; regular ball point pens are acceptable
No aluminum foil allowed
Keep PFAS samples in separate cooler, away from sampling containers that may contain PFAS
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 Gear:
Wet weather gear made of polyurethane and PVC only
Equipment Decontamination:
"PFC-free" water on-site for decontamination of sample equipment where feasible[1].
Only Alconox and Liquinox to be used as decontamination materials
Food Considerations:

[1] If it is necessary to use other water sources, such as distilled or de-ionized water, samples should be collected and analyzed to verify the absence of PFAS.

No food or drink on-site with exception of bottled water and/or hydration drinks (e.g., Gatorade, Powerade) that is available for consumption only in the staging area
Reference-NHDES https://www.des.nh.gov/organization/divisions/waste/hwrb/documents/pfc-stakeholder-notification-20161122.pdf

Table 2. Prohibited and Acceptable Items for Perfluorinated Compound (PFC) Field Investigations.

PPE, Clothing, Hygiene Products	PFC Concerns	Approved Alternative
Steel-toed boots	Boots may not contain Gore-Tex. Many waterproof boots are lined with Gore-Tex and are prohibited.	Steel-toed boots made with polyurethane and polyvinyl chloride (PVC)
Clothing	Water resistant, waterproof, or stain-treated clothing should be avoided. (EDQW 2016)	Clothing made of synthetic or natural fibers should be worn. Non-new cotton is preferred. Field gear should be laundered a minimum of six times prior to use, avoiding use of fabric softeners. Cotton overalls may be provided for use.
Rain Gear	Most rain gear is coated with a Gore-Tex lining and contains fluoropolymers.	Rain gear made from polyurethane and wax-coated materials may be worn (U.S. Navy 2015; EDWQ 2016).
Gloves	Nitrile gloves are specified for use in EPA Method 537.	Only nitrile gloves should be used. These should be changed often as outlined in EDQW 2016. Recommended powderless nitrile gloves.
Protective clothing	Fluoropolymer linings are used on Tyvek, Nomex, and Viton materials (U.S. Navy 2015; EDWQ 2016)	Avoid these materials. Select alternative protective clothing that does not contain fluoropolymers.
Sunblock and insect repellant	Many manufactured sunblocks and repellants contain PFCs.	Avoid use. If necessary, use of a 100% natural ingredient product may be used upon approval.
Cosmetics, moisturizers, hand creams, etc.	Many of these products contain surfactants and represent a potential source for PFCs.	Use of these products should be avoided prior to a sampling event. Acceptable products may include: ***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

Food and drink	Food packaging often contains PFCs as a protectant from water and grease.	No food or drink shall be brought on-site, except for bottled water and hydration drinks. No blue ice packs should be used. Additionally, hands should be thoroughly washed following consumption of any wrapped fast food or pizza.

General Sampling Equipment and Field Supplies	Approved Alternative
Standard decontamination water or municipal water	Water from a known source that has been analyzed for PFCs and has been determined to be acceptable for the specific sampling program.
Decon 90 detergent	Alconox and Liquinox are the only detergents approved for decontamination (EDQW 2016)
Glass or Teflon-lined sampling bottles and lids	Polypropylene or high-density polyethylene (HDPE) sample bottles with an unlined polypropylene HDPE screw cap
Fluoropolymer tubing, valves, and other parts in pumps	HDPE and silicon materials (EDQW 2016)
Teflon tubing, ballers, tape, and plumbing paste	HDPE and silicon materials or disposable equipment
Pumps, packers, transducers, tubing, liners, valves, and wiring with polytetrafluorethylene or ethylene tetrafluoroethylene	Alternative materials
LDPE HydraSleeves	HDPE HydraSleeves (EDQW 2016)
Aluminum foil	Thin HDPE sheeting
Markers and waterproof pens	Non-waterproof pens (EDQW 2016)
Rite-in-the-rain paper, binders, and plastic clipboards	All field paperwork should be printed on standard paper and placed in a non-water-resistant folder or aluminum clipboard (EDQW 2016)
Post-It Notes	No Post-It Notes should be brought to the site
Chemical (blue) ice packs	Only regular ice should be used for refrigeration on site (EDQW 2016)

Table 2 References

Source Document - Groundwater and PFAS: State of Knowledge and Practice, Section 5: Field Sampling and Analysis, National Groundwater Association Press, 2017 – Draft Copy Not NGWA Board-approved, Not for circulation.

EDQW 2016. Bottle Selection and Other Sampling Considerations When Sampling for Per- and Poly-Fluoroalkyl Substances (PFAS). Revision 1.1.

U.S. Navy 2015a. Perfluorinated Compounds (PFCs) Interim Guidance/Frequently Asked Questions (FAQs). Memorandum from Commander, Naval Facilities Engineering Command, January 29, 2015.

U.S. Navy 2015b. Bureau of Medicine and Surgery, 2015. Testing for Perfluorochemicals (PFCs) in Drinking Water. Memorandum for Commander, Navy Medicine East.

SAMPLE COLLECTION FIELD LOG

Project Name:_____Project Code:_____Page __ of __

Date	Time	Sample ID	Sample Location	Equipment Used	Samplers	Comments (sample volumes, preservatives, descriptions, weather conditions, other observations, etc.)

Notes:

I. INTRODUCTION

Equipment cleaning areas will be located within or adjacent to a specific work area or as specified in the Health and Safety Plan. The equipment cleaning procedures described in this document include pre-field, in-field, and post-field cleaning of sampling equipment. The sampling equipment consists of soil sampling devices, well construction materials, ground-water sampling devices, water testing instruments, and other activity-specific sampling equipment. All non-disposable sampling equipment will be cleaned after completion of each sampling event. If appropriate, cleaning procedures will be monitored through the analysis of rinse blank samples as described in the project work plan or QAPP. **NOTE: If field activities involve per- and polyfluoroalkyl substances (PFASs) such as PFOS or PFOA, refer to the PFAS sampling SOP for additional measures which supersede this SOP, especially regarding substances such as aluminum foil and distilled water.**

II.MATERIALS

The following materials will be available during equipment cleaning, as needed:

- Personal protection equipment (as required in the Health and Safety Plan);
- Distilled/de-ionized water;
- Non-phosphate detergent (Alconox, Liquinox, or equivalent);
- Tap water;
- Appropriate cleaning solvent (e.g., methanol, hexane, nitric acid);
- High-pressure hot water/steam cleaning unit;
- Wash basins;
- Brushes;
- Polyethylene sheeting;
- Aluminum foil;
- Plastic overpack drum, storage tub, or other suitable storage unit (for bladder or other pumps);
- Large heavy-duty garbage bags;
- Spray bottles (to hold tap water, distilled/de-ionized water, methanol, hexane, or nitric acid); and
- Disposable and/or heavy-duty reusable (PVC, latex, or nitrile) gloves.

III. STORAGE OF EQUIPMENT

All cleaned sampling equipment will be stored in a clean environment and, where appropriate, the equipment will be covered/sealed with aluminum foil.

IV. SAFETY PROCEDURES DURING EQUIPMENT CLEANING

1. Personnel will wear the following personal protection equipment at a minimum, when cleaning sampling equipment (e.g., split-spoon sampler, trowels) and larger equipment (e.g., drill rig, augers):

- Safety glasses, goggles, or a splash shield; and
- PVC, latex, or nitrile outer gloves,
- Coated Tyvek® or Saranex® disposable coveralls or rainsuit, optional for small equipment cleaning; and
- Chemical resistant over boots, optional for small equipment cleaning.

2. All solvent rinsing if required, will be conducted in an adequately ventilated area.
3. All solvents transported into the field will be stored and packaged in appropriate containers with care taken to avoid exposure to extreme heat.
4. Handling of solvents will be consistent with the manufacturer's Material Safety Data Sheets (MSDS).

V. FIELD CLEANING PROCEDURES

A. Cleaning Station

A designated field equipment cleaning station location will be established to conduct all cleaning at each work area of the Site. The field equipment cleaning station will be located away from the immediate work area to minimize adverse impacts from work activities on the cleaning procedures, but close enough so the sampling teams can minimize equipment handling and transport. All heavy equipment such as drill rigs and backhoes will receive an initial cleaning prior to use at the Site and will be cleaned again before leaving the site. The frequency of any additional cleaning will depend on the amount of use the heavy equipment receives and the extent of exposure to dirt and contaminants during the sampling event.

B. Cleaning of Smaller Sampling Equipment

Cleaning of smaller sampling equipment (e.g., split-spoon samplers, bailers, trowels) will be conducted according to the following sequential procedure:

- Non-phosphate detergent (Alconox, Liquinox, or equivalent) and tap water wash;
- Tap water rinse;
- Solvent rinse, if required (e.g., methanol or hexane for organic constituent analysis, nitric acid for inorganic constituent analysis); and
- Triple distilled/de-ionized water rinse.

The first step in decontamination is physical removal, where gross contaminants such as dust, soils and sediments can be removed through physical means such as wiping, scraping, shaking, and in some cases steam cleaning. Non-phosphate detergent and tap water scrub is intended to remove all visible particulate matter, residual oil and grease, and most but not all contaminants. Surfactants or detergents accumulate at the water to gas, solid, and oils interface, break the adhesive forces between the contaminant and the surface being cleaned, making the contaminants more soluble, allowing the contaminants to be washed away. The tap water rinse is necessary to remove all soapy residues and wash away loosened contaminants. The need for a specific solvent used for the solvent rinse, if required in the work plan or QAPP, will depend upon what the sample will be analyzed for and what contaminants are expected to be present. Some contaminants such as PCBs adhere to surfaces so tightly that a methanol or hexane rinse is required to break the adhesive bonds and adequately decontaminate the sampling equipment. Caution should be used when using solvent rinses to make sure that the chosen solvent is compatible with the sampling equipment and any PPE it will be used upon. It should be noted that most PPE constructed of organic materials could be

damaged or dissolved by organic solvents such as alcohols, ethers, ketones, aromatics, straight chain alkanes and common petroleum products. The final rinse of distilled/de-ionized water will be repeated three times. Rinsing removes any remaining contaminants through dilution, physical attraction, and solubilization. The equipment will then be allowed to air dry.

C. Cleaning of Submersible Pumps

Submersible pumps may be used to evacuate stagnant groundwater from the well casing (e.g., air lift or turbine pumps) or to collect samples (e.g., bladder pump). The pumps will be cleaned and flushed between wells using an external detergent wash and tap water rinse. Steam cleaning may be substituted for pump casing, hose, and cables followed by a flushing with potable water through the pump and tubing or discharge hose. The cleaning process for development and purge pumps can be performed by pumping potable water from a clean plastic over-pack, drum or storage tub until a sufficient amount of water has been flushed through the system. The decontamination process for sampling pumps will consist of filling each of three clean suitable decontamination units sequentially with detergent water, tap water, and distilled/de-ionized water. Placing the sampling pump into each respective decontamination unit and pumping sufficient liquid from each unit through the sampling pump chamber and tubing if appropriate, to flush out any contaminants. It is recommended that disposable tubing be used whenever possible, thus reducing the amount of equipment and time needed for decontamination. In some cases, the chosen sampling pump (e.g. QED Micro Purge bladder pump) can easily be disassembled, decontaminated as individual small parts, disposable parts such as bladders and grab plates replaced and them reassembled for use. Such a pump, if appropriate for your sampling situation, would save time when cleaning and provide a more thorough decontamination, since all surfaces of the pump in which sample water has contact can be inspected, cleaned, or replaced. If electric power pumps are used, care should be taken to avoid contact with the pump, well casing, pump reel and sample or purge water in direct contact with the pump, while the pump is running to avoid electric shock.

D. Cleaning of Heavy Equipment

Other equipment and materials, such as drill rigs, well casings, tools, and auger flights, associated with sampling events, will be cleaned prior to use. This equipment may retain chemical constituents from sources unrelated to the sampling site such as roadways, storage areas, or material from previous job sites that were not adequately removed. Heavy equipment will be thoroughly steam cleaned and/or manually scrubbed and rinsed upon arrival on site and when moved between sampling locations, as necessary. Drill rig items such as auger flights, wrenches, drill rods, and drill bits will also be cleaned before changing sample locations.

E. Collection and Disposal of used Solvents, Residuals and Rinse Solutions

All solvents, residuals, and rinse waters generated during the cleaning of equipment on-site will be collected, containerized, and stored on-site until

arrangements can be made for proper disposal.

I. INTRODUCTION

Documentation of observations, conditions and generated data during field activities is an accepted scientific procedure and a critical component of any investigation. The rigorous documentation methods described in this SOP may be changed, as necessary, depending upon the needs of any particular investigation. Review the project work plans for any specific field documentation guidance. If changes are made to this SOP, document those changes in the field notes. **NOTE: If field activities involve per- and polyfluoroalkyl substances (PFASs) such as PFOS or PFOA, refer to the PFAS sampling SOP for additional measures which supersede this SOP, especially regarding avoidance of Rite-in-the-Rain Field Books.**

II. METHODOLOGY

1. Use a new bound logbook for each project.
2. Label logbook cover and binding with project name and code. Label inside cover with site information (name, address, contact(s), phone numbers, etc.). This will serve as a reference when performing fieldwork.
3. Number each page of the logbook sequentially.
4. All entries must be made in indelible ink (black is preferred because it copies well).
5. All corrections or changes should be initialized, dated, and marked with a circled error code. Any mistakes should be drawn through with a single line. Commonly error codes that may be used include: RE Recording Error, CE Calculation Error, SE Spelling Error, CL Changed for Clarity, WO Write Over.
6. All entries should be accurate, factual, and unbiased. Never record an opinion.
7. Notes should be detailed but concise.
8. Notes should be written such that the day's activities can be reconstructed at a later date.
9. Date the beginning of each day's notes.
10. Use the 24-hour time format throughout the notes.
11. Complete each day's notes with your signature.
12. Maximize use of each line, crossing out gaps and blank pages so notes cannot be altered.
13. Reference in the logbook when using other forms (e.g., boring logs, sampling forms, etc.).
14. Return logbook to project manager upon completion of fieldwork.

III. MATERIALS

The materials required for this SOP include the following:

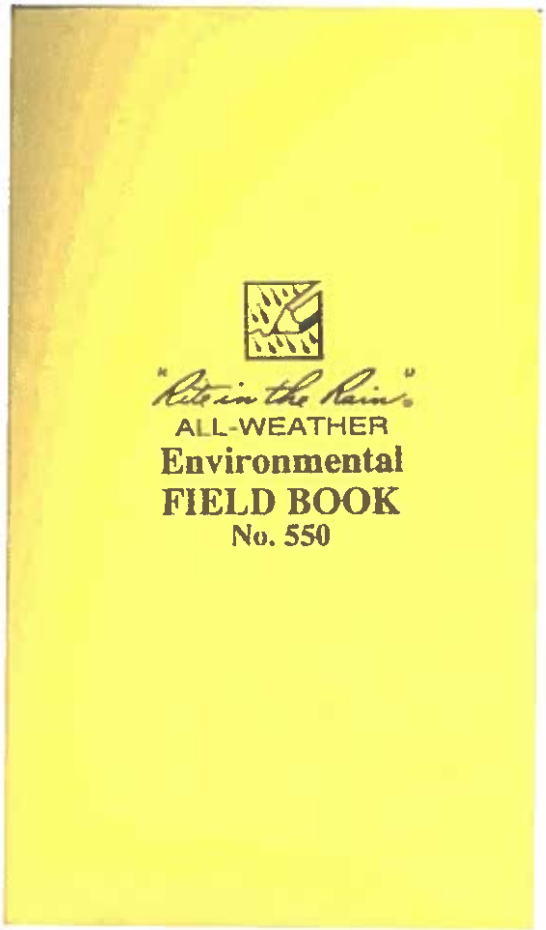
- Bound field logbook(s).
- Field forms.
- Black waterproof/indelible ink pen(s).

IV. ITEMS TO INCLUDE IN A LOGBOOK

Field activities can vary widely. Entries in field logbooks will describe activities conducted and may include, but are not limited to, the following:

- Times of arrival and departure for ALL site personnel.
- Personnel on-site and affiliation (LTI and subcontractor, regulatory personnel, visitors/guests, and uninvited intruders).
- List of equipment used on-site (LTI and subcontractor).

- Detailed descriptions of daily activities.
- Locations of structures, features, utilities, etc.
- Conversations with client, contractor, regulatory agencies, office (changes to scope of work, health and safety issues, and cost/payment issues are especially important).
- Weather conditions.
- Documentation of field instrument calibration.
- Documentation that photos were taken (include date/time of photo, photographer, site name/location, description of photo subject, compass direction taken, photo number).
- Sample collection and field measurement information including: sample location, description, date/time, methodology, container types, preservatives, instrument type/serial number (reference applicable field form, if applicable).
- Wastes generated (containers, volumes, matrix, storage locations).
- Materials used (e.g., water sources, well materials, field reagents, construction materials).
- Deviations from intended scope of work.
- Deviations from SOPs if not already indicated in the work plan.
- Keep notes legible so others can read the logbook.



A bound logbook is the legal documentation of fieldwork performed at a site.

I. SURFACE/SHALLOW SOIL SAMPLING

A. Introduction

Surface and shallow soil samples will be collected using a hand-driven split-spoon sampler or shelby tube, a stainless steel bucket auger, or a trowel and scoop as determined by the field supervisor depending on the subsurface material. Hand borings will be performed in areas where truck-mounted rigs are unable to gain access. Samples of subsurface material encountered during this operation will be collected at predetermined depth intervals for soils, sediments, and remnant deposit materials, if encountered and as specified in the work plan. **NOTE: If field activities involve per- and polyfluoroalkyl substances (PFASs) such as PFOS or PFOA, refer to the PFAS sampling SOP for additional measures which supersede this SOP, especially regarding substances such as aluminum foil and distilled water.**

B. Materials

The following materials, as required, will be available during surface/shallow soil sampling:

- Personal protective equipment as required by the Health and Safety Plan;
- Cleaning equipment as required in Appendix B;
- Photo Ionization Detector (PID), if potential for volatile compounds exists;
- Field log;
- Appropriate sample containers and forms;
- Insulated coolers with cold packs or ice;
- Concrete saws, or coring devices;
- Sampling devices (e.g., split-spoon, shelby tube, stainless steel bucket auger, stainless steel scoop or trowel);
- Sampling device extension rods, handle, or hammer-driver;
- Stainless steel spatula, lab spoon, or equivalent (new wooden tongue depressors may also be used); and
- Liners for sampling devices (e.g., brass, stainless steel, Teflon, or butyrate plastic).

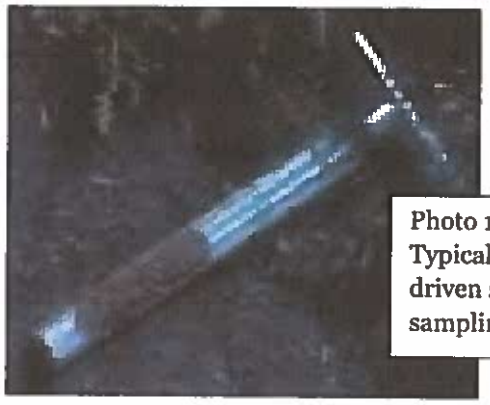


Photo 1: Typical hand-driven soil sampling tube.

C. Procedures

The following procedures will be employed to collect surface/shallow samples:

1. Check for utilities in the work area. Do not proceed until you are confident there is no danger of impacting buried utilities.
2. Don personal protective equipment as required by the Health and Safety Plan.
3. For surface/near surface soil sampling:
   a. Carefully remove the top layer of soil to the specified depth, if required, using a precleaned stainless steel scoop or trowel.
   b. Remove and discard a thin layer of soil from where the sample will be collected using a clean stainless steel scoop or trowel.
   c. Carefully remove the desired, representative sample with a precleaned stainless steel spatula, labspoon or equivalent.

4. For shallow subsurface soil sampling:
   a. Hand bore down to the specified depth using a precleaned bucket auger.
   b. Carefully insert a precleaned stainless steel split spoon sampler, shelby tube, or bucket auger to the bottom of the borehole and drive into the soil in a straight and vertical manner to secure a reasonably representative sample.
   c. Remove the sampler and place on a piece of aluminum foil to avoid contact with surrounding soils.
   d. Remove all excess soil from the outside of the sampling device to avoid cross contamination over the sample depth.
   e. Discard the upper 1"-2" of soil in the sampling device to avoid including borehole cave-in or carry down with the sample
5. Place the sample in the appropriate sample container.
6. Record all appropriate information in the field log.
7. Label, handle, pack, and ship the samples consistent with the procedures in the Standard Operating Procedure for Shipping and Handling of Samples.
8. Fill the sampling hole, as required by the work plan, with the discarded soils, bentonite chips, bentonite slurry, or bentonite/portland cement grout.

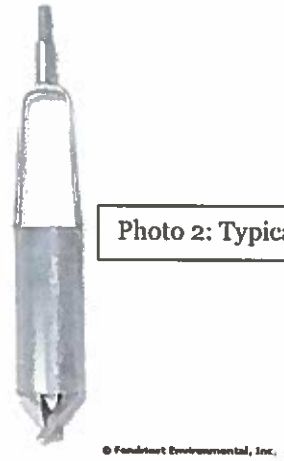


Photo 2: Typical bucket auger.

II.SOIL BORING SAMPLING

A. Introduction

Soil borings will be completed using the hollow-stem auger drilling method or the Geoprobe method (a hammer-driven hydraulic push probe) to a depth specified by the supervising geologist/engineer. In situations where physical site features limit the use of drill rigs, soil borings will be completed with a hand driven auger, a portable power auger, or a tripod and split-barrel sampler (split-spoon) depending on the required depth and subsurface material.

Samples of subsurface material encountered during the drilling of soil borings will be collected at regular intervals, not to exceed five feet, to the required depth of the boring, or as directed by the supervising geologist. The sampling method employed will be consistent with the American Society of Testing and Materials (ASTM) D1586 - Standard Method for Penetration Test and Split-Barrel Sampling of Soils or ASTM D4700 - Soil Sampling from the Vadose Zone. Relatively undisturbed samples will be collected for geotechnical evaluation, if required, using ASTM D1587 - Thin-walled Tube Sampling of Soils or ASTM D4700.

Upon completion of the boring, if a monitoring well is not to be installed, the bore hole will be backfilled to the surface, as required by the work plan, with soil cuttings, bentonite chips, bentonite slurry, or bentonite/portland cement grout, and the ground surface will be restored.

B. Materials

The following materials shall be available during soil boring sampling:

- Personal protective equipment as required by the Health and Safety Plan;
- Cleaning materials as required in the Standard Operating Procedure for Cleaning Equipment;
- Pre-cleaned drill rig, drill rods, auger flights, probe tubing and samplers;
- Appropriate sample containers and forms;
- Liners for sampling devices, if required;
- Insulated coolers with cold packs or ice;
- D.O.T.-approved drums for the containerization of soil cuttings; and
- Field log.

C. Procedures

1. Check for overhead and underground utilities in the work area. Do not proceed until you are confident there is no danger of impacting buried utilities.
2. Soil samples will typically be collected at 4- or 5-foot intervals, or as required to provide a profile of the subsurface. A geologist or other qualified person will be on-site during the drilling operations to visually inspect and describe each soil sample and/or drill cuttings. The soil descriptions will be recorded on a standard subsurface log and will include the following information, as appropriate or as specified by the supervising geologist.
   - soil type;
   - color;
   - percent recovery;
   - relative moisture content;
   - texture;
   - grain size and shape;
   - consistency;
   - standard penetration blow counts, if applicable;
   - depth to water tables; and
   - any other noteworthy observations.
3. Upon retrieval of sampling device, representative portions of the sample will be placed in appropriate sample containers (taking care to exclude the top 1-2 inches which may consist of cave-in or carry-down material from shallower depths in the borehole).
4. If required, one representative portion of each sample will be placed in a clean jar, covered with aluminum foil, and let stand for several minutes. The head space will then be screened with a photoionization detector (PID) or equivalent field instrument and the relative concentration of total volatile organic compounds (VOCs) in the sample will be recorded on the boring log.
5. Sample containers will be labeled, temporarily stored on site, and transported to the appropriate testing laboratory at the end of the day, whenever possible. The samples will be handled, packed, and shipped in accordance with the procedures set forth in Appendix A.
6. The supervising geologist will be responsible for documenting drilling events in the field log.
7. The drilling contractor will be responsible for obtaining accurate and representative samples and informing the

supervising geologist of changes in drilling pressure and keeping a separate subsurface log of soils encountered, including blow counts [i.e., the number of blows form a soil sampling drive weight (140 pounds) required to drive the split-spoon sampler in 6-inch increments], where applicable.

Photo 3: Geoprobe liner cut open to reveal soil sample. Samples are extracted using clean utensils or gloves from core into appropriate sample containers.

III. METHANOL PRESERVATION FOR VOC SAMPLES

A. Introduction

The sampling and analysis of soils for volatile organic compounds (VOCs) presents unique challenges because exposure of the soil to the atmosphere facilitates volatilization and biodegradation of some compounds. Soil samples to be analyzed for VOCs shall be;

1. Preserved with methanol prior to transport to a lab.
2. Be sampled using an approved "Encore" sampler. Note that these samples have a shorter hold time and are not universally approved for use. Refer to manufacturer's instructions for sampling procedure.

Photo 4: Encore Sampler and "T" handle.

B. Materials

The following materials shall be available during methanol preservation of soil samples:

- Personal protective equipment as required by the Health and Safety Plan;
- Pre-weighed, 40-ml vials containing methanol, (usually provided by laboratory conducting analysis);
- Empty sample containers for dry weight analysis (usually 4 oz. jars)
- Syringe sampler w/plunger or other sampling device which facilitates the measurement of a precise amount of soil, (usually provided by the laboratory conducting analysis);
- Digital scale able to measure grams to the hundredth (if necessary);
- Cooler with ice and packing materials
- Chain of custody forms

C. Procedures

Unless instructed otherwise, use an approximate one-to-one ratio of soil weight to methanol volume for proper preservation. A general guideline is 10 ml of methanol to 10 grams of soil.

Exact procedures for methanol preservation of soil samples will vary based on specific

laboratory requirements and/or instructions. Consult laboratory prior to collecting samples:

1. Obtain soil sample as described in previous section. Use a PID (photo ionization detector) to determine the layer (if multiple layers are present) most likely to contain VOCs. In lieu of data from the PID, refer to sampling guidance from the project manager.
2. Place empty syringe sampler on scale and tare so weight reads zero grams.
3. Push syringe sampler into soil and extract. Twisting may be necessary while extracting to keep soil inside syringe sampler.
4. Weigh syringe with soil inside, adding or subtracting soil and re-weighing to achieve 10 grams (or other lab-specified sample quantity).
5. Immediately add soil to sample vial containing methanol and seal tightly. Avoid over tightening, as this can cause methanol leakage. Swirl sample gently for 10 seconds.
6. Fill dry weight container with soil from sample area. Appropriately label, cushion, and place both containers in a Ziploc bag incase breakage occurs during shipment.

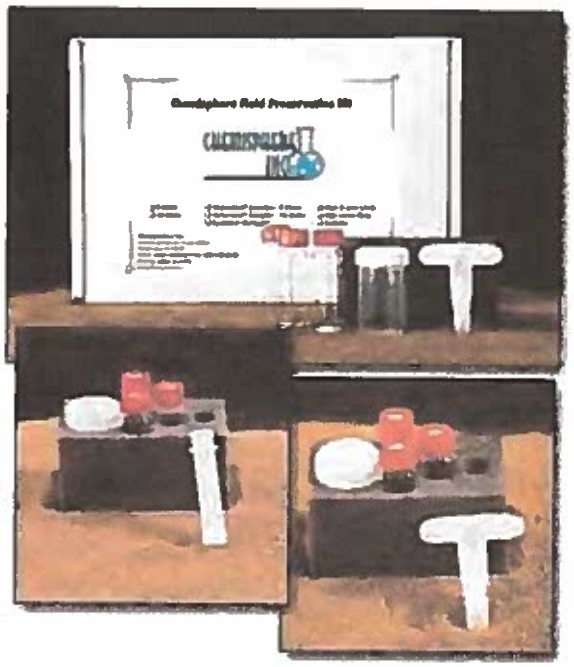


Photo 5: Typical methanol preservation kit.

D. Shipping Guidelines

The shipping of methanol is regulated by the U.S. Department of Transportation, Title 49 of the Code of Federal Regulations. The DOT number is UN 1230. The amount of methanol used for sample preservation falls under the exemption for small quantities. Requirements for shipment of samples by common carrier (such as FedEx) are as follows;

- maximum volume of methanol in a sample container cannot exceed 30 ml;
- the sample container cannot be full of methanol;
- sufficient absorbent material must be used to completely absorb sample content;
- each cooler shipped must have less than 500ml of methanol
- the cooler or package weight must not exceed 64 pounds

- each cooler must be identified as containing less than 500 ml methanol

IV. EQUIPMENT CLEANING

Equipment cleaning will be performed at the beginning of the sampling event and between each separate sampling location as described in Standard Operating Procedure for Cleaning Equipment.

V. DISPOSAL METHODS

Personal protective equipment, such as gloves, disposable clothing, and the disposable equipment resulting from personnel cleaning procedures and soil sampling and handling activities will be placed in plastic bags. These bags may be transferred into appropriately labeled 55-gallon drums for appropriate disposal, as necessary.

Sample Sub-Surface Log

Site	Project	By	Date	Page ___ of ___
ID/Location/Notes				

Depth feet/inch/	Sample Type	Resistance (Blowcount)	Recovery (inches)	PID/GC Units	Moisture Content	Lithologic Description	Notes
0							

Completion Depth	Depth to Saturation

P = Physical sample; A = Analytical sample; NSR = No Sample Recovery; SS = Split Spoon; HA = Hand Auger

I. Background

This SOP describes the materials and procedures for sampling of groundwater in wells using low-flow methodology. This methodology is typically used for two reasons:

- to preserve dissolved volatile organic compounds (VOCs) in the sample; and
- to reduce the content of non-mobile, non-colloidal suspended solids in the sample, thereby eliminating the need for sample filtration.

NOTE: If field activities involve per- and polyfluoroalkyl substances (PFASs) such as PFOS or PFOA, refer to the PFAS sampling SOP for additional measures which supersede this SOP, especially regarding substances such as aluminum foil and distilled water.

II. Materials

The following materials, as required, will be made available during low-flow groundwater sampling activities:

- Personal protective equipment and other health and safety-related equipment, as required by the Health and Safety Plan;
- Cleaning equipment (as required in the Standard Operating Procedure for Equipment Cleaning);
- Photoionization detector (PID) to measure headspace vapors (optional);
- Appropriate forms and field note sheets;
- Keys for wells;
- Electronic water level probe;
- Watch (to record time of day);
- Low-flow peristaltic or submersible pump;
- Flow-through cell for use with field water quality meters;
- Sample containers;
- Meters for field water quality parameters (pH, conductivity, temperature)

III. Well Purging and Field Parameter Monitoring Procedures

1. Don personal protective equipment (as required by the Health and Safety Plan).
2. Thoroughly decontaminate submersible pump if a non-dedicated submersible pump is used. If a dedicated submersible pump or a peristaltic pump is used, skip this step.
3. To reduce the potential for cross-contamination, wells should be sampled from cleanest to most impacted based on the previous sampling results.
4. Pump intakes should be located in the center of each well's screened interval.
5. Consistent with low flow (micropurge) protocols, the wells should be purged at rates which do not lower the water surface in the well (as measured with an electric probe during purging). Purge rates between 150 and 500 milliliters per minute (mL/min) or 0.15 and 0.5 L/min are desirable.

   If the soil surrounding the well has a low hydraulic conductivity, it may be impractical to completely avoid lowering of the water surface in the well. If this is the case, the lowering of the water table should be kept to less than a few inches at most. It may be necessary to turn off the pump and allow some recharge to occur before proceeding. In addition, any water level drawdown should be noted in the field notes.

6. Flow rates should be regulated and can be calibrated by using a stopwatch and measuring the time needed to fill a container of known volume. Purge rates should be recorded at regular intervals in the field notes.
7. A flow-through cell should be used for monitoring field parameters (dissolved oxygen, conductivity, pH, oxidation-reduction potential). The specific equipment and methodology used to monitor field parameters during purging should be described in the field notes. Manufacturer's calibration procedures should be followed for the specific instrument(s) used to monitor field parameters.
8. Field parameters, purge rates, and depth to water measurements should be recorded at regular intervals during well purging. Five to fifteen minute intervals are recommended.
9. Pump discharge tubing should be placed at or near the bottom of the flow-through cell, near the dissolved oxygen probe when possible.
10. A record of purging and groundwater sampling should be kept for each well. At a minimum, the log should include the following information: well number, date and time of purge, purging method and rate, volume of water evacuated from the well, description of the water produced, post purge water level, the total time required for purging and records of field analytical measurements.
11. Purging should be conducted at each well until the field parameters stabilize (within approximately 10%).
12. Purged groundwater should be containerized for future handling in accordance with the field sampling plan.

IV. Low-Flow Groundwater Sampling Procedures

1. Groundwater samples should be collected directly from the pump discharge tubing directly into laboratory supplied, pre-preserved glass bottleware. Water should be directed against the inner wall of the bottle to minimize aeration of the sample.
2. All bottles should be filled completely, leaving no headspace in the bottle.
3. Trip blanks, field blanks, and duplicate samples were collected at a frequency prescribed in the site Quality Assurance Project Plan (QAPP).
4. Chain of custody documentation should be prepared at the end of each sampling event and included in the packaged samples. Sample delivery to the laboratory should be expedited, thereby avoiding violation of sample holding times.

V. Disposal Methods

All water generated during cleaning and purging procedures will be collected and contained on-site for determination of proper treatment or disposal.

Personal protective equipment (e.g., gloves, disposable clothing) and other disposable equipment resulting from cleaning and sampling procedures will be placed in plastic bags and appropriately contained for proper disposal.

VI. Quality Assurance/Quality Control

Quality Assurance/Quality Control (QA/QC) protocols, as described in the site QAPP, should be followed during all sampling events.

GROUNDWATER SAMPLING LOG

Project Code: _____ Task: _____ Well ID: _____
Date: _____ Sampled By: _____
Sampling Time: _____ Recorded By: _____
Weather: _____ Replicate No.: _____

INSTRUMENT IDENTIFICATION

	PID	Water-Level Meter	Water Quality Meter(s)
Serial #:			

PURGING INFORMATION

Casing Material: _____ Purge Method: (circle one) submersible centrifugal Peristaltic Bailer
Casing Diameter: _____ Screen Interval: From: _____ To: _____
Total Depth: _____ Pump Intake Setting: _____
Depth to Water: _____ Volumes to be Purged: _____
Water Column: _____ Total Volume Purged: _____
Gallons/Foot: _____ Pump on: _____ Off: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Minutes Elapsed	Rate ml/min	Water Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments

OBSERVATIONS DURING SAMPLING

Well Condition: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): _____

Field Analyses:

Ferrous Iron (Hach) ____ mg/ dilution? yes/no
Sulfide (Hach) ____ mg/ dilution? yes/no

I. INTRODUCTION

This standard operating procedure (SOP) is applicable to the collection of representative liquid samples, both aqueous and non-aqueous, from streams, rivers, lakes, ponds, lagoons, and surface impoundments. It includes samples collected from depth, as well as samples collected from the surface. These typically applicable procedures have been adapted from the U.S. EPA Surface Water Sampling SOP No. 2013, dated 11/17/94 and may be varied or changed as required, dependent upon site conditions or equipment and procedural limitiations. The actual procedures used should be documented in the field notes, especially if changes are made.

There are two primary interferences or potential problems with representative surface water sampling. These include cross contamination of samples and improper sample collection. Following proper decontamination procedures and minimizing disturbance of the sample site will eliminate these problems as follows:

- Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Refer to the Equipment Cleaning SOP.
- Improper sample collection can involve using contaminated equipment, disturbance of the stream or impoundment substrate, and sampling in an obviously disturbed area.

In order to collect a representative sample, the hydrology and morphometrics of a stream or impoundment should be determined prior to sampling. This will aid in determining the presence of phases or layers in lagoons or impoundments, flow patterns in streams, and appropriate sampling locations and depths. In addition, water quality indicator data may be collected, if necessary, in impoundments and to determine if stratification is present. Measurements such as dissolved oxygen, pH, temperature, and redox potential can indicate if strata exist which would effect analytical results. Measurements should be collected at sufficiently sized intervals (e.g., 1 meter) from the substrate to the surface using the appropriate instrument (e.g, Hydrolab).

II. MATERIALS

The following materials shall be available, as required, during surface water sampling. Back-up field instruments/equipment should be available, if required.

- Personal protective equipment (as required by the Health and Safety Plan);
- Cleaning equipment (as required in the Standard Operating Procedure for Equipment Cleaning);
- Appropriate sampling apparatus and accessories (e.g., Kemmerer bottles, Bacon bomb sampler, Dip sampler, Overland flow sampler, line and messengers);
- Appropriate sample bottles, preservatives (if required) and sample bottle labels;
- ZiplocR-type bags;
- Insulated coolers, ice, and appropriate packing material;
- Chain of Custody records and custody seals;
- Field data sheets, field log book, waterproof pen, camera and film;
- Decontamination equipment;

- Maps/plot plan, survey stakes/flags/buoys and anchors;

III. PREPARATIONS

- Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.
- Obtain the necessary sampling and monitoring equipment to suit the task. Consider sample volume, depth, deployment circumstances (shore, wading, boat, currents), type of sample, sampler composition materials, and analyses to be conducted.
- Decontaminate or pre-clean equipment and ensure that it is in working order.
- Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.
- Perform a general site survey prior to site entry, in accordance with the site specific Health and Safety Plan.
- Use stakes, flagging, or buoys to identify and mark all sampling locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. If also collecting sediment samples, this procedure may disturb the bottom and cause interferences with collection of representative water samples.

IV. GENERAL SAMPLE COLLECTION PROCEDURES

1. Record pertinent data on the field log (see attached Surface Water Sampling Field Log, or equivalent).

2. Label all sample containers with the date, time, well number, site location, sampling personnel, and other requested information.

3. Don appropriate personal protective equipment (as required by the Health and Safety Plan).

4. Clean all sampling equipment prior to sample collection according to the procedures in the Standard Operating Procedure for Equipment Cleaning.

5. For samples requiring field filtering, use a pump and in-line disposable filter, if possible to collect the sample directly into the sample container.

6. If field preservation is required, place appropriate preservative into the sample container prior to sample collection. Note the preservative and preservative column on the sample container and sampling log.

7. If any quality control samples are specified in the work plan, they will be collected in the following manner:

- Duplicate samples should be collected at the same time or immediately following one another in accordance with the above procedures. If blind duplicate samples are specified in the work plan, one of the duplicate samples should be labelled so that it does not identify the other sample of the duplicate pair to the laboratory on the chain-of-custody (COC). For example, one sample of the duplicate pair would be labelled following the normal protocol, while the second would be labelled with a sample ID of "DUPLICATE" and a blank line placed in the location, date and time boxes of the sample label. It is important that the duplicate pair samples are

identified separately in the field notes with information including location, sample ID (as entered on the sample container label and COC), sample date and time so that analytical results can be paired after received from the laboratory.

- Trip blanks should be prepared by the laboratory and shipped with the sample bottles. Trip blanks are not to be opened at any time, except by the laboratory for analysis, and must accompany the other samples/sample bottles at all times. Be sure to log the trip blank samples on the COC before shipping samples back to the laboratory.
- Rinse (or equipment) blanks should be collected from a final distilled/deionized water rinse of the specified sampling equipment after that piece of equipment has been cleaned in accordance with appropriate specified cleaning procedures.
- Field blanks, such as samples of water or reagents used to clean sampling equipment, should be collected directly into the sample bottle from the appropriate source container.

8. Record sample collection information on the field log and store the samples in an iced cooler as described in the Standard Operating Procedure for the Shipping and Handling of Samples.

9. Handle, pack, and ship samples according to the procedures in Standard Operating Procedure for the Shipping and Handling of Samples.

V. EQUIPMENT-SPECIFIC SAMPLE COLLECTION PROCEDURES

A. Kemmerer Bottle

A Kemmerer bottle may be used in most situations where site access is from a boat or structure such as a bridge or pier, and where samples at depth are required.

Kemmerer Bottle

Sampling procedures are as follows:

1. Use a properly cleaned Kemmerer bottle. Set the sampling device so that the sampling end pieces (upper and lower stoppers) are pulled away from the sampling tube (body), allowing he substance to be sampled to pass through this tube.

2. Lower the pre-set sampling device to the pre-determined depth. Avoid bottom disturbance.

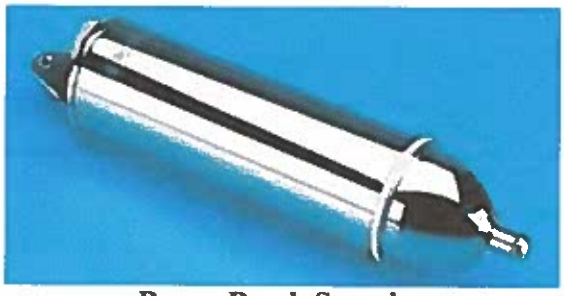
3. When the Kemmerer bottle is at the required depth, send down the messenger, closing the sampling device.

4. Retrieve the sampler and discharge from the bottom drain the first 10-20 mL to clear any potential contamination of the valve.

5. Transfer the sample to the appropriate sample container.

B. Bacon Bomb Sampler

A bacon bomb sampler may be used in situations similar to those outlined for the Kemmerer bottle.



Bacon Bomb Sampler

Sampling procedures are as follows:

1. Lower the bacon bomb sampler carefully to the desired depth, allowing the line for the trigger to remain slack at all times. When the desired depth is reached, pull the trigger line until taut. This will allow the sampler to fill.

2. Release the trigger line and retrieve the sampler.

3. Transfer the sample to the appropriate sample container by pulling up on the trigger.

C. Dip Sampler

A dip sampler is useful in situations where a sample is to be recovered from locations (e.g., outfall pipe, sump manhole, along a pond or lagoon bank) where direct access is limited. The long handle (or line if sampling from a bridge or other structure directly above the water body) on such a device allows access from a safe location.

Dip Sampler

Sampling procedures are as follows:

1. Assemble the device in accordance with the manufacturer's instructions.

2. Extend the device to the sample location and collect the sample by dipping the sampler into the substance.

3. Retrieve the sampler and transfer the sample to the appropriate sample container.

D. Direct Method

For streams, rivers, lakes, and other surface waters, the direct method may be used to collect water samples from the surface directly into the sample bottle. This method may not be appropriate for sampling lagoons

or other impoundments where contact with contaminants is a concern. When using the direct method, do not use pre-preserved sample bottles as the collection method may dilute the concentration of preservative necessary for proper sample preservation. The procedures are as follows:

1. Using adequate protective clothing, access the sampling station by appropriate means.

2. For shallow stream stations, collect the sample under the water surface while pointing the sample container upstream. The container must be upstream of the collector. Avoid disturbing the substrate.

3. For lakes and other impoundments, collect the sample under the water surface avoiding surface debris and boat wakes.

E. GKY Associates First Flush Sampler (Overland Flow Sampler for Stormwater Runoff)

The First Flush Sampler (FFS) is designed and installed at a location so that sheet flows from stormwater runoff can be collected directly into the sample device. The container in the FFS device may be retrieved, capped and used as a sample container for submittal to the analytical laboratory, or a sample may be aliquoted from the FFS container directly into another specified sample bottle. If the later method is used, care should be taken to obtain a representative sample by first thoroughly mixing the sample (taking care to suspend settled sediments) in the FFS before decanting to another container.

VI. DISPOSAL METHODS

If required, all water generated during equipment cleaning procedures will be collected and contained on site for determination of proper treatment or disposal. In addition, personal protective equipment (e.g., gloves, disposable clothing) and other disposable equipment resulting from cleaning and sampling procedures will be placed in plastic bags and appropriately contained for proper disposal.

SURFACE WATER SAMPLING FIELD LOG

Project Name:_____Project Code:_____Page __ of __

Date	Time	Sample ID	Sample Location	Equipment Used	Samplers	Comments

Notes: