

Illinois Environmental Protection Agency
Bureau of Water
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**Standard Operating Procedure for
Sample Collection of
Per- and Poly-Fluorinated Alkyl Substances (PFAS)
at Community Water Supplies in Illinois**

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ACRONYMS

BOW	Bureau of Water
COC	Chain of Custody
CWS	Community Water Supply
DPWS	Division of Public Water Supplies
ETFE	Ethylene-tetrafluoroethylene
FEP	Fluorinated ethylene propylene
FRB	Field Reagent Blank
FTB	Field Trip Blank
IEPA	Illinois Environmental Protection Agency
ITRC	Interstate Technology & Regulatory Council
L	Liter
LFSM	Laboratory Fortified Sample Matrix
LFSMD	Laboratory Fortified Sample Matrix Duplicate
mL	Milliliter
MRL	Minimum Reporting Level
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PFAS	Per- and Poly-Fluorinated Alkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PTFE	Polytetrafluoroethylene
QC	Quality Control
SOP	Standard Operating Procedure
USEPA	United States Environmental Protection Agency

1. PURPOSE AND OBJECTIVES

This Standard Operating Procedure (SOP) details the procedure for collecting samples for the determination of per- and poly-fluorinated alkyl substances (PFAS) in drinking water by United States Environmental Protection Agency (USEPA) Method 537.1. This document contains an introduction to PFAS and procedures to decrease the possibility of cross-contamination. Special care must be taken in handling and sampling for PFAS because PFAS are commonly found in many consumer products and in equipment typically used in collecting environmental samples. The analytical methods for laboratory analysis of PFAS have very low detection limits. This SOP outlines general practices for collecting PFAS samples and provides a summary of field and sampling materials that are likely to contain PFAS, as well as acceptable alternatives. PFAS are unregulated emerging contaminants and they continue to be evaluated and researched by numerous federal, state and public health organizations.

The objectives of this document are as follows:

- Provide procedures to avoid PFAS cross-contamination during sampling.
- Improve sampling consistency and data quality.
- Provide a Standard Operating Procedure to Illinois EPA, Bureau of Water (BOW) staff.

The Illinois Environmental Protection Agency (IEPA) Bureau of Water intends to update the information contained within this SOP as new information becomes available.

Any modifications to this SOP shall be approved in advance by the Planning & Assessment Unit Manager, documented in the field logbook, and presented in the final sampling report.

2. INTRODUCTION AND BACKGROUND

Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) are fluorinated organic chemicals that are part of a larger group of chemicals referred to as PFAS. PFAS are a class of emerging contaminants composed of nearly 5,000 human-made, fluorinated, organic chemicals. The carbon-fluorine bond that exists in PFAS is one of the strongest bonds in nature; these bonds are tough to break and are resistant to thermal, chemical, and biological degradation. The PFAS chemicals have been used in non-stick cookware, water-repellent

clothing, stain resistant fabrics and carpets, some cosmetics, some firefighting foams, and products that resist grease, water, and oil. The presence of PFAS in these materials is a potential source of environmental concern and cross-contamination. Some PFAS do not break down easily and persist for a long time in the environment, especially in water. The toxicity and persistence of PFAS chemicals in the environment indicate they are a potential danger to public health and the environment. PFOS and PFOA have been the most extensively produced and studied of these chemicals.

The probability of false positives is relatively high during PFAS sample collection due to the potential for many sources of cross-contamination, combined with low laboratory detection limits (nanograms per liter or parts per trillion). There are many products found in the sampling environment that have not been documented to either contain or not contain PFAS, and may come into contact with the samples, introducing cross-contamination.

3. RESOURCES

- <https://www.epa.gov/pfas>: Frequently Asked Questions, fact sheets and additional information from the U.S. EPA
- <http://www.itrcweb.org>: Educational materials from the Interstate Technology & Regulatory Council (ITRC)

4. HEALTH AND SAFETY WARNINGS

Caution is required when handling the sample bottles which contain a solid preservative Trizma[®], which serves as a dechlorinating agent and buffer.

According to the Sigma-Aldrich[®] Safety Data Sheet, Trizma[®] is not a hazardous substance or mixture.

In order to minimize exposure to the preservative, sample collectors shall take the appropriate exposure controls by wearing the following Personal Protective Equipment:

- Glasses for eye protection
- Gloves (nitrile) for skin protection

The following first aid measures shall be followed:

- **If inhaled** – move into fresh air.
- **In case of skin contact** – wash off with soap and plenty of water.
- **In case of eye contact** – flush eyes with water as a precaution.
- **If swallowed** – rinse mouth with water.

5. PLANNING FOR THE SAMPLING EVENT

Minimize potential of background contamination:

Due to the ubiquitous nature of these PFAS, there is a higher than usual potential for sample contamination. To minimize this potential, careful preparation for this sampling event is strongly recommended. The clothing worn, personal care products used, and objects brought to the sampling site must be considered.

Clothing NOT to be worn includes:

- Tyvek suits
- Flame resistant clothing (including shoes, hats, bags, gloves, headsets or accessories)
- Water resistant, stain resistant or water repellant clothing including boots/shoes, hats, bags, gloves or accessories
- Rain gear made from fluoropolymers such as Gore-Tex, Tyvek, or fabric with water resistant coating (breathable waterproof)¹
- Clothing that had been washed with fabric softeners or dried with anti-static sheets

NOTE: On the day of sampling it is recommended to wear clothing that has been washed five to six times **without** fabric softener (i.e., no new clothing).

¹ Polyvinyl chloride, polyurethane, polyethylene or rubber rain gear can be worn.

Avoid use of the following personal care products prior to or during sampling:

- Moisturizers and creams
- Cosmetic products (including nail polish)
- Dental floss
- Shaving cream
- Sunscreen
- Insect repellent
- Sanitizer (PFAS-free sanitizer is allowed)

NOTE: PFAS are known to be prevalent in food packaging, including paper plates, food containers, bags, and wraps. Although long-chain PFAS have been banned for use in the manufacturing of contact food materials in the United States, short-chain PFAS have not been banned.

Do NOT bring the following to the sampling site:

- Fast food (due to packaging), packaged food, pizza boxes and any food such as baked goods or sandwiches wrapped in grease-proof paper or bags
- Aluminum foil
- Adhesives (including Post-It notes and Scotch tape)
- Plumber sealant tape (thread tape) and plumbing paste
- Materials containing fluoropolymers such as polytetrafluoroethylene (PTFE or Teflon®), Ethylene-tetrafluoroethylene (ETFE or Tefzel®), Fluorinated ethylene propylene (FEP or Hostaflon® FEP, and may also include Neoflon® FEP)
- Waterproof paper or notebooks
- Permanent markers (use indelible ball point pens; no gel pens)
- Plastic clipboards
- Glass bottles

6. QUALITY CONTROL FIELD SAMPLE TYPES

Due to the prevalence of PFAS in a wide range of materials, there may be a greater likelihood for cross-contamination during sampling, transport, and storage of samples. As such, it is required to collect field quality control samples to evaluate if cross-contamination has occurred. These special quality control sample techniques must be discussed with the contract laboratory to ensure proper sample containers and materials are on hand when sampling begins in the field.

[Note: The contract laboratory may require all field and quality control (QC) samples be collected in duplicate to provide a back-up bottle for each sample type.]

Field Sample (Required):

The field sample is the sample collected from the ENTRY POINT to the distribution system of a community water supply.

Field Reagent Blank (Required):

A field reagent blank (FRB) is analyzed to assess the potential for PFAS cross-contamination being introduced during the sample collection/handling process and consists of a sample bottle filled at the sample site using reagent water provided by the laboratory. The Field Reagent Blank is treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The FRB must be collected at each sample site (i.e., each ENTRY POINT being sampled) and stored in the same resealable bag and cooler used to store and transport field samples. The laboratory will provide the FRB sample bottle, the reagent water, and the preservative (if not already added to the sample bottle).

The associated FRB prepared at the ENTRY POINT must be analyzed if a PFAS analyte is found in that ENTRY POINT sample at or above the laboratory's minimum reporting level. If the method analyte(s) found in the ENTRY POINT sample is present in the FRB at a concentration greater than 1/3 the Minimum Reporting Level (MRL), then all samples collected with that FRB are invalid and must be recollected and reanalyzed. The laboratory will notify the project management team at Illinois EPA, Division of Public Water Supplies (DPWS) when this occurs. Sample collectors will then schedule a resample of the ENTRY POINT should this situation occur.

(Note: The Field Reagent Blank (FRB) is USEPA Method 537.1 terminology for the Field Trip Blank (FTB).)

Field Duplicate (Required):

Duplicate samples shall be collected by filling a separate container following the collection of the primary sample and field reagent blank and treated exactly the same throughout field and laboratory procedures. Field duplicates are stored together in a separate resealable bag. Field duplicates measure the precision associated with sample collection, preservation, and storage, as well as laboratory procedures. Duplicate samples shall be collected at a frequency of one duplicate sample per twenty field samples (1:20) and have been pre-selected by the Planning & Assessment Unit Manager. Duplicate samples will be identified on the Chain of Custody (COC) form as being collected 5 minutes after the ENTRY POINT sample.

Laboratory Fortified Sample Matrix (LFSM) and LFSM Duplicate (LFSMD):

Samples to be used for LFSM and LFSMD shall be collected by filling separate containers following the collection of the primary sample and field reagent blank and treated the same throughout the field procedures. LFSM and LFSMD are stored together in a separate resealable bag. LFSM/LFSMDs measure precision and accuracy in the laboratory, and bias (matrix effects). The LFSM/LFSMDs are prepared in the laboratory by fortifying (or spiking) the field samples with the analytes of interest. LFSM/LFSMDs will be analyzed at a frequency of one set per twenty field samples (1:20) and have been pre-selected by the Planning & Assessment Unit Manager. LFSM/LFSMD shall be identified on the COC form.

(Note: The Laboratory Fortified Sample Matrix (LFSM) and LFSM Duplicate (LFSMD) is USEPA Method 537.1 terminology for the Matrix Spike (MS) and Matrix Spike Duplicate (MSD).)

Trip Blank (Not Required):

The trip blank sample is generally used to evaluate potential cross-contamination from sample shipping and handling procedures. The FRB provides the same quality assurance under this SOP; therefore, the trip blank is not a required sample for PFAS monitoring.

7. PREPARING FOR THE SAMPLING EVENT

Determine approximate date for sampling:

State vehicles should be reserved well in advance of planned sampling events. The designated sample collector should contact the community water supply (CWS) operator to make an appointment to collect samples at least two weeks prior to the sampling event. Each sample collector is responsible for notifying the contract laboratory immediately after the confirmed CWS sampling date (two-week notice) to order necessary sample kits. This is done to provide the contract laboratory with the time necessary for the preparation of the contaminant free laboratory reagent blank water with preservative for the FRBs, the field sample bottles, the empty bottles for the FRBs, and any other quality control samples the contract laboratory will require.

In most cases each of the community water supply's active ENTRY POINTs will require monitoring but must be verified by reviewing the community water supply's active sampling schedule in Illinois EPA's Drinking Water Watch website; <http://water.epa.state.il.us/dww/index.jsp> or Safe Drinking Water Information System website; <http://10.16.11.45:8080/SDWIS/jsp/secure/index.jsp>. Before any PFAS samples are collected, the Illinois EPA, DPWS will provide the contract laboratory with a list of all pertinent CWS data (name, facility ID number, ENTRY POINT ID number, five-digit well/intake number, etc.) to ensure that the correct number of bottles and supplies can be shipped to the appropriate Illinois EPA staff performing the sampling. Once the supplies are received, every effort must be made to collect the PFAS samples as soon as possible, preferably within five business days. All sample bottles received in a sampling kit shall be kept together during sampling and shipping. The laboratory reagent water and bottles must be stored where they will not be exposed to contamination and maintained at a temperature as cool as possible.

Sample collectors need to plan each sampling event to determine the number and location of each CWS that will be sampled on any given day. As part of this planning effort, sample collectors need to identify the shipping facility (i.e., Fed-Ex) location nearest the last CWS that will be sampled. This is done to ensure arrival before the latest guaranteed overnight shipping deadline.

Obtain the following supplies from the contract laboratory:

(Note: The contract laboratory may require all field and QC samples be collected in duplicate to provide a back-up bottle for each sample type.)

For “X” number of ENTRY POINTs being sampled, the laboratory shall send **at a minimum**:

- “X” number of 250 milliliters (mL) polypropylene bottles with polypropylene screw caps and containing a solid preservative (Trizma®) which serves as a dechlorinating agent and buffer—to be used for the ENTRY POINT samples
- “X” number of empty 250 mL polypropylene bottles with polypropylene screw caps—to be used for the FRBs
- “X” number of polypropylene bottles with at least 250 mL of laboratory provided reagent water which is purified water that had been tested as not having any measurable quantities of method analytes or interfering compounds and containing a solid preservative, Trizma® — to be used to prepare the FRBs
- “X” number of 250 mL polypropylene bottles with polypropylene screw caps and containing a solid preservative Trizma® which serves as a dechlorinating agent and buffer—to be used for the field duplicate samples
- “X” number of 250 mL polypropylene bottles with polypropylene screw caps and containing a solid preservative Trizma® which serves as a dechlorinating agent and buffer—to be used for the LFSM/LFSMD samples
- Chain of Custody (COC) form(s)
- PFAS Field Sheets
- Shipping instructions and pre-paid shipping label
- Cooler for shipping samples back to the contract laboratory

8. THE SAMPLING EVENT

Prior to day of sampling event:

1. The ENTRY POINT ID number and community water supply data will be provided to the contract laboratory and pre-populated on a COC form to be made available to the sample collectors. As an alternative, a blank COC form may be completed by the sample collector. Be sure to review the laboratory's instructions for completing the COC form.
2. For CWS with multiple ENTRY POINTs, the sequence in which the ENTRY POINTs will be sampled shall be established in advance by the designated sample collector. This sequence can then be recorded on the COC form prior to the sampling event.
3. Some laboratories will have affixed the labels to the samples bottles prior to shipping to avoid the handling of adhesive labels at the sampling site. If this is not the case, then bottles must be labeled by the designated sample collector before sample collection.
4. Ensure the bottles are preserved with 1.25 grams of Trizma[®] before sample collection. This preservative has been added to the bottles by the contract laboratory. (USEPA Method 537.1 states Trizma[®] concentration of 5 g/L; therefore, the 250 ml sample bottle will contain 1.25 grams of Trizma[®]).
5. Obtaining fresh bags of PFAS-free ice² will not be feasible since the water used for the ice will not be pre-tested to be PFAS-free by the contract laboratory. As a result, all purchased ice must be bagged in new polyethylene resealable plastic bags for use on the day of sample collection.
6. Remove any supplies or equipment that contain Teflon[®] or polytetrafluoroethylene (PTFE) or anything with "fluoro" in its name.
7. If bringing paper towels to the site, ensure that they are **UNTREATED** paper towels and not PFAS treated paper towels, or use a PFAS-free hand towel.

² Bagged ice in new, polyethylene resealable plastic bags must be used to prevent leaking. Blue ice or ice packs are prohibited.

Supplies needed:

(refer to the above to ensure that nothing used at the sampling site will contribute to background contamination.)

- Complete recommended materials and supplies checklist (see Attachment A)
- COC form(s)
- PFAS Field Sheets (see Attachment B)
- Cooler(s) (provided by contract laboratory)
- Bagged ice in new, resealable polyethylene bags (NO blue ice or chemical ice)
- Indelible ball point pen (NO gel pens, markers or Sharpie® markers)
- Bottles with preserved laboratory reagent water for each ENTRY POINT
- Bottles with preservative for each ENTRY POINT being sampled
- Empty bottles for the FRB from each ENTRY POINT
- Empty bottles for the field duplicate (as needed)
- Empty bottles for the LFSM/LFSMD set (as needed)
- Pairs of powderless nitrile gloves for each ENTRY POINT being sampled
- Sample bottle labels (if not already affixed to the bottles)

Information relevant to the day of sampling event:

- To save time chilling the samples after collection, sample collectors must keep bagged ice in the cooler while conducting the sampling. Do NOT use blue ice or chemical ice when chilling the sample bottles.
- When transporting samples, do NOT place samples/bottles directly on vehicle upholstery, office upholstery, or floor rugs since they most likely have been treated for stain, fire and/or water resistance.
- Field sampling occurring during extreme weather (e.g., rainfall, snowfall, or extreme

heat) shall be conducted while wearing the appropriate clothing that will not pose a risk for cross-contamination yet will ensure the safety of the field personnel.

- Avoid sampling during rain if possible (if necessary, polyvinyl chloride, polyurethane, polyethylene or rubber rain gear can be worn).
- Keep caps on all sample bottles until time to collect sample or prepare FRBs, field duplicates, or LFSM/LFSMD. Do NOT mix up caps and bottles.
- DO NOT confuse the bottles to be used for the FRBs, field duplicates, or LFSM/LFSMD with the bottles to be used for the ENTRY POINT samples.
- Use a fresh/new pair of powderless nitrile gloves at each sampling site.
- Ensure that the cooler interior is clean.

Sample collection procedure:

1. Ensure that the sample container is labeled appropriately. Check that the bottle label has the correct CWS name, Facility ID number and ENTRY POINT number and matches the COC form.
2. Sampling taps and plumbing shall be free of materials containing Teflon® (such as Teflon® tape at plumbing joints). If these cannot be avoided, ensure the tap has been flushed for at least 5 minutes.
3. Remove aerators or screens on sampling tap if present. Reduce the flow to a slow stream to reduce air entrainment and overfilling of the bottle.
4. Wash hands with prepared Alconox® or Liquinox® soap before each sampling event. Use non-PFAS treated paper towels or PFAS-free hand towel.
5. Put on a clean pair of powderless nitrile gloves, taking extra caution not to touch any surface prior to sample collection.
6. Samples must be collected in a wide mouth 250 mL polypropylene bottle (provided by the laboratory) fitted with a polypropylene screw cap.
7. Collect the ENTRY POINT sample by filling one of the bottles containing the preservative. Do NOT fill to overflowing since that will cause loss of the preservative. A

headspace free sample is not required with this sampling. Do NOT place the bottle cap on any surface when collecting the sample and avoid all contact with the inside of the sample bottle or its cap.

8. Cap the bottle and invert three times to dissolve the preservative. DO NOT OPEN.
9. Record the date and time of the ENTRY POINT sample collection on the COC form. Be sure that the information on the COC form matches the information on the ENTRY POINT sample bottle.
10. Prepare the FRB for that ENTRY POINT by pouring water from one of the bottles of preserved laboratory reagent water into an empty field reagent bottle. **DO NOT USE** any remaining laboratory reagent water from that bottle for any other FRBs to be prepared. Discard excess field reagent water at an appropriate location. Label the FRB so that it is associated with that ENTRY POINT sample location. The ENTRY POINT and CWS Facility ID numbers shall be referenced.
11. The empty laboratory reagent bottle shall not be shipped with the samples back to the laboratory and may be discarded or recycled.
12. On the COC form, record the date and time that the FRB was prepared for the ENTRY POINT being sampled at that location.
13. Repeat above process for field duplicates and LFSM/LFSMDs, as needed.
14. Record field site observations in the PFAS Field Sheet such as types of pipes and fittings, time well or intake operated prior to sample, site characteristics, and atmospheric conditions. Record this information at the time of sampling.

Storage of samples after collection and before shipping:

- The analytical method requires that the samples must not exceed 10°C (50°F) during the first 48 hours after collection.
- The samples that are significantly above 10°C (50°F) at the time of collection, or will not be shipped immediately, will need to be iced or refrigerated to chill them prior to shipping to the contract laboratory. (see Table 1).
- Samples must be at or below 10°C (50°F) when received at the contract laboratory.

- The goal is for the contract laboratory to receive samples within 48 hours of sample collection.

Table 1. PFAS Sample Summary Information

Parameters	Minimum Requirements
Sample Volume	250 mL
Container/Cap	Polypropylene Bottle/Screw Cap
Sample Preservation	Trizma® (1.25 grams)
Field Reagent Blank	One Per Sample Site
Temperature After Sample Collection	≤10°C (50°F) Within 48 Hours but Not Frozen
Holding Time For Extraction For Analysis	Within 14 Days of Collection Within 28 Days of Extraction

9. SAMPLE SHIPPING

It is important for sample collectors to coordinate in advance with the contract laboratory to determine if certain days of the week and/or holidays are not recommended by the laboratory for sample shipping.

1. Identify the shipping facility (i.e., Fed-Ex) location that will be used to ship sample cooler(s) to the contract laboratory. Be sure that you arrive before the latest guaranteed overnight shipping deadline.
2. Ship samples with bagged ice to ensure sample temperature does not exceed 10°C (50°F) if received by the laboratory within 48 hours from time of collection.
3. Pack the bottles upright in the cooler and ensure that the bottles cannot move sideways. (The sample bottles should already be separated into resealable bags as follows: field sample and FRB in one bag, duplicates in a separate bag, and

LFSM/LFSMD in a separate bag.) Any extra space around the bottles shall be packed with bagged ice to 1/3 the depth of the cooler.

4. Put additional bagged ice on top of the bottles.
5. The COC form will accompany all samples. The general information in the COC may be filled out in advance by the contract laboratory; otherwise, the sample collector must fill out the COC prior to/or at the sample collection event. The COC form is an integral part of sample Quality Assurance/Quality Control and each cooler must include a COC.
6. Prior to shipping, the sample collector shall record the "relinquished by" date and time on COC form using permanent black or blue ink.
7. Place the original COC in a sealed plastic bag (1 gallon) inside of the cooler.
8. The sample collector is to retain the PFAS Field Sheet for internal documentation. Do NOT place the PFAS Field Sheet in the cooler to be shipped to the laboratory.
9. Affix the laboratory shipping address and custody seal(s) and any shipping company labels such as temperature control label, etc. to the cooler.
10. Seal the cooler firmly with shipping tape, wrapping it around multiple times. The tape should begin and end on the top or the bottom of the cooler, not at the junction of the lid. Record the shipping/routing number on the PFAS Field Sheet and retain the shipping company receipt (if available).
11. Ship all coolers certified and with overnight shipping for next day delivery to ensure samples are received within the required holding time.
12. Provide the shipping information to the laboratory by email, telephone, etc. and communicate the estimated time of arrival of the samples.

10. REFERENCES

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- Kentucky Department for Environmental Protection (KDEP), May 28, 2019, "Sampling Procedures for Per- & Poly-Fluorinated Alkyl Substances." Division of Water and Division of Waste Management. 24 pgs.
- Michigan Department of Environmental Quality (MDEQ) guidance
https://www.michigan.gov/documents/pfasresponse/General_PFAS_Sampling_Guidance_634597_7.pdf
- New Hampshire Department of Environmental Services (NHDES) Website: NH PFAS Investigation at <https://www4.des.state.nh.us/nh-pfas-investigation> and Guidance for Waste Sites https://www4.des.state.nh.us/nh-pfas-investigation/?page_id=130

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U.S. Environmental Protection Agency. PFAS Webpages <https://www.epa.gov/pfas/basic-information-pfas> and <https://www.epa.gov/pfas>

11. ATTACHMENT A

Materials and Supplies Checklist

- Sampling procedure document (sampling methods)
- Site location information
- Chain of Custody forms
- PFAS Field Sheets
- Extra sample labels for each sample
- Sample bottles
 - Number of sites to be sampled: ____
 - Number of ENTRY POINT sample bottles: ____
 - Number of field reagent blanks: ____
 - Number of field duplicate sample bottles: ____
 - Number of LFSM/LFSMD sample bottles: ____
- Trizma® (preservative and dechlorinates, added to the bottles by the laboratory)
- Extra sample kit in case of errors in the field
- Cooler and bagged ice
- Clipboard (NOT waterproof)
- Office supplies (indelible ball point pens, avoid gel pens and Sharpie® markers)
- Strapping tape
- Powderless nitrile gloves

11. ATTACHMENT A (Cont.)

Materials and Supplies Checklist

- PFAS free paper towels or PFAS free hand towels
- Polyethylene resealable plastic bags
- Alconox® or Liquinox® soap
- Overnight carrier shipping labels

12. ATTACHMENT B

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
 DIVISION OF PUBLIC WATER SUPPLIES
GROUNDWATER SECTION

PFAS FIELD SHEET

SYSTEM NAME:
 SYSTEM ID: **IL**
 SAMPLE SITE I.D.:
 NETWORK REGION:
 SITE ADDRESS/LOCATION:

) PFAS SAMPLE
) DUPLICATE
) LFSM/LFSMD *****
) CONFIRMATION SAMPLE
(check appropriate boxes above)

OPERATOR:	SAMPLE COLLECTOR:
For sample sites where well casings are to be purged.	DATE COLLECTED:
CASING DIAMETER: _____ (inches)	TIME COLLECTED: _____ (24 hour)
WELL DEPTH: _____ (feet)	RUN TIME PRIOR TO SAMPLING: _____ (minutes)
PUMPING RATE: _____ (gpm)	(use 9999 for continuously running)
Formula (see table): [(gallons/foot) x depth] ÷ gpm	

Samples for PFAS analysis (USEPA Method 537.1) are shipped to Eurofins Eaton Analytical, South Bend, IN.

Bottle Order #: _____ Cooler Tracking ID: _____

COMMENTS: _____

CHECKLIST OF SUPPLIES:

BOTTLES/SAMPLE KIT and shipping label	MASK
COC (Chain-of-Custody sheet)	SAFETY EYEGLASSES
ICE and STRAPPING TAPE	SANITIZER – hand sanitizer, wipes, spray bottle
NITRILE GLOVES	HAND SOAP/RED HAND TOWELS
SAMPLE BAGS (4 mil)	BLUE SHOP TOWELS
PEN (blue, water indelible)	
CLIPBOARD	
CAMERA (extra batteries)	GW SECTION CONTACT INFO
** SPARE SAMPLE KIT **	OPERATOR CONTACT INFO

12. ATTACHMENT B (Cont.)

When the sample site is located a short distance beyond the well treatment point, well purging may be necessary to assure that any backflow of water has been removed from the well casing.

Well Volume Purge formulas (3 well casing volume purges preferred to assure removal of standing water)

1. US gallons/foot x depth = total gallons in well casing
2. total gallons ÷ gallons per minute (gpm) = minutes to purge 1 well volume

WELL DIAMETERS and GALLONS PER FOOT to calculate well purging times	
Well Diameter in Inches	U. S. Gallons per Foot
4.00	0.6528
5.00	1.020
6.00	1.469
7.00	1.999
8.00	2.611
9.00	3.305
10.0	4.081
11.0	4.937
12.0	5.876
13.0	6.895
14.0	7.997
15.0	9.180
16.0	10.44
17.0	11.79
18.0	13.22
19.0	14.73
20.0	16.32
21.0	17.99
22.0	19.75
23.0	21.58
24.0	23.50
25.0	25.50
26.0	27.58
27.0	29.74
28.0	31.99
29.0	34.31
30.0	36.72
31.0	39.21
32.0	41.78
33.0	44.43
34.0	47.17
35.0	49.98
36.0	52.88
37.0	55.68
38.0	58.92
39.0	62.06
40.0	65.29

WELL PURGING CALCULATION EXAMPLES (for well casing; does not include transmission line to sample site)

- 1) For 12-inch diameter well, 1,000 feet deep, pumping at 500 gallons per minute (gpm)

$$5.876 \times 1,000 = 5,876 \text{ gallons in well casing}$$

$$5,876 \div 500 = 11.752 \text{ minutes to purge 1 well volume}$$

* Note: purging at least three well volumes = $11.752 \times 3 = 35$ minutes.

- 2) For 12-inch diameter well, 200 feet deep, pumping at 75 gpm.

$$5.876 \times 200 = 1175.2 \text{ gallons in well casing}$$

$$1175.2 \div 75 = 15.669 \text{ minutes to purge 1 well volume}$$

* Note: purging at least three well volumes = $15.669 \times 3 = 47$ minutes.

- 3) For 8-inch diameter well, 100 feet deep, pumping at 100 gpm.

$$2.611 \times 100 = 261.1 \text{ gallons in well casing}$$

$$261.1 \div 100 = 2.611 \text{ minutes to purge 1 well volume}$$

* Note: purging at least 3 well volumes = 7.833 minutes