



## **Frequently Asked Questions (FAQs) for Sampling and Analysis of PFAS at WMD Sites**

This Fact Sheet was developed to support incorporation of per- and polyfluoroalkyl substances (PFAS) as routine contaminants of concern into NHDES Waste Management Division (WMD) programs. PFAS are emerging contaminants, and the current guidance and the content in this document may be modified as information becomes available.

PFAS have been widely used since the 1940s in industrial applications and in consumer products because of their properties to resist heat, oil, grease, stains, and water. In the environment, PFAS are stable, persistent, and bioaccumulative. Recently, PFAS impacts to groundwater used as drinking water have been identified in several communities in New Hampshire, and NHDES has conducted sampling and analysis of drinking water wells in many locations. However, the full nature and extent of PFAS impacts to groundwater throughout New Hampshire are unknown.

### **1. What terminology should be used for work reviewed by the WMD?**

Based on USEPA guidance, “per- and polyfluoroalkyl substances (PFASs)” is the preferred term to refer to this class of chemicals, although the general public and others may also refer to these compounds as “perfluorinated chemicals (PFCs)” or “perfluorinated compounds (PFCs).” For further information, see: <https://www.epa.gov/pfas/what-are-pfcs-and-how-do-they-relate-and-polyfluoroalkyl-substances-pfass>.

### **2. What is the basis for the USEPA Health Advisory level and NHDES’ Ambient Groundwater Quality Standard (AGQS), and the responses described herein?**

On May 19, 2016, USEPA issued drinking water lifetime health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), and after a review of USEPA’s information, NHDES filed an emergency rule on May 31, 2016 to establish the health advisories as Ambient Groundwater Quality Standards (AGQS). NHDES set three groundwater quality standards: 70 nanograms per liter (ng/L, equivalent to parts per trillion [ppt]) for PFOA, 70 ng/L for PFOS, and 70 ng/L for PFOA and PFOS combined, where these chemicals are present together. After completing the regular rulemaking process, these rules became permanent on October 22, 2016.

For information about health effects, please refer to:

- <https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>
- <https://www.epa.gov/pfas/basic-information-about-and-polyfluoroalkyl-substances-pfass#tab-3>
- <http://www.dhhs.nh.gov/dphs/pfcs/documents/pfc-faqs-gen.pdf>

The health advisory levels were established to provide a margin of protection from a lifetime of exposure to PFOA and PFOS in drinking water. The levels also offer a margin of protection against adverse health effects to the most sensitive populations: fetuses during pregnancy and

## **Frequently Asked Questions (FAQs) for Sampling and Analysis of PFAS at WMD Sites**

breastfed infants.<sup>1</sup> Exposures to these sensitive populations could occur over short periods of time (i.e., weeks to months) during pregnancy and lactation. For these reasons, a quick response is needed to address elevated concentrations detected in water supply wells.

### **3. What resources are available to learn more about PFAS?**

The Northeast Waste Management Officials' Association (NEWMOA) provided a five-part webinar training series in 2016 (<http://www.newmoa.org/cleanup/workshops.cfm>).

Other training events and information are available online. The Interstate Technology & Regulatory Council (ITRC) is also in the process of preparing educational materials, which will also be available online when completed.

### **4. What sites should be sampled?**

With the issuance of its May 2017 letter to responsible parties for waste sites, NHDES requires an initial screening for the presence of PFAS at waste sites per the provisions of the NH Code of Administrative Rules, Chapters Env-Or 600 and Env-Or 700, as applicable. This requirement follows the notice provided by NHDES in a letter regarding [Sampling for Per- and Polyfluoroalkyl Substances/Perfluorinated Chemicals \(PFASs/PFCs\) at Contaminated Sites](#) dated November 22, 2016. Affected waste sites include:

- All active hazardous waste sites managed by the NHDES Hazardous Waste Remediation Bureau (HWRB) (including, but not limited to, sites with active New Hampshire Groundwater Management Permits and New Hampshire Groundwater Release Detection Permits, and federal Superfund sites);
- All sites undergoing environmental site assessment activities for which the results will be reported and submitted to the Waste Management Division (WMD) for review, such as Brownfields sites, including, but not limited to, sites with a history indicating that industrial processes may have used PFAS-containing products, and sites where Class B firefighting foam (e.g., aqueous film forming foam [AFFF]) may have been used for training exercises or to extinguish a fire; and
- All landfills (lined, unlined, active, and/or closed) that are subject to groundwater monitoring requirements.

Due to the wide-ranging use of PFAS in commercial and industrial applications, as summarized in the table below, sampling is appropriate and required at the sites described above.

---

<sup>1</sup>Fact Sheet, PFOA & PFOS Drinking Water Health Advisories:  
[https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories\\_pfoa\\_pfos\\_updated\\_5.31.16.pdf](https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf)

## **Frequently Asked Questions (FAQs) for Sampling and Analysis of PFAS at WMD Sites**

<b>Commercial Products</b>	<b>Industrial Uses</b>
<ul style="list-style-type: none"><li>• Cookware (Teflon®, Nonstick)</li><li>• Fast Food Containers</li><li>• Candy Wrappers</li><li>• Microwave Popcorn Bags</li><li>• Personal Care Products (Shampoo, Dental Floss)</li><li>• Cosmetics (Nail Polish, Eye Makeup)</li><li>• Paints and Varnishes</li><li>• Stain Resistant Carpet</li><li>• Stain Resistant Chemicals (Scotchgard®)</li><li>• Water Resistant Apparel (Gore-Tex®)</li><li>• Cleaning Products</li><li>• Electronics</li><li>• Ski Wax</li></ul>	<ul style="list-style-type: none"><li>• Photo Imaging</li><li>• Metal Plating</li><li>• Semiconductor Coatings</li><li>• Aviation Hydraulic Fluids</li><li>• Medical Devices</li><li>• Class B Firefighting Foam (e.g., Aqueous Film-Forming Foam [AFFF])</li><li>• Insect Baits</li><li>• Printer and Copy Machine Parts</li><li>• Chemically Driven Oil Production</li><li>• Textiles, Upholstery, Apparel and Carpets</li><li>• Paper and Packaging</li><li>• Rubber and Plastics</li></ul>

Owners of operating solid waste landfills should have already received a letter from NHDES requiring sampling in July 2017. In addition, the Groundwater Discharge permit program in the NHDES Water Division has also directed all permit holders to sample for PFAS. At this time, sampling and analysis for PFAS at sites impacted only with petroleum-related constituents that are managed by the NHDES Oil Remediation and Compliance Bureau (ORCB) is not required, unless otherwise instructed by the ORCB Project Manager.

### **5. What media should be sampled?**

The initial evaluation should assess potential impacts to groundwater quality. Sampling of other media (e.g., soil, surface water) may be required in future monitoring events after considering the concentrations detected in groundwater, the potential release mechanism, extent of impacts, and proximity to sensitive receptors.

### **6. How many samples should be collected, and which wells should be sampled?**

The number of samples will depend on the site. Representative sampling should be performed to assess whether PFAS are present at the site at concentrations which exceed AGQS and whether receptors (i.e., drinking water supply wells) are impacted.

Sample locations should be selected based on the professional judgement of the Professional Engineer and/or Geologist directing the sampling effort in consideration of previous and current uses of the site, site hydrogeology, proximity to sensitive receptors, and other known releases. Sampling locations to be included in this initial screening effort should include, at a minimum:

- At least one monitoring well from each source area;
- Representative downgradient monitoring well(s) [e.g., at the extent of a site Groundwater Management Zone (GMZ), if established]; and
- Active drinking water supply well(s) included in the current GMP schedule and active drinking water supply wells with previous detections of other site contaminants of concern.

## **Frequently Asked Questions (FAQs) for Sampling and Analysis of PFAS at WMD Sites**

It also may be appropriate to include at least one hydraulically upgradient (background) monitoring location, based on site conditions and surrounding property uses.

Samples collected from water supply wells should be collected prior to treatment.

The proposed sampling locations do not need to be submitted to the NHDES for review prior to the sampling effort, unless otherwise requested by the NHDES Project Manager (.e.g., sampling locations at Federal sites and operating solid waste landfills need to be submitted to NHDES for review). Please provide justification for selection of the sampling locations in the summary documentation provided to NHDES following the sampling effort. NHDES may request further sampling and analysis if NHDES considers that the sampling completed was not representative.

### **7. What sampling protocols have been developed?**

Because of the potential presence of PFAS in common consumer products and in equipment often used to collect groundwater samples, special handling and care must be taken when collecting PFAS samples. Accordingly, *NHDES strongly recommends that protocols specific to sampling groundwater for the presence of PFAS be used for all well purging and groundwater sampling collection and handling methods, and that the sampling be performed by a consultant familiar with these protocols.*

NHDES' [Sample Collection Guidance](#) summarizes PFAS sampling protocols. For more detailed information, please refer to Standard Operating Procedure (SOP) No. HWRB-21 in the NHDES [HWRB Master Quality Assurance Project Plan](#), prepared for sites investigated through contracts administered by the HWRB.

### **8. What laboratories are certified to perform the analysis?**

A New Hampshire accreditation program for PFAS analysis is under development, but is not yet in place. At this time, *NHDES strongly recommends that a lab with DOD and/or NELAP certification be used for PFAS analysis.* The laboratory used for analysis of other site samples does not need to be the same as the laboratory that analyzes the PFAS samples. This document will be updated when further information is available.

### **9. What laboratory analysis should be used?**

For the most recent guidance, please refer to the Fact Sheet [Laboratory Testing Guidelines for Per- and Polyfluorinated Substances \(PFAS\)](#), which summarizes recommendations for analytical laboratory qualifications, analytical methods, parameters, and reporting limits.

USEPA Method 537 Rev 1.1 is a method for determining concentrations of select PFAS compounds in drinking water samples and was developed as part of the Safe Drinking Water Act program. There are concerns that this method may not be appropriate for groundwater samples collected as part of site investigations due to potential matrix interference effects. *Therefore, analysis by a modified USEPA Method 537 that uses isotope dilution techniques is strongly recommended.*

As of the date of this FAQ document, there is no standardized isotope dilution method for PFAS analysis. Therefore, individual laboratories have developed their own methods using the USEPA

## Frequently Asked Questions (FAQs) for Sampling and Analysis of PFAS at WMD Sites

Method 537 as a basis. USEPA is developing a standardized method for analysis of groundwater samples. This document will be updated when further information is available.

At a minimum, NHDES recommends that samples be submitted for analysis of the following compounds:

<b>Compound Name</b>	<b>CAS #</b>
PERFLUORONONANOIC ACID (PFNA)	375-95-1
PERFLUOROOCTANOIC ACID (PFOA)	335-67-1
PERFLUOROHEPTANOIC ACID (PFHPA)	375-85-9
PERFLUOROHEXANOIC ACID (PFHXA)	307-24-4
PERFLUOROPENTANOIC ACID (PFPEA)	2706-90-3
PERFLUOROBUTANOIC ACID (PFBA)	375-22-4
PERFLUOROOCTANESULFONIC ACID (PFOS)	1763-23-1
PERFLUOROHEXANESULFONIC ACID (PFHXS)	355-46-4
PERFLUOROBUTANESULFONIC ACID (PFBS)	375-73-5

Generally, the analytical reporting limit of analyses for each contaminant should be no greater than 5 ng/l for aqueous samples; however, available reporting limits from some laboratories for compounds other than PFOA and PFOS may be slightly higher (e.g., 10 ng/l), and are acceptable.

In NHDES' experience, some analytical laboratories report slightly different forms of PFOS, PFHXS, and PFBS (i.e., perfluorooctanesulfonic acid vs. perfluorooctane sulfonate), which vary slightly from one another in molecular weight, resulting in slight differences in reported concentrations. Confirm with the analytical laboratory that the forms of PFOS, PFHXS, and PFBS being analyzed **and reported** correspond to the CAS No. presented in the table above.

If feasible, please consider having the analytical laboratory report a longer list of PFAS than provided above, to support the understanding of potential PFAS impacts at your site. The list of compounds above represents those compounds most commonly detected during recent NHDES investigations that are also included in the analyte lists available from most laboratories.

NHDES has collected more than 2,000 samples for PFAS analysis, with the samples typically analyzed for a list of 24 PFAS provided below:

<b>Compound Name</b>	<b>CAS #</b>
PERFLUOROBUTANESULFONIC ACID (PFBS)	375-73-5
PERFLUOROBUTANOIC ACID - PFBA	375-22-4
PERFLUORODECANE SULFONATE - PFDS	30783
PERFLUORODECANOIC ACID - PFDA	335-76-2
PERFLUORODODECANOIC ACID - PFDOA	307-55-1
PERFLUOROHEPTANE SULFONATE - PFHPS	375-92-8
PERFLUOROHEPTANOIC ACID - PFHPA	375-85-9
PERFLUOROHEXANESULFONIC ACID (PFHXS)	355-46-4

## **Frequently Asked Questions (FAQs) for Sampling and Analysis of PFAS at WMD Sites**

PERFLUOROHEXANOIC ACID - PFHXA	307-24-4
PERFLUORONONANOIC ACID - PFNA	375-95-1
PERFLUOROTETRADECANOIC ACID - PFTEDA	376-06-7
PERFLUORO-N-TRIDECANOIC ACID - PFTRDA	72629-94-8
PERFLUOROOCTANESULFONIC ACID (PFOS)	1763-23-1
PERFLUOROOCTANOIC ACID - PFOA	335-67-1
PERFLUOROOCTANESULFONAMIDE - FOSA	754-91-6
PERFLUOROPENTANOIC ACID - PFPEA	2706-90-3
PERFLUOROUNDECANOIC ACID - PFUNA	2058-94-8
2-(N-ETHYLPERFLUORO-A-OCTANESULFONAMIDO)-ETHANOL - N-ETFOSE	1691-99-2
2-(N-METHYLPERFLUORO-A-OCTANESULFONAMIDO)-ETHANOL - N-MEFOSE	24448-09-7
6:2 FLUOROTELOMERSULFONATE - 6:2FTS	17619-97-2
8:2 FLUOROTELOMERSULFONATE - 8:2 FTS	39635
ETHYLPERFLUORO-1-OCTANESULFONAMIDE - N-ETFOSA	4151-50-2
METHYLPERFLUORO-1-OCTANESULFONAMIDE - N-MEFOSA	31506-32-8
2,3,3,3-TETRAFLUORO-2-(HEPTAFLUOROPROPOXY)PROPANOIC ACID (HFPO-DA)	13252-13-6

### **10. What QA/QC is necessary?**

Many clothing items and field equipment may contain PFAS, which increases the potential for inadvertent contamination of the samples. To support the validity of the data, one set of the following QA/QC samples per 20 field samples is suggested as part of the initial screening efforts, although not required:

- Equipment rinseate blank (only if non-dedicated equipment is used);
- Blind field duplicate (only if more than 10 samples collected); and
- Field blank.

Depending on detections, additional QA/QC samples may be warranted in future monitoring rounds, and will likely be necessary for site investigations.

### **11. What lead or turn-around times are typical?**

Typical turn-around times may range from about two to six weeks for reporting of laboratory data. Data transmittals are due to NHDES within 45 days of sampling; if the laboratory cannot provide the analytical data within this timeframe, contact the NHDES Project Manager to discuss whether a separate data transmittal will be warranted. In most cases, a separate transmittal will not be required.

## **Frequently Asked Questions (FAQs) for Sampling and Analysis of PFAS at WMD Sites**

### **12. For permitted sites, how should permittees report the data to NHDES?**

Reporting for an exceedance of AGQS in a sample collected from a drinking water supply and/or from a sample collected from a monitoring well located at a downgradient compliance point (e.g., at a GMZ boundary), shall be in accordance with the Permits, Env-Or 607.07, and Env-Or 610.03, as applicable:

- If an exceedance of the AGQS is discovered in a water supply well, then the responsible party shall provide written notification within 5 business days after receiving results.
- If an exceedance of the AGQS is discovered at or beyond the GMZ boundary, then the permittee shall provide written notification within 30 days after discovery of the violation.
- In addition to the above requirements, all results shall be reported within 45 days of receiving sampling results.

*For all sites, NHDES recommends the property owner and NHDES receive verbal notification upon receipt of the data indicating an exceedance of AGQS. In addition, NHDES recommends that this notification also be provided when PFOA and PFOS are detected at concentrations of  $\geq 90\%$  of AQGS (i.e., 63 ng/l).*

### **13. For new sites, or sites without permits, when should NHDES be notified of the data?**

Notification should follow the procedures outlined in Env-Or 604.02, as applicable:

- If an exceedance of the AGQS is discovered, then the responsible party shall provide written notification no more than 60 days after obtaining knowledge of the AGQS violation, with exceptions as noted in Env-Or 604.03 (e.g., reporting in accordance with Permits).

*If the exceedance of AGQS is discovered in a water supply well or a downgradient compliance monitoring well, NHDES strongly recommends that verbal notification is provided to NHDES and the property owner upon receipt of the results. In addition, NHDES recommends that this notification also be provided when PFOA and PFOS are detected at concentrations of  $\geq 90\%$  of AQGS (i.e., 63 ng/l).*

### **14. How should the data be provided to NHDES?**

Reports should be uploaded to OneStop following standard procedures. The summary documentation should include justification for selection of the sampling locations.

Additionally, PFAS analytical data should be uploaded to the NHDES Environmental Monitoring Database (EMD). Where possible, HRWB suggests that the analytical laboratory provide a direct upload to the EMD. Analytical results for non-PFAS compounds do not need to be uploaded to EMD at this time (unless otherwise required under separate initiatives). Further guidance can be found in the [EMD Process for PFAS Data Collected at HWRB Sites](#). Note that

## **Frequently Asked Questions (FAQs) for Sampling and Analysis of PFAS at WMD Sites**

sample locations (i.e. “Stations”) should be uploaded to EMD one week prior to the sampling event.

Technical questions regarding EMD data upload should be directed to Melanie Cofrin at 603 271-8803 ([Melanie.Cofrin@des.nh.gov](mailto:Melanie.Cofrin@des.nh.gov)).

### **15. What is the anticipated response for an exceedance of AGQS?**

If an exceedance of the AGQS is discovered in a water supply well in the GMZ at a permitted site, then the permittee shall implement the contingency provisions required by the permit and Env-Or 607.06(b) (i.e., provide a potable supply).

Initial response actions pursuant to Env-Or 605.04 will be required, as appropriate. For planning purposes, please note that NHDES likely will request a potentially responsible party to:

- Within 14 days of knowledge of the exceedance, identify and notify potential drinking water receptors located within 500 to 1,000 feet of the sampling location; and
- Within 28 days of knowledge of the exceedance, collect PFAS samples from potentially impacted drinking water wells identified in the receptor survey.

In an effort to promote timely response actions, NHDES does not plan to review and approve each work scope for the drinking water well sampling described above.

*Given the emerging understanding of the presence of PFAS in New Hampshire, the timeframe for exposure for sensitive populations, and the absence of a standard USEPA analytical method for laboratory analysis, although not required, NHDES strongly recommends that potentially responsible parties implement a similar approach where a water supply or downgradient monitoring well is impacted by concentrations of PFOA, PFOS, and PFOA and PFOS combined that exceed 90 percent of the AGQS (i.e., at a concentration greater than or equal to 63 ng/L).*

### **16. Will future monitoring be required?**

The need for future assessment will be evaluated following NHDES’ review of the PFAS data collected, similar to the approach taken for other contaminants of concern at a site. Site-specific considerations will be given to the concentrations, types, and distribution of PFAS, the site remedial status, and the proximity to sensitive receptors. General guidelines are provided below:

- **Non-detect in water supply wells and/or monitoring wells:** In general, WMD will consider waiving future sampling requirements if the initial sampling effort fails to detect these PFAS above the reporting limits, assuming appropriate reporting limits are achieved. Also, please note that as necessary, WMD will require a second analysis of a sample to obtain lower detection limits to assess the presence of PFAS that were reported with a high detection limit during the initial analysis.
- For detections greater than laboratory reporting limits, the following guidelines are recommended for consideration:

## **Frequently Asked Questions (FAQs) for Sampling and Analysis of PFAS at WMD Sites**

- **Detections of less than 50% of AGQS (i.e., 35 ng/l) in water supply wells and/or monitoring wells:** In general, WMD will consider waiving future sampling requirements if two consecutive rounds of sampling fail to detect these PFAS above 35 ng/l. However, based on site conditions, additional sampling rounds may be warranted, although likely on a less frequent basis than specified in any applicable permit-required sampling.
- **Detections  $\geq$  50% AGQS (i.e., 35 ng/l) in water supply wells and/or monitoring wells:** Additional monitoring will likely be required to establish a trend, the frequency and duration of which will be based on site-specific conditions. However, between two and four rounds of monitoring will likely be needed.
  - If increasing concentrations are observed, an evaluation of the site characterization, remedy, and future monitoring frequency will be necessary.
  - If steady or decreasing concentrations are observed, based on site conditions, additional sampling rounds may be warranted, although likely on a less frequent basis than specified in any applicable permit-required sampling, or until concentrations decrease to less than 50% of AGQS.
- **Additional guidance for detections  $\geq$  50% AGQS (i.e., 35 ng/l) in water supply wells:** More frequent monitoring is recommended to establish trends.
  - **$\geq$  70% AGQS (i.e., 49 ng/l):** Sample monthly.
  - **$\geq$  50% to  $\geq$  70% AGQS (i.e., 35 to 49 ng/l):** Sample in 3 to 6.