Protocol: Supplemental Exposure Investigation (EI) at Select PFAS Exposure Assessment Sites

FUNDED AND SPONSORED BY
Agency for Toxic Substances and Disease Registry (ATSDR)
Environmental Protection Agency (EPA)

Contents

Tables and Figures:

Abbreviations and Acronyms

11Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid
AFFF	Aqueous Film Forming Foam
ATSDR	Agency for Toxic Substances and Disease Registry
CDC	Center for Disease Control and Prevention
DE	New Castle County Delaware EA location
dL	Deciliter
DoD	US Department of Defense
DONA	4,8-dioxa-3H-perfluorononanoic acid
DQO	Data Quality Objectives
EA	Exposure Assessment
EI	Exposure Investigation
EPA	Environmental Protection Agency
EtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
FTOH	Fluorotelomer Alcohols
FtS 8:2	fluorotelomer sulfonic acid 8:2
FtS 6:2	fluorotelomer sulfonic acid 6:2
FtS 4:2	fluorotelomer sulfonic acid 4:2
g	Gram
GIS	Global Information System
HFPO-DA (GenX)	hexafluoropropylene oxide dimer acid
ISM	Incremental Sampling Methodology
L	Liter
LOD	Limit of detection
MA	Hampden County Massachusetts EA location
MeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
Mg	Milligrams
mL	Milliliter
n-PFOA	ammonium perfluorooctanoate
n-PFOS	sodium perfluoro-1-octanesulfonate
NDAA	National Defense Authorization Act
Ng	Nanogram
NHANES	National Health and Nutrition Examination Survey
ORD	EPA's Office of Research and Development
PFAS	Per- and polyfluoroalkyl substances

PFBA	perfluorobutanoic acid
PFBS	perfluorobutane sulfonic acid
PFDA	perfluorodecanoic acid
PFDS	perfluorodecane sulfonic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHpS	perfluoroheptane sulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexane sulfonic acid
PFNA	perfluorononanoic acid
PFNS	perfluorononane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
PFOSA	perfluorooctane sulfonamide
PFPeA	perfluoropentanoic acid
PFPeS	perfluoropentane sulfonic acid
PFTA	perfluorotetradecanoic acid
PFTrA	perfluorotridecanoic acid
PFUnA	perfluoroundecanoic acid
SAP	Sampling and Analysis Plan
Sb-PFOA	mixture of perfluoro-5-methylheptanoic acid isomers
Sm-PFOS	mixture of sodium perfluoro-5-methylheptane sulfonate isomers
QC	Quality Control
TOF	Total Organic Fluorine
TOP	Total Oxidizable Precursor

Protocol Summary

Under Section 8006 of the Consolidated Appropriations Act, 2018, CDC/ATSDR was required to conduct statistically based biomonitoring exposure assessments (EAs) at "no less than eight current or former domestic military installations" that have or have had documented exposures to per- and polyfluoroalkyl substances (PFAS) in drinking water.

The intention of the EAs was to determine how exposure to PFAS in drinking water in communities near the military installations may have impacted levels of PFAS in serum and urine. In addition to serum and urine testing, tap water and indoor dust were also sampled in a subset of homes.

Exposure to PFAS can result from exposure to both drinking water and non-drinking water sources. Although there is information indicating additional sources of exposure to PFAS, information on the contribution of these sources to PFAS body burden levels is sparse. CDC/ATSDR and EPA are conducting this environmental sampling exposure investigation (EI) to identify potential non-drinking water contributors to PFAS body burdens.

This protocol describes an environmental sampling Exposure Investigation (EI) that will include sampling environmental media at the homes of a sub-set of participants from two EA communities. CDC/ATSDR will evaluate potential exposure inside the home by collecting samples that include indoor air, indoor dust (filtered through a vacuum and obtained as a bulk sample), and wet wipes for evaluating potential PFAS-containing product use. CDC/ATSDR will also evaluate potential exposure to PFAS via outdoor sources by sampling soil at residences and outdoor air within the community. In addition, a silicone wristband worn by some participants will be analyzed for PFAS to characterize PFAS exposure during daily activities. Samples of locally grown produce will be analyzed to evaluate dietary exposure to PFAS.

A questionnaire will be administered to all EA participants present in the home during the sampling to gather information about potential drinking water and non-drinking water PFAS exposure, such as use of household consumer products and the intake of food products that may contain PFAS. The results of the environmental sampling EI questionnaire will be evaluated in conjunction with the questionnaire administered during the EA.

A consent form will be required to conduct the environmental sampling and a consent/parental permission/assent form will be required to administer the EI questionnaire.

EAs were completed at eight locations throughout the United States. Two locations were chosen for inclusion in this investigation: Hampton County, MA and New Castle County, DE.

The goals of this environmental sampling EI are to evaluate:

- Whether PFAS are detectable in various non-drinking water environmental media;
- What the detectable levels of PFAS in environmental media are; and

- Whether these detectable levels of PFAS may be associated with the existing measured body burden levels of PFAS identified during the EA.

Introduction

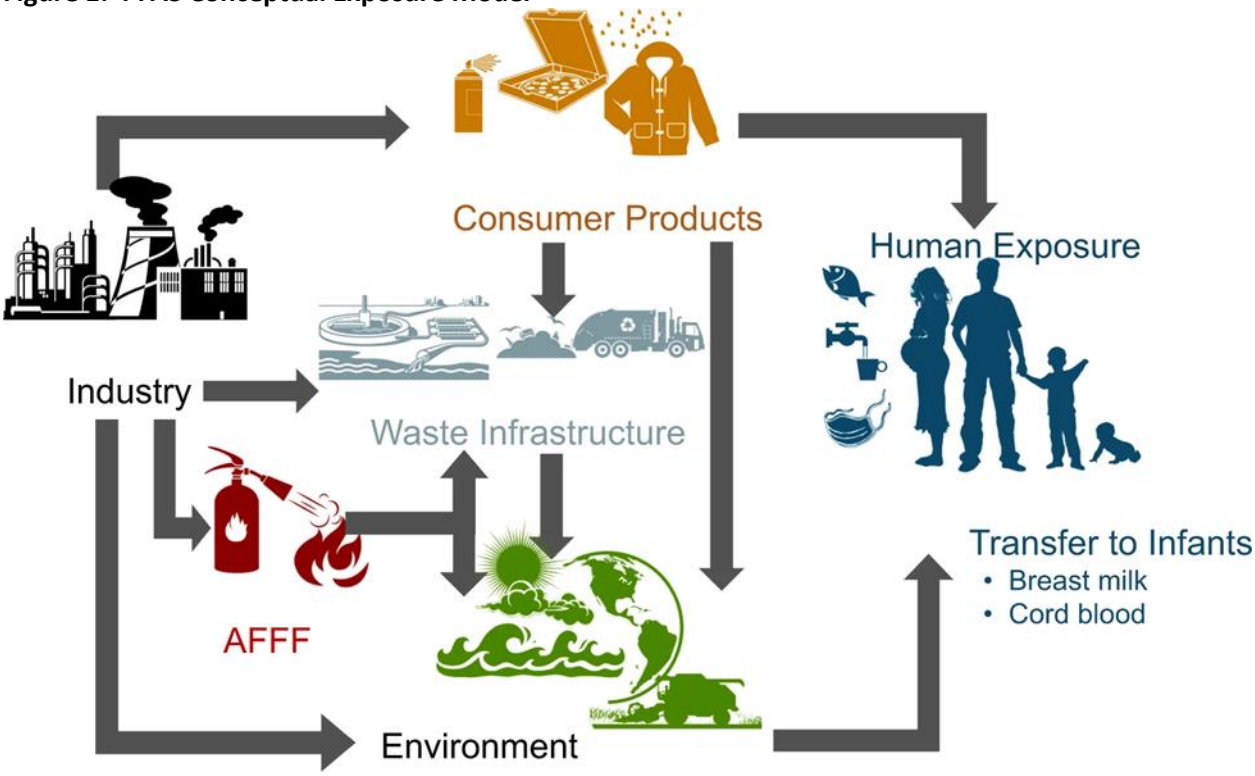
CDC/ATSDR's Office of Community Health and Hazard Assessment (OCHAA) conducts Exposure Investigations (EIs) when data gaps are identified at a site. CDC/ATSDR fills the data gaps by conducting biological and/or environmental sampling, with the results of the sampling allowing CDC/ATSDR to make better public health decisions.

In 2018, CDC/ATSDR was required to conduct no less than eight Exposure Assessments (EAs) in communities near military installations to evaluate the potential impacts on per-and polyfluoroalkyl substances (PFAS) body burden resulting from drinking water exposure [drinking water sources in the area exceeded EPA's health advisory of 70 ppt (combined PFOA and PFOS) in the past]. The PFAS EAs are essentially EIs since they were intended to fill a data gap (e.g., PFAS in blood and urine resulting from drinking water exposure) and are considered to be non-research investigations. Given that random sampling was conducted at most of the EA locations (some sampling areas were small and everyone in the sampling area was welcome to participate), the results can be generalized to the sampling area. Sampling of tap water and indoor dust was also conducted at a subset of EA households.

The PFAS EA biological data were compared to nationally representative data, specifically, to data collected by CDC as part of its National Health and Nutrition Examination Survey (NHANES). This survey collects blood and urine samples and tests them for chemicals, including PFAS, from a representative sample of the civilian non-institutionalized U.S. population. PFAS levels in blood reported by NHANES indicate that PFAS are found in the blood of virtually all Americans (PFAS in the US population | ATSDR (cdc.gov). Serum PFAS levels at all EA locations, including MA and DE, were higher than NHANES levels for several PFAS, primarily PFHxS, PFOS and/or PFOA [ATSDR 2021: PFAS Exposure Assessment Site Locations | ATSDR (cdc.gov)].

PFAS have been used in many consumer products, including stain-, water- and grease-resistant products and materials treated with these products are used in everyday life. Figure 1 provides a Conceptual Exposure Model indicating how PFAS may be present in the environment as a result of anthropogenic sources (e.g., PFAS manufacturing, use of firefighting foam, incinerators), as well as the general use of PFAS-containing consumer products.

Figure 1: PFAS Conceptual Exposure Model



Note: AFFF = Aqueous Film Forming Foam

The goals of this environmental sampling EI are to evaluate:

- Whether PFAS are detectable in various non-drinking water environmental media;
- What the detectable levels of PFAS are in environmental media; and
- Whether these detectable levels of PFAS may be associated with the existing measured body burdens of PFAS.

The serum results from the EA and the environmental sampling EI results will be interpreted using the results of the questionnaires from the EA as well as the EI to better understand water and non-drinking water exposures at two of the EA sites. Urine collected during the EA were only analyzed for a small number of participants (10%) and only one PFAS (PFBA) was detected at both MA and DE. The mean level of PFBA in urine at both locations was below the 95th percentile of NHANES for PFBA in urine. The data set for urine, therefore, is not considered to be robust enough for analysis in this environmental sampling EI.

The results of this environmental sampling EI may help individual participants better understand the magnitude of their non-drinking water environmental exposures to PFAS.

Procedures and Methods

Indoor and Outdoor PFAS sample collection

Given the widespread use of PFAS and their persistence in the environment, it is anticipated that PFAS associated with the use of household consumer products may be present both inside and outside the home and be available for exposure to residents. These potential exposures may be evaluated by sampling dust, indoor air and surface wipes. PFAS may be present in outdoor media, including soil and outdoor air, as a result of industrial and consumer use of products that contain PFAS and the use of PFAS-contaminated water outside the home (e.g, use of outside hose to water lawn). In addition, silicone wristbands worn by residents for a 7-day period of time may assess potential exposure of residents as they navigate their day, both inside and outside their home. Potential exposure in the diet may, in part, be evaluated by sampling locally grown produce. Potential exposure to PFAS by EA participants will also be evaluated using a questionnaire that will supplement the questionnaire completed during the EAs.

Sampling Locations

The primary criteria used to identify EA locations was the presence of PFAS in drinking water at levels above the EPA health advisory (i.e., 70 ppt for combined PFOA and PFOS) in the past. Water systems impacted by PFAS were remediated to levels below the health advisory in 2016 in MA and between 2014 and 2016 (dependent on the water system) in DE. The focus of the EAs was to evaluate the body burden of PFAS (serum and urine) in people known to be exposed to PFAS in their drinking water. This environmental sampling EI is focused on evaluating non-drinking water sources of PFAS exposure at two of the EA locations (see location selection discussion below) that were chosen using the following criteria:

- The number of participants at the location,
- The engagement of the participants within the community, to assist with reaching our recruitment goals,
- The level of PFAS found in the drinking water, and
- The presence of potential non-drinking water PFAS sources within the community, such as industrial sources in the area.

Hampden County, MA

The Hampden County, MA (MA) location was chosen because it has a large number of households that were included in the EA (247 households); it has an engaged community that has high interest in PFAS; and the levels of PFAS found in drinking water are moderate, indicating that non-drinking water sources may be more significant contributors to PFAS body burden than in communities with high levels of PFAS

in their drinking water. In the Hampden County area, significant industry associated with PFAS use or manufacturing has not been identified using Global Information System (GIS) tools provided by EPA and CDC/ATSDR.

New Castle County, DE

The New Castle County, DE (DE) location (134 households) was chosen because the levels of PFAS in serum were elevated and were associated with elevated levels of PFAS in the drinking water. In addition, there are potential industrial sources of PFAS within the community that may be a source of PFAS exposure. In the New Castle County area, an increased number of industrial sources have been identified using Global Information System (GIS) tools provided by EPA and CDC/ATSDR, as compared to the Hampden County location. Therefore, it is anticipated that outdoor sources of PFAS, including outdoor air and soil, may be of greater concern for potential PFAS exposure than in the MA site.

Environmental Sampling Eligibility and Recruitment

Two EA locations, New Castle County, DE and Hampden County, MA, were chosen for the additional environmental sampling. An "invitation to participate" letter will be sent to the households of all EA participants that agreed in the EA consent form to be contacted for future PFAS work at both locations: 247 households in MA and 134 households in DE. The letter and other recruitment materials are provided in Appendix A. CDC/ATSDR will request that EA participants contact us to make an appointment once the invitation letter is received.

CDC/ATSDR estimates a response rate of approximately 30% for this EI. For the EAs in MA, the response rate was approximately 8% (3000 household requests and 247 homes enrolled) and in DE, the response rate was approximately 4.5% (3000 requests and 134 homes enrolled). There were, however, many addresses that were not valid (e.g, invalid address, empty homes, commercial properties) and homes that were interested in participating but were not eligible due to time of residency (participants had to be living in the sampling frame for at least a year prior to water mitigation). Given that the households we did enroll reflect an interested portion of the population, we are estimating a response rate of approximately 30% for this investigation.

CDC/ATSDR will collect a filtered dust sample and administer questionnaires at a maximum of 80 households in MA and 40 households in DE, which represent approximately 30% of EA households in each community. If more than the proposed maximum of households are interested in being included in the EI, the participants will be chosen based on a first-come-first-serve basis; this is indicated in the invitation letter. If fewer than the proposed maximum number of households respond to the invitation letter, EA participants that have not responded will be randomly selected and contacted by phone to invite them to participate.

A subset of 20 households at each location will be chosen to participate in a more robust sampling effort (bulk dust, indoor air, wet wipes, soil, silicone wristband) in addition to the filtered dust sample and

questionnaire. The 20 households to be scheduled for the additional sampling will be chosen on a first-come first-serve basis during the recruitment period. When a participant calls to be included in the sampling, they will be offered the additional sampling, and the first 20 households to agree will be asked questions to ensure that all additional media can be collected (Appendix A).

If the participant answers "no" to any of the questions regarding the more robust sample collection, they are still eligible to complete the one-appointment dust sampling. CDC/ATSDR will continue to offer the more robust sample collection to participants who call until 20 households are identified at each location. After the 20 households are chosen, the rest of the participants will only be offered dust sampling in their homes. The number and type of each environmental sample to be collected in the participants' households is described below.

All participating households will receive a follow-up letter confirming their participation and sampling appointments, and a reminder phone call prior to their appointments (Appendix A). Appropriate consent forms (Appendix B) and questionnaires (Appendix C) will be provided with the confirmation letter to allow participants to complete the forms prior to the sampling appointment. This will provide time for all EA participants in the home to complete the appropriate forms so they do not need to be present during the sampling.

CDC/ATSDR will provide all participants with a $20 gift card per household per appointment as a token of appreciation for their participation; a total of $40 will be provided to the subset of 20 households where two appointments are required to complete the sampling. The additional amount for the two-appointment households is also intended to cover any additional charge the participant may incur resulting from the use of their electricity during the indoor air sampling. Participants will be provided the gift card(s) at each appointment.

Sample Collection Procedures

Informed Consent/Parental Permission/Assent Forms

The consent/parental permission/assent forms completed during the EA included a provision that allows CDC/ATSDR to use the results of the EA sampling, both biological and environmental, along with the results of the EA questionnaire for future PFAS analysis. This information will be used along with the results of the environmental sampling EI questionnaire to evaluate potential non-drinking water exposure to PFAS. The consent/parental permission/assent forms signed as part of this environmental sampling EI will ask participants to again consent to the use of the EA results (Appendix B).

A Privacy Act Statement and appropriate consent/parental permission/assent forms are provided in Appendix B. When the sampling appointment is made, the number of EA participants that provided a blood sample during the EA, and who live in the home, will be identified. The appropriate number of consent/parental permission/assent forms and questionnaires for the household will be mailed with the appointment reminder letters. All EA participants in the household will be asked to complete the

consent forms and questionnaires prior to the first sampling appointment. When the EI team arrives for the sampling appointment, the consent forms and questionnaires will be verified and completed at the home if they are incomplete.

One adult resident in the EA household will sign a consent form to conduct the environmental sampling (either just dust sampling or the full suite of indoor and outdoor sampling) and for completion of both a household and personal exposure questionnaire (Appendix B2).

Additional adults in the household will only need to consent to complete the personal exposure questionnaire (Appendix B3) since the other adult in the household consented to the sampling and completion of the household questionnaire. For children younger than 18 years old, a parental permission form and assent form (for children between 12 and 17 years old) will be completed to allow them to complete the personal exposure questionnaire (Appendix B4 and B5).

Consent forms include the purpose of the assessment; procedures for sample collection; benefits and risks of participation; and contact information should participants have additional questions. All forms are written at an appropriate reading level. All signed consent forms will be secured by the CDC/ATSDR lead in the field and securely archived at CDC/ATSDR.

Questionnaire

Questionnaires and the appropriate consent forms will be mailed to participants' households with the appointment confirmation letter (Appendix C). This will provide time for all household participants to complete the questionnaire so they will not be required to be present in the home during the sampling. The questionnaires will be provided as follows:

- One adult EA participant of the home will be administered two questionnaires:
    - Household questionnaire (Appendix C1): includes questions regarding water use inside and outside the home and the use of water filters. It also includes questions about characteristics of the home, including square footage, the nature of flooring materials, the use of products in the home that may contain PFAS (stain-resistant, water-resistant and grease-resistant products), and indoor cleaning and outdoor watering practices. The household questionnaire applies to all people in the household and is only required to be completed by one person.
    - Personal questionnaire (Appendix C2): includes questions regarding personal exposure, such as personal water use, the time spent outdoors and dietary intake of locally grown produce and convenience food.

Completion of the questionnaires will be verified when the EI team comes to the home to complete the environmental sampling. The hard copy questionnaires will be collected by EI team members and kept secure. The questionnaire results will be recorded using the Epi Info suite of software tool when the sampling is completed. If clarification of any questionnaire answer is needed after the sampling has been completed, ATSDR may contact the participant by phone for clarification.

Sampling Strategy

Table 1 provides the number of total samples, including Quality Control (QC) samples, that will be taken during the Exposure Investigation to evaluate non-drinking water exposure. The table includes the total number of samples to be taken at the 80 homes in MA and the 40 homes in DE. Appendix D, the Sampling and Analysis Plan (SAP), provides detailed sample collection procedures and analysis methods to be used for each sampled medium.

To evaluate potential indoor sources of PFAS, a maximum of 120 households (80 in MA and 40 in DE) will be sampled for indoor dust using a vacuum and filter setup that was used to collect indoor dust during the EAs. From the 120 homes, a maximum of 40 homes (20 homes at each location) will be chosen for additional analysis to better evaluate both indoor (indoor air, bulk dust, surface wipes) and outdoor (soil) sources of PFAS. The bulk dust sample will be taken from the participant's vacuum cleaner (bagged or bagless) during the first visit to the home. In addition, one adult in each of the 20 households will be provided two to three silicone wristbands to evaluate personal exposure to PFAS while the participant is within or away from home. The wristbands will be provided to the person that signed the environmental sampling consent form.

To evaluate potential community exposure to PFAS, a maximum of three samples of outdoor air at each location will be taken at a central location within the community that is not associated with an EA household. Up to two simultaneous, 7-day samples will be taken using the same methodology used to evaluate indoor air, to allow for comparison. In addition, another 7-day sample may be taken at the outdoor sampling location using a higher capacity pump to allow for lower detection limits.

Finally, 21 samples of locally grown produce at each location, obtained from local markets and grocery store, will be sampled to evaluate the presence of PFAS in up to 7 types of produce; the team will attempt to gather 3 samples of each type of produce.

In addition to a standard set of PFAS, the analysis will include evaluation of three additional sets of PFAS analytes (FTOH, TOF and TOP – see below) that will assist in evaluating fluorotelomer alcohols and PFAS precursors or breakdown products to provide a more complete evaluation of PFAS exposure. These PFAS analyses are considered to be exploratory, and the goal is to evaluate the presence or absence of a range of PFAS and their concentrations in several exposure media. The analyses for which sample numbers are provided in Table 1 include:

- PFAS – provides a list of PFAS that the laboratory is able to evaluate; the list will vary depending on the medium to be sampled
- Fluorotelomer Alcohols (FTOH) - provides an evaluation of a set of PFAS, which may also be precursors for other PFAS
- Total Organic Fluorine (TOF) - provides the total organic fluorine content of the sample
- Total Oxidizable Precursor (TOP) - provides an evaluation of PFAS precursors (completed for bulk dust samples only)

Quality Control (QC) samples to be taken include duplicates, triplicates, or split samples, where appropriate, and field blanks and control samples. The field control samples are samples that are provided by the laboratory and contain a known amount of PFAS to evaluate analyte recovery.

Sample collection teams will likely include personnel from both CDC/ATSDR and EPA. Each team will include at least one CDC/ATSDR staff member who will be responsible for the privacy and security of the consent forms and the questionnaires.

Table 1: Media and Sample Number: Environmental Exposure Investigation at EA Locations (Combined)

Media	Household Numbers ¥	PFAS Sample	PFAS Dup	PFAS FB	PFAS FC	FTOH Sample	FTOH Dup	FTOH FB	FTOH FC	TOF Sample	TOF Dup	TOF FB	TOP Sample	TOP Dup	TOP FB
Indoor dust (filter)	120	120	12	0	0	60	6	0	0	60	6	0	0	0	0
Indoor air	40	40	6	6	6	10	3	3	3	0	0	0	0	0	0
Outdoor air	--	6	3	3	0	6	3	3	0	0	0	0	0	0	0
Indoor dust (bulk)	40	40	6†	0	10*	40	6†	0	0	40	6†	0	40	6	0
Surface wipes	40	80	8	8	8	40	6	6	6	40	6	6	0	0	0
Soil	40	40	16 ǂ	0	0	20	8 ǂ	0	0	20	8 ǂ	0	0	0	0
Silicone Wristbands	40	40	6§	6	0	20	3§	3	0	20	3§	3	0	0	0
Produce	--	42	14†	0	0	42	14†	0	0	42	14†	0	0	0	0
TOTAL	--	408	71	23	24	238	49	15	9	222	43	9	40	6	0

¥ A total of 80 homes will be sampled in MA and 40 in DE. 20 homes at each location will be sampled for filtered dust and all other media
Dup = Duplicate; FB = Field Blank; FC = Field Control
*Lab will purchase 10g of NIST SRM 2585 to prepare 10 field controls for PFAS in the bulk dust sample
** two wipe samples will be taken at each of the 20 homes at each location
† split sample and not a duplicate for bulk dust and produce samples
ǂ triplicate analysis for incremental sampling protocol
§ if only a portion of the wristband is used for the analyses, the laboratory will extract a second portion of the wristband as a duplicate sample

Data Quality Indicator goals for precision, accuracy and completeness are provided in Table 2.

Table 2. Target Quantitative Data Quality Indicators[a]

Metric	Precision	Accuracy	% Completeness-Collection	% Completeness-Analysis
PFAS (per- and polyfluoroalkyl substances)	± 25%	70 – 130%	90	95

FTOH (fluorotelomer alcohols)	± 25%	70 – 130%	90	95
TOF (total organic fluorine)	± 25%	N/A[b]	90	95
TOP[c] (total oxidizable preccursors)	± 25%	N/A[b]	90	95

[a]Collection completeness is based on the number of samples attempted for collection and analysis. Since the investigation design is not intended to be representative or generalizable, completeness is not based on the overall design goals for numbers of participants.
[b]Not applicable; no standards available for spike preparation.
[c]Total oxidizable precursor analyses scheduled only for bulk dust samples.

The following sections provide a brief overview of the sampling and analysis process for each medium; further details are in the Sampling and Analysis Plan (SAP) in Appendix D. The Health and Safety Plan for completion of the environmental sampling EI is included in Appendix E.

Indoor Exposure

In addition to exposure to PFAS in the drinking water, indoor exposure to PFAS may include exposure to indoor air, dust, and surface residue.

Measurements of indoor air may provide an indication of airborne PFAS that may be attached to particulates (dust) as well as some species that may be more volatile and be present in the vapor phase. Measurements of household dust may act (to some extent) as a proxy for the presence of the analytes in products used in the household and as a descriptor of direct exposures (dust ingestion). The evaluation of all these media is exploratory with a primary goal of assessing presence/absence and concentrations in indoor media and may also yield information about how levels of PFAS in indoor media are correlated with PFAS serum concentrations.

Indoor dust and residue

Indoor dust and residue resulting from the use of PFAS-containing products within the home will be evaluated using three different collection methods:

- Filtered composite sample using the same method used for the PFAS EAs, with a sample being collected at all participants' homes (80 in MA and 40 in DE);
- Bulk sample from a vacuum cleaner (bagged or bagless) to provide a larger sample to allow for a more robust evaluation (20 households in both locations); and
- Wipe samples within the home to evaluate dust as well as residues that may result from the use of PFAS-related products. Two wet wipe samples will be collected at each home (20 households

in each location) on surfaces that may be associated with residue or dust build-up. One sample will be taken on the kitchen counter (to assess PFAS from food preparation and the use of cleaning and sealant products) and one will be taken in a closet/mud room area (to assess the presence of PFAS from clothing).

All samples will be provided to the laboratory and analyzed in accordance to procedures and methods provided in Appendix D.

Indoor air

Twenty homes at each location will be evaluated for PFAS in indoor air. An integrated indoor air sample will be collected from the main living space of the home over a course of 7 days. CDC/ATSDR personnel or their contractors will set up the indoor air collection apparatus at an initial appointment and will collect it at a second appointment 7 days later.

The air samples will be collected on filters attached to a pump that operates at approximately 4-5 liters/minute to allow for maximum collection potential with a minimum level of noise for as little disruption to the household as possible. The sample and all appropriate QC samples will be sent to the laboratory for analysis for constituents provided in Appendix D.

Outdoor Exposure - Soil

CDC/ATSDR will collect surface soil samples at 20 households at each environmental sampling EI location using an incremental sampling methodology (ISM) approach. This sampling method involves collecting and combining many equal mass increments of soil (i.e., increment samples) across a specific area or volume of soil (e.g., an exposure unit) into a single representative sample for laboratory analysis (i.e., bulk ISM sample). The combined sample is sieved and ground to obtain a consistent particle size and then subsampled and processed by the laboratory following specific protocols. Due to the sampling density afforded by collecting many increments, ISM samples can provide more precise and representative estimates of an exposure unit's average contaminant concentrations than other soil sampling approaches.

All samples will be provided to the laboratory and analyzed in accordance with procedures and methods provided in Appendix D.

Outdoor Exposure - Air

Up to 3 samples of outdoor air will be taken in a centralized location within the EA sampling frame in both MA and DE. The same sampling apparatus used to collect the indoor air samples will be used to collect up to two 7-day outdoor air samples. Separate air samples will be collected at each time for the standard PFAS and for the FTOH PFAS. The use of the same sampling method will allow for comparison to the results of the indoor samples (4-5 liters/min pump). An additional outdoor sample will also be taken using a higher volume pump (10-20 liters/min) to achieve lower detection limits for PFAS. The

sample and all appropriate QC samples will be sent to the laboratory for analysis for constituents provided in Appendix D.

Personal and Dietary Exposure

Silicone Wristbands

In 20 households at each sampling location, one adult from each household will be asked to wear silicone wristbands to evaluate personal exposure to PFAS both within the home and outside the home. The person will wear either 2 or 3 wristbands, to allow for FTOH, TOF or QC samples, for a period of 7 days. The participant will remove the wristbands when showering, bathing or swimming. The sample and all appropriate QC samples will be sent to the laboratory for analysis for constituents provided in Appendix D.

Homegrown/local produce

Produce samples will be collected from markets throughout each EA sampling frames. Venues selling locally grown produce will be identified before the sampling campaign begins. Local contacts and various organizations can help to identify local food and farm resources (e.g., https://www.localfoodma.org/). The sampling team will identify "local" produce based on labeling in the markets or knowledge of suppliers to community-based farmers' markets. To the extent possible, sampling will target produce grown in the community itself. The goal is to obtain 3 samples of 7 different types of produce at each EA location. The type of produce will be chosen based on availability. The sample and all appropriate QC samples will be sent to the laboratory for analysis for constituents provided in Appendix D.

Limitations of the Exposure Investigation

Although the environmental PFAS sampling may assist participants in better understanding their PFAS exposure, the results will not provide discrete information about all sources of exposure, such as PFAS-contaminated food. Additionally, it is not possible to identify every potential confounding exposure (e.g, age, sex, time of residence). CDC/ATSDR will take this limitation into account when drawing conclusions.

The results of this investigation may generate new hypotheses about which potential PFAS exposure pathways may exist in these communities.

The results will not be generalizable to either EA participants in the community that were not included in the environmental sampling EI or to non-EA residents within the sampling frame. The EI is intended to allow a better understanding of PFAS exposure within each household tested.

Intended/Potential Use of Exposure Investigation Findings

Household environmental sampling results will be provided to each participant following laboratory analysis and quality assurance procedures. For the EAs, tap water was sampled, and the results were compared to federal and applicable state guidelines for PFAS in drinking water. Federal and state regulations or guidelines are not available for PFAS in any of the media that will be sampled. Therefore, the results of the sampling can only be used to evaluate the presence or absence, and if detected, to identify the amount of PFAS that may be present in each of the sampled media. CDC/ATSDR Minimal Risk Levels (MRLs) are available for four PFAS (i.e., PFOA, PFOS, PFNA, PFHxS) and may be used to screen data in soil. Data screening will allow ATSDR to evaluate whether the levels of the four PFAS in soil may be associated with potential health effects. Screening levels are only available for four PFAS, however, so there is uncertainty associated with potential health effects associated with other PFAS.

The results of the serum testing available from the EAs will be evaluated using the results of the environmental sampling EI and the questionnaire results from the EAs along with this EI. The results and conclusions from the environmental sampling EI will be released as a report for the general public as soon as possible, and findings will be submitted for publication in the peer-reviewed scientific literature.

Anticipated Risks and Benefits and Estimated Time Burden on Participants

Participating in the environmental sampling EI will provide participants with information about levels of PFAS in their home. The results of the environmental sampling and the questionnaire will be used to better interpret serum results from the EA. As with the EA, CDC/ATSDR will not be able to determine whether the levels of PFAS found in media in and outside the home may result in adverse effects.

Participating in this investigation does not have anticipated risk other than the time it will take people to participate. The total time it will take participants to read through and sign the consent form, respond to the questionnaire, and complete the sampling will vary based on the number of samples that will be collected at each household. It is expected that the burden on the homeowner will vary between 1 hour at a single appointment for those homes where only a dust sample is collected, to 4 hours over 2 appointments (2 hours each) for those homes with the more robust sampling collection.

At the time of sampling, all appropriate COVID-19 precautions will be taken as indicated by current CDC guidance: https://www.cdc.gov/covid/index.html. All CDC/ATSDR and EPA personnel that will be conducting the sampling in participant's homes will be fully vaccinated for COVID-19. At a minimum, all EI team members will be monitored twice daily for elevated temperature and a symptom check and will wear a surgical mask and wear gloves when sampling inside the home of an EA participant. Additional PPE will be identified in the field, as appropriate, based on current CDC guidance at the time of sampling.

Given that the analysis of PFAS in the collected environmental samples is still exploratory, only the presence or absence of PFAS, and, if detected, the nature of the PFAS in samples will result from the sampling. There are no regulatory or health standards available in any of the sampled media that would allow for a comparison. CDC/ATSDR Minimal Risk Levels (MRLs) are available for four PFAS (i.e., PFOA, PFOS, PFNA, PFHxS) and may be used to screen data in soil. Participants will be informed that their participation in this EI will help advance the understanding of PFAS exposure.

All sample collection and analysis are provided at no cost to participants.

Privacy Protections

Personal privacy will be protected to the fullest extent possible by applicable federal and state laws and regulations. For the data sets collected at both sites, the HIPAA Safe Harbor de-identification method will be applied to extract specific personally identifiable information (PII) and store them separately from other information. All documents with PII (i.e., consent forms, collection logs, etc.) will be kept in locked cabinets, and all electronic data will be stored on password-protected network servers behind firewalls, accessible only to those staff working directly with raw data. Coded environmental samples will be sent to the laboratories—no PII will be included. Any reports produced from this information will not identify specific individuals.

Records will be retained and disposed of in accordance with the CDC/ATSDR Records Control Schedule. Physical copies of assessment materials and reports will be maintained at CDC/ATSDR until no longer needed by program officials and will be kept in accordance with the corresponding retention schedules. Computer documents will be disposed of when no longer needed by program officials. Personal identifiers will be deleted from records when no longer needed and will be retained no longer than five years. Disposal methods will include erasing computer files, shredding paper materials, or transferring records to the Federal Records Center when no longer needed for evaluation and analysis. Records are retained for 20 years.

In compliance with federal and state privacy protection laws and regulations, and as indicated in the consent form, the limited data set may be shared with other federal, state and/or local public health and environmental agencies via data use agreements for research purposes to advance the scientific understanding of human exposures to PFAS. These agencies must also protect this private information.

Each state health department will act in compliance with their respective Sunshine Laws, which may impact the potential for information sharing.

Environmental Data Handling and Evaluation

Data Handling

All environmental samples, data quality assurance and data quality control will be performed by the identified laboratory in accordance with laboratory methods capable of quantifying PFAS in all sampled media since no EPA methods are available in the sampled media (see the SAP in Appendix D).

Questionnaire data will be collected using the Epi Info software tool and will be kept in a secure and encrypted electronic database.

All data will be transmitted via secure connections and methods to CDC/ATSDR for incorporation into a centralized data management repository protected by CDC/ATSDR network firewall and additional security access controls. All results will be electronically transmitted in spreadsheet format using a secured and password-protected network. Deidentified data will be transmitted to the US EPA Office of Research and Development (ORD) through a secured directory to allow for access by EPA.

Data Evaluation

Descriptive statistics (mean or geometric mean, median, interquartile range, percentiles, minimum, maximum, % detected, etc.) will be prepared for each medium-analyte combination, as appropriate. Consistent with the procedures used to analyze the CDC/ATSDR PFAS Exposure Assessments, categorical responses with <10 values will be collapsed with other categorical responses. To meet the investigation objectives, we will perform several statistical analysis procedures (**Table** 3).

Table 3: Investigation Objective Statistical Methodology

Objective	Statistical Methodology
Identify the presence/concentrations of PFAS in indoor and outdoor residential environmental media and estimate media and route specific intake doses, as appropriate.	We will generally follow procedures consistent with CDC/ATSDR's exposure point concentration guidance document (ATSDR 2019) that describes the agency's approach to handling of censoring and calculating summary values (in this case, median and interquartile range values), and confidence limits on these values. We will modify the procedures in the guidance to calculate two – sided, 95% confidence limits using percentile bootstraps. If censoring is present in the data, we will be following the CDC/ATSDR guidance and Helsel, 2011. If multiple observations are collected per household (e.g. dust

	microvacuum samples) they will be averaged by household prior to calculating summary statistics.
Evaluate association between sources of PFAS, their presence in environmental media, and exposure.	We have prepared a questionnaire (Appendix C) that relates several sources of PFAS to either environmental concentrations of PFAS in differing environmental media. Categorical questions with dichotomous responses will be evaluated for the effect on PFAS environmental media concentrations using two-sample Wilcoxon; Mann-Whitney (WRS) test. For instance, for question 16 in Appendix C1 (If you have carpet or rugs in your home, have you ever treated that carpet/rug with stain-resistant products?) , we will perform WRS to test the null hypothesis that the PFAS dust levels are the same in these homes. Source questions with multiple categories will be evaluated with Kruskal-Wallis one-way analysis of variance, followed by pairwise comparisons using Dunn's multiple comparisons with Benjamini and Hochberg as outlined in Helsel, Hirsch, Ryberge, Archfield and Gilroy 2020. The Dunn's multiple contrast may be performed as a many – to – one comparison or all – pairs comparisons. For instance, question 23 in Appendix C1 (How often do you dust or wipe down surfaces in your home, including windowsills?), we will test the null hypothesis that PFAS in dust in households with higher cleaning categories are lower than the lowest category ("Never") using the Kruskal Wallis followed by Dunn's one – to – many multiple contrast test. For questions such as Appendix C1 question 25, "Have you or do you currently use or have any of the following products in your home?" we will evaluate the null hypothesis of PFAS concentrations in household dust is the same across all usage levels for each product using the Dunn's one – to – many multiple contrast test. Since there may be additive combinations of consumer product usage, we will use hierarchical clustering to look at combinations of consumer product usage and their effect on PFAS media levels. We will compare PFAS environmental media concentrations across these groups using Kruskal Wallis followed by Dunn's test with all – pairs comparisons to identify if a cluster of consumer product usage is higher or lower than the others.

Use media specific concentration measurements to estimate media and route specific intakes; and compare estimated intake doses to measured serum levels.	We will estimate route specific and media specific intake rates of PFAS. The total and route and media specific intake rates will be compared with serum measurements of PFAS from the Exposure Assessments. Because there is a high probability of censoring in both the dependent and the independent measurements, we will test the null hypothesis that there is no monotonic relationship between estimated intakes and serum PFAS using Kendall's tau and the Akritas-Theil-Sen (ATS) line (Akritas, 1995, Helsel 2011). For univariate and multiple regression analysis of the relationship of PFAS serum to the demographics, survey questions, and estimated exposure intake, we will use the R package "survey" (Lumley 2010) to account for household clustering (since there may be multiple observations of serum PFAS per household). For multivariate analysis, variable selection will follow backward stepwise procedures. To be consistent with the CDC/ATSDR Exposure Assessment, we will substitute nondetect values with the square root of two and use the log transformation to reduce the skew of the data. We will regress geometric means for PFAS with 60% or more detection rates.

Anticipated Products

Household sampling results will be provided electronically or by mail to the participants (Appendix F). Following dissemination of individual results, an environmental sampling EI team member will be available to discuss individual questions by phone or email.

At the conclusion of the environmental sampling EI, a report will summarize the overall aggregate findings and conclusions of the investigation but will not reveal personal identifiers. If warranted, recommendations for additional actions such as continued monitoring, educational activities, or interventions to reduce exposure will be made. Findings from the environmental sampling EIs will be summarized in a final report and in manuscript(s) submitted for publication in the peer-reviewed scientific literature.

References

References are cited in the Sampling and Analysis Plan in Appendix D

Akritas, M.G., Murphy, S.A., LaValley, M.P., 1995. The Theil-Sen Estimator With Doubly Censored Data and Applications to Astronomy. Journal of the American Statistical Association 90, 170–177. https://doi.org/10.2307/2291140

Agency for Toxic Substances and Disease Registry [ATSDR]. 2019. Exposure Point Concentration Guidance for Discrete Sampling. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, July 12.

Agency for Toxic Substances and Disease Registry [ATSDR]. 2021. PFAS Exposure Assessment Site Locations [PFAS Exposure Assessment Site Locations | ATSDR (cdc.gov)].

Agency for Toxic Substances and Disease Registry [ATSDR]. 2021. PFAS in the U.S. Population [PFAS in the US population | ATSDR (cdc.gov)].

Benjamini, Y., and Hochberg, Y. (1995). Controlling the false discovery rate: a practical and powerful approach to multiple testing. Journal of the Royal Statistical Society Series B, 57, 289–300. doi: 10.1111/j.2517-6161.1995.tb02031.x. https://www.jstor.org/stable/2346101.

Bizkarguenaga E. Zabeleta I, Mijangos L, Iparraguirre A, Ferdandez LA, Prieto A, Zuloaga O. 2016. Uptake of perfluorooctanoic acid, perfluorooctane sulfonate and perfluorooctane sulfonamide by carrot and lettuce from compost amended soil. Science of the Total Environment. 571: 444-451.

Blaine AC, Rich CD, Sedlacko EM, Hundal LS, Kumar K, Lau C, Mills MA, Harris KM, Higgins CP. 2014. Perfluoroalkyl acid distribution in various plant compartments of edible crops grown in biosolids-amended soils. Environmental Science and Technology. 48(14): 7858-7865.

Felizeter S, McLachlan MS, deVoogt P. 2012. Uptake of perfluorinated alkyl acids by hydroponically grown lettuce (Lactuca sativa). Environmental Science and Technology. 46(21): 11735-11743

Genualdi, Susan & Beekman, Jessica & Carlos, Katherine & Fisher, Christine & Young, Wendy & Dejager, Lowri & Begley, Timothy. (2021). Analysis of per- and poly-fluoroalkyl substances (PFAS) in processed foods from FDA's Total Diet Study. Analytical and Bioanalytical Chemistry. 414. 10.1007/s00216-021-03610-2.

Ghisi R, Vamerali T, Manzetti S. 2019. Accumulation of perfluorinated alkyl substances (PFAS) in agricultural plants: A review. Environ Res. 169: 326-341

Helsel D. 2011. Statistics for Censored Environmental Data using Minitab and R, second Edition. Hoboken, NJ: John Wiley and Sons.

Helsel, D.R., Hirsch, R.M., Ryberg, K.R., Archfield, S.A., and Gilroy, E.J., 2020, Statistical methods in water resources: U.S. Geological Survey Techniques and Methods, book 4, chapter A3, 458 p., https://doi.org/10.3133/tm4a3. [Supersedes USGS Techniques of Water-Resources Investigations, book 4, chapter A3, version 1.1.]

HUD. n.d. Wipe Sample of Settled Dust for Lead Determination. https://www.hud.gov/sites/documents/LBPH-40.PDF

Interstate Technology Regulatory Council [ITRC]. 2018. Site Characterization Considerations, Sampling Precautions, and Laboratory Analytical Methods for Per- and Polyfluoroalkyl Substances (PFAS).

Interstate Technology Regulatory Council [ITRC]. 2020. Incremental Sampling Methodology Update. https://ism-2.itrcweb.org/

Lechner M, Knapp H. 2011. Carryover of Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) from soil to plant and distribution to the different plant compartments studied in cultures of carrots (Daucus carota ssp. Sativus), potatoes (Solanum tuberosum), and cucumbers (Cucumis Sativus). Journal of Agricultural and Food Chemistry. 59(20): 11011-11018.

Levasseur JL, Hammel SC, Hoffman K, Phillips AL, Zhang S, Ye X, Calafat AC, Webster TF, Stapleton HM. 2021. Young children's exposure to phenols in the home: Associations between house dust, hand wipes, silicone wristbands, and urinary biomarkers. Environment International (147). https://doi.org/10.1016/j.envint.2020.106317

Liu Z, Lu Y, Song X, Jones K, Sweetman AJ. Johnson AC, Zhang M, Lu X, Su C. 2019. Multiple crop bioaccumulation and human exposure of perfluoroalkyl substances around a mega fluorochemical industrial park, China: Implication for planting optimization and food safety. Environ Int. 127: 671-684

Minnesota Department of Health [MDH]. 2010. House Dust Field Sampling Protocol for Perfluorochemical (PFC) Analysis.

National Children's Study. n.d. Environmental Vacuum Bag Dust Technician Collect SOP V1.0.

National Institute of Environmental Health Sciences. 2016. Perfluorinated Chemicals (PFCs). National Institutes of Health, Research Triangle Park, NC.

Navarro I, de la Torre A, Sanz P, Porcel MÁ, Pro J, Carbonell G, de los Angeles Martínez M. 2017. Uptake of perfluoroalkyl substances and halogenated flame retardants by crop plants grown in biosolids-amended soils. Environmental Research. 152: 199-206.

Roth J, Abusallout I, Hill T, Holton C, Thapa U, Hanigan D. 2020. Release of volatile per- and polyfluoroalkyl substances from aqueous film-forming foam. Environ. Sci. Technol. Lett. 7:164−170. https://pubs.acs.org/doi/suppl/10.1021/acs.estlett.0c00052/suppl_file/ez0c00052_si_001.pdf

Scher, D.P., Kelly, J.E., Huset, C.A., Barry, K.M., Hoffbeck, R.W., Yingling, V.L., and Messing, R.B. (2018) Occurrence of perfluoroalkyl substances (PFAS) in garden produce at homes with a history of PFAS-contaminated drinking water. Chemosphere. 196: 548-555

T. Lumley (2010) Complex Surveys: A Guide to Analysis Using R. John Wiley and Sons. Hoboken, NJ: John Wiley and Sons.

U.S. Environmental Protection Agency [EPA]. 2017. Field Collection Standard Operating Procedures (SOPs) for an EPA Pilot Study Evaluating Personal, Housing, and Community Factors Influencing Children's Potential Exposures to Indoor Contaminants at Various Lifestages (EPA Pilot Study Add-On to the Green Housing Study). [SOP for Collection of Indoor Air Samples using Active Samplers]. Office of Research and Development.
https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=335764&Lab=NERL

Wen, B., Wu, Y., Zhang, H., Liu, Y., Hu, X., Huang, H., and Zhang, S. (2016) The roles of protein and lipid in the accumulation and distribution of perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA) in plants grown in biosolids-amended soils. Environmental Pollution. 216: 682-688

Appendix A.1 Household Recruitment Letter

PFAS Environmental Sampling at Select Exposure Assessment Locations

Household Recruitment Letter

Reading Level: 10.5

Dear [Insert Name],

CDC/ATSDR thanks you again for being part of the PFAS Exposure Assessment (EA) that was conducted in {insert community} in {insert date}. You received the results of your biological and/or environmental testing in 2020 and the final community report was released in XX 2021.

During the EA process, you agreed to allow us to contact you about future PFAS activities that are taking place in your community. CDC/ATSDR, along with the Environmental Protection Agency (EPA), is collecting additional environment samples at the homes of some EA participants that will be analyzed for PFAS. We are trying to identify sources of PFAS that are not related to drinking water.

We are inviting you to be a part of the environmental sampling for PFAS at your home. We will be collecting samples at a maximum of 80 homes of EA participants.

If you would like to be a part of this investigation, please contact us at XXX. We will only be able to sample at 80 homes, so if you want to participate, we urge you to call to make an appointment as soon as possible. We will enroll participants on a first-come, first-serve basis.

An indoor dust sample will be collected at all 80 homes using a small vacuum and a filter. A consent form will need to be signed by one adult from the household whose blood was tested during the EA. The person who signs the consent form will also be asked to complete questionnaires similar to the one completed during the EA. Other adults and children that live in the household and participated in the EA will also be asked to sign a consent form and fill out a short questionnaire. One appointment will be needed to take the dust sample and to complete the consent forms and questionnaires. The appointment will take about one hour to complete.

For 20 of the 80 households, additional sampling will be done that will require two appointments instead of just one. In addition to the filtered dust sample and completion of the consent forms and questionnaires, the following samples will be taken at the home:

- Indoor air
- Bulk dust sample from your vacuum cleaner
- Surface wipe samples
- Soil
- Silicone wristbands

PFAS exposure indoors will be measured using the indoor air, indoor dust, and surface wipe samples. Outdoor exposure will be measured using soil samples. The silicone wristbands will be provided to the person in the household who signs the consent form. The silicone wristbands will be worn for a week to look at personal PFAS exposure both inside and outside the home.

No biological samples (e.g., blood or urine) will be taken as part of this investigation.

Two appointments will be needed for the households that have the additional samples taken because both the indoor air sample and the silicone wristbands will be collected one week after the first appointment. The total time needed to complete the additional sampling is approximately 4 hours spread over two appointments.

We will also be taking samples of outdoor air from a central location within the community, not associated with your home. Samples of locally grown produce will also be collected to look at PFAS exposure in the diet.
CDC/ATSDR will conduct this investigation from [*insert dates here*].

As soon as test results are available, we will send them to you electronically or by mail at the address you provided on the consent form.

Research to better understand the health effects associated with PFAS exposure is ongoing, but scientists are not currently certain of how PFAS levels in the blood can affect a person's health. More research is needed to clarify the risks posed by PFAS exposure. It is possible that new tests will be developed in the future that will increase our understanding of how PFAS impact human health. If there are any remaining samples after analysis, we would like to keep them so that scientists can test for PFAS if new tests are developed. To do this, we will need your permission when we collect samples from your home. We will provide you with the results of future testing.

Please be assured that, if required at the time of sampling, CDC/ATSDR will take needed steps to protect members of your community and our sampling team from COVID-19. The sampling will be conducted following all state, local, and CDC guidelines in place at the time the sampling is conducted. All CDC/ATSDR and EPA team members will be fully vaccinated.

As with the samples taken during the EA, there will be no charge for the collection or analysis of the environmental samples taken during this investigation.

The Benefits of Participating in Our Environmental Sampling

Your participation in this environmental sampling will give you information about levels of PFAS in your home. We will use the results of the environmental sampling and the questionnaires to better interpret your blood results from the EA.

We will **not** be able to tell you if the PFAS levels found in your home may make you sick now or later in life. You will be able to call project staff during and after the environmental sampling is completed if you have any questions about your results. If your doctor has questions about PFAS, he or she may also call project staff or the physician working on the environmental sampling EI. The names and phone numbers of people to call are listed below.

To show our appreciation for the time that you will take to allow us to complete the sampling in your home, a gift card in the amount of $20 will be provided to each household for each appointment ($40 total for the households with the additional sampling).

The Risks of Participating in Our Environmental Sampling

You may be inconvenienced since we will be in your home to complete the sampling. If you are chosen for the additional sampling, there may be the sounds of a sampling pump in your home for up to a week to obtain the air sample.

CDC/ATSDR will be taking precautions to minimize the risk associated with COVID-19 transmission for both participants and CDC/ATSDR team members, as needed.

Additional Information and Privacy Act Statement:

- **Results**: We will send you a letter with your PFAS sampling results, electronically or through the mail. This investigation will tell you how much PFAS may be inside and/or outside your home and may contribute to your PFAS exposure.
- **Privacy:** All personally identifiable information (PII) (such as name, address, date of birth) gathered for the PFAS exposure sampling is private. This information is protected according to federal and state regarding privacy protection. Only trained and authorized project staff will be allowed to look at information that can identify you. We will keep all of the information in a secure, locked database or file at all times. Except for the environmental sampling team, you are the only one who will receive your individual results. In accordance with CDC/ATSDR's policy regarding data access, sampling results that do not include PII may be used by public health researchers for approved research purposes.
- **Voluntary Participation:** Participation in this investigation is completely voluntary. Even if you decide to take part, you are free to quit the investigation at any time. If at any time in the future, you would like to have your samples destroyed or be removed from the assessment, please call Karen Scruton at 770-488-1325.

The enclosed fact sheets provide more information about the PFAS environmental sampling investigation.

If you have any additional questions, please feel free to contact Karen Scruton at 770-488-1325.

Thank you,

Enclosures:

- PFAS Frequently Asked Questions Fact Sheet (cleared content)
- PFAS Exposure Assessment Results Fact Sheet for MA/DE (cleared content)
- PFAS Environmental Sampling Fact Sheet (provided below)

From: https://www.atsdr.cdc.gov/pfas/additional_resources.html

Appendix A.2 Telephone Scripts for Eligibility Screening and Recruitment

Form Approved
OMB No. 0923-0048
Exp Date 4/30/2022

A.2.1 Eligibility Script when participants call to make an appointment for sampling

PFAS Environmental Sampling at EA Sites

Household Recruitment Script

Reading Level: 9.2

Note: A recruitment letter was sent to EA participants in MA and DE. Participants were instructed to call if they are interested in the environmental sampling. All participants are eligible for the indoor dust sampling and questionnaire completion only. As participants call, they will be offered the additional sampling using the following script.

Hello, I am _____ from [*insert affiliation*], answering on behalf of the Agency for Toxic Substances and Disease Registry. Thank you for calling regarding the environmental sampling to be done in your community.

Your household participated in the Exposure Assessment that was completed in the fall of 2019 and, as your letter indicated, we are conducting additional environmental sampling in your community for PFAS.

If you agree to participate, a dust sample and questionnaires will be completed for all people in your home that provided a blood sample for the exposure assessment so we can look at non-drinking water sources of PFAS. This sampling will take one appointment that will last about an hour. You may also be interested in having the additional sampling that was outlined in the letter, along with the questionnaires. The additional sampling will take two sampling appointments, about 2 hours each, one week apart.

The sampling will be conducted between XX and XX. Which sampling are you interested in (say both options and let them choose)?

1. One appointment with the dust sampling and questionnaires only, or
2. Two appointments with the dust and additional sampling along with the questionnaires
    - If they say they are interested in the dust sampling only, say "*Thank you! Let's go ahead and make that appointment for you.*"
    - If they say they are interested in the additional sampling, say "*Great – but we need to just ask you a few questions to make sure we can collect the samples we need at your home.*"
        a) *Are you willing to allow CDC/ATSDR to sample indoor air, dust and soil at your home during two separate 2- hour appointments, one week apart?*
        b) *Are you willing to allow CDC/ATSDR to set up an air sampling device in your home for a week to collect an indoor air sample? The air sampling equipment may make some noise. The noise will be similar to a household refrigerator.*
        c) *Do you have a yard and are you willing to allow CDC/ATSDR to sample soil from it? The sampling will leave holes in your lawn. The holes will be approximately 2 inches in diameter.*
        d) *Is your yard at least 1500 square feet?*
        e) *Do you have a vacuum cleaner (bagged or bagless) that you are willing to allow CDC/ATSDR to sample?*
        f) *Are you or someone in your household willing to wear several silicone wristbands for a week?* If they answer "no" to any of the questions:

Say "S*orry, we need to be able to collect all the samples at the homes we choose. Would you like us to come and take a dust sample only and complete the questionnaires in one appointment?*"

- If they agree to the dust sampling, make an appointment, and thank them for participating. Tell them they will receive an appointment verification letter and a reminder phone call before their appointment.
- If they do not agree to the dust sampling only, say *"That's fine. Thank you again for being part of the Exposure Assessment – have a great day."*

If they answer "yes" to all of the questions:

- *Make two appointments for them one week apart and thank them for participating. Tell them they will receive an appointment verification letter and a reminder phone call before their appointments.*

When the appointment(s) is made, ask the person "How many people live in your home that provided blood samples during the EA and what are their ages?" Record the number of people and their age and let them know that we will be sending them appropriate consent forms and questionnaires to complete with the appointment verification letter.

SKIP TO THE COVID SECTION BELOW

AFTER THE 20 ADDITIONAL SAMPLING APPOINTMENTS ARE FILLED, USE THE SCRIPT BELOW

Hello, I am _____ from [*insert affiliation*], answering on behalf of the Agency for Toxic Substances and Disease Registry. Thank you for calling regarding the environmental sampling to be done in your community.

Your household participated in the Exposure Assessment that was completed in the fall of 2019 and, as your letter indicated, we are conducting additional environmental sampling in your community for PFAS.

All households are eligible to have a dust sample collected and to have questionnaires completed for all people in your home that provided a blood sample in the Exposure Assessment so we can look at non-drinking water sources of PFAS. This sampling will take one appointment that will last about an hour.

The letter provided information on sampling we would do in addition to the dust sampling and questionnaire at some households. Unfortunately, all those appointments have been filled, but you are invited to have the dust sampling and questionnaires completed in your home.

.

The sampling will be conducted between XX and XX. Are you interested in participating?

> If they say "yes", say "*Great! Let's make an appointment for you*." Tell them they will receive an appointment verification letter and an appointment reminder call before the sampling.
>
> If they say "no", say "*That's fine. Thank you again for participating in the Exposure Assessment – have a great day*."

After the appointment(s) are made, say the following: CDC/ ATSDR will take COVID-19 prevention measures at every step of our work in your community. Would you like me to tell you about those?

> *If the resident says "no", move on with the script.*
>
> *If the resident says "yes", tell them the following:*

The sampling will be conducted following all state, local, and CDC guidelines in place at the time the sampling is conducted. Sampling team members will be monitored twice daily for fever and any COVID-19-related symptoms and will wear surgical masks and gloves to ensure the protection of participants. Participants will be monitored for fever and COVID-19-related symptoms prior to CDC/ATSDR staff entering the home. Participants will be asked to always wear a face covering or mask when interacting with sampling personnel. If you do not have a mask, one will be provided to you before we enter your home. If you are unable to wear a mask for medical reasons, please let us know and accommodations will be made.

A.2.2 Recruitment and Eligibility Script when additional participants needed at a site

Form Approved
OMB No. 0923-0048
Exp Date 4/30/2022

PFAS Environmental Sampling at EA Sites

Household Recruitment Script

Reading Level: 8.6

Note: A recruitment letter was sent to EA participants in MA and DE. Participants were instructed to call in if they are interested in the environmental sampling. All participants are eligible for the indoor dust sampling and questionnaire completion only. ***If all slots are not filled by participants calling in response to the recruitment letter, CDC/ATSDR will call them and they will be offered the additional sampling using the following script.***

Hello, I am _____ from [*insert affiliation*], calling on behalf of the Agency for Toxic Substances and Disease Registry.

Your household participated in the CDC/ATSDR Exposure Assessment that was completed in the fall of 2019. You should have a received a letter in the mail inviting your household to participate in additional environmental sampling at the homes EA participants. I'm calling today to see if you'd like to enroll in the investigation.

All households are eligible to have a dust sample collected and to have a questionnaire completed by all people in the home that provided a blood sample during the exposure assessment so we can look at non-drinking water sources of PFAS. This sampling will take one appointment that will last about an hour. You may also be interested in having the additional sampling outlined in the letter along with the questionnaires. The additional sampling will take two sampling appointments, about 2 hours each, one week apart.

The sampling will take place between XX and XX. Are you interested in either of the samplings (say both options and let them choose)?

1. One appointment with the dust sampling and questionnaires only, or
2. Two appointments with the dust and additional sampling and questionnaires
    - If they say they are not interested in any sampling, say "*That's fine. Thank you again for being part of the Exposure Assessment – have a great day.*"
    - If they say they are interested in the dust sampling only, say "*Thank you! Let's go ahead and make that appointment for you*." Tell them they will receive an appointment verification letter and a reminder phone call before their appointment.
    - If they say they are interested in the additional sampling, say "*Great – but we need to just ask you a few questions to make sure we can collect the samples we need at your home.*"
        a) *Are you willing to allow CDC/ATSDR to sample indoor air, dust, and soil at your home during two separate 2- hour appointments, one week apart?*
        b) *Are you willing to allow CDC/ATSDR to set up an air sampling device in your home for a week to collect an indoor air sample? The air sampling equipment may make some noise.*
        c) *Do you have a yard and are you willing to allow CDC/ATSDR to sample soil from it? The sampling will leave holes in your lawn.*
        d) *Is your yard at least 1500 square feet?*
        e) *Do you have a vacuum cleaner (bagged or bagless) that you are willing to allow CDC/ATSDR to sample?*
        f) *Are you or someone from your household willing to wear several silicone wristbands for a week?*

If they answer "no" to any of the questions:

Say "*Sorry, we need to be able to collect all the samples at the homes we choose. Would you like us to come and take a dust sample only and complete the questionnaires in one appointment?*"

- If they agree to the dust sampling, make an appointment, and thank them for participating. Tell them they will receive a reminder phone call the day before their appointment.
- *If they do not agree to the dust sampling only, say "That's fine. Thank you again for being part of the Exposure Assessment – have a great day."*

If they answer "yes" to all of the questions:

Make two appointments for them one week apart and thank them for participating. Tell them they will receive an appointment verification letter and a reminder phone call before their appointments.

When the appointment(s) is made, ask the person "How many people live in your home that provided blood samples during the EA and what are their ages?" Record the number of people and their age and let them know that we will be sending them appropriate consent forms and questionnaires to complete with the appointment verification letter.

SKIP TO COVID SECTION BELOW

IF WE ONLY NEED THE DUST ONLY APPOINTMENTS FILLED

Hello, I am _____ from [*insert affiliation*], calling on behalf of the Agency for Toxic Substances and Disease Registry.

Your household participated in the CDC/ATSDR Exposure Assessment that was completed in the fall of 2019. You should have a received a letter in the mail inviting your household to participate in additional environmental sampling at the homes EA participants. I'm calling today to see if you'd like to enroll in the investigation.

All households are eligible to have a dust sample collected and to have a questionnaire completed for all people in your home that provided a blood sample for the exposure assessment so we can look at non-drinking water sources of PFAS. This sampling will take one appointment that will last about an hour.

The letter provided information on sampling we would do in addition to the dust sampling and questionnaire at some households. Unfortunately, all those appointments have been filled, but you are invited to have the dust sampling and questionnaires completed in your home.

The sampling will take place between XX and XX. Are you interested in being included in the sampling?

If they say "yes", say "*Great! Let's make an appointment for you. You will receive a reminder call the day before your appointment.*"

If they say "no", say "That's fine. Thank you for being part of the PFAS EA – have a great day."

When the appointment(s) is made, ask the person "How many people live in your home that provided blood samples during the EA and what are their ages?" Record the number of people and their age and let them know that we will be sending them appropriate consent forms and questionnaires to complete with the appointment verification letter.

<u>After the appointment(s) are made, say the following:</u>

CDC/ATSDR will take COVID-19 prevention measures at every step of our work in your community. Would you like me to tell you about those?

If the resident says "no", move on with the script.

If the resident says "yes", tell them the following:

The sampling will be conducted following all state, local, and CDC guidelines in place at the time the sampling is conducted. Sampling team members will be monitored twice daily for fever and any COVID-19-related symptoms and will wear surgical masks and gloves to ensure the protection of participants. Participants will be monitored for fever and COVID-19-related symptoms prior to CDC/ATSDR staff entering the home. Participants will be asked to always wear a face covering or mask when interacting with sampling personnel. If you do not have a mask, one will be provided to you before we enter your home. If you are unable to wear a mask for medical reasons, please let us know and accommodations will be made.

Appendix A.3 Appointment Verification Letter

PFAS Environmental Sampling at Select Exposure Assessment Locations
Appointment Verification Letter
Reading Level: 8.1

Dear [Insert Name],

CDC/ATSDR thanks you for being part of the environmental sampling for PFAS that is being conducted in your community.

You have (an) appointment(s) to conduct the sampling at your home on:

Date and Time (put in two dates if two appointments)

The appointment will take about an hour (*or each appointment will take about 2 hours*).

We ask that you do the following prior to the sampling:

- Please do not vacuum the carpets in your home for at least 5 days prior to the sampling

The following statement will only be included for those homes with additional sampling being done:

- *Please do not empty your vacuum cleaner (bag or bagless) since we will be collecting the dust for analysis when we arrive at your home*

Enclosed are appropriate consent forms and questionnaires for everyone in your household that provided blood samples during the Exposure Assessment. The forms should be filled out as follows:

One adult in the home that provided a blood sample during the Exposure Assessment will be asked to:

- Sign a consent form to complete the questionnaires and to allow ATSDR to complete the sampling (Adult Consent 1),
- Fill out a household questionnaire, and
- Fill out a personal exposure questionnaire.

This adult will wear up to three silicone wristbands for one week to evaluate personal exposure to PFAS both at home and away from the home. We will ask that you remove the wristbands when you bathe, shower or swim.

Other adults in the home that provided a blood sample during the Exposure Assessment will be asked to:

- Sign a consent form to complete the questionnaire (Adult Consent 2), and
- Fill out a personal exposure questionnaire.

For children in the home that provided a blood sample during the Exposure Assessment, the following should be completed:

- A parent/guardian in the home should complete the parental permission form for children younger than 18 years old,
- Children between 12 and 17 years old should fill out the assent form to agree to fill out the personal questionnaire, and

- Fill out the personal exposure questionnaire, with assistance from an adult as needed.

When we arrive at your home to complete the sampling, we will ensure that the consent forms and questionnaires have been completed properly. We would ask that people who won't be present in the home during the sampling fill out the appropriate consent forms/questionnaires completely before we arrive so we can include them in the investigation. If you have questions regarding how to fill out the forms, please call XXX-XXX-XXXX.

Please let us know if you are unable to make your appointment by calling XXX-XXX-XXXX. We will attempt to reschedule your appointment if needed, but it will be difficult since we are sampling at many homes in your community.

You will receive a reminder call prior to your appointment.

Thank you again for participating!

SIGNTURE BLOCK

List out the forms that are included (consents and questionnaires)

Appendix B1: Privacy Act Statement

Thank you for participating in the environmental sampling EI.

Please read the Privacy Act Statement to better understand how ATSDR will protect your privacy during the Exposure Investigation.

PRIVACY ACT STATEMENT
FOR
SUPPLEMENTAL EXPOSURE INVESTIGATION AT SELECT PFAS EA SITES

This statement provides the notice required by the Privacy Act of 1974 (5 USC § 552a(e)(3)).

- **Authority:** The Agency for Toxic Substances and Disease Registry (ATSDR) has the authority to collect this information under the ‘‘Comprehensive Environmental Response, Compensation, and Liability Act of 1980’’ (CERCLA) as amended by ‘‘Superfund Amendments and Reauthorization Act of 1986’’ (SARA) (42 U.S.C. 9601, 9604).

- **Purpose:** ATSDR is conducting this environmental sampling exposure investigation to study your exposure to per- and polyfluoroalkyl substances (PFAS) from non-drinking water sources. ATSDR is collecting this information on you or your child for:
  - Adult consent, parental permission, and child assent to participate in questionnaires and environmental sample collection.
  - Sending your household sampling results back to you.

- **Routine Uses:**
  - ATSDR will share these records with the U.S. Environmental Protection Agency (EPA). EPA may provide investigation or support staff, laboratory and statistical analysis, etc.
  - ATSDR may disclose these records to its contractors to locate individuals exposed or potentially exposed to PFAS, and to conduct interviews and other assessment activities. The contractor must comply with the requirements of the Privacy Act to protect your or your child’s records.
  - Other routine uses as described in System of Records Notice (SORN) No. 09-19-0001 - ‘‘Records of Persons Exposed or Potentially Exposed to Toxic or Hazardous Substances.” See https://www.gpo.gov/fdsys/pkg/FR-2011-01-25/pdf/2010-33004.pdf.

- **Disclosure:** Providing this information is voluntary. ATSDR needs this information for you or your child to take part in the investigation. ATSDR may not include incomplete records in the data analysis. ATSDR needs up-to-date contact information to send your environmental sampling results.

Appendix B2: Adult Consent Form 1

PFAS Environmental Sampling at Select Exposure Assessment Sites
Adult Consent Form
Flesch-Kincaid Reading Level: 9.9

Thank you for participating in the environmental sampling EI.

This Adult Consent Form 1 should be completed by one adult in the household that provided a blood sample during the Exposure Assessment. The person will also agree to complete:

- **The Household Questionnaire**
- **The Adult Personal Exposure Questionnaire**

Only one adult in the household needs to complete this form allowing ATSDR to collect environmental samples in your home. Other adults in the household will complete Adult Consent Form 2 and the Adult Personal Exposure Questionnaire.

ATSDR will pick up this form from you when we come to your home for the environmental sampling.

You are invited to take part in an environmental sampling Exposure Investigation that will measure per- and polyfluoroalkyl substances (PFAS) at your home in environmental samples. We are trying to find out the levels of PFAS in the homes of people who participated in the PFAS Exposure Assessment (EA) in (*Insert name of city/town/place here*).

We want to give you some information about it so you can decide whether you want to participate.

The main goal for this environmental sampling is to look at non-drinking water sources of PFAS by sampling things like inside air, dust, and soil at your home. We will ask you to fill out this consent form and two questionnaires to look at potential PFAS exposure both inside and outside your home.

This form contains information about the sampling and what will happen if you decide to participate. If you agree to take part in this PFAS sampling, please sign at the end of the form.

PFAS Environmental Sampling and Questionnaire Completion

CDC/ATSDR will ask you to agree to the following to be included in the Exposure Investigation:

1. We will ask you to allow us to **collect environmental samples** at your home for PFAS analysis, as follows:

a. An indoor dust sample will be collected at all homes using a pump and a small dust collection filter.
b. At some homes (locations already identified), we will also take samples of the following:
    - **Indoor air**: An air sampling unit will be put in a central location within your home. The unit will be left running nonstop for one week. We will pick up the sampling unit one week from the day it was put in
    - **Bulk Dust Sample**: A sample of dust will be taken from the vacuum cleaner in your home
    - **Surface wipe samples**: Two wipe samples will be taken on hard surfaces in your home
    - **Soil**: Soil samples will be taken in your yard
    - **Wristband**: The person who signs this form will be asked to wear up to 3 silicone wristbands continuously (except when showering, bathing, or swimming) for one week. We will pick up the wristbands one week from the day they are provided.
c. We will label your samples with a code only. Only the project coordinator will be able to identify whose house the samples are from. The samples will be sent to a laboratory for PFAS analysis.
d. Methods to measure PFAS in environmental samples are still being improved. It is possible that new methods will be found in the future that will increase our ability to measure PFAS in these types of samples. We would like to keep your collected samples and store them at EPA so that scientists can test for more PFAS in the future, if new tests are found. To do this, we need your permission.

2. We will ask you to **fill out two questionnaires**:
    a. A household questionnaire that asks questions about your home
    b. A personal exposure questionnaire that asks questions about your personal exposure, such as questions about your diet.
3. We will ask you to allow CDC/ATSDR to **use the results of the PFAS blood sampling and the questionnaire from the EA** to evaluate the environmental sample results. If CDC/ATSDR sampled tap water and dust samples in your home as part of the EA, we would also like to use those PFAS results. At the end of the investigation, we will send you a letter with your results (email or through the mail). If you would like to talk with an CDC/ATSDR staff person about your results, you can, free of charge.

Time required to participate in the environmental sampling and questionnaire

For those homes where an indoor dust sample is taken and the questionnaires are administered, a one-hour appointment will be required. Your household will receive a $20 gift card as a token of our appreciation for your participation.

For those homes where the more robust sampling is conducted and the questionnaires are administered, two, 2-hour appointments, one week apart will be required. Your household will receive a $20 gift card as a token of our appreciation for your participation for each appointment for a total of $40.

There will be no cost to you for the sample collection or the laboratory analysis. No blood or urine sampling will be completed as part of this EI.

The Benefits of Taking Part in Our Exposure Investigation

Your participation in this investigation will help us better understand exposure to PFAS that is not in drinking water. You will find out the levels of PFAS in your home.

We will be providing a $20 gift card per household as a token of appreciation for completing the indoor dust sampling. An additional $20 gift card (for a total of $40) will be provided to those households that complete additional environmental sampling.

The Risks of Taking Part in Our Exposure Sampling

You might be inconvenienced. CDC/ATSDR will need to have access to your home for up to two appointments, one week apart, to collect the samples and to fill out the questionnaire. Overall, it will take between 1 and 4 hours over one or two appointments to complete the sampling, depending on the types of samples we collect in your home. In addition, an air sampling unit may be placed inside your home and will run nonstop for a week. The unit may cause some minor noise inside your home.

Additional Information:

- **Results**: We will send you a letter (by mail or electronically) with the PFAS results for the samples taken at your home.
- **Privacy:** All personally identifiable information (PII) (such as name, address, date of birth) gathered for the PFAS sampling is private and will not be made public. This information is protected according to federal and state laws regarding privacy protection. Only trained and authorized project staff will be allowed to look at information that can identify you. We will keep all of the information in a secure, locked database or file at all times. Except for the environmental sampling EI team, you are the only one who will receive your individual results. In accordance with CDC/ATSDR's policy regarding data access, sampling results that do not include PII may be used by public health researchers for approved research purposes.
- **Voluntary Participation:** Participation in this investigation is completely voluntary. Even if you decide to take part, you are free to quit the investigation at any time. If at any time in the future, you would like to have your samples destroyed or removed from the EI, please call Karen Scruton at 770-488-1325.

Consent Form

By marking the check boxes below and signing this form, you are confirming that you understand the goals of the PFAS sampling, and that you agree, of your own free will, to participate. You are also confirming you will allow the project staff to collect, store, and share the information collected as described above. You will receive a copy of this form for your records.

I agree to allow samples to be collected from my home and analyzed for PFAS.
¨ **Yes** ¨ N**o**

I agree to complete the household and personal exposure questionnaire for the environmental sampling Exposure Investigation.
¨ **Yes** ¨ **No**

I agree to allow the blood and environmental samples (tap water and dust, if applicable), collected during the EA, to be used to evaluate the environmental sampling EI sampling results.

¨ **Yes** ¨ **No**

I understand that I will receive my sampling results in a letter (electronically or by mail).
¨ **Yes** ¨ **No**

I agree that the PFAS environmental sampling results may be shared with other federal, state, and local environmental and health agencies. Identifying information will be protected to the extent possible by law should you choose to share the results with other federal, state or local agencies.
¨ **Yes** ¨ **No**

I agree that my samples may be saved for future PFAS-related analysis and that any leftover samples will be sent to EPA for storage and potential analysis in the future. If the samples are analyzed in the future, you will receive the results.
¨ **Yes** ¨ **No**

I agree to let CDC/ATSDR keep my contact information and contact me in the future for possible follow-up studies (may be research or non-research studies).
¨ **Yes** ¨ **No**

Participant's Name:_____
(Printed)

Participant's Signature:_____

Date Signed:_____

Address for your results:

Street Address: _____

City: _____ State: _____ Zip: _____

Phone number (area code): _____

Project Representative's
Name:_____
(Printed)

Project Representative's
Signature:_____

Appendix B3: Adult Consent Form 2

PFAS Environmental Sampling at Select Exposure Assessment Sites
Adult Consent Form for Questionnaire
Flesch-Kincaid Reading Level: 10.6

Thank you for participating in the environmental sampling EI.

This Adult Consent Form 2 should be completed by adults in the household that provided a blood sample during the Exposure Assessment that did not complete Consent Form 1. The person will also agree to complete:

- **The Adult Personal Exposure Questionnaire**

ATSDR will pick up this form from you when we come to your home for the environmental sampling.

You are invited to take part in an environmental sampling Exposure Investigation (EI) that will measure per- and polyfluoroalkyl substances (PFAS) at your home. We are trying to find out the levels of PFAS in the homes of people who participated in the PFAS Exposure Assessment (EA) in (*Insert name of city/town/place here*).

We want to give you some information about it so you can decide whether you want to participate.

The main goal for this investigation is to look at non-drinking water sources of PFAS by sampling things like inside air, dust, and soil at your home. We will ask you to fill out this consent form and a personal exposure questionnaire to look at potential PFAS exposure both inside and outside your home.

This form contains information about what will happen if you decide to participate. If you agree to take part in this PFAS sampling, please sign at the end of the form.

PFAS Questionnaire Completion

1. CDC/ATSDR will ask you to agree to **complete a personal exposure questionnaire** that will evaluate potential personal PFAS exposure, such as questions about your diet.

2. We will ask you to allow CDC/ATSDR to **use the results of the PFAS blood sampling and the questionnaire from the EA** to evaluate the results of the environmental sampling done at your home. If CDC/ATSDR sampled tap water and dust samples as part of the EA, we would also like to use those PFAS results. At the end of the investigation, the results of the sampling done in your household will be sent to your home in a letter (email or through the mail). If you would like to talk with an CDC/ATSDR staff person about your results, you can, free of charge.

It will take about 15 minutes to complete the personal exposure questionnaire.

There will be no cost to you for the sample collection or the laboratory analysis. No blood or urine sampling will be completed as part of this EI.

The Benefits of Taking Part in Our Exposure Investigation

Your participation in this investigation will help us better understand exposure to PFAS that is not in drinking water. You will find out the levels of PFAS in your home.

We will be providing a $20 gift card per household as a token of appreciation for completing the indoor dust sampling. An additional $20 gift card (for a total of $40) will be provided to those households that complete additional environmental sampling.

The Risks of Taking Part in Our Exposure Sampling

You might be inconvenienced by completing the personal questionnaire. It will take about 15 minutes to complete.

Additional Information:

- **Results**: We will send your household a letter (by mail or electronically) with the PFAS results for the samples taken at your home.
- **Privacy:** All personally identifiable information (PII) (such as name, address, date of birth) gathered for the PFAS sampling is private and will not be made public. This information is protected according to federal and state laws regarding privacy protection. Only trained and authorized project staff will be allowed to look at information that can identify you. We will keep all of the information in a secure, locked database or file at all times. CDC/ATSDR's policy regarding data access, sampling results that do not include PII may be used by public health researchers for approved research purposes.
- **Voluntary Participation:** Participation in this investigation is completely voluntary. Even if you decide to take part, you are free to quit the investigation at any time. If at any time in the future, you would like to have your samples destroyed or removed from the EI, please call Karen Scruton at 770-488-1325.

Consent Form

By marking the check boxes below and signing this form, you are confirming that you understand the goals of the PFAS sampling, and that you agree, of your own free will, to participate. You are also confirming you will allow the project staff to collect, store, and share the information collected as described above. You will receive a copy of this form for your records.

I agree to complete the personal exposure questionnaire for the environmental sampling Exposure Investigation.

¨ **Yes** ¨ **No**

I agree to allow the blood and environmental samples (tap water and dust, if applicable), collected during the EA, to be used to evaluate the environmental sampling EI sampling results.

¨ **Yes** ¨ **No**

I understand that my household will receive the results of the environmental sampling in a letter (electronically or by mail).
¨ **Yes** ¨ **No**

I agree that my household's PFAS environmental sampling results may be shared with other federal, state, and local environmental and health agencies. Identifying information will be protected to the extent possible by law should you choose to share the results with other federal, state or local agencies.
¨ **Yes** ¨ **No**

I agree to let CDC/ATSDR keep my contact information and contact me in the future for possible follow-up studies (may be research or non-research studies).
¨ **Yes** ¨ **No**

Participant's Name:_____
(Printed)

Participant's Signature:_____

Date Signed:_____

Address for your results:

Street Address: _____

City: _____ State: _____ Zip: _____

Phone number (area code): _____

Project Representative's
Name:_____
(Printed)

Project Representative's Signature:_____

Appendix B4: Parental Permission Form

PFAS Environmental Sampling at Select Exposure Assessment Sites
Parental Permission Form (<18 years of age)
Flesch-Kincaid Reading Level: 9.9

Thank you for participating in the environmental sampling EI.

This Parental Permission Form should be completed by one adult in the household for all children in the household younger than 18 years that provided a blood sample during the Exposure Assessment. The child (with assistance from parent as needed) will agree to complete:

- **The Child Personal Exposure Questionnaire**

ATSDR will pick up this form from you when we come to your home for the environmental sampling.

Your child/ward is invited to take part in an environmental sampling Exposure Investigation (EI) that will measure per- and polyfluoroalkyl substances (PFAS) at your home. We are trying to find out the levels of PFAS in the homes of people who participated in the PFAS Exposure Assessment (EA) in (*Insert name of city/town/place here*).

We want to give you some information about it so you can decide whether you want your child/ward to participate.

The main goal for this investigation is to look at non-drinking water sources of PFAS by sampling things like inside air, dust, and soil at your home. We will ask you to fill out a parental permission form for your child/ward so your child can complete a personal exposure questionnaire. If you child/ward is younger than 12 years old, you can complete the questionnaire for them. Older children will need to be present and complete an Assent form where they agree to participate.

We hope you will agree to let your child/ward be part of this exposure assessment. If you have any questions about this form at any time while filling it out, please don't hesitate to ask. Thank you for considering allowing your child/ward to be in this assessment.

This form contains information about the sampling and what will happen if you decide to allow your child/ward to participate. If you agree to allow your child/ward take part in this PFAS sampling, please sign at the end of the form.

PFAS Environmental Sampling and Questionnaire Completion

CDC/ATSDR will ask you to agree to the following to be included in the Exposure Investigation:

1. Sign this parental permission form allowing CDC/ATSDR to **use the results of the PFAS blood sampling and the questionnaire** from the EA for your child/ward. If CDC/ATSDR sampled tap water and dust samples in your home as part of the EA, we would also like to use those PFAS results.
2. Allow your child/ward to complete the **personal exposure questionnaire**. You may assist your child/ward or complete it for them if they are younger than 12 years old. If they are between 12 and 17 years old, they will need to complete an Assent form and must be present to complete the questionnaire.

It will take about 15 minutes to complete the personal exposure questionnaire.

There will be no cost to you for the sample collection or the laboratory analysis. No blood or urine sampling will be completed as part of this EI.

The Benefits of Taking Part in Our Exposure Assessment
Your child/ward's participation in this investigation will help us better understand exposure to PFAS that is not in drinking water. You will find out the levels of PFAS in your home.

The Risks of Taking Part in Our Exposure Assessment
Your or your child/ward may be inconvenienced by completing the personal exposure questionnaire. It will take about 15 minutes to complete.

Additional Information:

- **Results**: We will send your household a letter (by mail or electronically) with the PFAS results in samples from your home.
- **Privacy:** All personally identifiable information (PII) (such as name, address, date of birth) gathered for the PFAS sampling is private and will not be made publicly. This information is protected according to federal and state laws regarding privacy protection. Only trained and authorized project staff will be allowed to look at information that can identify you. We will keep all of the information in a secure, locked database or file at all times. In accordance with CDC/ATSDR's policy regarding data access, sampling results that do not include PII may be used by public health researchers for approved research purposes.
- **Voluntary Participation:** Participation in this investigation is completely voluntary. Even if you decide to allow your child/ward to take part, you are free to quit the investigation at any time. If at any time in the future, you would like to have your samples destroyed or removed from the assessment, please call Karen Scruton at 770-488-1325.

Parental Permission Form

By marking the check boxes below and signing this form, you are confirming that you understand the goals of the exposure assessment, and that you agree, of your own free will, to let your child/ward participate. You are also confirming you will allow the project staff to collect, store, and share the information gathered for the EI as described above. You will receive a copy of this form for your records.

I agree to allow my child/ward to complete the personal questionnaire or I will complete it for them to the best of my ability, if they are younger than 12 years old.
¨ **Yes** ¨ N**o**
I agree to allow the blood and environmental samples (tap water and dust, if applicable) for my child/ward, collected during the EA, to be used to evaluate the EI sampling results.
¨ **Yes** ¨ N**o**

I understand that my household will receive the results of the environmental sampling in a letter (electronically or by mail).
¨ **Yes** ¨ **No**

I agree that my household's PFAS environmental sampling test results may be shared with other federal, state, and local environmental and health agencies. Identifying information will be protected to the extent possible by law should you choose to share your child/ward's results with other federal, state, or local agencies.
¨ **Yes** ¨ **No**

I agree to let CDC/ATSDR keep my child/ward's contact information and contact me in the future for possible follow-up studies (may be research or non-research studies).
¨ **Yes** ¨ **No**

Parent/Guardian's Name:_____
(Printed)

Parent/Guardian's Signature:_____

Respondent ID No:

Child/Ward
Name and Age: _____

Date Signed:_____

Street Address: _____

City: _____ State: _____ Zip: _____

Phone number (area code): _____

Project Representative's
Name:_____
(Printed)

Project Representative's
Signature:_____

Appendix B5: Assent Form

PFAS Environmental Sampling at Select Exposure Assessment Sites
Assent Form (12-17 years of age)
Reading Level: 7.0

We are doing a study on chemicals called PFAS. PFAS stands for Per- and Polyfluoroalkyl Substances. Your parents have said that you could take part in the study. We want to give you some information about it so you can decide whether you want to participate.

Two years ago you were part of a study where we took samples of your blood and urine and tested them for PFAS. You also completed a questionnaire about your potential exposure to PFAS. PFAS was found in the drinking water in your community and we wanted to find out if exposure to PFAS in the water may result in higher levels of PFAS in the body.

Although drinking water is one way to be exposed to PFAS, there are also other ways. Many consumer products contain PFAS and you could be exposed if you use them or come into contact with them. We are asking you to **complete another questionnaire** that asks questions about your use of products and food that may contain PFAS to see if you may have been exposed.

You will not be asked to give us a sample of blood or urine.

We hope you will agree to be part of this investigation. If you have any questions about this form at any time while filling it out, please don't hesitate to ask. Thank you for considering being in this investigation.

If you agree to participate, please sign at the end of the form. The personal exposure questionnaire should take about 15 minutes to complete.

It is your choice whether to be in this investigation. There is no penalty if you choose not to be in this assessment. You may stop being in this assessment at any time. If at any time in the future, you would like to have your answers to the questions removed from the investigation, please call Karen Scruton at 770-488-1325.

Project Name: _____

Project Coordinator's Name:_____
(Printed)

Project Coordinator's Signature:_____

As described above, you are being asked to participate in an environmental sampling investigation. You may participate by indicating your assent to the items below. You may assent to all, some, or none of the items.

To be in this assessment, please sign your initials in the box next to each item you agree to.

	I agree to fill out the personal exposure questionnaire.
	I agree to let the blood sample collected during the EA be used to evaluate the environmental sampling results.
	I agree to let CDC/ATSDR keep my contact information and contact me or my parents in the future for possible follow-up studies (may be research or non-research studies).

I have read the assent form (or someone has read it to me), and I agree to be in this environmental sampling investigation and complete the questionnaire. My initials above show which parts of the assessment I agree to participate in.

Participant's

Respondent ID No:

Name:_____
(Printed)

Participant's Signature:_____

Date Signed: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Phone number (area code): _____

Appendix C1: Household Questionnaire

Form Approved
OMB No. 0923-0048

Environmental Sampling for PFAS at Selected Exposure Assessment Locations, Household Questionnaire

Thank you for participating in the environmental sampling EI.

This household questionnaire should be completed by an adult in the household that:

- **Provided a blood sample during the Exposure Assessment**

- **Completed and signed Adult Consent Form 1 (Environmental Sampling and Questionnaire)**

ATSDR will pick up this form from you when we come to your home for the environmental sampling.

Demographics

Name: _____

Date of Birth: _____ (Month/Day/Year)

Address: _____

Residence

1. Do you still live in the home you lived in when you were tested during the Exposure Assessment (date of EA)?

    - Yes

    - No

2. What is your annual household income?

    _____

    - Don't know
    - Prefer not to answer

3. What was your annual household income during the Exposure Assessment [insert year of EA for each site here]?

    _____

    - Don't know
    - Prefer not to answer

Water

4. What was the main source of drinking water in your home prior to [the date the PFAS in the water was mitigated]?

- Municipal water directly from the tap
  - If yes, what is the name of the public water system you were served by? _____
- Municipal water directly from the tap – filtered
  - If yes, what is the name of the public water system you were served by? _____
- Bottled water
- Other

5. Prior to the PFAS being mitigated from your water on [insert specific date], which, if any, water filter or treatment device did you use to filter or treat the tap water you drink? (select all that apply)

- Under the sink carbon filter or treatment device
- Faucet filter or treatment device
- Pitcher filter
- Refrigerator filter
- None, use bottled water only
- Other, specify: _____
- Don't Know
- Refused to answer
- Not Applicable
- None, no filter or treatment device used

6. If you used a filter or treatment device, when did you start filtration (mm/dd/yyyy)?

- Yes
  - If yes, what date? _____
- No
- Don't know

7. If you used a filter or treatment device, was it maintained and replaced according to manufacturer's recommendations?

- Yes

- o No
- o Don't know

8. After the PFAS was removed or mitigated (date of mitigation), what was your main source of drinking water in your home?

- o Municipal water directly from the tap
- o Municipal water directly from the tap – filtered
- o Bottled water
- o Other

9. After the PFAS was removed or mitigated [insert specific date], which, if any, water filter or treatment device do you use to filter or treat the tap water you drink? (select all that apply)

- o Whole house carbon filter
- o Under the sink carbon filter
- o Faucet filter
- o Pitcher filter
- o Refrigerator filter
- o None, use bottled water only
- o Reverse osmosis (RO) system
- o Other, specify: _____
- o Don't Know
- o Refused to answer
- o Not Applicable
- o None, no filter, or treatment device used

10. If you began using a filter after the PFAS was removed or mitigated, when did you start filtration (mm/dd/yyyy)?

- o Yes
  - o If yes, what date? _____
- o No
- o Don't know

11. Was the filter or treatment device you used after the PFAS was removed or mitigated from your water maintained and replaced according to manufacturer's recommendations?

- o Yes

- o No
- o Don't know

12. Which, if any, water filter or treatment device are you currently using to filter or treat household water for exterior use? (e.g., gardening) (select all that apply)

- o Whole house carbon filter
- o Reverse osmosis (RO) system
- o Other, specify: _____
- o Don't Know
- o Refused to answer
- o Not Applicable
- o None, no filter or treatment device used

Housing Characteristics

Flooring

13. What is the approximate square footage of your home?

_____

14. Do you generally leave windows open in your home?

- o Yes
- o No
- o Don't know

15. What type(s) of flooring do you have in the following rooms? When was it installed?

Room	Hardwood	Tile	Laminate	Carpet	Vinyl	Other	Don't know
Living Room							
Bedrooms							
Kitchen							
Bathroom							

Other							

16. If you have carpet or rugs in your home, have you ever treated that carpet/rug with stain-resistant products?

- Yes
- No
- Don't know

17. If yes, how often? _____

18. Have you ever used a professional carpet cleaning or treatment service?

- o Yes
- o No
- o Don't know

19. If yes, how often? _____

20. Do you have any furniture (couch, etc.) or carpeting/rugs in your house that were pre-treated with stain-resistant products?

- o Yes
- o No
- o Don't know

21. Do you have upholstered furniture that you treat with stain-resistant products?

- o Yes
- o No
- o Don't know

22. If yes, how often? _____

Surfaces

23. How often do you dust or wipe down surfaces in your home, including windowsills?

- Daily
- Weekly
- Monthly
- Seasonally
- Never
- Don't know

24. How often do you clean the floors in your room (e.g., sweep, mop, vacuum)?

Room	Everyday	A few times a week	A few times per month	A few times a year	Never	Don't know	Preferred not to answer
Living Room							
Bedrooms							
Kitchen							
Bathrooms							
Other							

Consumer Products

25. Do you currently use any of the following products in your home? (Check box)

Product type	No	Yes – use them occasionally (monthly)	Yes – use them often (daily or weekly)
Food contact materials			
Paper products (plates, cups)			
Fast food clamshells (paper)			
Fast food containers (paper, cardboard)			
Cupcake or muffin paper cups			
Food contact paper (parchment paper)			
Apparel/clothing/gear			
Waterproof shoes			
Water resistant jackets or coats			

Stain resistant products (clothing)			
Outdoor gear - tent			
Waterproofing treatment for apparel (shoe, textile, and leather)			
Surface treatment products			
Floor wax, sealants, or polish			
Kitchen counter sealant			
Furniture polish			
Boat, Car, Ski wax			
Lubricants (bicycles, etc.)			
Car detailing products			

26. Do you have any pets that spend time both indoors and outdoors?

- Yes
- No

27. Do you have a yard?

- Yes
- No

28. Do you have your lawn treated or do you treat your lawn with treatment products (fertilizers, weed or insect treatment)?

- Yes
- No
- Don't know

29. How often did you water your lawn before the PFAS was removed or mitigated from your water?

- Daily
- Weekly
- Monthly
- Never
- Don't know

30. How often do you water your lawn after PFAS was removed or mitigated from your water?

- Daily
- Weekly

- Monthly
- Never
- Don’t know

Appendix C2: Personal Exposure Questionnaire (Adult)

Form Approved

OMB No. 0923-0048

Environmental Sampling for PFAS at Selected Exposure Assessment Locations
Personal Exposure Questionnaire (Adult)

Thank you for participating in the environmental sampling EI.

This personal exposure questionnaire should be completed by every adult in the household that:

- **Provided a blood sample during the Exposure Assessment**
- **Completed and signed an Adult Consent Form 1 (Sampling and Questionnaire) or Adult Consent Form 2 (Questionnaire only)**

ATSDR will pick up this form from you when we come to your home for the environmental sampling.

These questions will be asked for every adult in the household.

Demographics

Name: _____

Date of Birth: _____ (Month/Day/Year)

Address: _____

1. Since the exposure assessment, do you work in any of the following industries? (select all that apply)

- Manufacturing of nonstick cookware
- Manufacturing of stain resistant coatings used on carpets, upholstery, and other fabrics
- Manufacturing of leather products
- Manufacturing of water-resistant clothing
- Manufacturing of aqueous film forming foam (AFFF)
- Manufacturing/Processing/Formulating facility of PFAS chemicals
- Military
- Aviation
- Firefighting
- Never worked in the industries listed above
- Prefer not to answer

Water

2. Prior to PFAS being mitigated/removed from your water on (date of mitigation), on average, how many 8-oz cups of tap water or beverages/soups prepared with tap water did you drink while at home per day?

____ (8-oz cups)
- Didn't drink tap water
- Don't know

Note: 1 cup = 8-oz; 2 cups = 1 pint (16-oz); 4 cups = 1 quart (32-oz); 16 cups = 1 Gallon (128-oz)

3. After PFAS were mitigated from your water (date of mitigation), how many 8-oz cups of water or beverages prepared with tap water do you drink while at home per day?

____ (8-oz cups)
- Didn't drink tap water
- Don't know

Note: 1 cup = 8-oz; 2 cups = 1 pint (16-oz); 4 cups = 1 quart (32-oz); 16 cups = 1 Gallon (128-oz)

Soil

4. How frequently do you come into direct contact with the soil (e.g. gardening, digging, home improvement, etc. at your home (select one)?

    - Every day
    - Once per week
    - Once per month
    - A few times per year
    - Rarely
    - Never
    - Don't know

5. Do you usually remove your shoes when you enter the home?

    - Yes
    - No

6. Before the pandemic (January 2020), how much time did you spend outdoors on a typical work/school/daycare day?

    - Never
    - 1-4 hours
    - 4-8 hours
    - Over 8 hours
    - Don't know

7. During/after the pandemic, how much time do you spend outdoors on a typical non-work/school/daycare day?

    - Never
    - 1-4 hours
    - 4-8 hours
    - Over 8 hours
    - Don't know

Diet

8. Do you eat locally grown vegetables or fruits from [*insert affected area/sampling frame/locations – show map of sampling frame to participant*]?

- Yes
- No
- Don’t Know

If yes, what time of year do you buy local produce? Please check all that apply.

- Fall
- Winter
- Spring
- Summer

If yes, how often do you eat locally grown fruits or vegetables when in season? (select one)

- Every day
- A few times per week
- A few times per month
- Rarely
- Never
- Don’t know

If yes, where do you buy these locally grown fruits or vegetables?

- Farmer’s market
- Local grocery store
- Vegetable / fruit stand
- Produce box or other home delivery service
- Don’t know

9. Do you eat vegetables or fruits grown at your home?

- Yes
- No
- Don’t Know

If yes, how often do you eat fruits or vegetables grown at your home? (select one)

- Every day

- Once per week
- Once per month
- A few times per year
- Rarely
- Never
- Don't know

If yes, what time of year do you grow vegetables or fruits at your home? Please check all that apply.

- Fall
- Winter
- Spring
- Summer

If yes, what is the source of the water for your homegrown produce?

- Outside hose
- Tap water from inside the house
- Bottled water
- Rain barrel
- Other
- Don't know

10. Do you eat fish locally caught from ponds, lakes, streams, or rivers in [*insert affected area/sampling frame/locations – can show map of sampling area*]?

- Yes
- No
- Don't Know

If yes, how often do you eat locally caught fish (select one)?

- 3 times per week or more
- A few times per month
- A few times per year

- Rarely
- Don't know

11. Do you consume fish from the grocery store?

- Yes
- No
- Don't Know

If yes, how often do you consume fish from the grocery store?

- Every day
- A few times per week
- A few times per month
- A few times per year
- Rarely
- Don't know

12. Do you consume fast food or convenience type of foods (can give an example)?

- Yes
- No
- Don't Know

If yes, how often do you consume fast food?

- Every day
- Once per week
- Once per month
- A few times per year
- Rarely
- Never
- Don't know

If yes, what type of fast food or convenience food products do you generally consume and how often do you consume it?

	How often the fast food or convenience type of food is eaten						
	Daily	**Once/ week**	**Once/month**	**Few times/ year**	**Never**	**Don't know**	**Prefer not to answer**
Food name							
French fries							
Take-out pizza (in a box with a separate liner)							
Frozen pizza (in a box with a separate liner)							
Burgers or sandwiches wrapped in paper							
Burgers or sandwiches in cardboard box (fast food paper clamshells)							
Frozen convenience meals (in cardboard)							
Microwave popcorn							

13. Do you currently use any of the following products in your home? (Check box)

Product type	**No**	**Yes – use them occasionally (monthly)**	**Yes – use them often (daily or weekly)**
Personal care products			
Waxed dental floss and plaque removers			
Nail polish			
Tooth whitening products			
Makeup products			

Hair styling products (shampoo and conditioner)			

14. Is there anything else you want to tell us about your PFAS exposures?

_____

*** THANK YOU ***

Appendix C3: Personal Exposure Questionnaire (Child)

Form Approved

OMB No. 0923-0048

Respondent ID No:

Environmental Sampling of PFAS at Selected Exposure Assessment Locations, Personal Exposure Child (<18 years or age of majority) Questionnaire

Thank you for participating in the environmental sampling Exposure Investigation (EI).

This personal exposure questionnaire should be completed by children (with parental assistance as needed) in the household that:

- **Provided a blood sample during the Exposure Assessment**
- **Have a completed Parental Permission form**
- **Have a completed Assent form, if the child is between 12 and 17 years old**

ATSDR will pick up this form from you when we come to your home for the environmental sampling.

Demographics

Child's Name: _____

Child's Date of Birth: _____ (Month/Day/Year)

Address: _____

Note: If you are a parent giving the response for your child, please replace "you" in the question with "your child." Example: How many years has your child lived in his/her current home?

Residence

1. Do you still live in the home you lived in when you were tested during the Exposure Assessment (date of EA)?

- o Yes
- o No

2. Is this your full-time residence?
   - o Yes
   - o No

     If No, how much time do you reside at this address?

     ___ Days per week ___ Weeks per month ___ Months per year

   - □ Not Applicable
   - o Don't know
   - o Prefer not to answer

If this is not your full-time residence, what is your alternate address?

Address: _____

3.

Water

3. Prior to PFAS being mitigated from your water (date of mitigation), on average,how many 8-oz cups of tap water or beverages prepared with tap water did you drink per day at home?

   - o ____ (8-oz cups)
   - o Don't drink tap water
   - o Don't know

Note: 1 cup = 8-oz; 2 cups = 1 pint (16-oz); 4 cups = 1 quart (32-oz); 16 cups = 1 Gallon (128-oz)

4. After the PFAS were mitigated from your water (date of mitigation), how many 8-oz cups of tap water or beverages prepared with tap water do you drink at home per day?

    - ____ (8-oz cups)
    - Don't drink tap water
    - Don't know

    Note: 1 cup = 8-oz; 2 cups = 1 pint (16-oz); 4 cups = 1 quart (32-oz); 16 cups = 1 Gallon (128-oz)

5. How many 8-oz cups of water or beverages prepared with tap water do you drink per day at day care/school?

    _____

    - Don't go to daycare/school
    - Don't drink tap water
    - Don't know

    Note: 1 cup = 8-oz; 2 cups = 1 pint (16-oz); 4 cups = 1 quart (32-oz); 16 cups = 1 Gallon (128-oz)

Outside Exposure

6. How often do you drink water from the hose outside at your home? (Select one)

    - Rarely
    - Never
    - Don't know
    - Prefer not to answer

7. How often do you play in or touch the soil or dirt at your own home? (Select one)
    - Every day
    - A few times per week
    - A few times per month
    - Rarely
    - Never
    - Don't know
    - Prefer not to answer

8. How often do you play in or touch the soil or dirt at daycare or school?
    - Every day
    - A few times per week
    - A few times per month
    - Rarely
    - Never
    - Don't know
    - Prefer not to answer

9. Before the pandemic was here (prior to January 2020), how many hours did you spend outdoors on a typical

   work/school/daycare day? _____ hours

   non work/school/daycare day? _____ hours

10. Since the start of the pandemic (approximately January 2020), how many hours do you spend outdoors on a typical

    work/school/daycare day? _____ hours

    non work/school/daycare day? _____ hours

11. How often do you remove your shoes when you enter the home?

    - o Always
    - o Sometimes
    - o Never

12. How often do you put soil or dirt in your mouth or get dirt in your mouth from being outside playing or doing sports (**if *the parent is responding, How often have you observed your child put soil or dirt in his/her mouth?***

    - o Every day
    - o A few times per week
    - o A few times per month
    - o Rarely
    - o Never
    - o Don't know
    - o Prefer not to answer

13. How often do you eat with your hands or put your hands in your mouth in your mouth?

    - o Every day
    - o A few times per week
    - o A few times per month
    - o Rarely
    - o Never
    - o Don't know
    - o Prefer not to answer

14. How often do you eat, chew on, or put non-food items in your mouth (example: toys, windowsill, etc.)

    - o Every day
    - o A few times per week
    - o A few times per month
    - o Rarely
    - o Never
    - o Don't know
    - o Prefer not to answer

Diet

15. Do you eat locally grown vegetables or fruits?
    - Yes
    - No
    - Don't Know

    If yes, how often do you eat locally grown fruits or vegetables? (select one)
        - Every day
        - Once per week
        - Once per month
        - A few times per year
        - Rarely
        - Never
        - Don't know

    If yes, where do you buy these locally grown fruits or vegetables?
        - Farmer's market
        - Local grocery store
        - Vegetable / fruit stand

    If yes, what time of year do you buy local produce? Please check all that apply.
        - Fall
        - Winter
        - Spring
        - Summer

16. Do you eat vegetables or fruits grown at your home?
    - Yes
    - No
    - Don't Know

    If yes, how often do you eat fruits or vegetables grown at your home? (select one)

- Every day
- Once per week
- Once per month
- A few times per year
- Rarely
- Never
- Don't know

If yes, what time of year do you grow vegetables or fruits at your home? Please check all that apply.

- Fall
- Winter
- Spring
- Summer

17. How often do you eat fish locally caught from ponds, lakes, streams, or rivers? (Select one)

- 3 times per week or more
- A few times per month
- A few times per year
- Rarely
- Never
- Don't know

18. Do you eat fast food or convenience type of foods?

- Yes
- No
- Don't Know

If yes, how often do you consume fast food?

- Every day
- Once per week

- Once per month
- A few times per year
- Rarely
- Never
- Don't know

If yes, what type of fast-food or convenience food products do you generally consume and how often do you consume it?

	How often the fast food or convenience type of food is eaten						
	Daily	**Once/ week**	**Once/month**	**Few times/ year**	**Never**	**Don't know**	**Prefer not to answer**
Food name							
French fries							
Take-out pizza (in a box with a separate liner)							
Frozen pizza (in a box with a separate liner)							
Burgers or sandwiches wrapped in paper							
Burgers or sandwiches in cardboard box (fast food paper clamshells)							
Frozen convenience meals (in cardboard)							
Microwave popcorn							

19. Is there anything else you want to tell us about your PFAS exposures?

*** THANK YOU***

Appendix D: Sampling and Analysis Plan

Sampling and Analysis Plan

Environmental Sampling (Multi-media) for ATSDR's Supplemental Exposure Investigation: Per- and Polyfluoroalkyl Substances (PFAS)

January 2022

Table of Contents

1. Introduction

1.1 Background and Purpose

Relatively scant information is available in the literature indicating whether non-drinking water exposures may contribute to per- and polyfluoroalkyl substances (PFAS) body burdens. Under an interagency agreement, the Agency for Toxic Substances (ATSDR) and U.S. Environmental Protection Agency (EPA) are conducting a supplemental exposure investigation (EI) to identify potential non-drinking water contributors of PFAS body burdens. The agencies will conduct the supplemental EI in two of the eight communities with drinking water contamination included in CDC/ATSDR's PFAS exposure assessments (EAs).

This document represents the sampling and analysis plan (SAP) and details the procedural and analytical methods to be followed when conducting sampling as part of this EI. CDC/ATSDR will be responsible for obtaining head of household consent prior to proceeding with administration of questionnaires and the environmental sampling within homes.

1.2 EI Overview

Air (indoor and outdoor), dust (filtered and bulk), surface wipes, silicone wristbands, soil, and produce samples will be collected and analyzed for PFAS and PFAS precursors in accordance with prescribed methods described in this SAP. The EI will also include the administration of a questionnaire that will focus on better defining exposure to PFAS in the drinking water and to obtain additional information on non-drinking water exposure to PFAS sources, including use of consumer products and potential dietary exposure.

CDC/ATSDR will collect samples from a subset of participating households at two of CDC/ATSDR's PFAS EA locations (Hampden County, MA, and New Castle County, DE). Households will be identified and scheduled by recruiting strategies outlined in CDC/ATSDR's EI Protocol. The targeted number of households by sample type are as follows:

Sample Type	Hampden County, MA	New Castle County, DE
Ambient Air (within community)	<4	<4
Indoor Air	20	20
Indoor Dust (filtered)	80	40
Indoor Dust (bulk)	20	20
Surface Wipes	20	20
Soil	20	20
Wristbands	20	20
Produce	21	21

2.0 Project Data Quality Objectives

2.1 Project Objectives and Problem Definition

The primary objective of this plan is to ensure that the samples will be collected in a consistent manner and will be of the quality necessary to support CDC/ATSDR evaluation of PFAS exposure in the selected communities. CDC/ATSDR's overall goal in this EI is to determine the presence or absence of PFAS in selected media as well as the nature of detected PFAS. The intention is not to generate data needed to address regulatory issues.

2.2 Data Quality Objectives

The project Data Quality Objectives (DQOs) help determine how good data must be to achieve a project's specific technical goals and objectives. This EI will use DQOs to develop the criteria that the data collection design should satisfy, including where to conduct sampling, the number of samples to collect, and the overall representativeness, completeness, and comparability of data. Eurofins have supplied ATSDR and EPA with a copy of their proprietary procedures for complete transparency. All laboratory analysis will be conducted with established procedures for quality assurance and control, including the use of an appropriate number of QC samples.

- Data representativeness
  - To help ensure that environmental samples collected are representative of the household that is being sampled, the sampling team will (1) collect dust and wipe samples from the primary living spaces as identified by the homeowner (e.g., living room, family room, television room, kitchen, bedroom) in which participants spend the most time; (2) locate indoor air sampling devices in one of the primary living spaces; and (3) implement soil sampling using incremental sampling approaches in areas of the yard accessed by children and other family members (the decision or exposure unit). For produce, sample selection and representativeness will be dictated by availability and variety of local produce.
- Data completeness
  - The sampling team will ensure that complete samples sufficient to run the requested analyses are collected, that the necessary quality control samples are collected and that laboratory calibration records are provided with the sampling report to determine the reliability of the sample data. Every effort will be made to reschedule sampling times should homeowners not be available for the scheduled data collection time to help ensure all of the selected households are sampled.
- Data comparability
  - Data sets will be checked for comparability. Comparability is a qualitative measure of the confidence with which data sets can be compared. All analytical data received from the contract laboratories will be reviewed to ensure analyses have been completed in accordance with documented analytical procedures and by reporting the results in the standard units of measure as required in the methods.

3.0 Field Methods and Procedures

This section presents planned procedures and methods for conducting sampling activities.

The household sampling locations will be a subset of PFAS EA participating households. Summary tables with community-specific locations, house identification numbers, contact numbers, and the household-specific sampling plan will be provided to the environmental sampling team ahead of scheduled appointments. The exact sampling locations within each household will be identified at the time of field sampling and recorded in the project-specific environmental sample collection form (Appendix D.1). Any deviations to the sampling plan will be documented on the form.

3.1 Indoor Dust (Filtered Composite Samples)

3.1.1 Field Equipment

- 0.8 µm pore size polycarbonate filters placed in open-face 37-mm filter cassettes
- Gast Rotary Vane Pump Model 1532 or similar
- Gilian Bubble Flow Meter model 800285
- Silicon tubing 3/16" ID x 3/8" OD x 0.094" wall
- Electronic Tesso TPS-100 scale
- 250 mL HDPE wide-mouth bottles, supplied by the lab
- Wooden 2 square foot (ft^2) sampling template
- PFAS free masking tape
- Field forms
- Chain of Custody (COC) forms, supplied by the lab
- Powderless nitrile gloves
- PFAS-free resealable bags
- Coolers, supplied by the lab
- Ice

3.1.2 Sampling Point Selection

Two or three composite dust samples will be collected from the floor of three locations inside each selected home – the primary living space as identified by the homeowner (e.g., living room, family room, television room), the kitchen, and the bedroom in which EI participants spend the most time. Participants will be instructed by the scheduler to not vacuum carpeting or sweep floors for at least 5 days prior to the scheduled visit to enable the sampling team to collect enough dust for analysis.

A filtered dust sample will be taken at all EI participants' homes: 80 homes in MA and 40 homes in DE.

3.1.3 Analyte and Method Selection

All filtered composite dust samples will be analyzed for targeted PFAS (by LC-MS/MS). FTOH analysis (by GC-MS/MS) will be conducted on samples collected in 10 percent of the selected households, and TOF

analysis (by combustion ion chromatography) will be conducted on samples collected in 10 percent of the selected households. See Section 4.0 for more information.

3.1.4 Sample Collection

Filtered dust samples will be collected in every household included in the EI. Household dust samples will be collected using a high-volume air sampler (Gast RotaryVane Pump Model 1532 or similar) with a flow rate of 15 L/min. The sampler will be calibrated against a bubble meter (Gilian Bubble FlowMeter model 800285, Gilian Instrument Corp.). Dust will be collected on 0.8 µm pore size polycarbonate filters (model 738 PC, Zefon Analytical Accessories, St. Petersburg, Fla.) placed in open-face 37-mm filter cassettes. The filters will be pre-tested to ensure they are PFAS free. See photographs below.

Samples will be taken from both hard and soft surfaces, with mats, carpets, and area rugs being the preferred sampling surfaces. Samples will be taken from easily accessible floor surfaces, but sampling staff may ask permission of the homeowner to temporarily move small items to gain access to more floor space.

Field staff will use a wooden 2 ft^2 sampling template and have PFAS-free masking tape on hand to mark off the sampling area. The total surface area, as well as the surface types on which the sample was taken will be recorded on environmental sample collection form. Field staff will attempt to collect samples with a minimum of 1-gram of total dust each in the open-faced cassettes from each home, vacuuming the same one 2 ft^2 of carpet or other surface at least four times (vertically, horizontally, circles with the cassette) with slightly overlapping passes.

The initial weight of each filter cassettes will be recorded in the field using an electronic Tesso TPS-100 scale. The initial recorded weight will be compared to the post-sampling weight of the filter cassette to determine when enough sample has been collected at each household. The change in sample weight will be recorded. Once sufficient sample volume has been collected, the filter cassette will be capped and placed in a certified pre-cleaned HDPE wide-mouth bottle. Each bottle will be labeled with the appropriate sample identification number prior to shipping.

While CDC/ATSDR does not anticipate sampling difficulties, site-specific conditions may result in modifications to planned sampling methodology. For instance, additional locations may need to be sampled to collect a minimum of 1 gram of dust from each household. Field staff will continue to sample additional 2 ft^2 areas until the 1-gram minimum composite sample volume has been collected. In

addition, if a filter cassette is observed full or overloaded of the filter, a new cassette will be used, and the contract laboratory will composite with the initial filter cassette in the laboratory.

Sampling teams will conduct all sampling activities in a manner to minimize potential contamination and cross-contamination of samples. Sampling staff will wear new nitrile gloves at each sampling point to avoid exposure to pollutants and other chemical, physical, and biological hazards, and to prevent cross-contamination of samples. Sampling staff will take care not to touch the insides of filter cassettes, bottles or lids, and caps during sampling. Sampling staff will use a new section of silicon tubing at each home to limit cross-contamination of samples.

Any deviations to the sampling plan will be documented on the environmental sample collection form and communicated to CDC/ATSDR. Conditions at the sampling locations, such as unusual operating conditions and odors or visual appearance, will also be recorded on the environmental sample collection form.

3.1.5 Sample Labeling and Shipping

A coded label provided by the laboratory that provides the sample ID and project ID will be affixed to each sample container.

All samples will be packed according to the following guidelines and then shipped priority overnight via FedEx. The sampling team anticipates shipping samples once per week, the specific days on which samples are shipped will be determined by the sampling schedule. Any samples that are not shipped the same day they are collected will be held by the sampling team in a secure location (e.g., locked hotel room, office, or vehicle) and stored at <4°C under low light conditions (i.e., in coolers on wet ice) until they are shipped. Samples will be shipped using the instructions below.

1. After sampling, insert sample containers into certified pre-cleaned HDPE bottles.
2. Ensure sample labels are firmly affixed to the HDPE bottles, then tape over the bottles with clear packing tape.
3. Place the bottles inside a one-gallon PFAS-free resealable bag.
4. Place a large garbage bag in the interior of the cooler. This bag will be your “outer liner.” No water or ice should be placed outside this bag.
5. Pour in some wet ice in a single layer to cover the bottom of the outer liner.
6. Add a second large garbage bag to the cooler so that it fits inside the outer liner. The second bag will be your “inner liner.”
7. Place bagged samples inside the inner liner.
8. Tie a knot at the top of the inner bag around the sample containers.
9. Pour ice onto and around the inner liner to fill up any empty spaces on the outside of the inner liner until the cooler is full. The ice should fill up about 30-50% of the content of cooler. Make sure that there are enough loose ends to tie the outer liner in a knot.
10. Tie a knot at the top of the outer liner in a manner that ensures there will be no leakage.
11. Place completed COC in a Ziploc bag and place in the cooler on top of the outer liner.
12. Ensure contents will not move too much when cooler is closed.
13. Secure shut the cooler with packing tape before you ship it out.

3.2 Indoor Air

An integrated indoor air sample will be collected from the main living space of each selected home over the course of up to 7 days. Each sample will be collected using a low-volume pumping device (active sampling). ATSDR will collect samples for PFAS (30 semi-volatiles) in 20 homes and FTOH (volatiles) in a subset of (n=5) of those homes. Quality assurance samples (duplicate samples, field blanks) are listed in Table D.1.

The sampling and analysis approach, modified for PFAS, is based in part on methods described in EPA (2017) (https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=335764&Lab=NERL) and Roth et al. (2020) (https://pubs.acs.org/doi/suppl/10.1021/acs.estlett.0c00052/suppl_file/ez0c00052_si_001.pdf; https://pubs.acs.org/doi/suppl/10.1021/acs.estlett.0c00052/suppl_file/ez0c00052_si_001.pdf).

Sampling team members will be fully trained in the air collection requirements and equipment operating procedures described herein prior to deployment.

3.2.1 Field Equipment

- Clean and spiked sample media, supplied by the laboratory (polyurethane foam [PUF]/XAD cartridge for semi-volatile PFAS and thermal desorption tube for volatile fractions)
- Sampling pumps (e.g., SKC "AirChek Touch" or comparable pump), with battery backup
- Flow meters
- Silicon tubing
- Metal sampling box (e.g., 12" (W)× 8" (D) × 4" (H) equipped with holes for power cord, sampling tube, exhaust, and locking clasp, and box key)
- Extech 44450 pocket humidity/temperature pen
- Power strip
- Standard laboratory ring stand with vertical support of 100 cm
- Fixed position two-pronged clamp to hold the sorbent tube
- PFAS-free resealable bags (anticipated to be part of the sample kit provided by the lab)
- Flow-rate adapter
- Zip ties
- Powderless nitrile gloves
- Field forms
- Chain of custody (COC) forms, supplied by the lab
- Coolers, supplied by the lab
- PFAS-free ice packs

3.2.2 Sampling Point Selection

An active air sampler will be placed in selected homes based on the following considerations:

1. The first priority is selecting the room of primary occupancy by the participant (the room where the participant spends most of his/her time throughout the day other than a bedroom). The room of primary occupancy is likely to include the den or living room. When the primary room is unavailable, then select a secondary room such as the kitchen or a bedroom to locate the sampling device. Record the room identity on the field form.
2. Following the room selection, the sampling team will identify the location where the indoor sampler will be placed. Pumps are typically placed in out-of-the-way locations away from the center of the room in order to present as little interference to the participants as possible. Factors contributing to location selection include: the dimension of the room and its furnishings, the presence of children or pets who might tamper with the device, occupant activity in the room, ventilation, potential disturbance to the occupants by the noise generated by the pump, location of outlets and trip hazards associated with the stretching of extension cords.
3. Sample media will be positioned at breathing zone height (~5 feet).
4. For duplicate samples, sampling pumps will be collocated within their boxes by placing each in adjacent positions at the base of the ring stand. Both sampling cartridges can be located on the same horizontal support.

The field staff will record the sampler location within the room in ink on the field form.

While CDC/ATSDR does not anticipate sampling difficulties, site-specific conditions may result in modifications to planned sampler installation/placement. The sampling team will record any deviations from the plan or observations that may impact data collection.

3.2.3 Analyte and Method Selection

Indoor air samples will be analyzed for a targeted list of 30 semi-volatile PFAS and fluorotelomer alcohols (FTOH). Samples will be collected for the semi-volatile PFAS analytes using PUF/XAD/PUF cartridges while a separate sample, more appropriate for the volatile FTOH, will be collected using thermal desorption cartridges with appropriate sorbents. Preliminary testing is being performed for both methods to optimize flow rates, sampling durations, and sample volumes to achieve the best detection limits possible for residential sample collection without analyte breakthrough. See Section 4.0 for more information on laboratory methods and method detection limits.

3.2.4 Sample Collection

Sample collection steps are adapted from EPA [2017]. Standard operating procedures will be refined and expanded as needed once method validation testing is complete, sampling equipment and sampling media are confirmed, and target flow rates and sample duration are determined.

Installation

- Set up the metal sampling box (designed to tamper proof the pump and deaden the noise associated with the pump). The box will contain the sampling pump with power cord. Make sure a 3-foot length of silicon tubing connected to the sample pump inlet extends through the hole on the side of the sampling box.
- If more than a single wall outlet is required, plug the power strip into the nearest outlet. Run an extension cord from the nearest electrical outlet to provide power to the sampling equipment.

Plug the extension cord into the power strip. Make sure that the sampling pump is plugged into the power strip. Ensure that all electrical connections are secure. Using 3" wide PFAS-free tape, secure the cord(s) in such a manner as to ensure it does not pose a trip hazard to the occupants or those involved in the sampling event.

- Make sure the AirCheck Touch is firmly plugged into the charging cradle and the red (charging) or green (charged) LED is illuminated on the front of the charging cradle.
- Don a clean pair of disposable powderless, nitrile gloves.
- Retrieve the sampling media from its respective plastic bag.
- Remove the caps/tips of the sampling media.
- Connect the media to the silicon tubing that is connected to the inlet of the sampling pump. Secure both tubing attachments with a zip tie.
- Hook a horizontal clamp assembly to the upright post of the ring stand.
- Place the sampling box next to the base of the ring stand.
- Attach the sampler cartridge/tube to the clamp with the open inlet facing down.

Calibration

Instructions for the selected pump will be followed. In general, the field staff will adhere to the following procedures (for the AirCheck Touch), all of which will be tested and further documented as needed prior to deployment.

- Activate the pump by pressing the recessed power button on the side of pump.
- Unlatch and raise the protective screen cover on the pump.
- Touch the flowrate screen on the top of the AirCheck Touch to bring up the "Set Flow" screen. Use the up and down arrows to adjust the flowrate to the desired flowrate for the sampling event (to be determined through pre-deployment testing and validation studies and anticipated to be between 4 and 5 L/minute).
- Connect the NIST traceable flow meter to the media inlet using the flow rate adapter. The flowrate adapter, connected in-line to the flow meter, simply slides onto the glass housing of the open-faced cartridge prior to calibration procedures.
- Allow the pump to run for at least five minutes to warm up.
- Press the ON button to turn on the flow meter and an initializing screen will display. Press and hold the Read button until a reading starts, then release. This will begin an automatic continuous read session. The display will indicate the current flow reading (shown as Flow on the left upper corner of the LCD screen), average flow reading of 10 readings and number of readings up to 10 times.
- If the AirCheck Touch display flowrate and the NIST traceable flowmeter reading differs by more than 2%, press the tools icon on the top right of the AirCheck Touch screen to enter into the "Manual Cal" screen.
- Adjust the flowrate by pressing the up and down arrows on the "Manual Cal" screen to adjust the flowrate to match the flowrate of the NIST traceable flowmeter. Touch the check mark key

to enter the new flowrate value and leave the “Manual Cal” screen. Touch the checkmark on the next screen to accept the new value.

- Once the flowrate is set in the proper range, let the pump run for 2 minutes. Press and hold the Read button on the flow meter to initiate multiple readings, then release. Record the average flow measurement (the average flow value of the 10 readings as provided as a readout on the device) and sample ID on the sample collection record.
- Remove the flow meter from the cartridge inlet.
- Record all calibration data in a field notebook.

Sampling

- After the sampling media (cartridge/tube) is installed and the appropriate flowrate has been set/calibrated, begin sampling by pressing the Green “Start Sample” button.
- Record the start time and all pertinent information on the sample collection form.
- Close the lid of the AirCheck Touch. Close, latch, and lock the outer box.

Sample Recovery

- After the designated sampling period, unlock and open the outer sampling box. Raise the screen cover of the AirCheck Touch.
- Reconnect the NIST traceable flow meter to the inlet of the cartridge. No adjustment to the pump is required at this step and only flow readings are collected. The average flow measurement (average flow value in 10 readings) will be recorded on the sample collection sheet.
- Record the accumulated time and sample volume from the AirCheck Touch display on the sample collection form. Press the red “Stop” button to end the sampling. The Accumulated time and volume will reset when the pump is stopped. the field staff (using nitrile gloved hands) will reconnect the flow meter to the inlet of the cartridge. No adjustment to the pump is required at this step and only flow estimates are collected. The average flow measurement (average flow value in 10 readings) will be recorded on the sample collection sheet.
- Record the sample end date and time on the sample collection sheet.
- Replace the Split Housing/Inlet from the plastic bag onto the sampler cartridge and place the caps on both ends (inlet and outlet) of the cartridge. Place a self-adhesive, previously prepared label on the sample housing. The identifying label should include the unique sample code and the collection date.
- Place the sampling media in a PFAS-free resealable plastic bag.

Any deviations to the sampling plan will be documented on the environmental sample collection form. Conditions at the sampling locations, such as unusual operating conditions and odors or visual appearance, will also be recorded on the environmental sample collection form.

3.2.5 Sample Labeling and Shipping

A coded label provided by the laboratory will be affixed to each sample that provides the sample ID and project ID.

All samples will be packed according to the following guidelines and then shipped priority overnight via FedEx. The sampling team anticipates shipping samples once per week, the specific days on which samples are shipped will be determined by the sampling schedule and any specific requirements dictated by the laboratory or method. Any samples that are not shipped the same day they are collected will be held by the sampling team in a secure location and stored at <4°C in a field freezer (shipped to or acquired at the field site) until they are shipped. Samples will be shipped using the instructions below.

1. Place bagged frozen ice packs (PFAS-free) in a single layer to cover the bottom of the cooler.
2. Place double bagged samples on top of the ice packs.
3. Place more bagged frozen icepacks in the cooler to fill the extra space.
4. Place completed COC in a Ziploc bag and place in the cooler on top of the ice packs.
5. Ensure contents will not move too much when cooler is closed.
6. Secure shut the cooler with packing tape before you ship it out.

3.3 Ambient Air

Integrated samples will be collected in ambient (outdoor) air at a single location for up to 7 days. Samples will be collected using one high-volume sampler and two (collocated) low-volume samplers. ATSDR will use the same equipment and procedures used for collecting the indoor air samples as described in Section 3.2. This section describes minor adaptations to the low-volume sampling approach in the ambient setting and the procedures for ambient air sampling using the high-volume sampler.

High-volume sampling approaches will be guided by EPA Method TO-13A, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air [EPA 1999].

Sampling team members will be fully trained in the air collection requirements and equipment operating procedures described herein prior to deployment.

3.3.1 Field Equipment

- Clean and spiked sample media, supplied by the laboratory (PUF/XAD cartridge for semi-volatile PFAS and thermal desorption tube for volatile fractions)
- SKC AirChek Touch or comparable pump (2 low-volume samplers)
- Flow meters
- Silicon tubing
- Weatherproof sampling box (e.g., 12” (W)× 8” (D) × 4” (H) equipped with holes for power cord, sampling tube, exhaust, and locking clasp, and box key)
- Extech 44450 pocket humidity/temperature pen

- Handheld GPS unit
- Power strip
- Standard laboratory ring stand with vertical support of 100 cm
- Fixed position two-pronged clamp to hold the sorbent tube
- PFAS-free resealable bags (anticipated to be part of the sample kit provided by the lab)
- Flow-rate adapter
- Zip ties
- Tisch Environmental Hi-Volume TE-1000 type sampler
- Installation tools
- Adjustable resistance plate for Hi-Volume sampler
- Hi-Volume sampler motor (replacement)
- Hi-Volume sampler motor brushes (replacement)
- Water manometer
- Field forms
- Chain of custody (COC) forms, supplied by the lab
- Powderless nitrile gloves, cotton gloves
- Coolers, supplied by the lab
- PFAS-free icepacks

3.3.2 Sampling Point Selection

Sampling apparatus for ambient data collection will be situated in a centralized location within the EA sampling frame within the community. Location selection will be based considerations such as power source, security, and minimizing noise disturbances, which ATSDR will evaluate during pre-sampling reconnaissance.

Field staff will record the ambient sampling equipment location (lat/long) on the field form and take pictures, if possible, in a 360-degree arc to record sampling location.

Temporary fencing and signage may be installed to ensure the equipment is secured and there is no potential for tampering with samples.

While ATSDR does not anticipate sampling difficulties, site-specific conditions may result in modifications to anticipated sampler installation/placement. The sampling team will record any deviations from the plan or observations that may impact data collection.

3.3.3 Analyte and Method Selection

Outdoor air samples will be analyzed for a targeted list of 30 semi-volatile PFAS and fluorotelomer alcohols (FTOH). Samples will be collected for the semi-volatile PFAS analytes using PUF/XAD/PUF cartridges while a separate sample, more appropriate for the volatile FTOH, will be collected using thermal desorption cartridges with appropriate sorbents. Preliminary testing is being performed for

both methods to optimize flow rates, sampling durations, and sample volumes to achieve the best detection limits possible for residential sample collection without analyte breakthrough. See Section 4.0 for more information on laboratory methods and method detection limits.

3.3.4 Sample Collection

High-volume samples: A Tisch Environmental Hi-Volume TE-1000 type sampler will be used to collect PFAS samples daily. We will collect 24-hour integrated samples and follow EPA Method TO-13A guidelines [EPA 1999] for sampler setup.

Low-volume samples: The calibration, installation, and breakdown procedures are the same as those described in Section 3.2

Installation/Set Up

5. Install the Hi-Volume sampling system so that the inlet is between 2-15m above level ground.
6. A set of stakes will be used to hold the Hi-Volume sampling system in place during the duration of sampling and prevent tipping.
7. No more than 100 feet of extension cord should be used for the sampling system and it should be plugged into a dedicated 110v AC outlet.
8. The Hi-Volume sampler should be installed at least 2 times the distance from any obstruction and have 360 degrees of unrestricted airflow.
9. The Hi-Volume sampler should not be installed under the dripline of any vegetation if possible.

Calibration

- Once the Hi-Volume samplers are set up at the sampling location, a Calibrated Orifice Transfer standard will be used to calibrate the Hi-Volume sampler as described in EPA Method TO-13A, Section 11.2.2.
- Record the calibration orifice ID, sampler ID, location, date, time, ambient temperature, and ambient barometric pressure.
- Record the orifice manometer inches for each reading associated with Hi-Volume sampler magnehelic readings associated with 70, 60, 50, 40, 30, 20, and 10 inches.
- Calculate the magnehelic flowrate and desired magnahelic setpoint per the calculations found in EPA Method TO-13A, Section 11.2.2.
- All calibration records will be recorded in a field notebook.

Sampling

- Open the lid of the Hi-Volume sampler. Remove the sampling head by lifting up on the two rings and the base of the sampling head releasing the latches that hold it in place.
- With the sampling head unscrew the lower assembly from the sample head. While wearing cotton gloves remove the PUF/XAD-2 trap/cartridge from its shipping container and open the sealed packaging.
- Remove the end caps from the trap and retain in the shipping container for later use.
- Inspect the sampling media for any damage during shipment. Any chip or crack in the surface of the trap will cause it to not seal appropriately inside the sample head assembly.

- Insert the trap into the lower assembly of the sample head so that the glass frit is at the bottom. Take care not to spill the PUF or XAD-2 contents while installing. Screw the lower assembly back to the upper assembly making sure the rubber fittings on each end seat onto the lips of the PUF/XAD-2 trap.
- Remount the sample head back into the Hi-Volume sampler and press down on the ringed latches until the lock into place.
- Open the upper assembly filter holder. Place the lower Teflon offset ring on the bottom of the filter holder above the screen. Open the glass fiber filter shipping container. With a pair of clean forceps, carefully transfer the glass fiber from the shipping container to the center of the screen on the upper assembly filter holder. Place the upper Teflon offset ring on top of the filter aligning the edges with the filter. Place the top portion of the filter holder assembly back on top and clamp the filter holder assembly back together.
- Record all appropriate information on to the sample data sheet (ambient temperature, barometric pressure, elapsed time meter reading, sampler number, filter number, and PUF cartridge number).
- Turn on the sampler and allow to warm-up for approximately 5 minutes.
- Record the sampler magnahelic reading on the sample data sheet and turn the sampler off.
- Set the program clamp on the elapsed timer wheel taking care to set the correct "OFF" clamp at the appropriate times. These will be set for a 24-hour sample duration.
- The sampler will switch on at the appropriate time. Close and lock the Hi-Volume sampler lid and door.

Sample Recovery

- Sample recovery procedures will generally follow EPA Method TO-13A, Section 11.3.4.
- After the end of the sampling period, turn the Hi-Volume sampler on and wait five minutes for the sampler to warm up.
- Record the Hi-Volume sampler magnahelic reading on the sample data sheet then turn the sampler off.
- Record the following information on the sample data sheet: ambient temperature, barometric pressure, elapsed time meter reading.
- Inspect the site area to ensure that nothing has changed that could bias the sample collection. Inspect the shelter and ancillary equipment to ensure it is functional in in good working condition.
- Carefully unclamp and remove the filter using a pair of clean forceps. Then unscrew the upper sampling head assembly. Remove the PUF/XAD-2 trap wearing a pair of cotton gloves. Fold the

glass fiber filter twice and place it inside the PUF/XAD-2 trap. Then recap and repackage the trap into the shipping container.

- Inspect the site area to ensure that nothing has changed that could bias the sample collection. Inspect the shelter and ancillary equipment to ensure it is functional in in good working condition.

3.3.5 Sample Labeling and Shipping

See Section 3.2.5 for low volume samples. Follow similar procedures for all ambient samples, placing samples with ice packs in designated coolers, and include sample data sheets.

3.4 Bulk Dust

3.4.1 Field Equipment

- PFAS-free resealable bags
- Pre-cleaned large forceps
- 250 mL HDPE wide-mouth bottles, supplied by the lab
- Extra 2-gallon heavy duty resealable plastic bags
- Scissors
- 10 x 1g aliquots of SRM 2585, supplied by the lab.
- Field forms
- COC forms, supplied by the lab
- Dust mask (disposable)
- Powderless nitrile gloves
- Coolers, supplied by the lab
- Ice

3.4.2 Sampling Point Selection

A bulk dust sample will be collected from the participant's vacuum cleaner. Procedures are adapted from the National Children's Study Environmental Vacuum Bag Dust Technician Collect SOP (National Children's Study, n.d.) and EPA's Field Collection Standard Operating Procedures for an EPA Pilot Study Evaluating Personal, Housing, and Community Factors Influencing Children's Potential Exposures to Indoor Contaminants at Various Lifestages (EPA Pilot Study Add-On to the Green Housing Study) (U.S. EPA 2017).

During scheduling participants will be instructed not to empty/dispose of dust in their vacuum, but not to vacuum at least five days prior to the appointment (see Section 3.3, filtered dust collection).

3.4.3 Analyte and Method Selection

All bulk dust samples will be analyzed for targeted PFAS (by LC-MS/MS), FTOH analysis (by GC-MS/MS), TOF analysis (by combustion ion chromatography), and supplemented by total oxidizable precursor (TOP) assay. SRM 2585 will be used as a reference for bulk dust. See Section 4.0 for more information.

3.4.4 Sample Collection

- Confirm with the participant that they have and use a vacuum cleaner(s) in the residence. If a vacuum does not exist or has not been used, no sample can be collected. Document the reason on the environmental data collection form.
- Ask the participant to show you the vacuum cleaner that is used most frequently inside the home. If this vacuum cleaner is a hand-held vacuum, ask the participant if there is a full-sized canister or upright vacuum that is also used. Only collect the sample from a hand-held vacuum if it is the only vacuum in the home.
- Don a clean pair of powder-free nitrile gloves.
- For vacuums with a bag:
  - Carefully remove the bag from the vacuum cleaner. Removing the vacuum bag from some vacuums may not be intuitive. If needed, ask the participant for help, or to remove the bag for you.
  - Place the contents of the vacuum bag into the 250 mL HDPE wide-mouth jar. If the contents are dense and do not pour out easily, reach in and grab the dust with the large forceps if necessary. Make sure you have removed as much of the fine dust as possible. Shake the container, if necessary. Collect all of the dust, if possible. Otherwise, make sure the sample collected is representative of the dust in the bag or container (i.e., includes both coarse and fine particles).
  - Affix the sample ID label onto the jar.
- For vacuums without a bag, with a reusable bag, or a central vacuum system:
  - Carefully remove the vacuum dust collection container or reusable bag. Removing the vacuum dust collection container or reusable bag from some vacuums may not be intuitive. If needed, ask the participant for help, or to remove the container or bag for you.
  - Holding the vacuum dust collection container over the bag, pour the dust into the 250 mL HDPE wide-mouth jar. If the contents are dense and do not pour out easily, reach in and grab the dust with the forceps if necessary. Make sure you have removed as much of the fine dust as possible. Shake the container, if necessary. Collect all of the dust, if possible. Otherwise, make sure the sample collected is representative of the dust in the bag or container (i.e., includes both coarse and fine particles).
  - Affix the sample ID label onto the jar.
- Record any notes on the collection form.
- Place the vacuum bag sample into the cooler with ice.
- Clean the work area thoroughly.

While CDC/ATSDR does not anticipate sampling difficulties, site-specific conditions may result in modifications to planned sampling methodology. For instance, the participant's vacuum may be empty. If the participant's vacuum is empty, a "spot" vacuum sample may be collected after the filtered sample is collected.

Any deviations to the sampling plan will be documented on the environmental sample collection form and communicated to CDC/ATSDR. Conditions at the sampling locations, such as unusual operating conditions and odors or visual appearance, will also be recorded on the environmental sample collection form.

3.4.5 Sample Labeling and Shipping

A coded label provided by the laboratory that provides the sample ID and project ID will be affixed to each sample container.

All samples will be packed according to the following guidelines and then shipped priority overnight via FedEx. The sampling team anticipates shipping samples once per week, the specific days on which samples are shipped will be determined by the sampling schedule. Any samples that are not shipped the same day they are collected will be held by the sampling team in a secure location (e.g., locked hotel room, office, or vehicle) and stored at <4°C under low light conditions (i.e., in coolers on wet ice) until they are shipped. Samples will be shipped using the instructions below.

1. Ensure sample labels are firmly affixed to the HDPE bottles, then tape over the bottles with clear packing tape.
2. Place the bottles inside a one-gallon PFAS-free resealable bag.
3. Place a large garbage bag in the interior of the cooler. This bag will be your “outer liner.” No water or ice should be placed outside this bag.
4. Pour in some wet ice in a single layer to cover the bottom of the outer liner.
5. Add a second large garbage bag to the cooler so that it fits inside the outer liner. The second bag will be your “inner liner.”
6. Place bagged samples inside the inner liner.
7. Tie a knot at the top of the inner bag around the sample containers.
8. Pour ice onto and around the inner liner to fill up any empty spaces on the outside of the inner liner until the cooler is full. The ice should fill up about 30-50% of the content of cooler. Make sure that there are enough loose ends to tie the outer liner in a knot.
9. Tie a knot at the top of the outer liner in a manner that ensures there will be no leakage.
10. Place completed COC in a Ziploc bag and place in the cooler on top of the outer liner.
11. Ensure contents will not move too much when cooler is closed.
12. Secure shut the cooler with packing tape before you ship it out.

3.5 Soil

CDC/ATSDR will collect surface soil samples at 20 properties within each community using an incremental sampling methodology (ISM) approach. This sampling method involves collecting and combining many equal mass increments of soil (i.e., increment samples) across a specific area or volume of soil (e.g., an exposure unit) into a single representative sampled for laboratory analysis (i.e., bulk ISM sample). The combined sample is sieved and ground to obtain a consistent particle size and then subsampled and processed by the laboratory following specific protocols. Due to the sampling density afforded by collecting many increments, ISM samples can provide more precise and representative estimates of an exposure unit’s average contaminant concentrations than other sampling approaches.

The approach described below is based on CDC/ATSDR’s Exposure Point Concentration Guidance for Non-discrete Sampling (2021, in development) and guidance developed by the following entities:

- Interstate Technology Regulatory Council (ITRC), 2020: https://ism-2.itrcweb.org/

The sample team is encouraged to review CDC/ATSDR's guidance and the two other documents listed above prior to sample collection for additional background on this sampling approach.

3.5.1 Field Equipment

- 2-gallon PFAS-free resealable bags to hold the ISM soil samples
- Cold Regions Research and Engineering Laboratory (CRREL) multi-increment sampler with a three centimeter probe to collect the ISM soil samples (2 wrenches will be needed to adjust the CRREL tool) (ERDC/CRREL SR-09-1, User's Manual for the CRREL Multi-Increment Sampling Tool (erwiki.net)
- Stainless steel wool pads or a parts-cleaning brush with stainless bristles to remove adhered soil from the CRREL sampler between sampling locations
- PFAS-free cleaning solution to decontaminate sampling equipment between locations. All water used to decontaminate/clean off sampling equipment should be confirmed to not contain any PFAS prior to use. Laboratory supplied PFAS-free deionized water is preferred. Commercially available deionized water in a high-density polyethylene (HDPE) container may be used if verified to be PFAS-free.
- Clean PFAS-free paper towels to wipe down the CRREL sampler
- Measuring tape to determine increment sampling locations
- Global Positioning System (GPS) unit
- Pin flags or posts for identifying sampling locations
- Field forms to document sampling activities and field conditions
- Scale to measure increment samples and bulk ISM samples
- COC forms, supplied by the lab
- Powderless nitrile gloves
- Coolers, supplied by the lab
- Sample labels
- Large garbage bag for packing the samples for shipment
- Ice for shipping

3.5.2 Sampling Point Selection

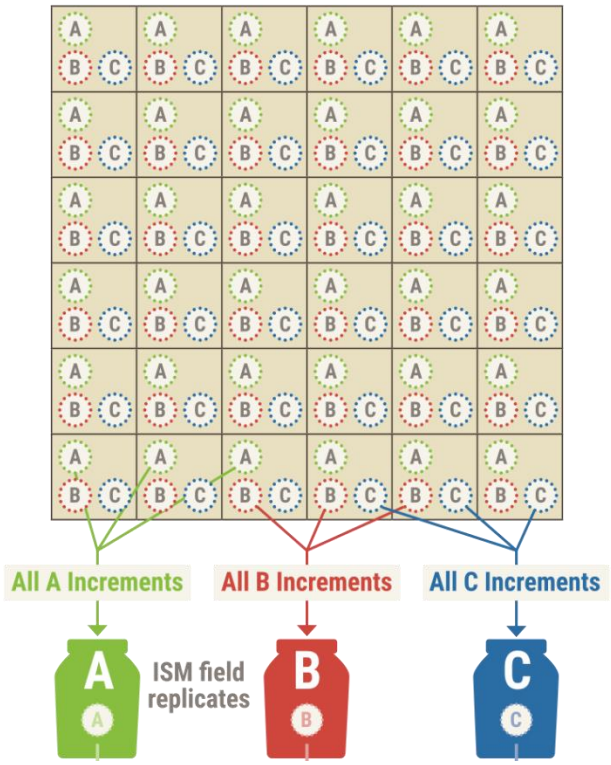
ISM increments will be collected throughout the identified exposure unit (i.e., the area that people could come into contact with contaminants in soil on a regular basis) at each property[1]. For some

[1] ISM samples are designed to provide representative contaminant concentrations over a specific volume of soil.

properties, this may include the front, side, and back areas of the properties—if individuals are expected to access all areas of the properties equally. For others, this may encompass a more limited space (e.g., the backyard only if there is no access to the front yard).

Many possible sampling designs can be applied for ISM sample collection, each with the goal of yielding unbiased estimates of average concentrations. Systematic random grid sampling, a common and reliable method, will be used for this program. Under this design, the position of the first increment sample is randomly selected and the remaining ISM increment collection points are determined by a sampling grid based off that first point. If field duplicates or triplicates are collected, the same grid pattern is used, but based on a new randomly selected starting point.

An example of this sampling pattern with two field replicates is shown in the figure to the right. For this example, increment samples are collected and combined into three field replicate ISM samples. In this case, a sampler collects equal volume increments at all A locations and then combines those increments into a single ISM sample. This process is repeated for all B and then C sampling locations if field replicates were to be collected. Note that field replicates will only be collected at a subset of properties (see Section 3.5.4).



ATSDR's EPC Guidance for Non-discrete Sampling (2021, in development)

3.5.3 Analyte and Method Selection

ISM soil samples will be analyzed for targeted PFAS via LC-MS/MS. FTOH analysis (by GC-MS/MS) will be conducted on samples collected in 50 percent of the selected households, and TOF analysis (by combustion ion chromatography) will be conducted on the remaining 50% of the selected households. See Section 4.0 for more detail.

ISM soil samples will be subsampled and processed in the laboratory following standard ISM protocols (HDOH 2016; ISM 2020). This will involve sieving the samples to a particle size of less than two millimeters, and then drying and grinding the samples prior to subsampling (e.g., using a two-dimensional Japanese slab cake) and then extracting material for laboratory analysis.

3.5.4 Sample Collection

CDC/ATSDR will collect an ISM soil sample at each property with the goal of obtaining an ISM sample that contains analytes in the same proportion as soil throughout the given exposure unit.

Several agencies use the term "decision unit" to refer to the smallest volume of soil for which a decision will be made with ISM data. The boundaries of decision units can be based on human health exposure areas, ecological exposure areas, source areas, and more. An ISM decision unit may not always align with the exposure unit. For this program, ISM samples will be collected within identified exposure units (i.e., geographically defined areas where a person contacts an environmental medium at random throughout the area over time).

For this program, each ISM sample will be comprised of 80 increments collected in an unbiased manner and at a depth of two centimeters throughout the identified exposure unit for a given property. Each individual soil increment that is collected will weigh between 30 and 40 grams. The target bulk sample mass for each of the resulting combined samples is 3 kilograms (30-40 grams X 80 increments = approximately 3 kilograms). This bulk mass will ensure that there is sufficient sample mass available for analysis after the laboratory sieves the combined samples to less than two millimeters particle size.

At a subset of properties, ISM field replicates will be collected. Field replicates consist of separate ISM samples collected and processed from the same exposure unit. For this program, triplicate ISM field samples will be collected at approximately 20% of participating properties in each community (i.e., three to five properties per community).

A two-person team will collect the ISM samples. One person will collect the increments while the other holds the resealable sample collection bags and keeps track of the number of increments. Sample procedures are as follows.

- Check the local weather forecast prior to mobilization. Sample collection should be completed during stable weather conditions to ensure moisture consistency between replicates and increments, as well as uniform soil density.
- Outline the boundaries of the exposure unit with field tape and measure the dimensions of the exposure unit with a tape measure or equivalent. If possible, record the location of the corners of the exposure unit (or enough points to delineate the exposure unit's shape if irregular) with a GPS unit
- Estimate the overall area of the exposure unit using the GPS unit or manual measurements.
- Estimate the approximate increment spacing using Equation 1 below for 80 increments and the area determined in the previous step.

  Equation 1

  $$Increment\ spacing = \sqrt{\frac{Exposure\ Unit\ Area}{Number\ of\ Increments}}$$

- Subdivide the exposure unit into uniform sized cells based on the desired number of increments (i.e., 80 increments) and increment spacing calculated in the previous step. This will create a "sample grid". Systematic sampling requires that increment sampling locations be evenly spaced between all axes of the "sample grid", to the extent feasible in the field.
- Place pins/flags in the ground to mark the start of each cell/row for easy identification of the 80 increment sample locations within the "sample grid". Alternative, these markings can be logged in the GPS unit.
- Use a systematic random sampling approach to identify the specific increment sample location for the first cell of the "sample grid." Note that actual increment collection locations reflect a random offset of the grid, with increments collected from an identical (i.e., systematic) location within each cell (HDOH 2016). That means that the initial increment is collected from a random location within the first cell. The location selected within that first cell will be the same location that is sampled in each of the subsequent cells.

- Use a coring device (i.e., a CRREL sampler with a three centimeter probe – see image below) to collect increments in each cell of the "sample grid." Increment samples should be collected at a depth of 2 centimeters and have a mass between 30 and 40 grams. Additional information on how to operate the CRREL sampler is available at: [ERDC/CRREL SR-09-1, User's Manual for the CRREL Multi-Increment Sampling Tool (erwiki.net)]

  - Begin by collecting a sample from a cell located at one corner of the "sample grid" and then placing that sample into a 2-gallon resealable bag.

  - Repeat this process at each of the other 79 cells, following the pre-determined sample path throughout the "sample grid", and place each subsequent increment sample into the same resealable bag. The combined sample containing all 80 increments represents the bulk ISM sample, which should have a final mass of approximately 3 kilograms. This is the sample that will be sent to the laboratory. Note that large sticks, stones, and other particles can be removed from the ISM bulk sample prior to shipment to the laboratory.

  - Place the ISM bulk sample inside of another 2-gallon resealable bag to protect the sample during transport to the laboratory.

CRREL Multi-Increment Sampling Tool with various coring tips
http://erwiki.net/images/6/66/Walsh-2009_ERDC-CRREL_SR-09-1.pd

- At a subset of properties (i.e., 20% of properties within a given community), repeat this process throughout the same "sample grid" in order to collect two additional field replicates. For this, shift the increment sample location within each cell in a systematic manner for both replicates.

Sampling equipment can be used repeatedly within an exposure unit/property without decontamination but should be decontaminated between exposure units/properties and also between replicates (at the subset of properties where field replicates are to be collected). Before starting ISM sample collection at a new exposure unit/property or for field replicates, the CRREL sampler (and any other tools used to collect increment samples) should be cleaned of soil particles, decontaminated with a triple rinse of PFAS-free deionized water, and then dried with PFAS-free paper towels.

While CDC/ATSDR does not anticipate sampling difficulties, site-specific conditions may result in modifications to planned sampling methodology. If participants ask the sampling team to stop at any time, the sampling team will stop sampling. Any deviations to the sampling plan will be documented on environmental sample collection forms. Conditions during sample collection, including the weather, any unusual odors, and a brief description of the visual appearance of the sample will also be recorded. For decontamination of the sampler tip between households, the tip will be rinsed with water and a methanol wipe and allowed to dry before reuse.

3.5.5 Sample Labeling and Shipping

A coded label provided by the laboratory that provides the sample ID and project ID will be affixed to each ISM sample container.

All samples will be packed according to the following guidelines and then shipped priority overnight via FedEx. The sampling team anticipates shipping samples once per week, the specific days on which samples are shipped will be determined by the sampling schedule. Any samples that are not shipped the same day they are collected will be held by the sampling team in a secure location (e.g., locked hotel room, office, or vehicle) and stored at <4°C under low light conditions (i.e., in coolers on wet ice) until they are shipped. Samples will be packed and shipped following the instructions below.

1. Place a large garbage bag in the interior of the cooler. This bag will be your "outer liner." No water or ice should be placed outside this bag.
2. Pour in some wet ice in a single layer to cover the bottom of the outer liner.
3. Add a second large garbage bag to the cooler so that it fits inside the outer liner. The second bag will be your "inner liner."
4. Place bagged ISM soil samples inside the inner liner.
5. Tie a knot at the top of the inner bag around the sample containers.
6. Pour ice onto and around the inner liner to fill up any empty spaces on the outside of the inner liner until the cooler is full. The ice should fill up about 30-50% of the content of cooler. Make sure that there are enough loose ends to tie the outer liner in a knot.
7. Tie a knot at the top of the outer liner in a manner that ensures there will be no leakage.
8. Place completed COC in a Ziploc bag and place in the cooler on top of the outer liner.
9. Ensure contents will not move too much when cooler is closed.
10. Secure shut the cooler with packing tape before you ship it out.

3.6 Surface Wipes

3.6.1 Field Equipment

- Glass fiber wipes in HDPE jars, both supplied by the lab
- 1 liter of methanol (MeOH) or other solvent, supplied by the lab
- Wooden sampling template (minimum 10cm x 10cm/4in x 4in)
- KimWipes
- PFAS-free masking tape to tape down template
- Trash bags
- Ruler or measuring tape
- Field forms
- COC forms, supplied by the lab
- Powderless nitrile gloves
- Coolers, supplied by the lab
- Ice

3.6.2 Sampling Point Selection

Wipes will be taken at two locations within the home, along with appropriate QC samples. Samples may be taken in areas that may have residue from the use of PFAS-containing products or areas where dust may accumulate, such as kitchen counters or shelves in a high-traffic area that may accumulate dust. The scheduler will have instructed the participant to not dust, vacuum or sweep floors for at least 5 days prior to the scheduled visit.

3.6.3 Analyte and Method Selection

Wipe samples will be analyzed for targeted PFAS via LC-MS/MS. FTOH analysis (by GC-MS/MS) will be conducted on samples collected in 50 percent of the selected households, and TOF analysis (by combustion ion chromatography) will be conducted on samples collected in the remaining 50 percent of the selected households. See Section 4.0 for more detail.

3.6.4 Sample Collection

Field staff will follow the Department of Housing and Urban Development (HUD) protocol for Wipe Sampling of Settled Dust for Lead Determination (https://www.hud.gov/sites/documents/LBPH-40.PDF), adapting the elements specific to collecting samples for PFAS analysis. Procedures extracted from the HUD protocol follow.

ATSDR will collect two samples within each home: one from the kitchen counter to evaluate potential cleaning products and food packaging and one from a closet area within the home to evaluate PFAS on clothing items. Sampling staff may ask permission of the homeowner to temporarily move small items to gain access to more space.

- Identify the sample area (the area to be wiped). Do not touch the sample area. Clean the wooden template with a KimWipe. Carefully place the clean template on the sample area and, to keep it from moving while wiping, tape the outside edges to the surface. Minimize disturbance of dust in the sample area.
- Don a pair of powderless nitrile gloves
- Retrieve a wipe from a HDPE jar and moisten it with methanol.
- Place the moistened wipe at one corner of the area to be sampled with the wipe fully opened and flat on the surface.
- Make the first wipe pass, top-to-bottom: With the fingers together, grasp the wipe between the thumb and the palm. Press down firmly, but not excessively with the fingers and, if the wipe is large enough, the palm. Proceed to wipe top-to-bottom with as many “S”-like motions as are necessary to completely cover the entire sample area. Exerting excessive pressure on the wipe will cause it to curl. Exerting too little pressure will result in poor collection of dust. Do not use only the fingertips to hold down the wipe, because there will not be complete contact with the surface and some dust may be missed. Attempt to pick up all dust from the sample area.
- Do not cross the template, but be sure to wipe the entire sample area. It is permissible to touch the template with the wipe, but not the surface beyond.
- Make the second wipe pass, side-to-side: Fold the wipe in half with the contaminated side facing inward. (You may straighten the wipe by laying it on the sample area, contaminated side up, and folding it over.) Be sure not to spill dust when folding. Once folded, place the wipe in the top corner of the sample area and press down firmly with the fingers (and the palm if the

folded wipe is large enough). Repeat wiping the area with “S”-like or “Z”-like motions, but on the second pass, move in a side-to-side direction. Attempt to pick up all dust. Do not touch the contaminated side of the wipe with the hand or fingers. Do not shake the wipe in an attempt to straighten it out, since dust may be lost during shaking.

- Make the third wipe pass, top-to-bottom, as was done for the first pass: Fold the wipe into a quarter of the pad with the contaminated side facing inward. (You may straighten the wipe by laying it on the sample area, contaminated side up, and folding it over.) Be sure not to spill dust when folding. Once folded, place the wipe in the top corner of the sample area and press down firmly with the fingers (and the palm if the folded wipe is large enough). Repeat wiping the area with “S”-like or “Z”-like motions, but on the second pass, move in a top-to-bottom direction. Attempt to pick up all dust. Do not touch the contaminated side of the wipe with the hand or fingers. Do not shake the wipe in an attempt to straighten it out, since dust may be lost during shaking.
- After collecting as much dust as possible with the wipe, fold the wipe with the contaminated side facing inward again, and insert aseptically (without touching anything else) into the HDPE jar.
- Measure or record the area of the wiped area. If the template was used, record the area of the template. If a custom area was used, measure the dimensions of the surface area wiped to the nearest eighth of an inch using a tape measure or a ruler. Record specific measurements for each area wiped on the field sampling form.
- After sampling, remove all masking tape and put it in a trash bag. Before removing the last pair of disposable gloves, put all other contaminated gloves and other sampling debris used for the sampling period into a trash bag. Then remove the last pair of gloves and put them in the trash bag. Remove the trash bag when leaving the dwelling. Do not throw away gloves, wipes, etc. inside the dwelling unit where they could be accessible to young children. The plastic bag and gloves may be a suffocation hazard.

Sampling teams will conduct all sampling activities in a manner to minimize potential contamination and cross-contamination of samples. Sampling staff will wear new nitrile gloves at each sampling point to avoid exposure to pollutants and other chemical, physical, and biological hazards, and to prevent cross-contamination of samples. Sampling staff will take care not to touch the insides of bottles or lids.

While CDC/ATSDR does not anticipate sampling difficulties, site-specific conditions may result in modifications to planned sampling methodology. For instance, a larger sampling area may need to be used if there is no visible dust in the sampling area. If this is the case, use PFAS-free masking tape to mark a larger sampling area and be sure to record the sample area to the nearest eighth of an inch using a tape measure or a ruler. Record specific measurements for each area wiped on the field sampling form.

Any deviations to the sampling plan will be documented on the environmental sample collection form and communicated to CDC/ATSDR. Conditions at the sampling locations, such as unusual operating conditions and odors or visual appearance, will also be recorded on the environmental sample collection form.

3.6.5 Sample Labeling and Shipping

A coded label provided by the laboratory that provides the sample ID and project ID will be affixed to each sample container.

All samples will be packed according to the following guidelines and then shipped priority overnight via FedEx. The sampling team anticipates shipping samples once per week, the specific days on which samples are shipped will be determined by the sampling schedule. Any samples that are not shipped the same day they are collected will be held by the sampling team in a secure location (e.g., locked hotel room, office, or vehicle) and stored at <4°C under low light conditions (i.e., in coolers on wet ice) until they are shipped. Samples will be shipped using the instructions below.

1. After sampling, insert sample containers into certified pre-cleaned HDPE bottles.
2. Ensure sample labels are firmly affixed to the HDPE bottles, then tape over the bottles with clear packing tape.
3. Place the bottles inside a one-gallon PFAS-free resealable bag.
4. Place a large garbage bag in the interior of the cooler. This bag will be your "*outer liner*." No water or ice should be placed outside this bag.
5. Pour in some wet ice in a single layer to cover the bottom of the outer liner.
6. Add a second large garbage bag to the cooler so that it fits inside the *outer liner*. The second bag will be your "*inner liner*."
7. Place bagged samples inside the inner liner.
8. Tie a knot at the top of the inner bag around the sample containers.
9. Pour ice onto and around the inner liner to fill up any empty spaces on the outside of the inner liner until the cooler is full. The ice should fill up about 30-50% of the content of cooler. Make sure that there are enough loose ends to tie the outer liner in a knot.
10. Tie a knot at the top of the outer liner in a manner that ensures there will be no leakage.
11. Place completed COC in a Ziploc bag and place in the cooler on top of the outer liner.
12. Ensure contents will not move too much when cooler is closed.
13. Secure shut the cooler with packing tape before you ship it out.

3.7 Silicone Wristbands

3.7.1 Field Equipment

- KimWipes
- Stainless-steel forceps
- Silicone wristbands, pre-cleaned by lab
- 125 mL HDPE bottles, supplied by the lab
- Field forms
- COC forms, supplied by the lab
- Powderless nitrile gloves
- Coolers, supplied by the lab

- Ice

3.7.2 Sampling Point Selection

One adult per household will be requested to wear two to three wristbands. This should be the person who signs the consent or their designee (e.g., a spouse).

3.7.3 Analyte and Method Selection

Silicone wristbands will be analyzed for targeted PFAS via LC-MS/MS. FTOH analysis (by GC-MS/MS) will be conducted on samples collected in 50 percent of the selected households, and TOF analysis will be conducted on samples collected in the remaining 50 percent of the selected households. See Section 4.0 for more detail.

3.7.4 Sample Collection

A sample will be collected using silicone wristbands as a passive sampler. One participant per selected household will receive two to three wristbands designated for passively collecting PFAS.

Participants will be instructed to wear wristbands continuously for 7 days, but to remove the wristband during showering, bathing, or swimming.

For drop off at the participant's home:

- Don a pair of nitrile gloves.
- Unscrew the wristband jars.
- Hand the two wristbands to the participant.
- Allow the participant to place the PFAS wristbands on their wrist.
- Hand the participant an instruction sheet for wearing the wristbands and talk them through the instructions.

For pick up at the participant's home:

- Don a pair of nitrile gloves.
- Obtain the 125mL wristband jars from storage.
- Unscrew the wristband jar.
- Ask the participant to remove their wristbands.
- Take the wristbands from the participant.
- Place the wristbands in individual jars and label the jars, specifying the required analysis.
- Place the jars on wet ice.

While CDC/ATSDR does not anticipate sampling difficulties, site-specific conditions may result in modifications to planned sampling methodology. For example, some participants' wrists may be too big or small for the wristbands. In such cases, CDC/ATSDR will consider asking another adult household member to wear the wristbands.

Sampling teams will conduct all sampling activities in a manner to minimize potential contamination and cross-contamination of samples. Sampling staff will take care not to touch the insides of bottles or lids during sampling.

Any deviations to the sampling plan will be documented on the environmental sample collection form. Conditions at the sampling locations, such as unusual operating conditions and odors or visual appearance, will also be recorded on the environmental sample collection form.

3.7.5 Sample Labeling and Shipping

A coded label provided by the laboratory will be affixed to each sample container that provides the sample ID and project ID.

All samples will be packed according to the following guidelines and then shipped priority overnight via FedEx. The sampling team anticipates shipping samples once per week, the specific days on which samples are shipped will be determined by the sampling schedule. Any samples that are not shipped the same day they are collected will be held by the sampling team in a secure location (e.g., locked hotel room, office, or vehicle) and stored at <4°C under low light conditions (i.e., in coolers on wet ice) until they are shipped. Samples will be shipped using the instructions below.

After sampling, insert sample containers into certified pre-cleaned HDPE bottles.

10. Ensure sample labels are firmly affixed to the HDPE bottles, then tape over the bottles with clear packing tape.
11. Place the bottles inside a one-gallon PFAS-free resealable bag.
12. Place a large garbage bag in the interior of the cooler. This bag will be your "*outer liner*." No water or ice should be placed outside this bag.
13. Pour in some wet ice in a single layer to cover the bottom of the outer liner.
14. Add a second large garbage bag to the cooler so that it fits inside the *outer liner*. The second bag will be your "*inner liner*."
15. Place bagged samples inside the inner liner.
16. Tie a knot at the top of the inner bag around the sample containers.
17. Pour ice onto and around the inner liner to fill up any empty spaces on the outside of the inner liner until the cooler is full. The ice should fill up about 30-50% of the content of cooler. Make sure that there are enough loose ends to tie the outer liner in a knot.
18. Tie a knot at the top of the outer liner in a manner that ensures there will be no leakage.
19. Place completed COC in a Ziploc bag and place in the cooler on top of the outer liner.
20. Ensure contents will not move too much when cooler is closed.
21. Secure shut the cooler with packing tape before you ship it out.

3.8 Produce

3.8.1 Field Equipment

- KimWipes
- Stainless-steel knife

- 250 mL HDPE wide-mouth bottles, supplied by the lab
- Stable, PFAS-free surface for chopping produce
- Paper towels
- Deionized water
- Field forms
- COC forms, supplied by the lab
- Powderless nitrile gloves
- Coolers, supplied by the lab
- Ice

3.8.2 Sample Selection Point

Produce samples will be collected from markets throughout the EA sampling frame. Venues selling locally grown produce will be identified before the sampling campaign begins. Local contacts and various organizations can help to identify local food and farm resources (e.g., https://www.localfoodma.org/). The sampling team will identify "local" produce based on labeling in the markets or knowledge of suppliers to community-based farmers' markets. To the extent possible, sampling will target produce grown in the community itself. If not available, the sampling team will seek produce grown (per labels) within the state/region. Ideally, samples not pre-packaged should be selected.

3.8.3 Analyte and Method Selection

Produce samples will be tested for targeted PFAS by LC-MS/MS. The laboratory will process (homogenize) the as received sample. See Section 4.0 for more information.

3.8.4 Sample Collection

Available data suggest that PFAS accumulation varies by plant part. The shorter chain length PFAS tend to accumulate in the shoots (leaves and fruits), whereas the longer chain length PFAS tend to accumulate in the roots (Blaine et al. 2014; Felizeter et al. 2012; Ghisi et al. 2019; Navarro et al. 2017). Uptake also appears to vary depending on vegetative structure (e.g. presence/absence of barriers) (Blaine et al. 2014; Liu et al. 2019) and protein content (Wen et al. 2016). In some cases, higher concentrations are found in the leaves/foliage than the edible parts of plants (e.g., potatoes, carrots, and cucumbers) (Lechner and Knapp 2011); higher concentrations have been reported in the lettuce heart versus the leaves (Bizkarguenaga et al. 2016). Acknowledging this expected variance, the EI sampling goal will be to collect a cross-section of edible portions of leafy greens, root/shoot vegetables, and fruit vegetables. The following produce serves as a guide for sampling based on several considerations, including documented PFAS accumulation in the edible portion of the plant and likelihood of being grown locally. The methods and analysis of processed foods from FDA's total diet study will be considered a reference for the produce collection and analysis (Genualdi et al. 2021).

Leafy Greens	**Root/Shoot Vegetables**	**"Fruit"**
1. Lettuce	1. Celery	1. Tomatoes
2. Cabbage	2. Carrots	2. Melons
3. Spinach	3. Radishes	3. Pears or apples
4. Other	4. Potatoes	4. Corn

In each community, the sampling team will collect 21 samples—ideally, three samples of seven different types of produce. The seven types of produce may vary depending on sampling location and season. However, an effort should be made to select a variety of produce types and within each produce type, the specific produce that is expected to have the highest PFAS levels, broadly ranked in the list above.

The following sampling procedure is adapted from the MDH soil and garden study (Scher et al. 2018).

- At each market, don a pair of nitrile gloves.
- Obtain produce sample and place in paper or thin-film plastic bag provided in produce aisle of market.
- Take notes on any relevant details (e.g., where grown, organic/not organic)
- Change out gloves between each produce sample collected.
- After all produce samples have been collected, purchase produce.
- At vehicle, set up a surface that can be used for cutting / preparing samples.

For sample preparation, follow these procedures:

- At vehicle or other designated team meeting location, set up a surface that can be used for cutting / preparing samples.
- Use a KimWipe to clean the stainless-steel knife and the surface used for cutting / preparing samples.
- Remove first produce sample from paper or thin-film plastic bag.
- Remove any non-edible portions of the produce (e.g., stems, leaves). Take notes on what parts of the produce are removed.
- If the produce has any visible soil on it, wipe away the soil with a paper towel and with deionized water if necessary.
- Chop the produce sample into 1 in^3 or smaller pieces.
- Place each chopped produce sample into pre-labeled jar.
- Change out gloves between each sample preparation.
- Use a KimWipe to clean the knife and surface in between each sample preparation.
- Place all chopped produce samples on ice.

Any deviations to the sampling plan will be documented on the environmental sample collection form and communicated to CDC/ATSDR. Conditions at the sampling locations, such as unusual operating conditions and odors or visual appearance, will also be recorded on the environmental sample collection form.

3.8.5 Sample Labeling and Shipping

A coded label provided by the laboratory will be affixed to each sample container that provides the sample ID and project ID.

All samples will be packed according to the following guidelines and then shipped priority overnight via FedEx. The sampling team anticipates shipping samples once per week, the specific days on which samples are shipped will be determined by the sampling schedule. Any samples that are not shipped the same day they are collected will be held by the sampling team in a secure location (e.g., locked hotel room, office, or vehicle) and stored at <4°C under low light conditions (i.e., in coolers on wet ice) until they are shipped. Samples will be shipped using the instructions below.

1. After sampling, insert sample containers into pre-cleaned HDPE bottles.
2. Ensure sample labels are firmly affixed to the HDPE bottles, then tape over the bottles with clear packing tape.
3. Place the bottles inside a one-gallon PFAS-free resealable bag.
4. Place a large garbage bag in the interior of the cooler. This bag will be your "*outer liner*." No water or ice should be placed outside this bag.
5. Pour in some wet ice in a single layer to cover the bottom of the outer liner.
6. Add a second large garbage bag to the cooler so that it fits inside the *outer liner*. The second bag will be your "*inner liner*."
7. Place bagged samples inside the inner liner.
8. Tie a knot at the top of the inner bag around the sample containers.
9. Pour ice onto and around the inner liner to fill up any empty spaces on the outside of the inner liner until the cooler is full. The ice should fill up about 30-50% of the content of cooler. Make sure that there are enough loose ends to tie the outer liner in a knot.
10. Tie a knot at the top of the outer liner in a manner that ensures there will be no leakage.
11. Place completed COC in a Ziploc bag and place in the cooler on top of the outer liner.
12. Ensure contents will not move too much when cooler is closed.
13. Secure shut the cooler with packing tape before you ship it out.

3.9 PFAS Cross Contamination Prevention Best Practices

Sampling teams will conduct all sampling activities in a manner to minimize potential contamination and cross-contamination of samples. Sampling staff will wear new nitrile gloves at each sampling point to avoid exposure to pollutants and other chemical, physical, and biological hazards, and to prevent cross-contamination of samples. Sampling staff will take care not to touch sampler "cartridges" or the insides of storage bags or sample bottles/jars.

Due to the potential presence of PFAS in common consumer products and in equipment typically used to collect water and dust samples, special handling and care must be taken when collecting samples for PFAS analysis to avoid sample contamination. Below is a summary of items that are likely to contain PFAS and therefore **will not** be used by the personnel conducting sampling. Where appropriate, acceptable substitutions are provided in italics.

- Decontamination: Decon 90 (*instead use Alconox® or Liquinox®, potable water followed by deionized PFAS-free water rinse*)

- Sample storage and preservation: LDPE or glass bottles, Teflon™-lined caps, chemical ice packs (i.e., Blue ice®) *(instead use HDPE or polypropylene containers with HDPE or polypropylene caps, regular ice in Ziploc bags)*
- Field documentation: waterproof/treated paper or field books, plastic clipboards, Sharpie® markers, "sticky" notes and other adhesive paper products *(instead use loose plain paper, metal clipboard, ballpoint pens)*
- Clothing: clothing or boots with Gore-Tex® or other synthetic water-resistant and/or stain-resistant materials, Tyvek material, fabric softener *(old, well laundered (at least 6 washings since purchase) clothing made of cotton preferred)*
- Personal care products on day of sample collection: cosmetics, moisturizers, hand cream, sunscreen, and other related products
- Aluminum foil
- Anything with fluoro in the name
- Fluorinated ethylene propylene (FEP)
- Ethylene tetrafluoroethylene (ETFE)
- Low density polyethylene (LDPE), polyvinylidene fluoride (PVDF)
- Food and beverage: pre-packaged food, fast food wrappers or containers

To further prevent contamination, hands must be thoroughly washed after handling fast food, carryout food, or snacks, as many food and snack products are packaged in wrappers treated with PFAS. Pre-wrapped food or snacks must not be in the possession of the sampling personnel during sampling. When field personnel require a break to eat or drink, they should remove their gloves and move to an appropriate location. When finished, field personnel should clean up and don a new pair of gloves. No food or drink shall be brought into sample collection or work areas.

3.10 Field Documentation

Field documentation will include CDC/ATSDR's Environmental Sample Collection Form (Appendix D.1) and COC records. Field notes will include:

- Sample locations and description;
- General conditions of the sampling point;
- Date and time of sample collection;
- Field observations and details related to analysis or integrity of samples (e.g., condition in homes, noticeable odors or coloring of samples, etc.); and
- Notes regarding other relevant information collected on-site pertaining to the sample location.

3.11 Sample Handling and Custody

To maintain scientifically defensible sampling data, sample integrity must be maintained at all times from sample collection through analysis. Correct and detailed sample labeling will be used and appropriate COC forms will be maintained. In order to stay within appropriate holding times and ensure

safe delivery, the samples that are collected will be shipped using FedEx Priority Overnight to ensure they arrive at the analytical laboratories the morning after being shipped. Coolers and ice will be used to transport the samples and maintain holding temperatures. The COC will be correctly signed during the transfer of these samples and at the time of delivery to the laboratory.

To maintain a record of sample collection, transfer between personnel, shipment, and receipt by the laboratory, a COC is completed for each sample set at each sampling location. These forms are used to document sample custody transfer from the field to the laboratory. The COC forms are completed for all samples sent to the laboratory.

In addition to the transfer of custody, the COC provides information to the laboratory on the sample number, type of sample, sample description, the sample collection date and time, and the analyses requested. The comment section is used to provide special notes or instructions to the laboratory. Additionally, deviations from standard sampling protocols are to be noted in the comments section.

3.12 Inspection of Supplies and Consumables

Sampling supplies and consumables for this project include those that contact samples, such as laboratory-provided sample containers and sampling equipment. The sampling staff will be responsible for acquiring required materials from the contract laboratory and specified vendors and inspecting those materials upon receipt to ensure they are usable for this project (e.g., inspecting for breakage, evidence of tampering, or contamination). The sampling team will use new sampling equipment materials, such as nitrile gloves, which will be dedicated to a single sampling point and then disposed.

4.0 Analytes and Method Selection

Eurofins (Test America) is the ATSDR-contracted laboratory that will complete all the PFAS analysis in the environmental samples. Eurofins uses state-of-the-art LC/MS/MS instrumentation in support of trace-level reporting of PFAS contaminants as well as GC/MS/MS for the analysis of the more volatile PFAS.

Samples of bulk dust, soil and silicone wristbands remaining after laboratory analysis will be send to EPA at Research Triangle Park for storage and potential future non-targeted analysis of PFAS.

All the methods to be used are based on Eurofins in-house SOPs. The primary method used for the analysis of PFAS is referred to as 537 Modified. The SOPs for the analysis of TOF and FTOHs are considered proprietary but have been reviewed by the EI team.

Below is a summary of the methods that Eurofins has developed and validated to capture the variety of matrices and target analytes to be used in the EI.

Matrix	Target Analytes/Method	SOP Name
Soil, Bulk Dust, Filtered Dust, Surface Wipes and Wristbands	Extraction and Analytical Method for Targeted list of 40 semivolatile PFAS	WS-LC-0025 r4.0

Soil, Bulk Dust, Filtered Dust, Surface Wipes and Wristbands	Analytical Method for FTOHs	TSSGWI7750 r5
Soil, Bulk Dust, Filtered Dust, Surface Wipes and Wristbands	Extraction Method for FTOHs	TSSGWI41726 r1
Soil, Bulk Dust, Filtered Dust, Surface Wipes and Wristbands	Extraction and Analytical Method for Extractable Organic Fluorine (EOF)	T-PFAS-WI43681 rA
Bulk Dust	Sample Prep and Analytical Method for TOP Assay	WS-LC-0025 r4.0
Soil	Incremental Sample Management (ISM) Sample Prep Method	WS-QA-0028 r4.8
Produce	Analytical Method for Targeted list of 40 semivolatile PFAS	TPFASWI12031 r10
Produce	Extraction Method via FDA C-010.01 prescribed QuEChERS method	T-PFAS-WI36393
Indoor/Outdoor Air	Analytical Method for Targeted list of 30 semivolatile PFAS	WS-LC-0025 r4.0
Indoor/Outdoor Air	Extraction Method for Targeted list of 30 semivolatile PFAS from PUF/XAD cartridges	WS-WI-0065 r1.1
Indoor/Outdoor Air	Extraction and Analytical Method for FTOHs	Modified EPA TO-17

1. Soil, Produce, Bulk Dust, Surface Wipes and Wristbands
    - Targeted PFAS will be extracted and analyzed according to the in-house SOP method referred to as 537 Modified with isotope dilution.
    - For produce, PFAS will be extracted using methods consistent with FDA methodology, with isotope dilution.
    - Incremental Sample Management (ISM) preparation will be applied to soil samples only and will be completed using Eurofins standard procedures.
        - Approximately 1 Kg of sample is received
        - Disaggregate, spread on sheet to air dry
        - Sieve through 2 mm sieve
        - Spread on sheet into 2-D slab cake
        - Grid into approximately 30 units
        - Using flat ended spoon, take approximately equal subsamples from each grid division
        - Subsamples combined into one aliquot for each analysis quoted.
    - FTOHs will be extracted and analyzed according to the in-house SOP method referred to as FTOHs by GCMSMS.

- The TOP Assay is a pre-treatment technique which will be applied to the Bulk Indoor Dust only. The pre-treatment is an oxidation step conducted prior to analysis of a split sample. The analysis is conducted using 537 Modified.
- Organic Fluorine will be reported as Extractable Organic Fluorine or EOF for all solid materials. Samples will be extracted using the same solvent system as 537 Modified and analyzed by the in-house method referred to as TOF-CIC. for non-potable water and other environmental media, which will eventually be published as standard methods.[2]

2. Indoor Dust (filter)
    - Targeted PFAS will be extracted and analyzed from a filter cassette according to the in-house SOP method referred to as 537 Modified.
    - FTOHs will be extracted and analyzed from a filter cassette according to the inhouse SOP method referred to as FTOHs by GCMSMS.
    - Organic Fluorine will be reported as Extractable Organic Fluorine or EOF. Samples will be extracted from a filter cassette using the same solvent system as 537 Modified and analyzed by the in-house method referred to as TOF-CIC.
3. Indoor and Outdoor Air
    - Targeted PFAS will be extracted from a PUF/XAD cartridge by an in-house SOP method using KOH/MeOH extraction and sonication. The analysis is completed by 537 Modified which is identical to the water/solids method.
    - FTOHs will be extracted from a thermal desorption sorbent tube and analyzed according to the in-house SOP method referred to as FTOHs by TD-GCMSMS.
    - Validation and method testing will be performed prior to deploying to the field to determine the most appropriate length of time for data collection to achieve appropriate MDLs.

Appendix D.2 provides a list of analyses to be performed in each medium along with appropriate method detection limits (MDLs).

4.1 Quality Control Samples

The primary field quality control method for sampling will be the use of field equipment blanks, duplicate samples, and field controls. Table D.1 presents the proposed number of samples, duplicates, field blanks, and field control samples to be collected as part of this EI (MA and DE locations combined).

Table D.1. Proposed sample and quality control sample counts

Media	Household Numbers ¥	PFAS Sample	PFAS Dup	PFAS FB	PFAS FC	FTOH Sample	FTOH Dup	FTOH FB	FTOH FC	TOF Sample	TOF Dup	TOF FB	TOP Sample	TOP Dup	TOP FB
Indoor dust (filter)	120	120	12	0	0	60	6	0	0	60	6	0	0	0	0
Indoor air	40	40	6	6	6	10	3	3	3	0	0	0	0	0	0
Outdoor air	--	6	3	3	0	6	3	3	0	0	0	0	0	0	0
Indoor dust (bulk)	40	40	6†	0	10*	40	6†	0	0	40	6†	0	40	6	0
Surface wipes	40	80	8	8	8	40	6	6	6	40	6	6	0	0	0
Soil	40	40	16 ǂ	0	0	20	8 ǂ	0	0	20	8 ǂ	0	0	0	0
Silicone Wristbands	40	40	6§	6	0	20	3§	3	0	20	3§	3	0	0	0
Produce	--	42	14†	0	0	42	14†	0	0	42	14†	0	0	0	0
TOTAL	--	408	71	23	24	238	49	15	9	222	43	9	40	6	0

¥ A total of 80 homes will be sampled in MA and 40 in DE. 20 homes at each location will be sampled for filtered dust and all other media
Dup = Duplicate; FB = Field Blank; FC = Field Control
*Lab will purchase 10g of NIST SRM 2585 to prepare 10 field controls for PFAS in the bulk dust sample
** two wipe samples will be taken at each of the 20 homes at each location
† split sample and not a duplicate for bulk dust and produce samples
ǂ triplicate analysis for incremental sampling protocol
§ if only a portion of the wristband is used for the analyses, the laboratory will extract a second portion of the wristband as a duplicate sample

4.2 Field and Equipment Blanks

Field equipment blanks will be used to evaluate possible contamination arising from equipment or containers used during air, filtered dust, surface wipes, and wristband sampling. One unused filter cassette will be connected to the tubing, disconnected, and sent to the contracted lab at each of the EI locations (MA and DE). This will be to ensure the filter cassettes used to collect the samples are PFAS-free. Similarly, an unused cartridge/sorbent tube use for air sampling will be connected to tubing, disconnected, and sent to the contracted lab for analysis at each of the EI locations (MA and DE). For surface wipes, a wipe will be removed from its jar, moistened with methanol, place back in its jar, and sent to the contracted lab for analysis. For wristbands, a wristband will be removed from its jar briefly, placed back in its jar, and sent to the contracted lab for analysis.

4.3 Duplicate and Split Samples

For filtered dust and surface wipes, duplicate samples will be collected in an immediately adjacent area under identical conditions into separate sample containers. It is uncertain whether truly homogenous samples can be collected. For bulk dust, 15% of samples will be split at the lab after the homogenization process. Each split sample will be evaluated independently. For indoor air, at 15% of households, a co-located cartridge and pump will be set up next to the original sample. For outdoor at half of all sampling locations, a co-located cartridge and pump will be set up next to the original sample. For soil, triplicate samples will be collected at 40% of homes. As

each original ISM sample is collected within the same location of each increment grid, so will the replicate samples. For wristbands, 15% of samples will be selected for split sampling at the lab. Each split sample will be evaluated independently. Finally, for produce, one third of samples will be split at the lab after the homogenization process. Each split sample will be evaluated independently.

4.4 Field Controls

The laboratory will prepare matrix spikes for the wipe and air media as an additional measure of data quality assurance and control.

5.0 Sampling Logistics

This section of the SAP details specifics of the sampling team, site visit preparation, and contact information

5.1 Field Sampling Schedule

The general anticipated workflow for the 2-week data collection period will be some combination of the following and will be dictated in part by participant availabilities. The goal will be to conduct the more extensive sampling and required set ups in the subset of 20 households per location in the early parts of Week 1 with pickup of samples early in Week 2. The numbers in Table D.2 below reflect the total homes tested per day (2 teams unless noted).

Table D.2 Anticipated Data Collection Schedule

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1*	6 (robust 1†)	6 (robust 1†)	6 (robust 1†)	2 (robust 1†)	10 (dust only §– DE and MA)	10 (dust only §– DE and MA)	Produce and take down outdoor air
2	6 (robust 2‡)	6 (robust 2‡)	6 (robust 2‡)	6 (robust 2‡)	15 (dust only §– MA only)	15 (dust only §– MA only)	10 (dust only – MA only)

* Set up outdoor air sampling the Saturday before sampling begins

† Robust 1 = questionnaire, set indoor air, wipes, soil and wristbands

‡ Robust 2 – take down indoor air, collect wristbands, indoor dust (filter), bulk dust

§ Dust only = questionnaire, indoor dust (filter) only – 20 for DE (2 teams) and 60 for MA (3 teams)

5.2 Project Contacts

This section summarizes contacts and addresses for personnel involved in the assessment.

CDC/ATSDR Contacts

Karen Scruton
770-488-1325
lsg3@cdc.gov

Peter Kowalski
770-488-0776
pek2@cdc.gov

James Durant
770-488-0668
hzd3@cdc.gov

EPA Contacts

Elaine Cohen Hubal
Hubal.elaine@epa.gov

Kent Thomas
Thomas.kent@epa.gov

Laboratory Contacts

Taryn McBride, Eurofins (TestAmerica)

Air Sampling Contractor Contacts

Naida Gavrelis, Eastern Research Group (ERG)

6.0 References

Bizkarguenaga E. Zabeleta I, Mijangos L, Iparraguirre A, Ferdandez LA, Prieto A, Zuloaga O. 2016. Uptake of perfluorooctanoic acid, perfluorooctane sulfonate and perfluorooctane sulfonamide by carrot and lettuce from compost amended soil. Science of the Total Environment. 571: 444-451.

Blaine AC, Rich CD, Sedlacko EM, Hundal LS, Kumar K, Lau C, Mills MA, Harris KM, Higgins CP. 2014. Perfluoroalkyl acid distribution in various plant compartments of edible crops grown in biosolids-amended soils. Environmental Science and Technology. 48(14): 7858-7865.

EPA [U.S. Environmental Protection Agency]. 2017. Field Collection Standard Operating Procedures (SOPs) for an EPA Pilot Study Evaluating Personal, Housing, and Community Factors Influencing Children's Potential Exposures to Indoor Contaminants at Various Lifestages (EPA Pilot Study Add-Oon to the Green Housing Study). EPA/600/R-17/064. March 2017. Available at: https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=335764&Lab=NERL

EPA. 1999. Determination of Polycyclic Aromatic Hydrocarbons (PAHs) in Ambient Air Using Gas Chromatography/Mass Spectrometry (GC/MS); EPA Compendium Method TO-13A. In *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air (Second Edition)*. EPA/625/R-96/010b. . Office of Research and Development. Cincinnati, OH. Available at: https://www3.epa.gov/ttnamti1/files/ambient/airtox/to-13arr.pdf

Felizeter S, McLachlan MS, deVoogt P. 2012. Uptake of perfluorinated alkyl acids by hydroponically grown lettuce (Lactuca sativa). Environmental Science and Technology. 46(21): 11735-11743

Genualdi, Susan & Beekman, Jessica & Carlos, Katherine & Fisher, Christine & Young, Wendy & Dejager, Lowri & Begley, Timothy. (2021). Analysis of per- and poly-fluoroalkyl substances (PFAS) in processed foods from FDA's Total Diet Study. Analytical and Bioanalytical Chemistry. 414. 10.1007/s00216-021-03610-2.

Ghisi R, Vamerali T, Manzetti S. 2019. Accumulation of perfluorinated alkyl substances (PFAS) in agricultural plants: A review. Environ Res. 169: 326-341

Hawaii Department of Health. 2016. Use of Multi Incremental Samples to Characterize DU's. http://www.hawaiidoh.org/tgm.aspx?p=0402a.aspx

HUD. n.d. Wipe Sample of Settled Dust for Lead Determination. https://www.hud.gov/sites/documents/LBPH-40.PDF

Interstate Technology Regulatory Council [ITRC]. 2018. Site Characterization Considerations, Sampling Precautions, and Laboratory Analytical Methods for Per- and Polyfluoroalkyl Substances (PFAS).

Interstate Technology Regulatory Council [ITRC]. 2020. Incremental Sampling Methodology Update. https://ism-2.itrcweb.org/

Lechner M, Knapp H. 2011. Carryover of Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) from soil to plant and distribution to the different plant compartments studied in cultures of carrots (Daucus carota ssp. Sativus), potatoes (Solanum tuberosum), and cucumbers (Cucumis Sativus). Journal of Agricultural and Food Chemistry. 59(20): 11011-11018.

Levasseur JL, Hammel SC, Hoffman K, Phillips AL, Zhang S, Ye X, Calafat AC, Webster TF, Stapleton HM. 2021. Young children's exposure to phenols in the home: Associations between house dust, hand wipes, silicone wristbands, and urinary biomarkers. Environment International (147). https://doi.org/10.1016/j.envint.2020.106317

Liu Z, Lu Y, Song X, Jones K, Sweetman AJ. Johnson AC, Zhang M, Lu X, Su C. 2019. Multiple crop bioaccumulation and human exposure of perfluoroalkyl substances around a mega fluorochemical industrial park, China: Implication for planting optimization and food safety. Environ Int. 127: 671-684

Minnesota Department of Health [MDH]. 2010. House Dust Field Sampling Protocol for Perfluorochemical (PFC) Analysis.

National Children's Study. n.d. Environmental Vacuum Bag Dust Technician Collect SOP V1.0.
National Institute of Environmental Health Sciences. 2016. Perfluorinated Chemicals (PFCs). National Institutes of Health, Research Triangle Park, NC.

Navarro I, de la Torre A, Sanz P, Porcel MÁ, Pro J, Carbonell G, de los Angeles Martínez M. 2017. Uptake of perfluoroalkyl substances and halogenated flame retardants by crop plants grown in biosolids-amended soils. Environmental Research. 152: 199-206.

Roth J, Abusallout I, Hill T, Holton C, Thapa U, Hanigan D. 2020. Release of volatile per- and polyfluoroalkyl substances from aqueous film-forming foam. Environ. Sci. Technol. Lett. 7:164−170. https://pubs.acs.org/doi/suppl/10.1021/acs.estlett.0c00052/suppl_file/ez0c00052_si_001.pdf

Scher, D.P., Kelly, J.E., Huset, C.A., Barry, K.M., Hoffbeck, R.W., Yingling, V.L., and Messing, R.B. (2018) Occurrence of perfluoroalkyl substances (PFAS) in garden produce at homes with a history of PFAS-contaminated drinking water. Chemosphere. 196: 548-555

U.S. Environmental Protection Agency [EPA]. 2017. Field Collection Standard Operating Procedures (SOPs) for an EPA Pilot Study Evaluating Personal, Housing, and Community Factors Influencing Children's Potential Exposures to Indoor Contaminants at Various Lifestages (EPA Pilot Study Add-On to the Green Housing Study). [SOP for Collection of Indoor Air Samples using Active Samplers]. Office of Research and Development. https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=335764&Lab=NERL

Wen, B., Wu, Y., Zhang, H., Liu, Y., Hu, X., Huang, H., and Zhang, S. (2016) The roles of protein and lipid in the accumulation and distribution of perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA) in plants grown in biosolids-amended soils. Environmental Pollution. 216: 682-688

Appendix D.1 Household Environmental Sample Collection Form – Dust Sampling

Form Approved
OMB No. 0923-0048
Exp. Date 04/30/2021

Date and Time of Sample Collection: _____

Address of Sample Collection: _____

Dust - Filtered

Indoor **Dust** (Filtered Cassette) 1 (PFAS Sample)– Sample ID _____

Indoor **Dust** (Filtered Cassette) 1 Sample Location Description _____

Indoor **Dust** (Filtered Cassette) 2 (FTOH or TOF Sample)– Sample ID _____
FTOH / TOF (circle one)

Indoor **Dust** (Filtered Cassette) 2 Sample Location Description _____

Indoor **Dust** (Filtered Cassette) – Duplicate Sample ID _____
none / PFAS / FTOH / TOF (circle one)

List of Observations to be made by sample team:

- Housing Type:
  - Detached single family home _____
  - Mobile home _____
  - Apartment/Condo/Townhouse _____
  - Detached duplex home _____
  - Other: _____
- Number of floors in home: _____
- Number of bedrooms in home: _____
- General condition of the home (e.g., peeling paint): Good ___ Fair ___ Poor ___
- Home cleanliness: Very clean ___ Moderately clean ___ Not clean ___
- Household clutter: Little clutter ___ Moderately cluttered ___ Very cluttered ___

- Material used for the kitchen counters: _____

- General age and condition of the soft furniture in the home:

  New/pristine _____ Typical _____ Old/worn _____

- Approximate percentage of floor types in room(s) where filter dust samples are collected:

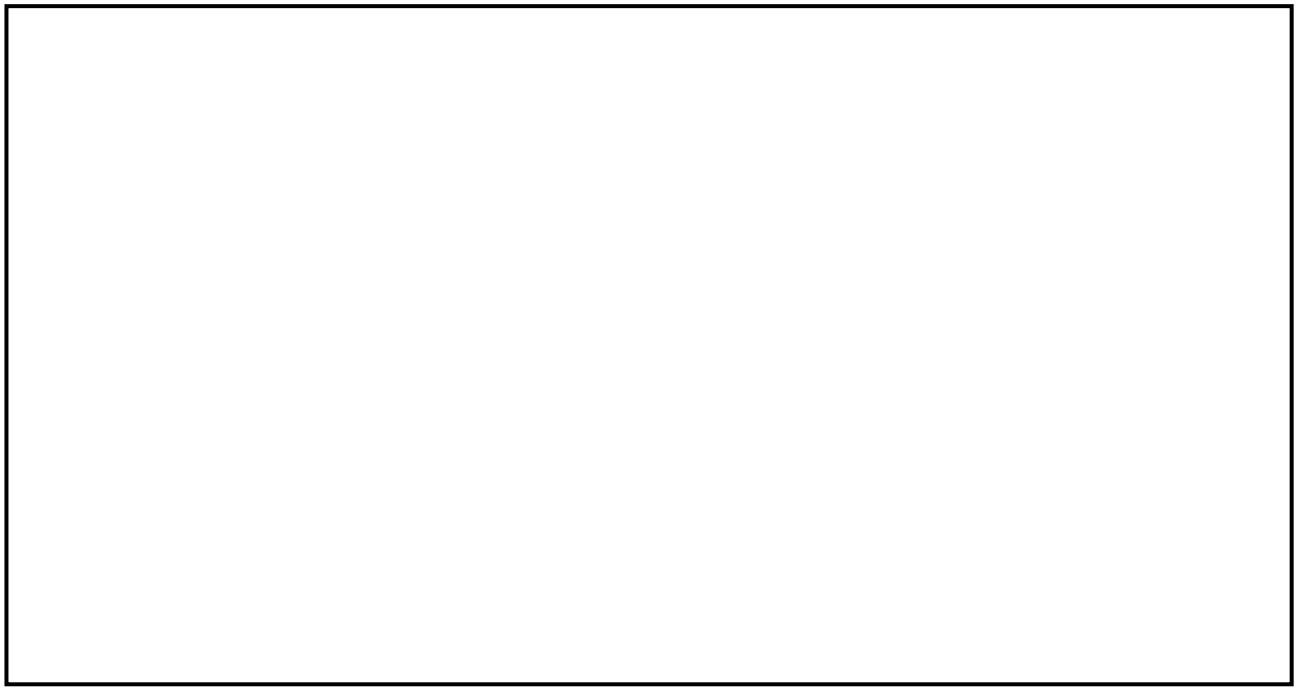
	Room 1	Room 2
Hardwood	_____%	_____%
Tile	_____%	_____%
Laminate	_____%	_____%
Carpet	_____%	_____%
Vinyl	_____%	_____%
Other: _____	_____%	_____%

- Number of total person-seats of fabric covered and/or upholstered furniture in room(s) where filter dust samples are collected:

  Room 1 _____
  Room 2 _____

Data Collection Technician: _____ _____
Printed Name Signature

Sketch Location of Filtered Dust Collected Inside the Home:



Notes:

Appendix D.2 Household Environmental Sample Collection Form – Robust Sampling

Form Approved
OMB No. 0923-0048
Exp. Date 04/30/2022

Date and Time of Sample Collection: _____

Address of Sample Collection: _____

Samples Collected

Indoor Air

Indoor **Air** – Sample ID _____

Indoor **Air** Sample Location Description _____

Indoor **Air** Sample Start Date/Time _____

Indoor **Air** Sample End Date/Time _____

Flow Rate Data

Measurement 1_____

Measurement 2_____

Measurement 3_____

Average_____

Indoor **Air** Duplicate Sample Start Time _____

Indoor **Air** Sample End Date/Time _____

Flow Rate Data _____

Measurement 1_____

Measurement 2_____

Measurement 3_____

Average_____

Indoor Air Humidity (%) _____

Indoor Air Temperature (°F) _____

Dust - Filtered

Indoor **Dust** (Filtered Cassette) 1 (PFAS Sample)– Sample ID _____

Indoor **Dust** (Filtered Cassette) 1 Sample Location Description _____

Indoor **Dust** (Filtered Cassette) 2 (FTOH or TOF Sample)– Sample ID _____
FTOH / TOF (circle one)

Indoor **Dust** (Filtered Cassette) 2 Sample Location Description _____

Indoor **Dust** (Filtered Cassette) – Duplicate Sample ID _____
none / PFAS / FTOH / TOF (circle one)

Dust - Bulk

Indoor **Dust** (Bulk) – Sample ID _____

Indoor **Dust** (Bulk) Sample Description (indicate vacuum type) _____

Indoor **Dust** (Bulk) – Duplicate Sample ID_____

Surface Wipe

Location #1 Surface Wipe Location Description _____

Location #1 Surface Wipe #1 – Sample ID _____

Location #1 Surface Wipe #2 – Sample ID _____

Location #1 Surface Wipe #3 – Sample ID _____

Location #1 Surface Wipe #4 – Sample ID _____

Location #1 Surface Wipe Duplicate – Sample ID _____

Location #2 Surface Wipe Location Description _____

Location #2 Surface Wipe #1 – Sample ID _____

Location #2 Surface Wipe #2 – Sample ID _____

Location #2 Surface Wipe #3 – Sample ID _____

Location #2 Surface Wipe #4 – Sample ID _____

Location #2 Surface Wipe Duplicate – Sample ID _____

Soil

ISM Soil – Sample ID _____

ISM Soil Sample Location Description (e.g., the corners of the decision unit)

_____

ISM Soil – Replicate Sample #1 ID _____

ISM Soil Replicate Sample #1 Location Description (relative to the original sample)

_____

ISM Soil – Replicate Sample #2 ID _____

ISM Soil Replicate Sample #2 Location Description (relative to the original sample)

_____

Silicone Wristbands

Wristband for PFAS Sampling – Sample ID#1 _____

Wristband for FTOH or TOF Sampling – Sample ID#2 _____ FTOH / TOF (circle one)

List of Observations to be made by sample team:

Observations to be made in all EI homes:

- Housing Type:
  - Detached single family home _____
  - Mobile home _____
  - Apartment/Condo/Townhouse _____
  - Detached duplex home _____
  - Other: _____
- Number of floors in home: _____
- Number of bedrooms in home: _____
- General condition of the home (e.g., peeling paint): Good ___ Fair ___ Poor ___
- Material used for the kitchen counters: _____
- General age and condition of the soft furniture in the home:

  New/pristine _____ Typical _____ Old/worn _____
- Approximate percentage of floor types in room(s) where filter dust samples are collected:

	Room 1	Room 2
Hardwood	_____%	_____%
Tile	_____%	_____%
Laminate	_____%	_____%
Carpet	_____%	_____%
Vinyl	_____%	_____%
Other: _____	_____%	_____%

- Number of total person-seats of fabric covered and/or upholstered furniture in room(s) where filter dust samples are collected:
  - Room 1 _____
  - Room 2 _____

Additional observations to be made in homes with indoor air and soil sampling:

- Estimated height of ceilings: _____ft
- Does the home have a fan coil for air conditioning (indicating central air conditioning):
  Yes_____ No_____
- Does the home have air conditioning units in a window: Yes_____ No_____
- If Household Question Q13 is not answered, estimate home square footage of living space from interior or exterior measurements, if feasible.
  Estimated square footage: _____ft2

- Does the home have a basement: Yes ____ No _____
  If yes, is the basement used as living space: All ____ Some _____ None _____
  If yes, what is the approximate percentage square footage as compared to the floor above:
  _____

- Does the home have an attic: Yes ____ No _____
  If yes, is the basement used as living space: All ____ Some _____ None _____
  If yes, what is the approximate percentage square footage as compared to the floor below:
  _____

- Describe type, extent, and estimated distance from participant home for trees, buildings, or other possible sheltering on each side of the home, including estimated height or number of building stories (*this information may be entered on the building sketch*):
  Side 1:_____
  Side 2:_____
  Side 3: _____
  Side 4:_____

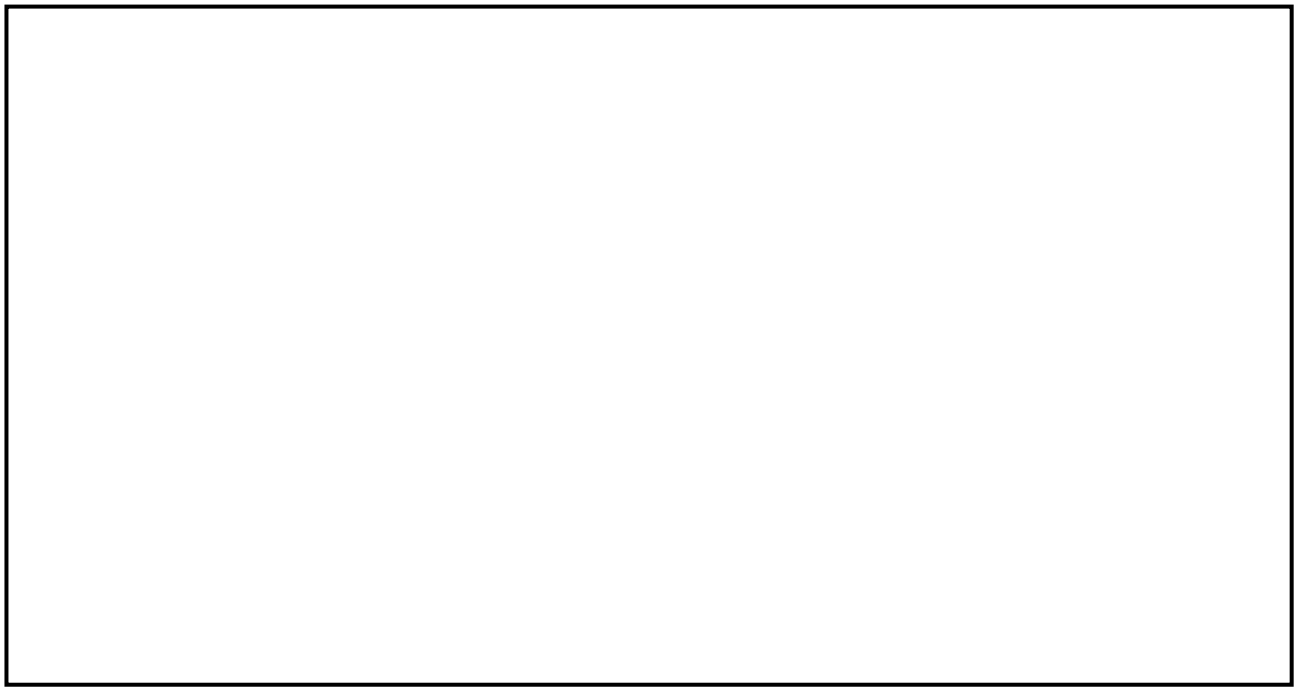
- What siding materials are used on the exterior of the home:
  Brick
  Vinyl
  Wood
  Cement board
  Stucco
  Shingles
  Other: _____

- What is the overall condition of the siding: Good ___ Fair ___ Poor ___

Data Collection Technician: _____ _____

Printed Name Signature

Sketch Location of Filtered Dust, Surface Wipe, and Air Samples Collected Inside the Home:



Sketch Decision Unit for ISM Soil Sample with Grid Lines:

Notes:

Outdoor Air Sampling Form

Sample Location Description_____

Sample 1: Low Flow Sample – 7 day

Outdoor **Air** – Sample ID _____

Outdoor **Air** Sample Start Date/Time _____

Outdoor **Air** Sample End Date/Time _____

Flow Rate Data _____

Outdoor Air Humidity (%) _____

Outdoor Air Temperature (°F) _____

Sample 1: Low Flow Sample – 7 day

Outdoor **Air** – Sample ID _____

Outdoor **Air** Sample Start Date/Time _____

Outdoor **Air** Sample End Date/Time _____

Flow Rate Data _____

Outdoor Air Humidity (%) _____

Outdoor Air Temperature (°F) _____

Sample 1: High Flow Sample – 7 day

Outdoor **Air** – Sample ID _____

Outdoor **Air** Sample Start Date/Time _____

Outdoor **Air** Sample End Date/Time _____

Flow Rate Data _____

Outdoor Air Humidity (%) _____

Outdoor Air Temperature (°F) _____

Produce Sample Collection Form

Sample Number	Sample ID	Date and Time of Sample Collection	Sample Description (type of produce, where grown, organic / not organic)	Market Name/Location	Notes (packaging information)

Appendix D.3 Analyte List and Method Detection Limits (MDLs)

Matrix	Method Description	Analyte Description	CAS Number	MDL	Units
Solids	537 Modified	Perfluorobutanoic acid (PFBA)	375-22-4	0.0280	ug/Kg
Solids	537 Modified	Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0770	ug/Kg
Solids	537 Modified	Perfluorohexanoic acid (PFHxA)	307-24-4	0.0420	ug/Kg
Solids	537 Modified	Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0290	ug/Kg
Solids	537 Modified	Perfluorooctanoic acid (PFOA)	335-67-1	0.0860	ug/Kg
Solids	537 Modified	Perfluorononanoic acid (PFNA)	375-95-1	0.0360	ug/Kg
Solids	537 Modified	Perfluorodecanoic acid (PFDA)	335-76-2	0.0220	ug/Kg
Solids	537 Modified	Perfluoroundecanoic acid (PFUnA)	2058-94-8	0.0360	ug/Kg
Solids	537 Modified	Perfluorododecanoic acid (PFDoA)	307-55-1	0.0670	ug/Kg
Solids	537 Modified	Perfluorotridecanoic acid (PFTrA)	72629-94-8	0.0510	ug/Kg
Solids	537 Modified	Perfluorotetradecanoic acid (PFTA)	376-06-7	0.0540	ug/Kg
Solids	537 Modified	Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.0440	ug/Kg
Solids	537 Modified	Perfluorooctadecanoic acid (PFODA)	16517-11-6	0.0280	ug/Kg
Solids	537 Modified	Perfluorobutanesulfonic acid (PFBS)	375-73-5	0.0250	ug/Kg
Solids	537 Modified	Perfluoropentanesulfonic acid (PFPeS)	2706-91-4	0.0200	ug/Kg
Solids	537 Modified	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.0310	ug/Kg
Solids	537 Modified	Perfluoroheptanesulfonic acid (PFHpS)	375-92-8	0.0350	ug/Kg
Solids	537 Modified	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.200	ug/Kg
Solids	537 Modified	Perfluorononanesulfonic acid (PFNS)	68259-12-1	0.0200	ug/Kg
Solids	537 Modified	Perfluorodecanesulfonic acid (PFDS)	335-77-3	0.0390	ug/Kg
Solids	537 Modified	Perfluorododecanesulfonic acid (PFDoS)	79780-39-5	0.0600	ug/Kg
Solids	537 Modified	Perfluorooctanesulfonamide (PFOSA)	754-91-6	0.0820	ug/Kg
Solids	537 Modified	N-Methyl perfluorooctanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.390	ug/Kg
Solids	537 Modified	N-Ethyl perfluorooctanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.370	ug/Kg
Solids	537 Modified	4:2 Fluorotelomer sulfonic acid (FtS 4:2)	757124-72-4	0.370	ug/Kg
Solids	537 Modified	6:2 Fluorotelomer sulfonic acid (FtS 6:2)	27619-97-2	0.150	ug/Kg
Solids	537 Modified	8:2 Fluorotelomer sulfonic acid (FtS 8:2)	39108-34-4	0.250	ug/Kg

Solids	537 Modified	10:2 Fluorotelomer sulfonic acid (FtS 10:2)	120226-60-0	0.0500	ug/Kg
Solids	537 Modified	N-Ethylperfluorooctanesulfonamide (N-EtFOSA)	4151-50-2	0.0240	ug/Kg
Solids	537 Modified	N-Methylperfluorooctanesulfonamide (N-MeFOSA)	31506-32-8	0.0410	ug/Kg
Solids	537 Modified	N-Methyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide (N-MeFOSE)	24448-09-7	0.0710	ug/Kg
Solids	537 Modified	N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide (N-EtFOSE)	1691-99-2	0.0360	ug/Kg
Solids	537 Modified	Hexafluoropropylene oxide dimer acid (HFPO-DA)	13252-13-6	0.110	ug/Kg
Solids	537 Modified	Perfluoro(2-((6-chlorohexyl)oxy)ethanesulfonic acid) (9Cl-PF3ONS)	756426-58-1	0.0270	ug/Kg
Solids	537 Modified	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	763051-92-9	0.0220	ug/Kg
Solids	537 Modified	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	0.0180	ug/Kg
Solids	537 Modified	3:3 Fluorotelomer carboxylic acid (3:3 FTCA)	356-02-5	0.0410	ug/Kg
Solids	537 Modified	5:3 Fluorotelomer carboxylic acid (5:3 FTCA)	914637-49-3	0.0380	ug/Kg
Solids	537 Modified	7:3-Fluorotelomer carboxylic acid (7:3 FTCA)	812-70-4	0.0410	ug/Kg
Solids	537 Modified	6:2 Fluorotelomer carboxylic acid (6:2 FTCA)	53826-12-3	0.100	ug/Kg
Solids	537 Modified	6:2 FTUCA	70887-88-6	0.0710	ug/Kg
Solids	537 Modified	8:2 Fluorotelomer carboxylic acid (8:2 FTCA)	27854-31-5	0.4000	ug/Kg
Solids	537 Modified	8:2 FTUCA	70887-84-2	0.0270	ug/Kg
Solids	537 Modified	10:2 Fluorotelomer carboxylic acid (10:2 FTCA)	53826-13-4	0.0250	ug/Kg
Solids	537 Modified	10:2 FTUCA	70887-94-4	0.0490	ug/Kg
Solids	537 Modified	Perfluoro(perfluoroethyl)cyclohexanesulfonic acid (PFecHS)	133201-07-7	0.0440	ug/Kg
Solids	537 Modified	Perfluoropropanesulfonic acid (PFPrS)	423-41-6	0.0300	ug/Kg
Solids	537 Modified	Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	151772-58-6	0.0400	ug/Kg
Solids	537 Modified	Perfluoro(4-methoxybutanoic) acid (PFMBA)	863090-89-5	0.0450	ug/Kg
Solids	537 Modified	Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	0.0240	ug/Kg

Solids	537 Modified	Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	113507-82-7	0.0320	ug/Kg
Solids	537 Modified	Perfluoro-2-methoxyacetic acid (PFMOAA)	674-13-5	0.0210	ug/Kg
Solids	537 Modified	Perfluoro-6-methyl-5-oxaheptanoic acid (PFPE-1)	801212-59-9	0.0350	ug/Kg
Solids	537 Modified	Perfluoro-3,5,7,9-butaoxadecanoic acid (PFO4DA)	39492-90-5	0.0460	ug/Kg
Solids	537 Modified	Perfluoro-3,5,7-trioxaoctanoic acid (PFO3OA)	39492-89-2	0.0400	ug/Kg
Solids	537 Modified	Perfluoro-3,5-dioxahexanoic acid (PFO2HxA)	39492-88-1	0.0580	ug/Kg
Solids	537 Modified	Perfluoro-3,5,7,9,11-pentaoxadodecanoic acid (PFO5DA)	39492-91-6	0.0680	ug/Kg
Solids	537 Modified	Perfluoromethoxypropionic acid (PMPA)	13140-29-9	0.0300	ug/Kg
Solids	537 Modified	Perfluoro-2-ethoxypropanoic acid (PEPA)	267239-61-2	0.0520	ug/Kg
Solids	537 Modified	MTP	93449-21-9	0.0990	ug/Kg
Solids	537 Modified	Perfluoropropanoic acid (PFPrA)	422-64-0	0.0290	ug/Kg
Solids	537 Modified	4-(2-Carboxy-1,1,2,2-tetrafluoroethoxy)-perfluoropentanoic acid (R-EVE)	2416366-22-6	0.0440	ug/Kg
Solids	537 Modified	(1,1,2,2-Tetrafluoro-2-(1,2,2,2-tetrafluoroethoxy)ethane-1-sulfonic acid) (NVHOS)	801209-99-4	0.140	ug/Kg
Solids	537 Modified	Hydro-EVE acid (Hydro-EVE)	773804-62-9	0.0290	ug/Kg
Solids	537 Modified	EVE Acid	69087-46-3	0.0140	ug/Kg
Solids	537 Modified	R-PSDA (Byproduct 4)	2416366-18-0	0.0520	ug/Kg
Solids	537 Modified	Hydrolyzed PSDA (Byproduct 5)	2416366-19-1	0.0670	ug/Kg
Solids	537 Modified	R-PSDCA	2416366-21-5	0.102	ug/Kg
Solids	537 Modified	PS Acid	29311-67-9	0.00800	ug/Kg
Solids	537 Modified	Hydro-PS Acid	749836-20-2	0.0480	ug/Kg
Solids	FTOH by GCMSMS	10:2 Fluorotelomer alcohol (10:2 FTOH)	865-86-1	10.0	ng/g
Solids	FTOH by GCMSMS	8:2 Fluorotelomer alcohol (8:2 FTOH)	678-39-7	10.0	ng/g
Solids	FTOH by GCMSMS	7:2 sFluorotelomer alcohol (7:2 sFTOH)	24015-83-6	10.0	ng/g
Solids	FTOH by GCMSMS	6:2 Fluorotelomer alcohol (6:2 FTOH)	647-42-7	10.0	ng/g
Solids	FTOH by GCMSMS	4:2 Fluorotelomer alcohol (4:2 FTOH)	2043-47-2	10.0	ng/g
Solids	Extractable Organic Flourine (EOF)	Extractable Organic Flourine (EOF)	7782-41-4	2.00	mg/Kg

Wipes	537 Modified	Perfluorobutanoic acid (PFBA)	375-22-4	0.14	ug/wipe
Wipes	537 Modified	Perfluoropentanoic acid (PFPeA)	2706-90-3	0.385	ug/wipe
Wipes	537 Modified	Perfluorohexanoic acid (PFHxA)	307-24-4	0.21	ug/wipe
Wipes	537 Modified	Perfluoroheptanoic acid (PFHpA)	375-85-9	0.145	ug/wipe
Wipes	537 Modified	Perfluorooctanoic acid (PFOA)	335-67-1	0.43	ug/wipe
Wipes	537 Modified	Perfluorononanoic acid (PFNA)	375-95-1	0.18	ug/wipe
Wipes	537 Modified	Perfluorodecanoic acid (PFDA)	335-76-2	0.11	ug/wipe
Wipes	537 Modified	Perfluoroundecanoic acid (PFUnA)	2058-94-8	0.18	ug/wipe
Wipes	537 Modified	Perfluorododecanoic acid (PFDoA)	307-55-1	0.335	ug/wipe
Wipes	537 Modified	Perfluorotridecanoic acid (PFTrA)	72629-94-8	0.255	ug/wipe
Wipes	537 Modified	Perfluorotetradecanoic acid (PFTA)	376-06-7	0.27	ug/wipe
Wipes	537 Modified	Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.22	ug/wipe
Wipes	537 Modified	Perfluorooctadecanoic acid (PFODA)	16517-11-6	0.14	ug/wipe
Wipes	537 Modified	Perfluorobutanesulfonic acid (PFBS)	375-73-5	0.125	ug/wipe
Wipes	537 Modified	Perfluoropentanesulfonic acid (PFPeS)	2706-91-4	0.1	ug/wipe
Wipes	537 Modified	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.155	ug/wipe
Wipes	537 Modified	Perfluoroheptanesulfonic acid (PFHpS)	375-92-8	0.175	ug/wipe
Wipes	537 Modified	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1	ug/wipe
Wipes	537 Modified	Perfluorononanesulfonic acid (PFNS)	68259-12-1	0.1	ug/wipe
Wipes	537 Modified	Perfluorodecanesulfonic acid (PFDS)	335-77-3	0.195	ug/wipe
Wipes	537 Modified	Perfluorododecanesulfonic acid (PFDoS)	79780-39-5	0.3	ug/wipe
Wipes	537 Modified	Perfluorooctanesulfonamide (PFOSA)	754-91-6	0.41	ug/wipe
Wipes	537 Modified	N-Methyl perfluorooctanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	1.95	ug/wipe

Wipes	537 Modified	N-Ethyl perfluorooctanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	1.85	ug/wipe
Wipes	537 Modified	4:2 Fluorotelomer sulfonic acid (FtS 4:2)	757124-72-4	1.85	ug/wipe
Wipes	537 Modified	6:2 Fluorotelomer sulfonic acid (FtS 6:2)	27619-97-2	0.75	ug/wipe
Wipes	537 Modified	8:2 Fluorotelomer sulfonic acid (FtS 8:2)	39108-34-4	1.25	ug/wipe
Wipes	537 Modified	10:2 Fluorotelomer sulfonic acid (FtS 10:2)	120226-60-0	0.25	ug/wipe
Wipes	537 Modified	N-Ethylperfluorooctanesulfonamide (N-EtFOSA)	4151-50-2	0.12	ug/wipe
Wipes	537 Modified	N-Methylperfluorooctanesulfonamide (N-MeFOSA)	31506-32-8	0.205	ug/wipe
Wipes	537 Modified	N-Methyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide (N-MeFOSE)	24448-09-7	0.355	ug/wipe
Wipes	537 Modified	N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide (N-EtFOSE)	1691-99-2	0.18	ug/wipe
Wipes	537 Modified	Hexafluoropropylene oxide dimer acid (HFPO-DA)	13252-13-6	0.55	ug/wipe
Wipes	537 Modified	Perfluoro(2-((6-chlorohexyl)oxy)ethanesulfonic acid) (9Cl-PF3ONS)	756426-58-1	0.135	ug/wipe
Wipes	537 Modified	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	763051-92-9	0.11	ug/wipe
Wipes	537 Modified	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	0.09	ug/wipe
Wipes	537 Modified	3:3 Fluorotelomer carboxylic acid (3:3 FTCA)	356-02-5	0.205	ug/wipe
Wipes	537 Modified	5:3 Fluorotelomer carboxylic acid (5:3 FTCA)	914637-49-3	0.19	ug/wipe
Wipes	537 Modified	7:3-Fluorotelomer carboxylic acid (7:3 FTCA)	812-70-4	0.21	ug/wipe
Wipes	537 Modified	6:2 Fluorotelomer carboxylic acid (6:2 FTCA)	53826-12-3	0.5	ug/wipe
Wipes	537 Modified	6:2 FTUCA	70887-88-6	0.355	ug/wipe
Wipes	537 Modified	8:2 Fluorotelomer carboxylic acid (8:2 FTCA)	27854-31-5	0.2	ug/wipe
Wipes	537 Modified	8:2 FTUCA	70887-84-2	0.135	ug/wipe
Wipes	537 Modified	10:2 Fluorotelomer carboxylic acid (10:2 FTCA)	53826-13-4	0.125	ug/wipe
Wipes	537 Modified	10:2 FTUCA	70887-94-4	0.245	ug/wipe

Wipes	537 Modified	Perfluoro(perfluoroethyl)cyclohexanesulfonic acid (PFecHS)	133201-07-7	0.22	ug/wipe
Wipes	537 Modified	Perfluoropropanesulfonic acid (PFPrS)	423-41-6	0.15	ug/wipe
Wipes	537 Modified	Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	151772-58-6	0.2	ug/wipe
Wipes	537 Modified	Perfluoro(4-methoxybutanoic) acid (PFMBA)	863090-89-5	0.225	ug/wipe
Wipes	537 Modified	Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	0.12	ug/wipe
Wipes	537 Modified	Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	113507-82-7	0.16	ug/wipe
Wipes	537 Modified	Perfluoro-2-methoxyacetic acid (PFMOAA)	674-13-5	0.105	ug/wipe
Wipes	537 Modified	Perfluoro-6-methyl-5-oxaheptanoic acid (PFPE-1)	801212-59-9	0.175	ug/wipe
Wipes	537 Modified	Perfluoro-3,5,7,9-butaoxadecanoic acid (PFO4DA)	39492-90-5	0.23	ug/wipe
Wipes	537 Modified	Perfluoro-3,5,7-trioxaoctanoic acid (PFO3OA)	39492-89-2	0.2	ug/wipe
Wipes	537 Modified	Perfluoro-3,5-dioxahexanoic acid (PFO2HxA)	39492-88-1	0.29	ug/wipe
Wipes	537 Modified	Perfluoro-3,5,7,9,11-pentaoxadodecanoic acid (PFO5DA)	39492-91-6	0.34	ug/wipe
Wipes	537 Modified	Perfluoromethoxypropionic acid (PMPA)	13140-29-9	0.15	ug/wipe
Wipes	537 Modified	Perfluoro-2-ethoxypropanoic acid (PEPA)	267239-61-2	0.26	ug/wipe
Wipes	537 Modified	MTP	93449-21-9	0.495	ug/wipe
Wipes	537 Modified	Perfluoropropanoic acid (PFPrA)	422-64-0	0.145	ug/wipe
Wipes	537 Modified	4-(2-Carboxy-1,1,2,2-tetrafluoroethoxy)-perfluoropentanoic acid (R-EVE)	2416366-22-6	0.22	ug/wipe
Wipes	537 Modified	(1,1,2,2-Tetrafluoro-2-(1,2,2,2-tetrafluoroethoxy)ethane-1-sulfonic acid) (NVHOS)	801209-99-4	0.7	ug/wipe
Wipes	537 Modified	Hydro-EVE acid (Hydro-EVE)	773804-62-9	0.145	ug/wipe
Wipes	537 Modified	EVE Acid	69087-46-3	0.07	ug/wipe
Wipes	537 Modified	R-PSDA (Byproduct 4)	2416366-18-0	0.26	ug/wipe
Wipes	537 Modified	Hydrolyzed PSDA (Byproduct 5)	2416366-19-1	0.335	ug/wipe
Wipes	537 Modified	R-PSDCA	2416366-21-5	0.51	ug/wipe

Wipes	537 Modified	PS Acid	29311-67-9	0.04	ug/wipe
Wipes	537 Modified	Hydro-PS Acid	749836-20-2	0.24	ug/wipe
Wipes	FTOH by GCMSMS	10:2 Fluorotelomer alcohol (10:2 FTOH)	865-86-1	50	ug/wipe
Wipes	FTOH by GCMSMS	8:2 Fluorotelomer alcohol (8:2 FTOH)	678-39-7	50	ug/wipe
Wipes	FTOH by GCMSMS	7:2 sFluorotelomer alcohol (7:2 sFTOH)	24015-83-6	50	ug/wipe
Wipes	FTOH by GCMSMS	6:2 Fluorotelomer alcohol (6:2 FTOH)	647-42-7	50	ug/wipe
Wipes	FTOH by GCMSMS	4:2 Fluorotelomer alcohol (4:2 FTOH)	2043-47-2	50	ug/wipe
Wipes	Extractable Organic Flourine (EOF)	Extractable Organic Flourine (EOF)	7782-41-4	10	ug/wipe
Air	537 Modified	Perfluorobutanoic acid (PFBA)	375-22-4	0.750	ng/Sample
Air	537 Modified	Perfluoropentanoic acid (PFPeA)	2706-90-3	0.750	ng/Sample
Air	537 Modified	Perfluorohexanoic acid (PFHxA)	307-24-4	0.750	ng/Sample
Air	537 Modified	Perfluoroheptanoic acid (PFHpA)	375-85-9	0.750	ng/Sample
Air	537 Modified	Perfluorooctanoic acid (PFOA)	335-67-1	0.750	ng/Sample
Air	537 Modified	Perfluorononanoic acid (PFNA)	375-95-1	0.750	ng/Sample
Air	537 Modified	Perfluorodecanoic acid (PFDA)	335-76-2	0.750	ng/Sample
Air	537 Modified	Perfluoroundecanoic acid (PFUnA)	2058-94-8	0.750	ng/Sample
Air	537 Modified	Perfluorododecanoic acid (PFDoA)	307-55-1	0.750	ng/Sample
Air	537 Modified	Perfluorotridecanoic acid (PFTrA)	72629-94-8	0.750	ng/Sample
Air	537 Modified	Perfluorotetradecanoic acid (PFTA)	376-06-7	0.750	ng/Sample
Air	537 Modified	Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.750	ng/Sample
Air	537 Modified	Perfluorooctadecanoic acid (PFODA)	16517-11-6	0.750	ng/Sample
Air	537 Modified	Perfluorobutanesulfonic acid (PFBS)	375-73-5	0.750	ng/Sample
Air	537 Modified	Perfluoropentanesulfonic acid (PFPeS)	2706-91-4	0.750	ng/Sample
Air	537 Modified	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.750	ng/Sample

Air	537 Modified	Perfluoroheptanesulfonic acid (PFHpS)	375-92-8	0.750	ng/Sample
Air	537 Modified	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.750	ng/Sample
Air	537 Modified	Perfluorononanesulfonic acid (PFNS)	68259-12-1	0.750	ng/Sample
Air	537 Modified	Perfluorodecanesulfonic acid (PFDS)	335-77-3	0.750	ng/Sample
Air	537 Modified	Perfluorododecanesulfonic acid (PFDoS)	79780-39-5	0.750	ng/Sample
Air	537 Modified	Perfluorooctanesulfonamide (PFOSA)	754-91-6	0.750	ng/Sample
Air	537 Modified	N-Ethylperfluorooctanesulfonamide (N-EtFOSA)	4151-50-2	0.750	ng/Sample
Air	537 Modified	N-Methylperfluorooctanesulfonamide (N-MeFOSA)	31506-32-8	0.750	ng/Sample
Air	537 Modified	N-Methyl perfluorooctanesulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.750	ng/Sample
Air	537 Modified	N-Ethyl perfluorooctanesulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.750	ng/Sample
Air	537 Modified	N-Methyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide (N-MeFOSE)	24448-09-7	0.750	ng/Sample
Air	537 Modified	N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide (N-EtFOSE)	1691-99-2	0.750	ng/Sample
Air	537 Modified	4:2 Fluorotelomer sulfonic acid (FtS 4:2)	757124-72-4	0.750	ng/Sample
Air	537 Modified	6:2 Fluorotelomer sulfonic acid (FtS 6:2)	27619-97-2	0.750	ng/Sample
Air	537 Modified	8:2 Fluorotelomer sulfonic acid (FtS 8:2)	39108-34-4	0.750	ng/Sample
Air	537 Modified	10:2 Fluorotelomer sulfonic acid (FtS 10:2)	120226-60-0	0.750	ng/Sample
Air	537 Modified	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	0.750	ng/Sample
Air	537 Modified	Hexafluoropropylene oxide dimer acid (HFPO-DA)	13252-13-6	0.750	ng/Sample
Air	537 Modified	Perfluoro(2-((6-chlorohexyl)oxy)ethanesulfonic acid) (9Cl-PF3ONS)	756426-58-1	0.750	ng/Sample
Air	537 Modified	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	763051-92-9	0.750	ng/Sample
Air	FTOH by GCMSMS	10:2 Fluorotelomer alcohol (10:2 FTOH)	865-86-1	0.3 (estimated)	ng/Sample

Air	FTOH by GCMSMS	8:2 Fluorotelomer alcohol (8:2 FTOH)	678-39-7	0.3 (estimated)	ng/Sample
Air	FTOH by GCMSMS	6:2 Fluorotelomer alcohol (6:2 FTOH)	647-42-7	0.3 (estimated)	ng/Sample
Air	FTOH by GCMSMS	4:2 Fluorotelomer alcohol (4:2 FTOH)	2043-47-2	0.15 (estimated)	ng/Sample

Appendix E: Health and Safety Plan and COVID-19 Precautions

Introduction

This Site Health and Safety Plan (SHSP) defines applicability and responsibility regarding compliance with the Agency for Toxic Substances and Disease Registry (ATSDR) Health and Safety Program for Hazardous Substance Field Activities.

This SHSP defines site requirements and protocol applicable during all activities. It extends to all CDC/ATSDR employees, CDC/ATSDR contractors, and site visitors invited by CDC/ATSDR.

Site emergency response procedures and any potential fire, explosion, health, or safety hazards of the operation must be communicated to all personnel. Noncompliance with site safety procedures will not be tolerated. Personnel not observing safety procedures could be suspended from participation in site activities.

Development of this plan included consideration of current safety standards and recommendations as defined by the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), the American Conference of Governmental Industrial Hygienists (ACGIH), health effects and standards for known contaminants, and procedures designed to account for potential exposure to unknown substances.

Personnel Training Requirements

All site personnel will be trained in accordance with the requirements contained in the CDC/ATSDR Mandatory Training Requirements. At a minimum, all personnel will be trained to recognize on-site hazards, the provisions of this SHSP, and identification of responsible personnel.

All personnel are required to complete the following training courses:

- Safety Survival Skills Part 1 - General Responsibilities
- Personal Protective Equipment Training
- Human Research Protections Training
- First aid/CPR/Automated External Defibrillator (AED) Training

All site personnel and agents (on-site contractors, fellows, and others appointed or retained to work under the auspices of CDC) who intend to collection information from human subjects must have a Scientific Ethics Verification (SEV) number.

Emergency Procedures

On-site personnel will use the following standard emergency procedures. Notify the site lead of any on-site emergencies. The site lead is responsible for ensuring that appropriate emergency procedures are followed.

Personal Injury

When an injury occurs the site lead will assess its nature. A qualified first aid provider should initiate appropriate first aid and continue appropriate emergency medical services. If necessary, injured personnel will be transported to a local area hospital.

Natural Hazards

The site lead has responsibility for safety of CDC/ATSDR personnel if natural hazards (e.g., thunderstorms, tornadoes, hurricanes, etc.) occur. The site lead will inform personnel of current and impending weather conditions.

Equipment Failure

If any site worker experiences a protective equipment failure or alteration that affects the protection factor, that person shall immediately wash hands as needed and replace the failed equipment.

If any other on-site equipment fails to operate properly, the site lead shall be notified and will then determine the effect of this failure on continuing operations at the site.

COVID-19 Precautions

The environmental sampling Exposure Investigation (EI) includes collecting environmental samples at the homes of PFAS EA participants. Current CDC, state and local COVID-19 recommendation and guidance for each community (Hampden County MA and New Castle County, DE) will be implemented at the time of sampling.

Objectives

- minimize risk of exposure, illness, and spread of disease among staff conducting the environmental sampling for PFAS; and
- minimize risk of exposure, illness, and spread of disease for participants during environmental sampling for PFAS.

Staffing:

Staff travel for the environmental sampling EI activities will be voluntary. Staff will be briefed on their potential role as well as risks prior to travel and will be given the opportunity to opt out of any travel. Staff will be provided with clear information about updated procedures and PPE requirements. All PPE will be provided to staff prior to initiation of activities. Staff will have an opportunity to ask questions about the PPE requirements

as well as any risk factors they have. Staff with increased risk factors including age and pre-existing conditions will be encouraged not to travel for field work.

Environmental Sample Collection:

Participants will be informed of screening and protective procedures at the time appointments are scheduled. Staff will confirm that there are no individuals with COVID-19 symptoms in the house before entering. Staff will briefly and sensitively confirm that no individuals on the staff team have symptoms, they are wearing PPE to protect themselves and the household residents, and any other COVID-19 infection control measures they are taking to ensure protection of the household residents. If a resident exhibits symptoms, staff will recommend they consult with their primary care provider and then leave the home. Informed consent will be obtained outside the home without entering. Staff will wear appropriate PPE as directed by OSSAM for entering participant homes. The number of staff entering the home and duration spent inside will be minimized. All equipment preparation and disassembly will be conducted prior to entry or after leaving the home.

Travel

During travel staff will be directed to the considerations at https://www.cdc.gov/covid/?CDC_AAref_Val=https://www.cdc.gov/coronavirus/2019-ncov/travelers/travel-in-the-us.html. Staff will also be provided with the guidance below.

Protect yourself and others during your trip:

- Clean your hands often.
    - Wash your hands often with soap and water for at least 20 seconds especially after you have been in a public place, or after blowing your nose, coughing, or sneezing.
    - If soap and water are not readily available, use a hand sanitizer that contains at least 60% alcohol. Cover all surfaces of your hands and rub your hands together until they feel dry.
- Avoid touching your eyes, nose, and mouth.
- Avoid close contact with others.
    - Keep 6 feet of physical distance from others.
    - Avoiding close contact is especially important if you are at higher risk of getting very sick from COVID-19.
- Wear a cloth face covering in public.
- Cover coughs and sneezes.
- Pick up food at drive-throughs, curbside restaurant service, or stores. Do not dine in restaurants if that is prohibited by state or local guidance.

When staying in a hotel:

- Take the same steps you would in other public places—for example, avoid close contact with others, wash your hands often, and wear a cloth face covering.
- When you get to your room, clean and disinfect all high-touch surfaces. This includes tables, doorknobs, light switches, countertops, handles, desks, phones, remote controls, toilets, and sink faucets.
    - Bring an EPA-registered disinfectant and other personal cleaning supplies, including cloths and disposable gloves.
- Wash any plates, cups, or silverware (other than pre-wrapped plastic) before using.

Screening of Personnel

All personnel (CDC/ATSDR staff and contractors) will be screened for symptoms prior to travel and twice daily while in the field. CDC/ATSDR staff will be enrolled in TIMS and contractors will report any symptoms to their management daily. Screening will include a temperature check as well as questions about the presence of any symptoms associated with COVID-19. Questions on symptoms will include presence of any of the following:

- Cough
- Shortness of breath or difficulty breathing
- Fever
- Chills
- Muscle pain
- Sore throat
- New loss of taste or smell

If any employee develops symptoms they will be instructed not to come to work, to inform the site lead, and to contact the Occupational Health Clinic (OHC) 404 639 3385 and the CDC/ATSDR site lead. (Contractor staff should inform their supervisor). Site-specific health and safety plans will be developed to include instructions for seeking medical care should any staff develop symptoms while supporting work in the field. If a staff member develops symptoms consistent with COVID-19, we will pause all activities. If the staff member subsequently tests negative, we will consult with CDC and local/state public health before resuming activities.

ATSDR employees will continue to report self-report symptoms in TIMS for 14 days after returning from the field and will follow instructions from the OHC should any symptoms develop.

Protective Measures

Specific environmental sampling EI activities are shown in the table below with recommended PPE, and additional precautions. All PPE for CDC/ATSDR staff will be provided by CDC/ATSDR. Contractor will provide PPE originally required for EAs, CDC/ATSDR will provide additional PPE as needed from the table below.

Activity	Description	PPE	Additional Precautions
Travel	Time spent in ride share/public transportation, in airport, on airplane, time spent in public venues while traveling	Cloth face covering or disposable surgical mask	Frequent hand washing https://www.cdc.gov/covid/?CDC_AAref_Val=https://www.cdc.gov/coronavirus/2019-ncov/travelers/travel-in-the-us.html
Environmental sample collection	Entering participant homes, collection of environmental samples and administration of consent forms and questionnaire (outside)	PPE required by OSSAM – minimal PPE will include surgical masks and gloves	Minimize staff entering home to only necessary personnel, confirmation that no members of the household have symptoms prior to entering, hand washing after each home, disinfection of sample collection materials after each home

Campus Access

We need a few staff (including contractors) to have access to Chamblee Building 102 in order to pack and ship supplies. All supplies are stored in the call center and staff will need to be physically present on campus to get these sent out to participants. Staff will also need to access campus to store and access PPE.

Appendix F.1: Letter when only indoor dust was sampled

Date

Address

Dear XX,

Thank you for being a part of the Agency for Toxic Substances and Disease Registry (ATSDR) and U.S. Environmental Protection Agency (EPA) Supplemental Exposure Investigation (EI) at Select PFAS exposure assessment (EA) sites. We are grateful to you for allowing us to collect an indoor dust sample from your home to analyze for per- and polyfluoroalkyl substances (PFAS). This letter gives your test results. You may share these results with others if you would like – it's your choice.

The Results of Your Indoor Dust Test

Table 1 provides a list of all the specific PFAS that we measured in your indoor dust. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

This exposure assessment is one of the first to measure PFAS in indoor dust. Because of this, we cannot tell you what a safe level of PFAS in indoor dust is.

In addition to the samples we took at your home, we also took samples of outdoor air within your community and samples of locally grown produce. The results of these analysis are provided in this letter but are not associated with your home. We will share all our findings with you in our final report.

However, your results will help us to understand how people are exposed to PFAS in indoor dust. We will share our findings with you in our final report.

Table 1: Your PFAS indoor dust levels.

PFAS	Abbreviation	Your Level in µg/kg
perfluorotetradecanoic acid	PFTA	ND [<1.99]
perfluorotridecanoic acid	PFTrA	ND [<1.99]
perfluorododecanoic acid	PFDoA	ND [<1.99]
perfluoroundecanoic acid	PFUnA	ND [<1.99]
perfluorodecanoic acid	PFDA	ND [<1.99]
perfluorononanoic acid	PFNA	ND [<1.99]
perfluorooctanoic acid	PFOA	11.7
perfluoroheptanoic acid	PFHpA	4.24
perfluorohexanoic acid	PFHxA	4.63
perfluoropentanoic acid	PFPeA	ND [<3.98]
perfluorobutanoic acid	PFBA	ND [<7.95]
perfluorodecane sulfonic acid	PFDS	ND [<1.99]
perfluorononane sulfonic acid	PFNS	ND [<1.99]
perfluorooctane sulfonic acid	PFOS	21.6
perfluoroheptane sulfonic acid	PFHpS	ND [<1.99]
perfluorohexane sulfonic acid	PFHxS	4.59
perfluoropentane sulfonic acid	PFPeS	ND [<1.99]
perfluorobutane sulfonic acid	PFBS	ND [<1.99]
Perfluorooctanesulfonamide	PFOSA	ND [<1.99]
fluorotelomer sulfonic acid 8:2	FtS 8:2	ND [<7.95]
fluorotelomer sulfonic acid 6:2	FtS 6:2	ND [<7.15]
fluorotelomer sulfonic acid 4:2	FtS 4:2	ND [<7.95]
N-ethyl perfluorooctanesulfonamidoacetic acid	EtFOSAA	ND [<1.99]
N-methyl perfluorooctanesulfonamidoacetic acid	MeFOSAA	8.10
perfluorododecanesulfonate	PFDoS	ND [<1.99]
N-methylperfluorooctanesulfonamide	N-MeFOSA	ND [<2.29]
N-ethylperfluorooctanesulfonamide	N-EtFOSA	ND [<4.98]

PFAS	Abbreviation	Your Level in µg/kg
N-methylperfluorooctanesulfonamidoethanol	N-MeFOSE	153
N-ethylperfluorooctanesulfonamidoethanol	N-EtFOSE	ND [<14.9]
Perfluoro-2-propoxypropanoate	HFPO-DA	ND [<7.54]
4-dioxa-3H-perfluorononanoate	ADONA	ND [<7.95]
9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	ND [<7.95]
11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	ND [<7.95]
ND – Not detected; reporting limits for PFAS that were not detected are included in brackets.		

The Results of Outdoor Air in your community

Table 2 provides a list of all the specific PFAS that we measured in outdoor air measured in a central location within your community. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 2: PFAS in Outdoor Air

The Results of Locally Grown Produce

Table 3 provides a list of all the specific PFAS that we measured in locally grown produce within your community. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 3: PFAS in Locally Grown Produce

Next Steps

XXXX

Please call XX at XX to discuss any questions you may have. Your test results will be kept private. Your results may be combined with other participants in your community and used in a summary report; however, no one will be able to identify you.

You can lower your exposure to PFAS in these ways:

1. The City of Westfield continually monitors the drinking water they provide for the presence of PFAS. For additional information on your water quality, you can access Consumer Confidence Reports at https://www.cityofwestfield.org/236/Water-Quality-Reports.

2. Avoid eating contaminated fish. Check with your local or state health and environmental quality departments for fish advisories in your area and follow the advisories.

3. Even though recent efforts to remove PFAS have reduced the likelihood of exposure, some products may still contain them. If you have questions or concerns about products you use in your home, contact the Consumer Product Safety Commission at (800) 638-2772.

More Information

- For additional information about PFAS from the CDC and ATSDR, please visit: http://www.atsdr.cdc.gov/pfas/index.html.
- For more information about remediation technologies and methods for PFAS, https://pfas-dev.itrcweb.org/wp-content/uploads/2020/10/treatment_tech_508_Aug-2020-Final.pdf.
- For additional information about PFAS from the U.S. Environmental Protection Agency, please visit: https://www.epa.gov/PFAS.
- For more information about PFAS and health effects, please visit: https://www.atsdr.cdc.gov/pfas/health-effects/index.html

Thank you again for being part of the Supplemental EI for PFAS exposure.

SIGNATURE BLOCK

Appendix F.2: Letter when additional media was sampled

Date

Address

Dear XX,

Thank you for being a part of the Agency for Toxic Substances and Disease Registry (ATSDR)/U.S. Environmental Protection Agency (EPA)'s Exposure Investigation (EI) at PFAS exposure assessment (EA) sites. We are grateful to you for allowing us to collect samples from your home for this project. We tested indoor dust (from a filter and from your vacuum cleaner bag), indoor air, surface wipe samples and soil for per- and polyfluoroalkyl substances (PFAS). We also analyzed the silicone wristband that we provided you to wear for a week. This letter gives your test results. You may share these results with others if you would like – it's your choice.

This exposure investigation is one of the first to measure PFAS in the environmental samples listed above. Because of this, we cannot tell you what a safe level of PFAS is in these samples but can only tell you whether PFAS were detected in the sample and, if so, which ones were detected.

However, your results will help us to understand how people are exposed to PFAS in these types of environmental samples.

In addition to the samples we took at your home, we also took samples of outdoor air within your community and samples of locally grown produce. The results of these analysis are provided in this letter but are not associated with your home. We will share all our findings with you in our final report.

The Results of Your Indoor Dust Test – filter sample

Table 1 provides a list of all the specific PFAS that we measured in your indoor dust taken from a filter sample. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 1: Your PFAS indoor dust levels – filter sample.

PFAS	Abbreviation	Your Level in µg/kg
perfluorotetradecanoic acid	PFTA	ND [<1.99]
perfluorotridecanoic acid	PFTrA	ND [<1.99]
perfluorododecanoic acid	PFDoA	ND [<1.99]
perfluoroundecanoic acid	PFUnA	ND [<1.99]
perfluorodecanoic acid	PFDA	ND [<1.99]
perfluorononanoic acid	PFNA	ND [<1.99]
perfluorooctanoic acid	PFOA	11.7
perfluoroheptanoic acid	PFHpA	4.24
perfluorohexanoic acid	PFHxA	4.63
perfluoropentanoic acid	PFPeA	ND [<3.98]
perfluorobutanoic acid	PFBA	ND [<7.95]
perfluorodecane sulfonic acid	PFDS	ND [<1.99]
perfluorononane sulfonic acid	PFNS	ND [<1.99]
perfluorooctane sulfonic acid	PFOS	21.6
perfluoroheptane sulfonic acid	PFHpS	ND [<1.99]
perfluorohexane sulfonic acid	PFHxS	4.59
perfluoropentane sulfonic acid	PFPeS	ND [<1.99]
perfluorobutane sulfonic acid	PFBS	ND [<1.99]
Perfluorooctanesulfonamide	PFOSA	ND [<1.99]
fluorotelomer sulfonic acid 8:2	FtS 8:2	ND [<7.95]
fluorotelomer sulfonic acid 6:2	FtS 6:2	ND [<7.15]
fluorotelomer sulfonic acid 4:2	FtS 4:2	ND [<7.95]

PFAS	Abbreviation	Your Level in µg/kg
N-ethyl perfluorooctanesulfonamidoacetic acid	EtFOSAA	ND [<1.99]
N-methyl perfluorooctanesulfonamidoacetic acid	MeFOSAA	8.10
perfluorododecanesulfonate	PFDoS	ND [<1.99]
N-methylperfluorooctanesulfonamide	N-MeFOSA	ND [<2.29]
N-ethylperfluorooctanesulfonamide	N-EtFOSA	ND [<4.98]
N-methylperfluorooctanesulfonamidoethanol	N-MeFOSE	153
N-ethylperfluorooctanesulfonamidoethanol	N-EtFOSE	ND [<14.9]
Perfluoro-2-propoxypropanoate	HFPO-DA	ND [<7.54]
4-dioxa-3H-perfluorononanoate	ADONA	ND [<7.95]
9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	ND [<7.95]
11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	ND [<7.95]
ND – Not detected; reporting limits for PFAS that were not detected are included in brackets.		

The Results of Your Indoor Dust Test – vacuum cleaner bag sample

Table 2 provides a list of all the specific PFAS that we measured in your indoor dust sample taken from your vacuum cleaner. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 2: Your PFAS indoor dust levels – vacuum cleaner bag sample.

The Results of Your Indoor Air sample

Table 3 provides a list of all the specific PFAS that we measured in your indoor air. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 3: Your PFAS indoor air sample.

The Results of Your Indoor surface wipe samples

Table 4 provides a list of all the specific PFAS that we measured in two surface wipes taken within your home. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 4: Your PFAS indoor surface wipe samples.

The Results of Your Soil sample

Table 5 provides a list of all the specific PFAS that we measured in soil in your yard. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 5: Your PFAS soil sample.

The Results of Your Silicone Wristband

Table 6 provides a list of all the specific PFAS that we measured on the silicone wristband we requested your wear for a week. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 6: Your PFAS silicone wristband sample.

The Results of Outdoor Air in your community

Table 7 provides a list of all the specific PFAS that we measured in outdoor air measured in a central location within your community. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 7: PFAS in Outdoor Air

The Results of Locally Grown Produce

Table 8 provides a list of all the specific PFAS that we measured in locally grown produce within your community. The table also lists the acronyms for the PFAS. Your results are in units of micrograms per kilogram (µg/kg). One µg/kg equals one part per billion, equivalent to about one grain of sand in a sandbox.

Table 8: PFAS in Locally Grown Produce

Next Steps

XXXX

Please call XX at XX to discuss any questions you may have. Your test results will be kept private. Your results may be combined with other participants in your community and used in a summary report; however, no one will be able to identify you.

You can lower your exposure to PFAS in these ways:

1. The City of Westfield continually monitors the drinking water they provide for the presence of PFAS. For additional information on your water quality, you can access Consumer Confidence Reports at https://www.cityofwestfield.org/236/Water-Quality-Reports.
2. Avoid eating contaminated fish. Check with your local or state health and environmental quality departments for fish advisories in your area and follow the advisories.
3. Even though recent efforts to remove PFAS have reduced the likelihood of exposure, some products may still contain them. If you have questions or concerns about products you use in your home, contact the Consumer Product Safety Commission at (800) 638-2772.

More Information

- For additional information about PFAS from the CDC and ATSDR, please visit: http://www.atsdr.cdc.gov/pfas/index.html.

- For more information about remediation technologies and methods for PFAS, https://pfas-dev.itrcweb.org/wp-content/uploads/2020/10/treatment_tech_508_Aug-2020-Final.pdf.
- For additional information about PFAS from the U.S. Environmental Protection Agency, please visit: https://www.epa.gov/PFAS.
- For more information about PFAS and health effects, please visit: https://www.atsdr.cdc.gov/pfas/health-effects/index.html

Thank you again for being part of the Supplemental EI for PFAS exposure.

SIGNATURE BLOCK