

EMERGING CONTAMINANTS SAMPLING WORK PLAN

Focusing on PFAS

Department of Natural Resources and Environmental Control
Division of Waste and Hazardous Substances
Remediation Section
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ACRONYMS

AQ	Aqueous
°C	Degrees Celsius
CAS#	Chemical Abstracts Service Number
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chain-of-custody
CWS	Community Water System
DHSS	Department of Health and Social Services
DI	Deionized
DNREC	Delaware Department of Natural Resources and Environmental Control
DO	Dissolved oxygen
DPH	Division of Public Health
Dup	Field Duplicate
DW	Drinking water
DWHS	DNREC Division of Waste and Hazardous Substances
DoW	DNREC Division of Water
EPCRA	Emergency Planning and Community Right-to-Know Act
GenX	Hexafluoropropylene oxide dime acid, or HFPO-DA
GPB	Groundwater Protection Branch
GW	Ground water
HAL	Health Advisory Level
HSCA	Hazardous Substance Cleanup Act
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
mg/L	Milligrams per liter
MS	Matrix Spike
MSD	Matrix Duplicate
µS/cm	Microsiemens per centimeter
NDAA	National Defense Authorization Act
ng/L	Nanograms per liter
NTNC	Non-Transient Non-Community
ODW	Office of Drinking Water
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane sulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid
ppt	Parts per trillion
PRG	Preliminary Remediation Goal
PWS	Public Water System
RCRA	Resource Conservation and Recovery Act

RS	Remediation Section
SDWA	Safe Drinking Water Act
SOPCAP	Standard Operating Procedures for Chemical Analytical Programs
TDS	Total dissolved solids
TNC	Transient Non-Community
TRI	Toxics Release Inventory
USEPA	United States Environmental Protection Agency
UCMR3	Third Unregulated Contaminant Monitoring Rule
UCMR5	Fifth Unregulated Contaminant Monitoring Rule
USGS	United States Geological Survey

INTRODUCTION

The Delaware Department of Natural Resources and Environmental Control (DNREC) Groundwater Protection Branch (GPB) and Remediation Section (RS) performed Per- and Polyfluoroalkyl Substances (PFAS) sampling to determine the potential for impact to aquifer groundwater across the State of Delaware. The work was performed to support remedial programs implemented under the Delaware Hazardous Substance Cleanup Act (HSCA). HSCA has listed two PFAS, perfluorooctanesulfonic acid (PFOS) and, perfluorooctanoic acid (PFOA), as Hazardous Substances. The DNREC team conducted sampling of the aquifer groundwater to identify and interrupt the consumption of PFAS at Safe Drinking Water Act (SDWA) regulated public water systems (PWS). To ensure consistency in sampling, analysis, and reporting, DNREC has developed this work plan to summarize guidance and procedures pertaining to PFAS aquifer groundwater sampling.

BACKGROUND

PFAS general information –

- Manufactured and used in a variety of industries worldwide since the 1940s
- Human-made chemicals not naturally found in the environment
- Components of fire-fighting foams, wire insulation, cleaners, textiles, apparel, carpet, leather, paper, paint, and other consumer products
- Found in air, water, and soil. Airborne PFAS fall to the ground where they enter water or soil. (ASTDR, March, 2018)
- Extremely persistent in the environment and carried great distances by wind, rain, groundwater, and surface water.
- Bioaccumulate in humans and wildlife. Uptake in plants.
- Perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are two among a larger group of over 8,000 PFAS compounds.
- PFOS and PFOA are two end products from the breakdown of other PFAS

The wide use and stability of PFAS provides many pathways for accumulation in humans and wildlife. Most people have been exposed to PFAS (ATSDR, 2018). The main sources of exposure are usually from drinking water and eating food. PFAS accumulate primarily in blood serum, kidney, and liver. The toxicity, mobility, and bioaccumulation potential of PFOS and PFOA result in potential adverse impacts to human health and the environment. (USEPA, 2017, December 5)

These chemicals have been found to cause cancer, decrease fertility, decrease vaccine response, or affect the liver, immune system, thyroid, and cholesterol levels. The United States Environmental Protection Agency (USEPA) acknowledges that scientific information on these compounds continues to evolve, and additional research is necessary to determine the full scope of PFAS impacts.

What USEPA is doing on the national level –

December 2019 USEPA issued interim recommendations and an action plan for addressing groundwater contaminated with PFAS under federal CERCLA and RCRA cleanup programs. (USEPA, 2019, December 20).

The USEPA action plan includes:

- Drinking Water Levels - The USEPA has begun the process of developing a Maximum Contaminant Level (MCL) for perfluorooctane sulfonic acid (PFOS), and perfluorooctanoic acid (PFOA)
- Health Advisory Level – In 2016 the USEPA released a Health Advisory Level (HAL) for PFOS and PFOA, individually or combined, of 70 parts per trillion (ppt).
- Interim Health Advisory Level – In 2022 USEPA released updated Interim HALs for PFOS at 0.02 ppt and PFOA at 0.004 ppt. New HALs were released for GenX at 10 ppt, and PFBS at 2,000 ppt.
- Toxics Inventory – The National Defense Authorization Act (NDAA) for Fiscal Year 2021 adds 176 PFAS to the list of chemicals covered by the Toxics Release Inventory (TRI) as part of the Emergency Planning and Community Right-to-Know Act (EPCRA). The TRI gathers information about reported PFAS releases by certain industrial sectors and federal facilities. (USEPA 2020, March 4)
- Monitoring - The USEPA will propose nationwide drinking water monitoring for PFAS as part of the fifth Unregulated Contaminant Monitoring Rule (UCMR 5) monitoring cycle. The UCMR 5 sample collection will occur between 2023 and 2025. The UCMR 5 compound list is included as Appendix A.
- Research – The USEPA is expanding its research to further understand and manage the risks from PFAS, including improved detection, methods, treatment, and remediation.
- Risk Communication - The USEPA has developed a "risk communication toolbox" that will provide guidance and resources to help federal, state, and local entities

clearly communicate PFAS risks to the public. (EPA, 2022)
<https://www.epa.gov/research-states/pfas-resources-states>

What Delaware is doing:

The DNREC-RS currently regulates PFOS and PFOA as hazardous substances through the Hazardous Substance Cleanup Act (HSCA) and follows the Standard Operating Procedures for Chemical Analytical Programs (SOPCAP, 2015).

July 2018, the DNREC Division of Waste and Hazardous Substances (DNREC-DWHS) published the “Policy for Sampling and Evaluation of Per- and Polyfluoroalkyl Substances in Surface Water and Groundwater:”

<https://documents.dnrec.delaware.gov/dwhs/SIRB/Documents/DWHS%20PFAS%20Sampling%20Policy.pdf> The policy only addressed surface water and groundwater sampling and reinforced PFOS and PFOA as hazardous substances. DNREC-RS adopted the EPA HAL as a screening value to determine if a release has occurred at a site. <https://dnrec.alpha.delaware.gov/waste-hazardous/remediation/laws-regs-guidance/>

Spring 2019 was the inaugural meeting of several Delaware state agencies to form the Delaware PFAS Team (Team). The Team continues with collaboration on addressing PFAS from multiple programs and in multiple media.

June 2019 - March 2020, water systems as identified by the United States Geological Survey (USGS) or DNREC-RS with known PFAS contamination, were regularly sampled for PFAS.

April - October 2021, DNREC conducted statewide PFAS aquifer groundwater sampling of Community Water Systems (CWS) with unconfined wells.

October 2021 - [Delaware House Bill 8 \(H.B. 8\)](#)

[H.B 8 amends](#) TITLE 29 OF THE DELAWARE CODE RELATING TO DRINKING WATER) <https://legis.delaware.gov/BillDetail/48449> This bill was signed into law on October 20, 2021 and directs the Department of Health and Social Services – Division of Public Health – Office of Drinking Water in collaboration with the Department of Natural Resources and Environmental Control to complete multiple tasks. These tasks are to initiate the MCL regulatory development process, conduct public hearings on proposed regulations, on a periodic basis review and revise the MCL based upon reliable public studies, conduct a statewide survey of public water systems (PWS), and report the results and develop a dynamic strategy to address PFAS across the State of Delaware.

October 2021, DNREC began PFAS source investigations and sampling of impacted residential drinking water wells in areas identified through PWS aquifer sampling.

December 2021 – January 2022, DNREC conducted statewide sampling of Non-Transient Non-Community Water Systems (NTNC) with unconfined wells.

March 2022 - Delaware Department of Health and Social Services (DHSS) - Health Systems Protection – Office of Drinking Water (ODW) releases proposed MCLs for PFOS and PFOA through an implementation plan. The proposed MCLs are 14 ppt for PFOS, 21 ppt for PFOA, and a combined value of PFOS and PFOA of 17 ppt.

May 2022 - DNREC conducted follow-up confirmation aquifer groundwater sampling of PWSs with PFOS/PFOA results at or above 12 ppt. Confirmation of results at or above 12 ppt is a protection factor for sample variability.

June 2022 – USEPA announced two interim and two final HALs for 4 PFAS compounds. The new interim HAL supersedes the previous 2016 HALs. The HALs for GenX and PFBS are new.

- Interim updated Health Advisory for PFOA = 0.004 ppt
- Interim updated Health Advisory for PFOS = 0.02 ppt
- Final Health Advisory for GenX chemicals = 10 ppt
- Final Health Advisory for PFBS = 2,000 ppt

Summer - Fall 2022, DNREC is conducting aquifer groundwater sampling of remaining sensitive population and Transient Non-Community (TNC) PWS.

2022 – DNREC-RS will update its PFAS Policy (2018) to include knowledge gained through the implementation of this dynamic sampling work plan, and the PFOS/PFOA drinking water MCL mandated through the signing of Delaware House Bill 8.

STATEWIDE SURVEY OF PUBLIC DRINKING WATER SYSTEMS

Approximately 82% of Delaware residents get their water from a Public Water System and 18% from a residential well. (Delaware, 2018). DNREC is implementing a statewide multi-year, multi-phased sampling program for impacted public and residential wells. Analysis of data obtained will determine subsequent sampling or response to detections above threshold criteria.

OBJECTIVE

- Sample PFAS in aquifer groundwater used by Public Water Systems (PWS) and potentially impacted residential wells.
- Work with PWSs and residential well owners to address detections above the appropriate health threshold criteria with our partners at Delaware Health and Social Services (DHSS) - Division of Public Health. At the start of this effort, the 2016 HALs were the threshold criteria. Subsequently, the threshold criteria along with a protection factor, is now the State of Delaware PFOS and PFOA proposed MCLs.

- Perform follow-up monitoring on impacted aquifer groundwater to determine if results fluctuate or are impacted seasonally to help prioritize and direct next steps.
- Gather data for determining existence of ongoing or additional sources of PFAS to aquifer groundwater.
- Resample the wells sampled by USGS for PFAS as part of ambient sampling for confirmatory purposes.
- Sample the wells previously sampled for PFAS as part of the Unregulated Contaminant Monitoring Rule 3 (UCMR 3) for confirmatory and comparison purposes.
- Provide guidance on improving sample consistency and data quality, while preventing cross-contamination.
- Determine if PFAS compounds beyond PFOS and PFOA are prevalent in the State of Delaware aquifers to determine if these compounds should be regulated.

STRATEGY

DNREC and DHSS created a dynamic sampling priority and data objective strategy to direct the implementation of this plan. This effort focuses on gathering data that provides the greatest breadth of information related to public health and the potential for exposure to the presence of PFAS. The primary focus is the protection of public health. As PFAS information, technology, and regulations evolve, DNREC's PFAS strategy implementation will continue to evolve and adapt along with it.

For more information regarding PFAS and the DHSS - Public Health, Office of Drinking Water or Public Water Systems, please see <https://www.dhss.delaware.gov/dhss/dph/hsp/odw.html>

DNREC initially evaluated PFAS sample results by comparing them to the federal EPA HAL of 70 ppt for PFOS/PFOA (individual or combined). Since then, DHSS has proposed a drinking water MCL for PFOS/PFOA ([MCLImplementationPlanPFAS.pdf \(delaware.gov\)](#)). The proposed MCLs are PFOS = 14 ppt, PFOA = 21 ppt or a combined value of PFOS and PFOA of 17 ppt. The proposed drinking water MCL was used by DNREC as a screening value to evaluate the aquifer groundwater results to determine any additional actions.

Sampling was conducted in a phased approach based on the following rationale.

DNREC asked water systems serving more than 10,000 people for PFAS data from the third Unregulated Contaminant Monitoring Rule (UCMR 3) sampling conducted between 2013 and 2015. DNREC accepted that data as valid and shifted sampling to other water systems with no PFAS data. (Please note the dynamic strategy changes at the end of this section)

The remaining Public Water Systems (PWS) are sorted into 3 categories

1. Community Water Systems (CWS) – serves 15 service connections or regularly serves 25 year-round residents. Examples – residential neighborhoods, municipalities

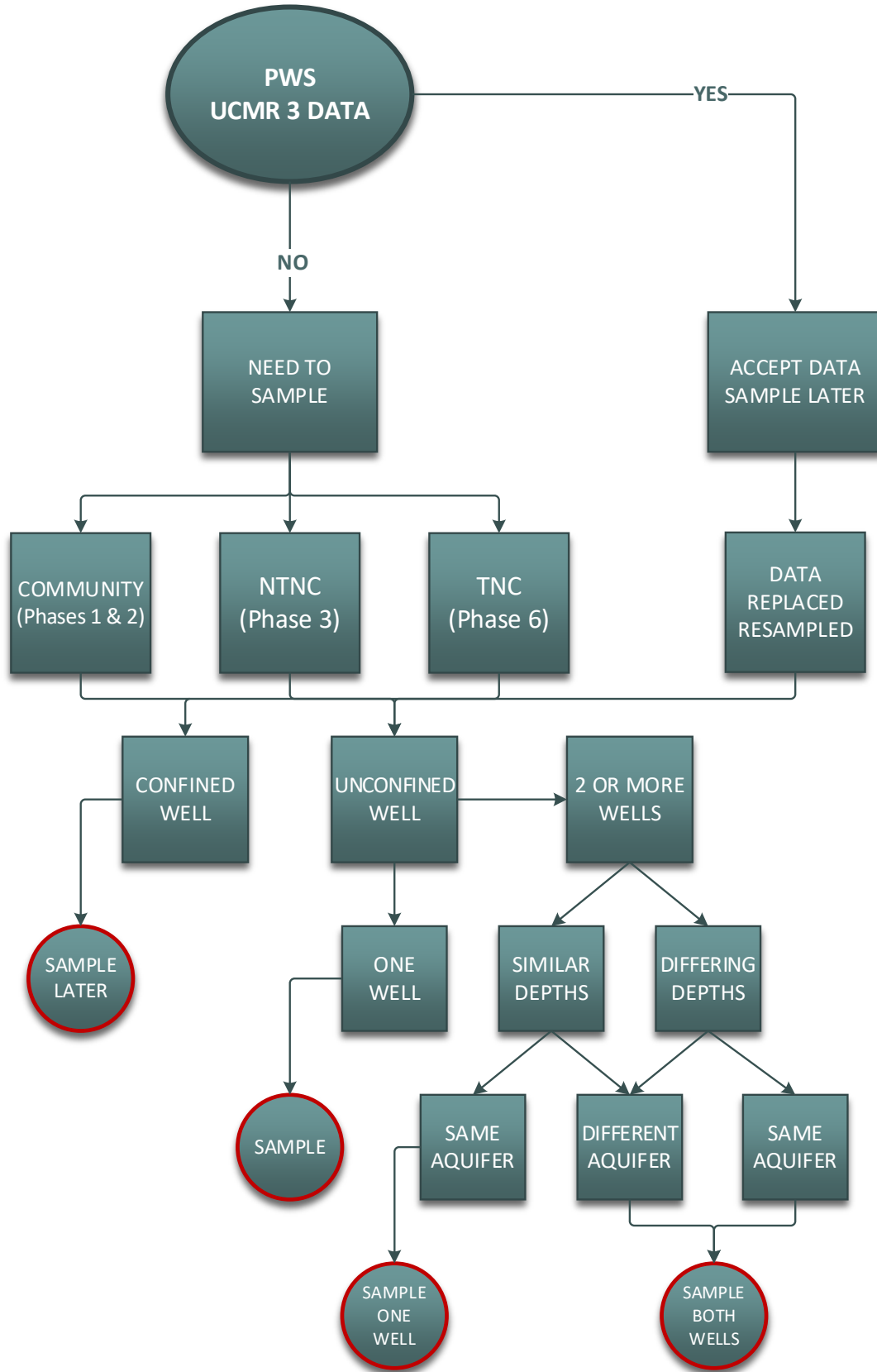
2. Non-Transient Non-Community (NTNC) – not a CWS, that regularly serves the same 25 people over 6-months per year. Examples – daycares, large businesses, churches, schools
3. Transient Non-Community (TNC) – regularly serves an average of 25 people daily at least 60 days per year. Examples – convenience stores, restaurants, parks, seasonal campgrounds

Since the home is typically where the largest amount of water consumption would occur, CWS were selected to be sampled first. Most CWSs have more than one well; the wells can be geographically spaced out, and the well screens can be at different depths and in different aquifers. This information is available through the DNREC Division of Water, Groundwater Protection Branch, Source Water Protection Program.

The CWS wells were prioritized by unconfined and confined aquifers. Unconfined wells are thought to be the most vulnerable to PFAS (and other contaminants) and were selected to be sampled first. Confined wells (using the Delaware regulatory definition of 10-foot thickness of confining geologic unit) are thought to not be as susceptible to PFAS contamination and left for sampling in later phases. A selection of confined aquifer wells will be sampled to address this contention.

CWS unconfined wells were further sorted. If the CWS had more than one unconfined well screened at similar depths, in the same aquifer, only one of those wells were sampled. If the CWS unconfined wells were screened similar depths, in differing aquifers, both wells were sampled. If those unconfined wells screened at differing depths, in same or different aquifers, they both were sampled. The CWS sampling was then logistically organized into Phases 1 and 2. See the flowchart below for the decision-making process.

PWSs may or may not have treatment in place to address other contaminants impacting the aquifer water that supplies the system. PWSs treatments were reviewed to determine if they had existing treatment that may potentially address detections of PFAS. Other DNREC sampling focused on a statewide survey of potential PFAS releases and possible PWS exposure pathways. This sampling effort focused on aquifer ground water as opposed to “finished” drinking water. The EPA 537M method used to analyze the aquifer groundwater samples, is not an EPA approved method for drinking water. Sampling the aquifer groundwater would be the first step to determine if a PWS’s drinking water (regulated under the SDWA) would need treatment.



DNREC started Phase 1 sampling using method 537M “Max”. Method 537M Max was created by the sampling team in coordination with our DNREC contract lab which analyzed for 70 PFAS compounds. See Appendix B for method 537M Max compound list. The thought was to analyze for as many PFAS compounds as possible. Results were reviewed for acceptable quality assurance and quality control (QA/QC). A high QA/QC level of comfort is needed for each of the 70 compound sample results to be acceptable. Upon reviewing the results, the QA/QC level of comfort was lacking for some of the 70 compound sample results. So, the decision was made to use the upcoming 2023-2025 fifth Unregulated Contaminant Monitoring Rule (UCMR 5) list of 29 compounds (Appendix A). This shift was made to increase the QA/QC standard across the board for all 29 compound results and have data to compare against future results. Phase 2 sampling started using method 537M and “UCMR 5 -29 PFAS” list.

Phase 1 and 2 results were reviewed for significant detections (results 5 times the detection limit). A comparison of Phase 1 and 2 results revealed 8 compounds with significant detections from Phase 1 that were not included in the Phase 2 compound list. So, the 8 significant detection Phase 1 compounds were added to the Phase 3 compound list and analyzed as method 537M “DNREC REM”. “REM” being short for Remediation Section. See Appendix C for 537M DNREC REM compound list. The intent is to have data to compare with future UCMR 5 results and have additional data to inform potential additions to the DNREC RS Screening Level Table or future Delaware PFAS MCLs.

NTNC water systems were sampled as part of Phase 3. Like previous sampling, the NTNC wells were divided into confined and unconfined wells. Unconfined wells were sampled, and confined wells were saved for sampling later. The majority of NTNC systems do not have treatment in place or an easily accessible raw tap. If the system had no treatment, DNREC considered the sample to be direct aquifer water when sampling. Due to lack of treatment and raw tap access, samples were collected at a distribution water tap.

CWS and NTNC results triggered “follow-up” (Phase 4) sampling. Those systems with individual or combined PFOS/PFOA results 12 ppt or above, were scheduled for confirmation re-sampling. As part of follow-up sampling, all the wells in the water system were sampled regardless of if they were confined or unconfined. Also, if the system had any blending prior to distribution or drinking water treatment, a water sample was collected after either.

The next statewide sampling will be at any remaining “sensitive” populations (Phase 5). PWSs that serve sensitive populations, such as daycares, schools, and nursing homes, etc. that were not sampled prior, will be sampled. Both confined and unconfined wells will be sampled at these “sensitive” population systems.

Transient Non-Community (TNC) water systems will be sampled (Phase 6) after “sensitive” sampling. These PWS will be selected to fill any apparent geographical data gaps. Many NTNC

and TNC systems are clustered, leading to clustered data which could possibly sway future analytics.

Prior to finalizing this sampling plan, DNREC resampled the UCMR 3 PWSs that previously sampled for PFAS between 2013 and 2015. At the start of statewide sampling, DNREC accepted that UCMR 3 data as valid. However, with the advancement of analytical methods, and the opportunity to have comparable data, DNREC extended sampling to the UCMR 3 PWSs.

If the PWSs well had significant PFAS detections, DNREC-RS investigations were expanded to sample nearby private residential, miscellaneous public, and non-potable wells. The focus of this follow-up sampling, by way of HSCA regulations, is to determine the source of the PFAS compounds release to the environment. Each of these investigations are documented through the DNREC-RS standard practice for investigations of release to the environment.

PROCEDURE

Due to the widespread use of PFAS, many materials normally used in field operations contain PFAS. Potential sources of PFAS cross-contamination include materials used within the sampling environment; sampling equipment; vehicles, field clothing and personal protective equipment; sun and biological protection products; personal hygiene and personal care products; food packaging; and the environment itself. See Table 1 for acceptable and unacceptable items. Compliance with field sampling protocols and procedures are critical to ensuring that test results reflect actual PFAS levels in water. DNREC sampling will be via 537M DNREC REM (Appendix C). Other methodology may be approved for use soon.

PRE-SAMPLE ACTIVITIES

- Coordinate a sampling date and time with the water supply and sample team members.
- Arrange a bottle order with the DNREC-RS Chemist 1-2 weeks, but no more than thirty (30) days, before a sampling event.
- Reserve a Fleet vehicle as far in advance as possible.
- Fill out sample labels and COC (to the extent possible ahead of time)
- For large water systems, coordinate meeting at which well.

MATERIALS AND EQUIPMENT

- Bottle ware and PFAS-Free deionized water blanks (supplied by laboratory)
- Labels for bottle ware (supplied by laboratory)
- Chain-of-custody forms (COC) (supplied by laboratory) (Appendix D)
- Multi-parameter water quality meter
- Stainless steel bucket
- Groundwater Logs (Appendix E)

- Box(es) of powderless nitrile gloves
- Cotton beach towels (laundered > 6 times)
- Coolers
- Double bagged regular ice
- Hose (if needed)
- Non-waterproof pen and paper
- Aluminum clipboard
- Paper bag or bucket for glove disposal
- Business cards
- Phone or camera for pictures

PRECAUTIONS

- Sampler should shower as normal the night before, but only rinse shower the morning of sampling.
- Only certain sunscreen and/or insect repellent should be used the day of sampling.
- Rain gear should not be used during sampling.
- Field clothing should be laundered at least six (6) times prior to sampling.
- Field clothing should not be laundered with fabric softener.
- The cooler should contain a sample bag or should be cleaned with Alconox and deionized, with PFAS-free water.
- Sample team's vehicle seats should be covered with cotton towels.
- Refer to Table 1 for additional prohibited and acceptable items.

ACTIVITY DAY PREPARATION

- Fill a cooler with double bagged regular ice and large poly bag
- Place Trip Blank and Temperature Blank into cooler to accompany samples
- Grab water meter, aluminum clipboard, bucket, gloves, hose, extra bottles, PFAS-free water, forms, labels, badge, keys, fuel-man card, etc.
- Cover the car seat with well-laundered cotton towel
- Calibrate meter. Refer to water quality meter instruction manual regarding calibration and operation.

SAMPLE COLLECTION

1. Sample the wells/taps from the least contaminated to the most contaminated, if possible. The laboratory method used to analyze the aquifer groundwater is EPA537M (537M DNREC REM).

2. Sample handler must wash their hands before sampling, and wear nitrile gloves while filling and sealing the sample bottles. Proper hand washing and wearing/frequent changing of nitrile gloves will aid in minimizing sample contamination.
3. If the raw water sample tap is inaccessible to a stainless-steel bucket or in a location easily flooded, attach a hose to fill the bucket remotely. Open the tap and allow the system to flush (approximately 10 to 15 min) into a stainless-steel bucket. Place the meter probe into the filled/overflowing bucket.
4. On the Ground Water Log (Appendix E), complete as much as possible of the following: Water system name, date, well permit number, local well ID, well type, sampling team members, meter type, purge rate, weather, wind, and temperature and location in system of sample.
5. Every minute or longer, document the readings for time, temperature, specific conductance, total dissolved solids (TDS), salinity, dissolved oxygen (mg/L), and pH.
6. Use the table below to determine if meter readings have stabilized.

PARAMETER	ALLOWABLE DIFFERENCE
Temperature (T)	$\pm 0.2^{\circ}\text{C}$
Specific Conductance (SC)	$\pm 5\%$ for $\text{SC} \leq 100 \mu\text{S/cm}$ $\pm 3\%$ for $\text{SC} > 100 \mu\text{S/cm}$
Dissolved Oxygen (DO)	$\pm 0.3 \text{ mg/L}$
pH	± 0.1 standard pH units

Units -
 $^{\circ}\text{C}$ – degrees Celsius
 $\mu\text{S/cm}$ – microsiemens per centimeter
 mg/L – milligrams per liter

7. Continue to record readings until stabilization.
8. After stabilization, remove meter probe and hose (if attached), dump the bucket, and lower the tap stream to collect the samples from the flowing stream. Do not turn off the flow between samples. Samples do not need to be collected free of headspace.
9. Our 537M DNREC REM laboratory analytical method is for groundwater samples and not EPA approved for drinking water.
 - a. Water samples that have been through treatment should be collected in bottles containing the preservation reagent, Trizma. For example, chlorinated water samples should be collected in bottles containing Trizma. Collect the sample in 2 - 250-mL polypropylene bottles, that contain Trizma, and fitted with a polypropylene screw-cap.
 - i. Be careful to not rinse out the Trizma powder.

- ii. Gently shake samples until preservative is dissolved.
 - b. Non-chlorinated samples should be collected in 2-250-mL polypropylene bottles, does not require a preservative, and fitted with a polypropylene screw-cap. Note: Trizma bottles may also be used for non-chlorinated samples.
 - i. An MS/MSD is not required for the 537M DNREC REM laboratory analytical method samples as the analytical procedure already determines matrix effect.
10. In addition to the primary sample, the following quality assurance (QA) samples should be collected:
- a. Field Duplicate – a field duplicate (“dup”) is made up of 2-250 mL polypropylene bottles and collected as a separate blind sample. The field duplicate will have a different sample identification number than the corresponding primary sample.
 - i. Open sample tap, collect sample, and seal 2-250 mL bottles.
 - ii. A field duplicate will be collected for each batch or every nineteen (19) samples.
 - iii. Select the field duplicate location at random. Do not leave the field duplicate for the last sample location, due to the possibility of the well not pumping or being inaccessible.
 - b. Field Blank – Field blanks are used for evaluating the potential for cross-contamination of site samples. Field blanks will be created at the sampling site using laboratory provided PFAS free deionized (DI) water.
 - i. Open an empty 250 mL container at the sampling site, fill with DI water, seal, and return to the laboratory without opening.
 - ii. One field blank will be collected per set (a set is per delivery group).
 - c. Trip Blank – Trip blanks are used for evaluating the potential for cross-contamination of site samples. A sealed 250 mL trip blank should arrive with the sample bottle order, be transported to the sampling site, and be returned to the laboratory without opening.
 - i. One trip blank should be collected per 20 samples/ per cooler/ per set (a set is per delivery group) and remain with the cooler.

One 537M sample should generate a minimum of 6 – 250 mL bottles -

- 2 – Water sample
- 2 – Field duplicate (blind sample)

1 – Field blank (PFAS Free DI water)

1 - Trip blank (unopened)

SAMPLE DOCUMENTATION

Document well location, any tap identifiers, or miscellaneous relevant information on the groundwater log (Appendix E).

Fill out the COC as completely as possible. Any errors should be crossed out with one line and initialed. On the COC, document the trip and field blank matrix as “AQ” (aqueous), drinking water as “DW” and ground water as “GW.”

On the typical COC –

- Company will be “DNREC”
- Project name/Site would be “Site/Project Name DE-XXXX”
- Project Manager would be “Bob Schulte or Todd Keyser”
- Regulatory Program will be “HSCA”
- Complete Date, X of Y for COC, and sampler’s initials
- Turnaround Time will be “Standard”
- Analysis Requested will be “537M DNREC REM”
- Sample Identification would be well ID number, location, QA sample, or equivalent
- Field duplicate ID will be a sampler determined ID
- Trip Blank “date” is the date of sampling, not created date
- Sample Type will be “G” for Grab
- Matrix will be DW, GW, SW, or AQ
- “Relinquished by” should be staff name
- “Company” should be DNREC RS



COMPLETED COC EXAMPLE

Regulatory Program: DW NPDES RCRA Other: **HSCA** TAL-6210

Date: **5/16/22**

Client Contact: **PUREC RS** Project Manager: **TODD KEYSER** Site Contact: _____ Date: _____ COC No.: _____
 Address: **391 LUKENS DR** Tel/Email: _____ Lab Contact: _____ Carrier: _____
 City/State/Zip: **NEWCASTLE DE 19720** Analysis Turnaround Time: _____
 Phone: **302 395-2400** CALENDAR DAYS WORKING DAYS
 Fax: _____ *TAT if different from Best STANDARD
 Project Name: **EMERG CONTAM PROJ -** 2 weeks
 Site: **SP000416** 1 week
 P O #: _____ 2 days
 1 day

Sampler: **KB BH**
 For Lab Use Only:
 Walk-In Client:
 Lab Sampling: _____
 G No.: _____

460-256647 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Sample Specific Notes
WELL 234491 DS	5/16/22	1057	G DW	2	2	X		1
WELL 234491 I	5/16/22	1052	G GW	4	4	X	X	2
WELL 234491 RW	5/16/22	1051	G GW	2	2	X		3
WELL 63804 RW	5/16/22	1108	G GW	2	2	X		4
WELL 63804	5/16/22	1106	GW	4	4	X		5
WELL 218652 DS	5/16/22	956	DW	2	2	X		6
WELL 218652 RW	5/16/22	948	GW	2	2	X		7
WELL B 218652	5/16/22	949	GW	2	2	X		8
WELL 218652	5/16/22	950	GW	4	4	X	X	9
FIELD BLANK A	5/16/22	1010	AG	1	1	X		10
FIELD BLANK B	5/16/22	1011	AG	4	4	X	X	11
TRIP BLANK	5/16/22	900	AG	1	1	X		12

Preservation Used: No. 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other

Possible Hazard Identification:
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
 1= Corrosive 2= Flammable 3= Skin Irritant 4= Poison B 5= Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
 Return to Client Disposal by Lab Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seal Intact: Yes No
 Custody Seal No.: **102695** Cooler Temp. (°C): Obs'd: **7.2** Cor'd: **7.2** Therm ID No.: **102**
 Reimanded by: **Branda Howe** Company: **DNREC** Date/Time: _____ Received by: **AAH** Company: **ETA** Date/Time: **5/17/22 1010**

SAMPLE TRANSPORT

1. Replenish or add more double bagged ice to the cooler to maintain the sample temperature of 4±2°C.
2. Complete any remaining sample paperwork.
3. Place samples within the large poly bag in the cooler.
4. Seal the chain of custody in a zippered storage bag and place with the cooler
5. Transport samples to the DNREC-RS for shipment to the Hazardous Substance Cleanup Act (HSCA) approved contract laboratory.
6. Samples must be chilled during shipment and must not exceed 10 °C during the first forty-eight (48) hours after collection.
7. Notify DNREC RS chemist when samples are ready for laboratory pick up.

HOLD TIME

When collected, stored, and shipped as described above, samples must be extracted within fourteen (14) days.

LABORATORY APPROVAL

A HSCA approved laboratory should be utilized for all work. If the contracted HSCA laboratory cannot perform the work for whatever reason, that laboratory should subcontract the work to another HSCA approved laboratory. The contracted HSCA laboratory will be responsible for ensuring the subcontracted laboratory performs the analysis to HSCA standards.

If a HSCA approved laboratory is not available to perform the work, upon pre-approval by DNREC, a non-HSCA approved laboratory can be utilized.

ANALYSIS

PFAS will be analyzed by LC-MS/MS, based upon the method “537M DNREC REM”. The modified laboratory method will be used as the performance standard for State of Delaware lead efforts unless replaced or modified in the future. Time until receipt of electronic data is three (3) weeks and four (4) weeks for hard copy.

DATA AND RESULTS FOLLOW-UP

The DNREC-RS Chemists and sampling team review the received data for any issues or quality assurance/quality control items that may need addressed. DNREC will determine necessity of any further actions. Once sufficient data are collected to provide meaningful analysis, sample result summaries will be presented in a separate report.

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TABLE 1 – PROHIBITED AND ACCEPTABLE ITEMS DURING PFAS SAMPLING

PROHIBITED Items	ACCEPTABLE Items
Sampling Equipment containing the following materials:	
Polytetrafluoroethylene (PTFE)	Stainless steel
Teflon ®	Acetate
Low-density polyethylene (LDPE)	Silicone
	High-density polyethylene (HDPE)
	Polypropylene
Non-Sampling Field Equipment	
Waterproof field books	Non-waterproof loose-leaf paper
Plastic clipboards, binders, or spiral hard cover notebooks that may be coated	Masonite or aluminum clipboards
Sharpies ® or similar indelible markers	Ball-point pens or pencils
Post-it ® notes	
Field Clothing and Protective Gear	
New clothing and/or clothes treated for stain resistance	Clothes washed several times before use during sampling
Use of fabric softener	Clothing made from natural fibers, such as cotton
Water-resistant clothing and shoes	Rain gear made from polyurethane or wax-coated materials
Use of cosmetics, shampoos, moisturizers, or similar items on the morning of sampling	Sunscreen and insect repellent with 100% natural ingredients
Tyvek ®	Nitrile gloves worn at all times and changed often during sampling
Contact with car upholstery treated with PFAS	
Sample Containers and Shipping	
Glass sample containers	Lab-supplied plastic containers, such as polypropylene or HDPE
Teflon ®-lined caps	Unlined polypropylene screw caps
Blue Ice ®	Regular Ice
Shipping tape used to secure coolers (may contain PFAS; avoid touching samples with tape)	
Decontamination	
Decon 90	Alconox ®

PROHIBITED AND ACCEPTABLE ITEMS DURING PFAS SAMPLING (Continued)	
Food and Drink	
PROHIBITED Items	ACCEPTABLE Items
Handling pre-wrapped food, such as candy bars, granola bars, microwave popcorn, etc., is prohibited in sampling area	Wash hands thoroughly after handling fast food, snacks, or other items that may contain PFAS
Acceptable Insect Repellants or Sunscreens	
OFF Deep Woods	Sawyer Permethrin
Banana Boat for Men Triple Defense Continuous Spray Sunscreen SPF 30	Banana Boat Sport Performance Sunscreen Lotion Broad Spectrum SPF 30
Banana Boat Sport Performance Coolzone Broad Spectrum SPF 30	Banana Boat Sport Performance Sunscreen Stick SPF 50
Banana Boat Sport Performance Sunscreen Lotion Broad Spectrum SPF 30	Coppertone Sunscreen Lotion Ultra Guard Broad Spectrum SPF 50
Coppertone Sunscreen Stick Kids SPF 55	Coppertone Sport High-Performance AccuSpray Sunscreen SPF 30
L'Oréal Silky Sheer Face Lotion 50+	Meijer Sunscreen Lotion Broad Spectrum SPF 30
Meijer Clear Zinc Sunscreen Lotion Broad Spectrum SPF 15, 30 and 50	Meijer Wet Skin Kids Sunscreen Continuous Spray Broad Spectrum SPF 70
Neutrogena Ultra-Sheer Dry-Touch Sunscreen Broad Spectrum SPF 30	Neutrogena Beach Defense Water + Sun Barrier Lotion SPF 70
Neutrogena Beach Defense Water + Sun Barrier Spray Broad Spectrum SPF 30	Neutrogena Pure & Free Baby Sunscreen Broad Spectrum SPF 60+

APPENDIX A - UCMR5 PFAS COMPOUND LIST

UCMR5 PFAS COMPOUND LIST	CAS#
11Cl-PF3OUdS	763051-92-9
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4
4:2 FTS	757124-72-4
6:2 FTS	27619-97-2
8:2 FTS	39108-34-4
9Cl-PF3ONS	756426-58-1
HFPO-DA (GenX)	13252-13-6
NEtFOSAA	2991-50-6
NFDHA	151772-58-6
NMeFOSAA	2355-31-9
Perfluorobutanesulfonic acid (PFBS)	375-73-5
Perfluorobutanoic acid (PFBA)	375-22-4
Perfluorodecanoic acid (PFDA)	335-76-2
Perfluorododecanoic acid (PFDoA)	307-55-1
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8
Perfluoroheptanoic acid (PFHpA)	375-85-9
Perfluorohexanesulfonic acid (PFHxS)	355-46-4
Perfluorohexanoic acid (PFHxA)	307-24-4
Perfluorononanoic acid (PFNA)	375-95-1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1
Perfluorooctanoic acid (PFOA)	335-67-1
Perfluoropentanesulfonic acid (PFPeS)	2706-91-4
Perfluoropentanoic acid (PFPeA)	2706-90-3
Perfluorotetradecanoic acid (PFTeA)	376-06-7
Perfluorotridecanoic acid (PFTrDA)	72629-94-8
Perfluoroundecanoic acid (PFUnA)	2058-94-8
PFEESA	113507-82-7
PFMBA	863090-89-5
PFMPA	377-73-1

APPENDIX B – METHOD 537M MAX PFAS COMPOUND LIST

METHOD 537M MAX	CAS#
10:2 FTCA	53826-13-4
10:2 FTS	120226-60-0
10:2 FTUCA	70887-94-4
11Cl-PF3OUdS	763051-92-9
3:3 FTCA	356-02-5
4:2 Fluorotelomer sulfonic acid	757124-72-4
5:3 FTCA	914637-49-3
6:2 Fluorotelomer sulfonic acid	27619-97-2
6:2 FTCA	53826-12-3
6:2 FTUCA	70887-88-6
7:3 FTCA	812-70-4
8:2 Fluorotelomer sulfonic acid	39108-34-4
8:2 FTCA	27854-31-5
8:2 FTUCA	70887-84-2
9Cl-PF3ONS	756426-58-1
DONA	919005-14-4
EVE Acid	69087-46-3
HFPODA	13252-13-6
Hydro-EVE Acid	773804-62-9
Hydrolyzed PSDA	2416366-19-1
Hydro-PS Acid	749836-20-2
MTP	93449-21-9
NEtFOSA	4151-50-2
NEtFOSAA	2991-50-6
NEtFOSE	1691-99-2
NMeFOSA	31506-32-8
NMeFOSAA	2355-31-9
NMeFOSE	24448-09-7
NVHOS	801209-99-4
PEPA	267239-61-2
Perfluoro (2-ethoxyethane) sulfonic acid	113507-82-7
Perfluoro-4-ethylcyclohexanesulfonic acid	133201-07-7
Perfluorobutanesulfonic acid	375-73-5
Perfluorobutanoic acid	375-22-4
Perfluorodecanesulfonic acid	335-77-3

METHOD 537M MAX (Continued)	CAS#
Perfluorodecanoic acid	335-76-2
Perfluorododecanesulfonic acid	79780-39-5
Perfluorododecanoic acid	307-55-1
Perfluoroheptanesulfonic acid	375-92-8
Perfluoroheptanoic acid	375-85-9
Perfluorohexadecanoic acid	67905-19-5
Perfluorohexanesulfonic acid	355-46-4
Perfluorohexanoic acid	307-24-4
Perfluorononanesulfonic acid	68259-12-1
Perfluorononanoic acid	375-95-1
Perfluorooctadecanoic acid	16517-11-6
Perfluorooctanesulfonamide	754-91-6
Perfluorooctanesulfonic acid (PFOS)	1763-23-1
Perfluorooctanoic acid (PFOA)	335-67-1
Perfluoropentanesulfonic acid	2706-91-4
Perfluoropentanoic acid	2706-90-3
Perfluoropropanesulfonic acid	423-41-6
Perfluorotetradecanoic acid	376-06-7
Perfluorotridecanoic acid	72629-94-8
Perfluoroundecanoic acid	2058-94-8
PFECA A	863090-89-5
PFECA B	151772-58-6
PFECA F	377-73-1
PFECA G	801212-59-9
PFMOAA	674-13-5
PFO2HxA	39492-88-1
PFO3OA	39492-89-2
PFO4DA	39492-90-5
PMPA	13140-29-9
PPF Acid	422-64-0
PS Acid	29311-67-9
R-EVE	2416366-22-6
R-PSDA	2416366-18-0
R-PSDCA	2416366-21-5
TAF	39492-91-6

APPENDIX C – METHOD 537M DNREC REM PFAS COMPOUND LIST

METHOD 537M DNREC REM	CAS#
11Cl-PF3OUdS	763051-92-9
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4
4:2 FTS	757124-72-4
5:3 FTCA	914637-49-3
6:2 FTCA	53826-12-3
6:2 FTS	27619-97-2
6:2 FTUCA	70887-88-6
8:2 FTS	39108-34-4
9Cl-PF3ONS	756426-58-1
HFPO-DA (GenX)	13252-13-6
Hydro-PS Acid	749836-20-2
NEtFOSAA	2991-50-6
NFDHA	151772-58-6
NMeFOSAA	2355-31-9
Perfluorobutanesulfonic acid (PFBS)	375-73-5
Perfluorobutanoic acid (PFBA)	375-22-4
Perfluorodecanoic acid (PFDA)	335-76-2
Perfluorododecanoic acid (PFDoA)	307-55-1
Perfluoroheptanesulfonic acid (PFHpS)	375-92-8
Perfluoroheptanoic acid (PFHpA)	375-85-9
Perfluorohexanesulfonic acid (PFHxS)	355-46-4
Perfluorohexanoic acid (PFHxA)	307-24-4
Perfluorononanoic acid (PFNA)	375-95-1
Perfluorooctanesulfonic acid (PFOS)	1763-23-1
Perfluorooctanoic acid (PFOA)	335-67-1
Perfluoropentanesulfonic acid (PFPeS)	2706-91-4
Perfluoropentanoic acid (PFPeA)	2706-90-3
Perfluorotetradecanoic acid (PFTeA)	376-06-7
Perfluorotridecanoic acid (PFTrDA)	72629-94-8
Perfluoroundecanoic acid (PFUnA)	2058-94-8
PFEESA	113507-82-7
PFMBA	863090-89-5
PFMOAA	674-13-5
PFMPA	377-73-1
PFO2HxA	39492-88-1
PFO3OA	39492-89-2
PPF Acid	422-64-0

APPENDIX E – GROUNDWATER LOG

GROUND-WATER SAMPLING LOG						
Water System Name				Arrival Time:		
Well permit number:			Local ID:		Date:	
Sampling team members:				Depart Time:		
Well latitude and longitude:				GPS file:		
Well type (circle one): domestic public agricultural irrigation monitor other						
WELL GAUGING (monitoring wells only)					Conversion Table	
Well diameter in inches:				0.1632 (radius) ²		
Depth to water in feet (a):				diameter	gal/foot	
Depth to well bottom in feet (b):				2"	0.16	
Height of water in well, b-a, in feet (c):				4"	0.65	
Volume of water in well in gallons (c * conversion):				6"	1.5	
(Note: one cubic foot equals 7.48 gallons)				8"	2.61	
WELL PURGING		Time well started pumping:				
Allowable Difference:	Parameters	Start time				
± 0.2°C	Temperature (°C)					
±5% if ≤ 100	Sp. Cond. (µS/cm)					
±3% if > 100						
±0.1 SU	pH (standard units)					
± 0.3 mg/L	Dissolved O ₂ (mg/L)					
	% Dissolved O ₂					
	TDS (g/L)					
	Salinity					
		Stop time				
Purge method (circle 1): dedicated pump / submersible pump / bailer / peristaltic / other						
Purge rate in gallons / minute (GPM):			H2O quality meter (specify type):			
Volume of water purged in gallons:			Well condition / construction:			
Well went dry: Y / N						
WELL SAMPLING			Pump type:			
Sample time:			Transducer in well Y / N			
Sample odor:			Monitoring port Y / N			
Sample color:			Drop Tube Y / N			
Sample containers (specify type and quantity):						
Quality control samples (specify type and identification):						
NOTES			ADDITIONAL COMMENTS:			
Weather:	clear partlysunny partlycloudy cloudy					
Wind:	calm light breeze gusts windy					
Temperature:	cold cool warm hot					
Filter Make:	Filter Lot #:		Rev 2			

APPENDIX F – CALIBRATION LOG - EXAMPLE PRINTOUT

Calibration Report

Instrument Aqua TROLL 600
Serial Number 723676
Created 5/3/2022

Sensor pH/ORP
Serial Number 704268
Last Calibrated 5/3/2022

Calibration Details

Calibration Point 1

pH of Buffer 7.00 pH
pH mV -48.9 mV
Temperature 22.35 °C

Pre Measurement

pH 6.90 pH
pH mV -49.0 mV

Post Measurement

pH 7.00 pH
pH mV -48.5 mV

Slope and Offset 1

Slope -58.63 mV/pH
Offset -48.9 mV

ORP

ORP Solution Quick-Cal
Offset 272.2 mV
Temperature 22.35 °C
Pre Measurement -45.0 mV
Post Measurement 227.5 mV

Sensor Conductivity
Serial Number 720149
Last Calibrated 5/3/2022

Calibration Details

TDS Conversion Factor (ppm) 0.65
Cell Constant 1.086
Reference Temperature 25.00 °C

Pre Measurement

Actual Conductivity 7,244.9 µS/cm
Specific Conductivity 7,631.2 µS/cm

Post Measurement

Actual Conductivity 7,595.0 µS/cm
Specific Conductivity 8,000.0 µS/cm

Sensor RDO
Serial Number 719758
Last Calibrated 5/3/2022

Calibration Details

Slope 1.182532
Offset 0.00 mg/L

Calibration point 100%

Concentration 7.94 mg/L
Pre Measurement 99.07 %Sat
Post Measurement 100.00 %Sat
Temperature 21.06 °C
Barometric Pressure 1,067.7 mbar

Sensor Turbidity
Serial Number 719958
Last Calibrated Factory Defaults

Sensor Barometric Pressure
Serial Number 723676
Last Calibrated Factory Defaults

Sensor Pressure
Serial Number 718609
Last Calibrated Factory Defaults

APPENDIX G – PUBLIC WATER SYSTEMS SAMPLED

Type	PWSID	PWS Name
NTNC	DE0000298	Allen Harim Foods Inc.
COMM	DE0000840	ANGOLA BEACH ESTATES
COMM	DE0000999	ANGOLA CREST II
COMM	DE0000248	ANGOLA PUMP DISTRICT
COMM	DE00A0323	ARTESIAN WATER CO (South Bethany)
COMM	DE0000552	ARTESIAN WATER COMPANY
COMM	DE0000885	AVALON WOODS OWNERS ASSOC INC
NTNC	DE00A0733	Beach Babies Day Care
COMM	DE0000221	Bethany Bay Pump District (TUI)
COMM	DE0000628	BETHANY CREST LLC
COMM	DE00A0680	BLUE HERON ESTATES
COMM	DE0000438	BRIARWOOD MANOR MHP
NTNC	DE0000155	BRIDGEVILLE MALL
COMM	DE0000559	BRIDGEVILLE WATER DEPARTMENT
COMM	DE0000238	Broadkiln Beach (TUI)
COMM	DE00A0697	BRUMBLEY'S FAMILY PARK
NTNC	DE0020074	Byler's Store (West Dover)
COMM	DE0000521	CAREY ESTATES, LLC
COMM	DE0000399	CARPENTERS ROW
NTNC	DE0000167	Center for the Creative Arts
NTNC	DE0000667	Central Christian School
NTNC	DE00A0746	Central Delaware Christian Academy
NTNC	DE00A0700	Central Delaware Habitat for Humanity
NTNC	DE0020094	Centreville Layton School
NTNC	DE0000067	Centreville Layton School
NTNC	DE0000172	Child Craft Company
NTNC	DE0020095	Children & Families First - Smyrna
NTNC	DE0020039	Child's Play By the Bay
COMM	DE0000267	COLONIAL ESTATES MOBILE HOME PARK
COMM	DE00A0679	COUNTRY CLUB VILLAGE (TUI)
COMM	DE0000623	COUNTRY LIVING MOBILE COURT
COMM	DE0000817	COUNTRYSIDE HAMLET
COMM	DE0000901	COUNTY SEAT GARDENS
NTNC	DE00A0751	Crossroad Christian Church
NTNC	DE00A0498	Crystal Steel Fabricators



NTNC	DE0000481	Delaware Electric Coop.
NTNC	DE0000595	Delaware State Fair
NTNC	DE0000470	Delaware Turnpike Administration
COMM	DE0000567	DELMAR UTILITY COMM (TN OF DELMAR)
NTNC	DE0000223	Discovery Cove Learning Center
COMM	DE0000604	DONOVAN SMITH MOBILE HOME PARK
COMM	DE0000571	DOVER WATER DEPARTMENT
COMM	DE00A0767	DOVER MEADOWS PUMP DISTRICT
NTNC	DE00A0527	Eagles Nest Fellowship Church
NTNC	DE0000984	Epworth Christian School
NTNC	DE0020045	Fieldstone Golf Club
NTNC	DE00A0415	First Step Preschool
COMM	DE0000260	FISH HOOK MOBILE HOME PARK
NTNC	DE0000715	FORT DELAWARE STATE PARK
COMM	DE00A0770	GANDER WOODS PUMP DISTRICT
COMM	DE0000004	GARRISON LAKE PUMP DISTRICT
COMM	DE0000592	GEORGETOWN WATER DEPARTMENT
COMM	DE00A0522	GRANTS WAY PUMP DISTRICT
COMM	DE0000558	GREENWOOD WATER DEPARTMENT
NTNC	DE00A0785	Guardian Angels Daycare
NTNC	DE0000230	Hanover Foods Corporation
COMM	DE0000660	Hedgerow Hollow
COMM	DE0000251	Henlopen Acres, Town of
NTNC	DE00A0534	Hocker's Super Center
COMM	DE0000523	HOLIDAY ACRES, LLC
COMM	DE0000262	HOLIDAY ESTATES
COMM	DE0000568	HOLLY OAK MOBILE HOME PARK
COMM	DE0000226	HOLLY VIEW MOBILE HOME PARK
COMM	DE00A0377	HOME TOWN VILLAGE OF COOL BRANCH
COMM	DE0000264	HOMESTEAD PARK
COMM	DE0000220	HUNTER MILL ESTATES PUMP DISTRICT
NTNC	DE0000916	Hy-Point Dairy
COMM	DE0000227	INDIAN RIVER ACRES PUMP DISTRICT
NTNC	DE0020000	Intercollegiate Studies Institute
NTNC	DE00A0775	Kristen's Care and Learning Center
COMM	DE0000130	LAKE FOREST ESTATES
COMM	DE0000650	LAKESIDE HOME LLC
COMM	DE00A0575	LAUREL PUMP DISTRICT

COMM	DE0000265	LAUREL VILLAGE MOBILE HOME PARK
COMM	DE0000597	LAUREL WATER DEPARTMENT
COMM	DE0000602	Lewes BPW
NTNC	DE00A0781	Lighthouse Point
COMM	DE0000625	Long Neck Water
NTNC	DE0020067	Lotus Blossom Learning Center
COMM	DE00A0329	Love Creek Woods Pump District (TUI)
COMM	DE0000606	LOVE CREEK PARK
COMM	DE0000271	MEADOWS PUMP DISTRICT
COMM	DE0020063	MESSICK'S MHC LLC SYSTEM 3
NTNC	DE0020073	Mid-Atlantic Family Practice
COMM	DE0000629	Milton Water
NTNC	DE00A0681	Mt. Cuba Center
COMM	DE0000630	NEWARK WATER DEPARTMENT
NTNC	DE0020054	Northside Professional Center
COMM	DE00A0753	Oak Crest Farms (TUI)
NTNC	DE00A0233	Ollies Imagination Station
NTNC	DE0000001	Peddlers Village
NTNC	DE0000833	Perdue (Georgetown)
NTNC	DE00A0341	Perdue Feedmill
COMM	DE0000270	PINE RIDGE MOBILE HOME PARK
COMM	DE0000547	Pinewood Acres
NTNC	DE0000304	PINNACLE FOODS CORPORATION
NTNC	DE0000841	Pinnacle Rehabilitation & Health Center
COMM	DE0000430	PLEASANT ACRES, LLC
NTNC	DE0000288	Pyle Service Center
COMM	DE0000723	Rehoboth Beach Water Department
COMM	DE0000991	Rehoboth Pump District (TUI)
COMM	DE0000645	REHOBOTH BAY COMMUNITY
COMM	DE0000115	SAND HILL ACRES
COMM	DE0000982	SAND HILL MOBILE HOME PARK
COMM	DE0000599	SCOTTSDALE MOBILE HOME PARK
COMM	DE00A0516	SEA WINDS PUMP DISTRICT
COMM	DE0000246	SEAFORD WATER DEPARTMENT
COMM	DE0000654	SELBYVILLE WATER DEPARTMENT
COMM	DE0000600	SHADY ACRES MOBILE HOME PARK
COMM	DE0001646	SHAWNS HIDEAWAY SYSTEM #1
NTNC	DE00A0710	Shells Learning Center III



NTNC	DE0000200	Shoppes of Millville
COMM	DE0000657	Smyrna Water Dept
COMM	DE0000613	SOUTHWOOD ACRES PUMP DISTRICT
NTNC	DE00A0774	Splash Bay Shore Day School
COMM	DE0000276	STOCKLEY CENTER
NTNC	DE0000109	Summit Aviation
NTNC	DE00A0685	Sussex Academy
NTNC	DE00A0794	Sussex Central High School
NTNC	DE0000537	Sussex County Industrial Airpark
COMM	DE0000557	Sussex Shores
NTNC	DE0000291	Sussex Technical School District
COMM	DE0000465	SWANN KEYS
COMM	DE0001605	TALL PINES RESORT COMMUNITY SYS1
COMM	DE0002605	TALL PINES RESORT COMMUNITY SYS2
COMM	DE00A0321	TEAL POINT
COMM	DE0000253	TODDS MOBILE COURT
NTNC	DE0020006	UD Carvel Research and Education Center
COMM	DE0000564	VEOLIA
COMM	DE0000572	Village of Grandview
NTNC	DE0000019	Village Square Academy Learning Center
COMM	DE00A0369	WEBBS LANDING PUMP DISTRICT
COMM	DE00A0159	WILD QUAIL PUMP DISTRICT
COMM	DE00A0757	WILLOW LAKE PUMP DISTRICT
COMM	DE0000663	WILMINGTON WATER DEPARTMENT
COMM	DE0000503	WINTERTHUR
COMM	DE00A0279	WOODLANDS OF MILLSBORO PUMP DISTRICT