



The PFAS-Impacted Haven Wellfield Case Study, PFAS Occurrences and Regulations and Introduction to the Pease Water Treatment Facility

City of Portsmouth

Brian Goetz, Director of Water Resources

Al Pratt, PE, Water Resources Manager

Tim Green, Treatment Operations Foreman

2014

A Little Background:

- PFAS Regulatory Timeline
- Other Contaminated Sites

■ January 2009

■ EPA Preliminary Health Advisories:

- PFOA: 400 ppt
- PFOS: 200 ppt

Known Sites with Contamination:

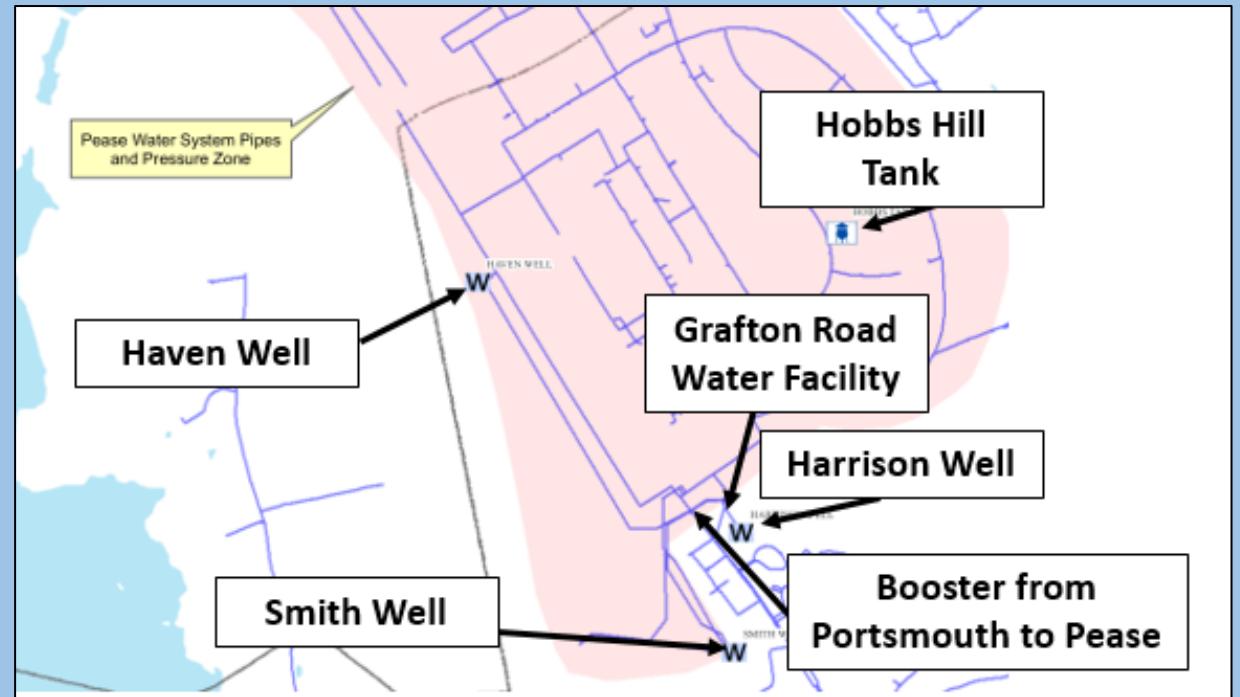
Washington County/Oakdale, MN - 2004
Decatur, Alabama - 2005
Ohio, West Virginia (C8 sites) – 2007

2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

■ May 2012

- EPA issues UCMR 3 requiring sampling of 6 PFAS Compounds. This monitoring provides a basis for future regulatory actions to protect public health. Water Systems to Sample a 12-month period between 2013 - 2015

Pease Tradeport Water System in 2014...



Smith Well

Installed in 1957



300 GPM Pump



Harrison Well

Installed in 1957

Replaced in 2006

225 GPM Pump



Haven Well

Installed in 1875 at Haven Springs

Served Pease Air Base: 1956 to 1992

PDA/Portsmouth: 1992 to 2014

500 GPM Pump




Haven Well History

- Elevated nitrates in the 1990's due to urea used for ice control
- Water from Portsmouth booster was used to blend with Pease water to keep nitrates below 5 ppm. An online analyzer was used to regulate flow
- TCE monitoring in place through EPA directives. Well originally had a 300 gallon-per-minute restriction which was lifted around 2010
- Air stripping treatment system installed by Air Force to allow for treatment if monitoring ever triggered the need (never needed)

Pease Air Base Closure - Superfund

- Eleven Record of Decisions (ROD) representing all the major Superfund cleanup decisions were completed between 1993 and 1997.
- All remedial design and construction activities for the Base have also been completed.
- Haven Well had an extensive monthly monitoring program to track any potential contaminants nearing the well.

Haven Well Monitoring – May 2014 Report



CB&I FEDERAL SERVICES LLC

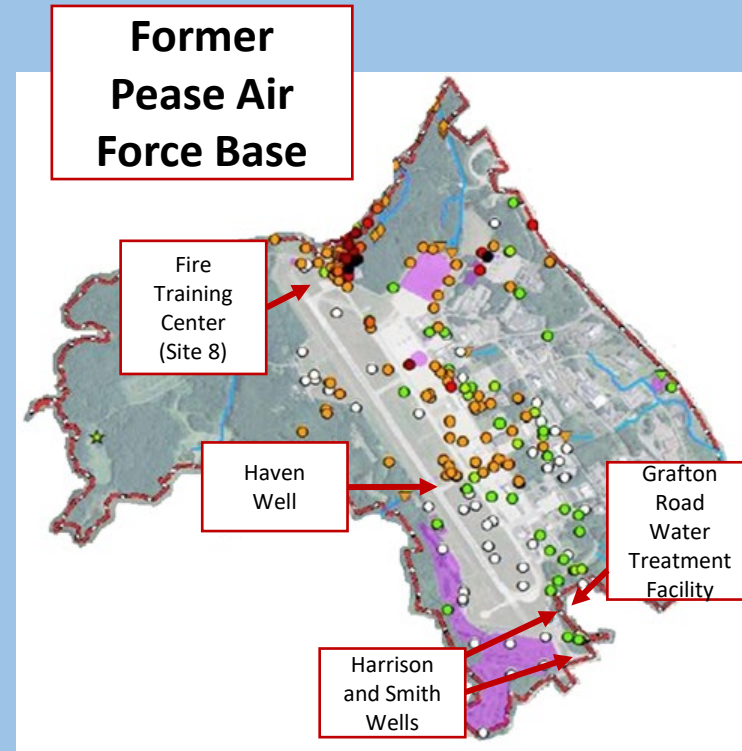
**Haven Well Monthly Data Report
May 2014
(NHDES Site Number 100330300)**

This Haven Well Monthly Data Report, May 2014 is submitted in accordance with the Zone 3 Long-Term Monitoring Plan, Revision 3 (URS Group, Inc. [URS], 2011). Routine monthly sampling of the Haven Well was performed. A sample was collected from the Haven Well (Location ID: 99-034) on May 14, 2014, and was submitted for expedited volatile organic compound (VOC) laboratory analysis. Additional separate analyses were also performed on the Haven Well sample to comply with New Hampshire Department of Environmental Services (NHDES) analytical requirements: 1,2-dibromoethane (also known as ethylene dibromide or EDB) and 1,2-dibromo-3-chloropropane (also known as dibromochloropropane) by U.S. Environmental Protection Agency (EPA) Method 504.1, and 1,4-dioxane by SW846 Method 8270D SIM.

HAVEN WELL MONTHLY DATA REPORT—MAY 2014

Pease Tradeport Water System PFC Contamination

- **April 2014** – NHDES contacts City of Portsmouth to sample the three Pease Tradeport water system wells for PFAS due to detections at former Fire Training Center and past use of AFFF
- **May 12, 2014** – City staff are notified that PFAS levels in Haven Well exceeded the EPA's Health Advisory Standard for PFOS of 200 Parts-Per-Trillion (ppt)
 - Haven PFOS level = 2,500 ppt
- **May 12, 2014**
 - Haven Well is shut down
 - Smith and Harrison wells remain in service with lower detectable levels of PFAS
 - All other Portsmouth Sources are sampled and test "Non Detect"



April and May 2014 PFC Analytical Results
Pease Public Water Supply
Former Pease AFB
Portsmouth, New Hampshire

Sample Location	Collection Date	Perfluorobutane sulfonate	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexane sulfonate	Perfluorohexanoic acid	Perfluorononanoic acid	Perfluorooctane sulfonate (PFOS)	Perfluorooctanoic acid (PFOA)	Perfluoropentanoic acid	Perfluoroundecanoic acid
PHA (µg/L)		--	--	--	--	--	--	--	0.2	0.4	--	--
HAVEN	16-Apr-14	0.051	0.0049 J	ND	0.12	0.83	0.33	0.017	2.5	0.35	0.27	ND
HAVEN	14-May-14	0.051	0.0043 J	ND	0.12	0.96	0.35	0.017	2.4	0.32	0.26	ND
HARRISON	16-Apr-14	0.002 J	ND	ND	0.0046 J	0.036	0.0087	ND	0.048	0.009	0.0079	ND
HARRISON	14-May-14	0.0019 J	ND	ND	0.0042 J	0.032	0.01	ND	0.041	0.0086	0.0084	ND
SMITH	16-Apr-14	0.00094 J	0.0044 J	0.012	0.0025 J	0.013	0.0039 J	ND	0.018	0.0035 J	0.0035 J	0.017
SMITH	14-May-14	0.00087 J	ND	ND	0.002 J	0.013	0.004 J	ND	0.015	0.0036 J	0.0034 J	ND

Notes:

Grey text indicates the parameter was not detected.

indicates concentration above PHA

J - estimated value

all results in µg/L

ND - non detect

PHA - Provisional Health Advisory

-- indicates no established PHA



Haven Well – above the Preliminary Health Advisory (PHA) for PFOS

Harrison and Smith Wells – below the PHA for PFOS

May 22, 2014....

NH Department of Health and Human Services
129 Pleasant Street – Hugh Gallen State Office Park
Concord, NH 03301



NH Department of Environmental Services
29 Hazen Drive
Concord, NH 03301

PRESS RELEASE
FOR IMMEDIATE RELEASE
May 22, 2014

CONTACT
DHHS Public Information Office
603-271-9388
Twitter: NHDHHSPIO
Facebook: NHDepartmentOfHealthAndHumanServices

DES Public Information Office
603-271-3710

Unregulated Contaminant Found in Pease Tradeport Water System

Concord, NH – The New Hampshire Department of Health and Human Services (DHHS), Division of Public Health Services, and the New Hampshire Department of Environmental Services (DES) are today announcing a positive test result for perfluorooctane sulfonic acid (PFOS) from a well that serves the Pease Tradeport and the New Hampshire Air National Guard base at Pease. PFOS is one of a class of chemicals known as PFCs or perfluorochemicals. Because the level of PFOS exceeds the “provisional health advisory” set by the U.S. Environmental Protection Agency (EPA), the well was immediately shut down by the City of Portsmouth.



PUBLIC WORKS DEPARTMENT

CITY OF PORTSMOUTH
680 Peverly Hill Road
Portsmouth N.H. 03801
(603) 427-1530 FAX (603) 427-1539

May 22, 2014

The Pease International Tradeport Water System and Wells

On Monday May 12, 2014, City of Portsmouth staff were notified by the New Hampshire Department of Environmental Services (NHDES) that water sampling results for the Haven Well showed that perfluorooctanesulfonic acid, an unregulated contaminant, exceeded the provisional health advisory levels recommended by the Environmental Protection Agency. The Smith and Harrison wells also had levels of this unregulated contaminant in their water but they were well below the advisory levels. As a precautionary measure, the City took the Haven Well immediately off line as recommended by NHDES Drinking Water and Groundwater Bureau.



What Caused the Contamination? Aqueous Film-Forming Foam (AFFF)



May 2014 - What Did We Know?

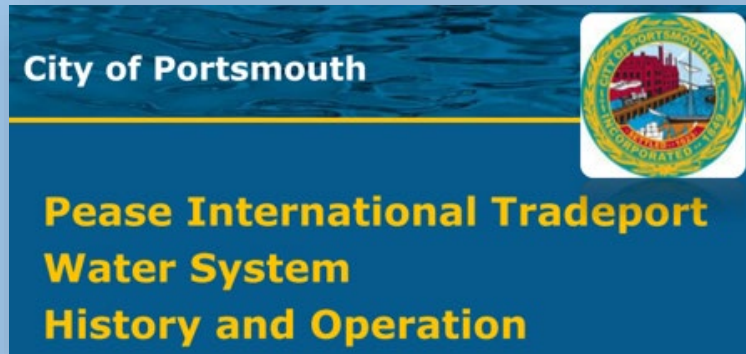
- Referred to as “PFCs” – not yet “PFAS”
- Health concerns at Parts per Trillion
- It Bio-accumulates
- Not just one compound... Many variants

New Hampshire Sites with PFAS

May 2014

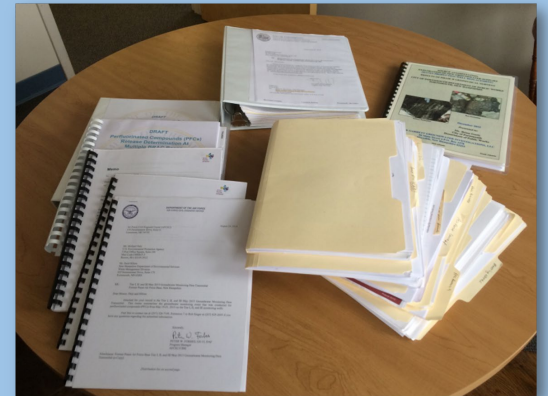
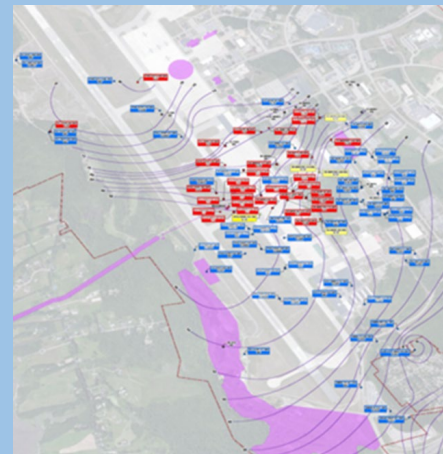


May 28, 2014: State, Health and Water System Officials Hold First Public Meeting



Pease Tradeport PFAS Investigation Begins

- Technical Team
 - Air Force Civil Engineering
 - Air Force Engineering Consultants
 - EPA Region 1
 - NHDES Waste Division
 - NHDES Drinking Water and Groundwater Program
 - Pease Development Authority
 - City of Portsmouth Staff and Consultants



Co-operative Partnerships with Air Force

- ENVIRONMENTAL SERVICES COOPERATIVE AGREEMENTS
 - Well Replacement Study
 - Treatment Feasibility Study
 - Treatment Pilot Studies
 - Treatment Design
 - Treatment Construction
 - Additional Operations Expense



August 26, 2015 - CAB meeting with U.S. Air Force to discuss Pease PFC contamination

Public Outreach:

Meetings, Website, Press Releases



Portsmouth City Council Briefing
by Brian Goetz, Deputy Director of Public Works



NH Department of Health and Human Services
129 Pleasant Street – Hugh Gallen State Office Park
Concord, NH 03301

NH Department of Environmental Services
29 Hazen Drive
Concord, NH 03301

PRESS RELEASE
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City of
Portsmouth
Department of Public Works



August 13, 2014

Pease International Tradeport Water System Update

The City of Portsmouth's Water Division has been actively working with the United States Air Force (Air Force), the United States Environmental Protection Agency (EPA), and the New Hampshire Department of Environmental Services (DES) in response to the detection of elevated levels of the unregulated contaminant perfluorooctane sulfonic acid (PFOS) from the Haven Well, one of three wells that serves the Pease International Tradeport and the New Hampshire Air National Guard base at Pease. PFOS is one of a class of chemicals known as PFCs or perfluorochemicals. Because the level of PFOS exceeded the “provisional health advisory” set by the EPA, the well was shut down by the City of Portsmouth on May 12, 2014 and since that time it has been physically disconnected from the system. A number of actions have been taken by the project team. They include the following:

Water System Operations

The Pease Water System water demands are currently being met by supply from the other two Pease wells, the Harrison and Smith wells, supplemented by water boosted from the City of Portsmouth pressure zone. Overall water system demands for the combined Pease/Portsmouth water system have been met by the combined resources of the system's surface water supply and eight other wells. Water demands were very high early in the month when the weather was hot and dry and customers were irrigating. They have gone down since that time. System operators continue to track water system demands on a daily basis to assure that our supply meets demand. The following graphic provides a summary of the July 2014 water system pumpage.

EPA Order to Treat Haven Well Water July 2015

21

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION I

In the Matter of:

United States Air Force,

Respondent,

Former Pease Air Force Base,

The "Facility"

Docket No.: SDWA-01-2015-0061

Proceeding Under Section 1431(a) of the
Safe Drinking Water Act,
42 U.S.C. § 300i(a)



By Jennifer
Crompton
B10 »

EPA orders Air Force to clean up contaminated Pease well

High levels of contaminant found last year

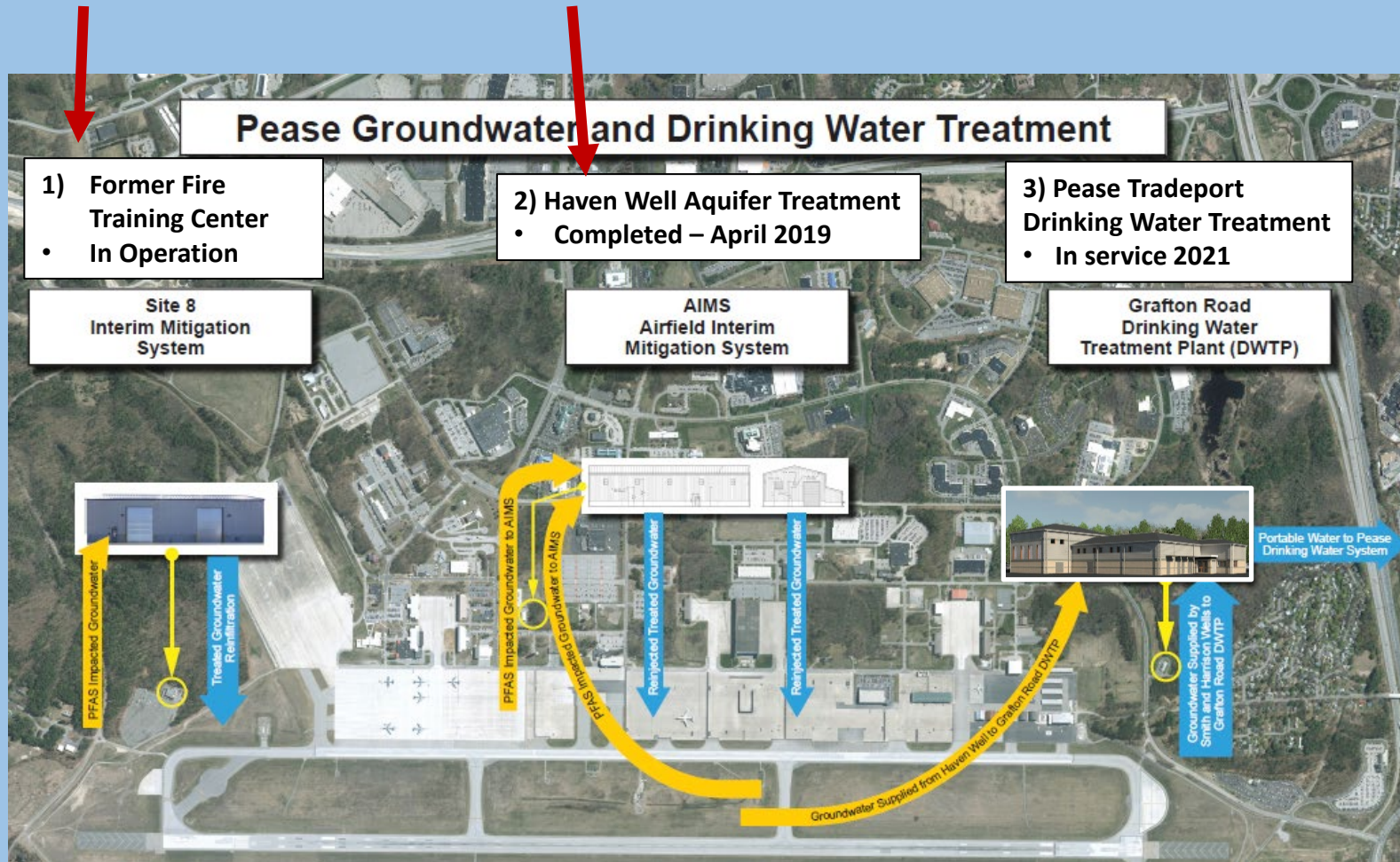
Published 6:10 PM EDT Jul 10, 2015

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- Required Treatment System for Haven Well
- City and Air Force Subsequently met with Senator Shaheen and City proposed treatment for all three Pease Wells
 - Air Force agreed to system that would also treat Harrison and Smith Wells
- City signed agreement with Air Force to design and construct the system

EPA Order Included Two Other Treatment Systems:



2014

2015

2016

2017

2018

2019

2020

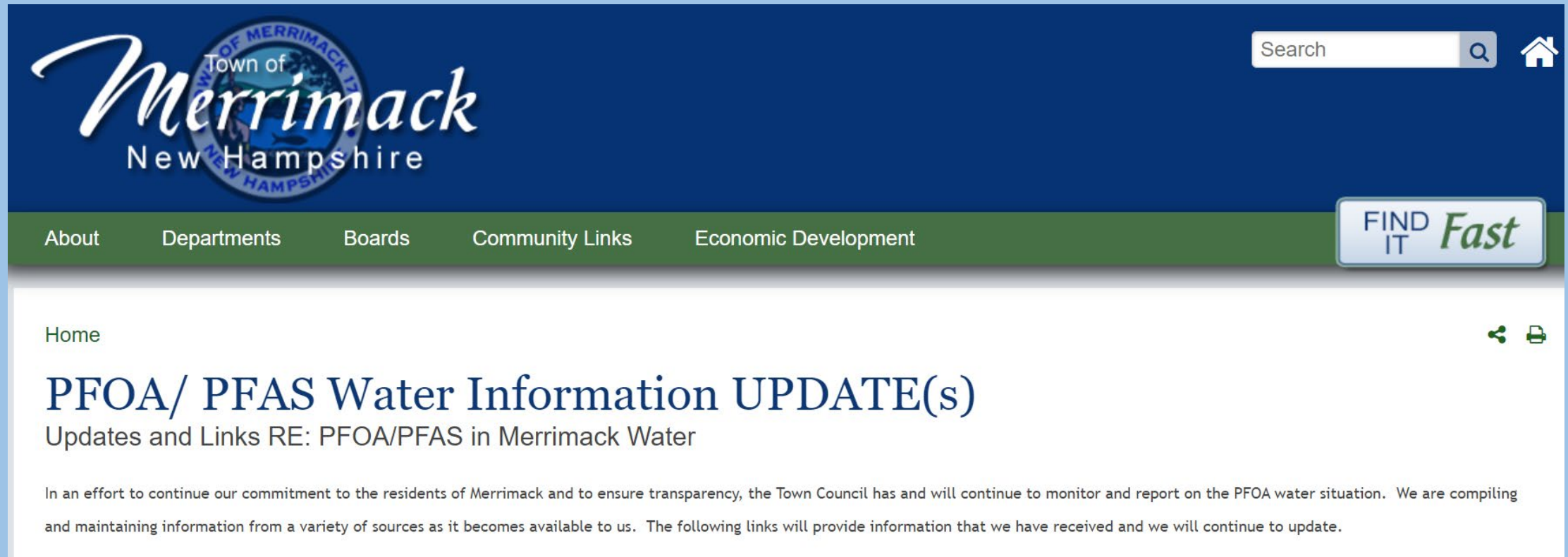
2021

2022



2023

March 2016

PFOA Detected in Merrimack, NH





Town of Merrimack
New Hampshire

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PFOA/ PFAS Water Information UPDATE(s)

Updates and Links RE: PFOA/PFAS in Merrimack Water

In an effort to continue our commitment to the residents of Merrimack and to ensure transparency, the Town Council has and will continue to monitor and report on the PFOA water situation. We are compiling and maintaining information from a variety of sources as it becomes available to us. The following links will provide information that we have received and we will continue to update.

Local and Federal Legislative Delegation



2016 – Governor (now Senator) Hassan meets with Testing for Pease representatives

Advocates for response to PFAS contamination,
blood testing/health studies

GAC Piloting Begins on Harrison and Smith Wells: April 2016

Purpose – monitor GAC effects on pH

- Potential issues with orthophosphate effectiveness



2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

Updated Lifetime Health Advisories

January 2009

EPA Preliminary Health Advisories:

- PFOA: 400 ppt
- PFOS: 200 ppt

May 2016

EPA Lifetime Health Advisories:

- PFOA: 70 ppt
- PFOS: 70 ppt

2009

2010

2011

2012

2013

2014

2015

2016

2017

2018

May 2012

- EPA issues UCMR 3 requiring sampling of 6 PFAS Compounds. This monitoring provides a basis for future regulatory actions to protect public health. Water Systems to Sample a 12-month period between 2013 - 2015



EPA
United States
Environmental
Agency

FACT SHEET
PFOA & PFOS Drinking Water
Health Advisories

Overview

EPA has established health advisories for PFOA and PFOS based on the agency's assessment of the latest peer-reviewed science to provide drinking water system operators, and state, tribal and local officials who have the primary responsibility for overseeing these systems, with information on the health risks of these chemicals, so they can take the appropriate actions to protect their residents. EPA is committed to supporting states and public water systems as they determine the appropriate steps to reduce exposure to PFOA and PFOS in drinking water. As science on health effects of these chemicals evolves, EPA will continue to evaluate new evidence.

Background on PFOA and PFOS

PFOA and PFOS are fluorinated organic chemicals that are part of a larger group of chemicals referred to as perfluoroalkyl substances (PFASs). PFOA and PFOS have been the most extensively produced and studied of these chemicals. They have been used to make carpets, clothing, fabrics for furniture, paper packaging for food and other materials (e.g., cookware) that are resistant to water, grease or stains. They are also used for firefighting at airfields and in a number of industrial processes.

Because these chemicals have been used in an array of consumer products, most people have been exposed to them. Between 2000 and 2002, PFOS was voluntarily phased out of production in the U.S. by its primary manufacturer. In 2006, eight major companies voluntarily agreed to phase out their global production of PFOA and PFOA-related chemicals, although there are a limited number of ongoing uses. Scientists have found PFOA and PFOS in the blood of nearly all the people they tested, but these studies show that the levels of PFOA and PFOS in blood have been decreasing. While consumer products and food are a large source of exposure to these chemicals for most people, drinking water can be an additional source in the small percentage of communities where these chemicals have contaminated water supplies. Such contamination is typically localized and associated with a specific facility, for example, an industrial facility where these chemicals were produced or used to manufacture other products or an airfield at which they were used for firefighting.

EPA's 2016 Lifetime Health Advisories

EPA develops health advisories to provide information on contaminants that can cause human health effects and are known or anticipated to occur in drinking water. EPA's health advisories are non-enforceable and non-regulatory and provide technical information to states agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water contamination. In 2009, EPA published provisional health advisories for PFOA and PFOS based on the evidence available at that time. The science has evolved since then and EPA is now replacing the 2009 provisional advisories with new, lifetime health advisories.

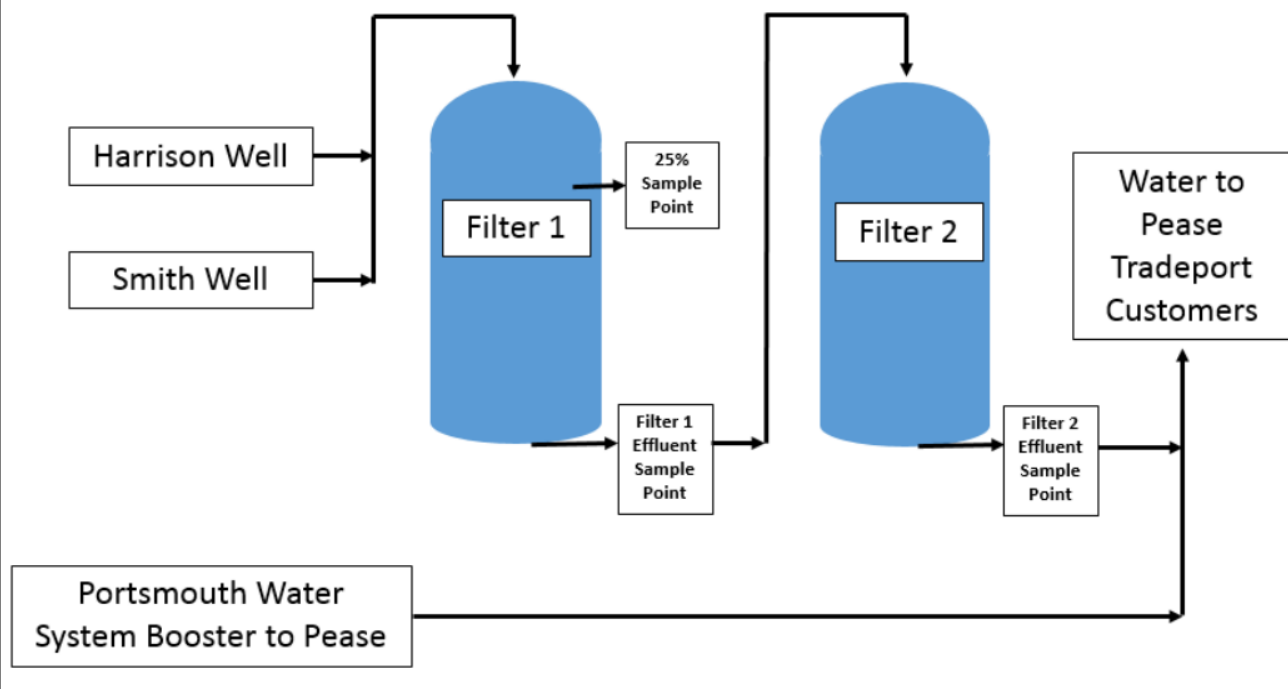
Demonstration Filters

- Fall 2016 – Installed full size temporary GAC filtration
- Flow rate - 400 GPM
- Test GAC effectiveness on Pease (Harrison and Smith) water



Demonstration Filter Schematic

Harrison and Smith Well
Activated Carbon Treatment Demonstration Schematic



December 2016 Pease Customer Outreach

Mailer to all Pease Customers:

City of
Portsmouth
Department of Public Works



September 8, 2016

TREATMENT PLAN FOR PEASE TRADEPORT WATER SUPPLY

Following the detection of levels above the preliminary health advisory for perfluorinated hydrocarbons (PFCHs) in the Haven Well and its subsequent shut down in May 2014, the City of Portsmouth and the United States Air Force established a water treatment plan for the operating Harrison and Smith Wells that will also guide the treatment of the Haven Well, the three wells that supply water to the Pease Tradeport water supply system. Through an agreement with the United States Air Force, the City has been moving forward with the installation of two 20,000 lb. granular activated carbon vessels (GACs) to filter and remove PFCHs from the Harrison and Smith Wells at the existing Grafton Road water facility. This installation will ensure effective technology is in place to properly treat the PFCHs and enhance the overall performance of our water system.



This work follows an initial pilot study that was completed in June 2016. Pilot testing results indicated that the GAC filter media will remove PFCHs without significant pressure, build up or fouling in the media. General chemistry results also indicated acceptable levels for pH and alkalinity with no anticipated disruption to the existing water distribution system. Frequent sampling, filter monitoring and operational requirements from the Harrison and Smith Wells' demonstration project will be evaluated for the first six months of operation. Information from both the pilot and the demonstration study will then be used by the City's consultant to revise the final design parameters for treatment of the Haven Well.

Startup of the carbon filter system for the Harrison and Smith Wells is anticipated in late September or early October 2016. Final data and design plans for the Haven treatment system

are planned for Spring 2017 with construction of this system anticipated to commence in the Fall of 2017. The Haven Well design will also include contingency planning and treatment system retrofits to treat other contaminants if necessary.

TREATMENT SYSTEM COMPONENTS AND OPERATION

The filtration system for the demonstration will consist of GAC as a filter media. Calgon pressure vessels will be filled with Filtrasorb 400™, which has been used effectively to treat PFCHs in drinking water systems in Minnesota, Maryland and other states. Similar to the pilot study, filter vessels for the demonstration project will be placed in series. Groundwater will be pumped through a primary filter (lead), while a second filter (lag) will provide additional filtration capacity to ensure effective removal of PFCHs if any pass through the lead filter. Water quality will be monitored before, between and after the filters to evaluate media life. The use of a lead/lag arrangement allows the GAC to be replaced in the lead filter when adsorptive capacities are fully utilized and PFC removal effectiveness has diminished. This dual filtration design provides redundancy and safety for finished water from the plant.



ONGOING WATER QUALITY MONITORING

The Air Force's consultant has been performing frequent routine sampling of the water supply wells in the Pease water system since May 2014. The Smith Well has been sampled weekly for PFCHs and the Harrison Well sampled every two weeks. In addition to these water supply wells, the Air Force's consultant samples other monitoring wells in the surrounding area to track the aquifer and monitor for any PFCHs moving toward the supply wells.

The EPA recently issued new health advisories of 0.070 µg/L (micrograms per liter) for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS). The Smith and Harrison wells that supply the Pease Tradeport Water System have combined levels PFOA and PFOS that have consistently been below this limit since sampling began in 2014. The most recent samples of tap water in the Pease water system in two locations both had combined levels of PFCHs of 0.018 µg/L. Once the City receives the validated results for these wells, plus quarterly sampling in the distribution system, the data is updated and posted on the City's website.

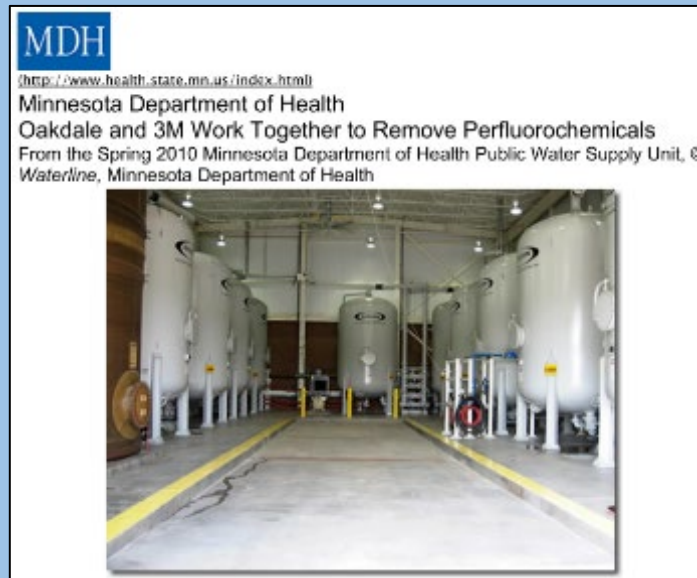
Additional information can be accessed at:

<http://www.cityofportsmouth.com/publicworks/phwn.html>

Or by calling Al Pratt, Water Resources Manager, at 520-0622

Treatment Design Options

- Activated Carbon Filtration is most widely accepted for drinking water applications
- Membrane Filtration
- Anion Exchange
- Advanced Oxidation



Oakdale, Minnesota
Activated Carbon



Newcastle, Delaware
Activated Carbon

Haven Well Pilot Test – Resin Filters

(November 2017 – December 2018)

- Approached by ECT2 about potential to utilize resin treatment
- Begin piloting to compare the ability of media to remove PFAS from the Haven Well
 1. IX Resin = ECT2's SORBIX LC1
 2. GAC = Calgon's F400



March 2018 – Continued Updates to City Council



PFAS Update Supporting Information City of Portsmouth

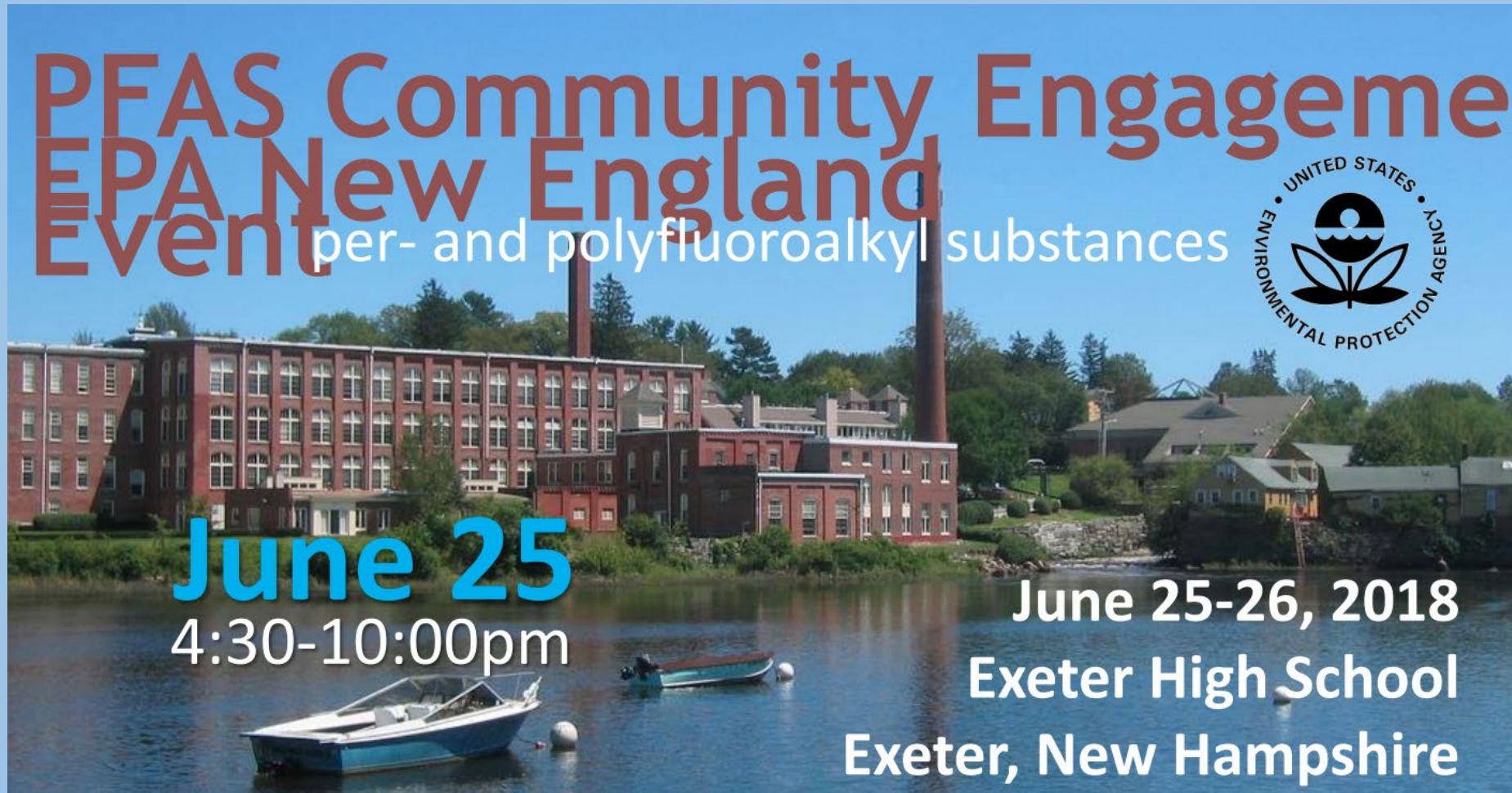
Portsmouth City Council Packet
March 5, 2018

April 7, 2018

Public Meeting with Senator Shaheen and Air Force



EPA Begins Community Engagement Outreach

A poster for a community engagement event. The background is a photograph of a large, multi-story red brick building with many windows, situated on a hill overlooking a body of water. Two small boats are in the water in the foreground. The sky is blue. Overlaid on the image is text in various colors and sizes. At the top, in large red letters, is 'PFAS Community Engagement'. Below that, in white letters, is 'EPA New England Event'. To the right of the event title is the EPA logo, which is a circular seal with 'UNITED STATES' at the top, 'ENVIRONMENTAL PROTECTION AGENCY' at the bottom, and a stylized flower in the center. Below the event title, in white letters, is 'per- and polyfluoroalkyl substances'. At the bottom left, in large blue letters, is 'June 25'. Below that, in white letters, is '4:30-10:00pm'. At the bottom right, in white letters, is 'June 25-26, 2018', 'Exeter High School', and 'Exeter, New Hampshire'.

PFAS Community Engagement
EPA New England Event
per- and polyfluoroalkyl substances

June 25
4:30-10:00pm

June 25-26, 2018
Exeter High School
Exeter, New Hampshire



Pease Tradeport Water System PFAS Contamination

- April 2014 – NHDES contacts City of Portsmouth to sample the three Pease Tradeport water system wells for PFAS due to detections at former Fire Training Center and past use of AFFF
- May 12, 2014 – City staff are notified that PFAS levels in Haven Well exceeded the EPA's Health Advisory Standard for PFOS
 - 2,500 ppt (Preliminary Health Advisory = 200 ppt)
- May 12, 2014
 - Haven Well is shut down
 - Portsmouth water supplements water lost from Haven Well
 - Smith and Harrison wells remain in service
- Extensive Monitoring of PFAS by the Air Force's consultant
- July 2015 – EPA Order to Air Force to treat aquifer and wells
- 2015 and 2016 – Preliminary treatment design and treatment piloting studies
- September 2016 – Activated Carbon Filters on Harrison and Smith Wells
- 2017-2018 – Design of treatment system for all three Pease wells
- 2019-2020 – Anticipated construction of final treatment system

114

6/26/2018

Brian Goetz

Pease Tradeport PFAS History

September 2018 Resin Piloting Results

- Resin significantly outperforms GAC when raw water PFAS concentrations are high
- As regulations move PFAS limits lower, the advantages of resin over GAC goes up
- Recommend treatment system with resin followed by GAC filters



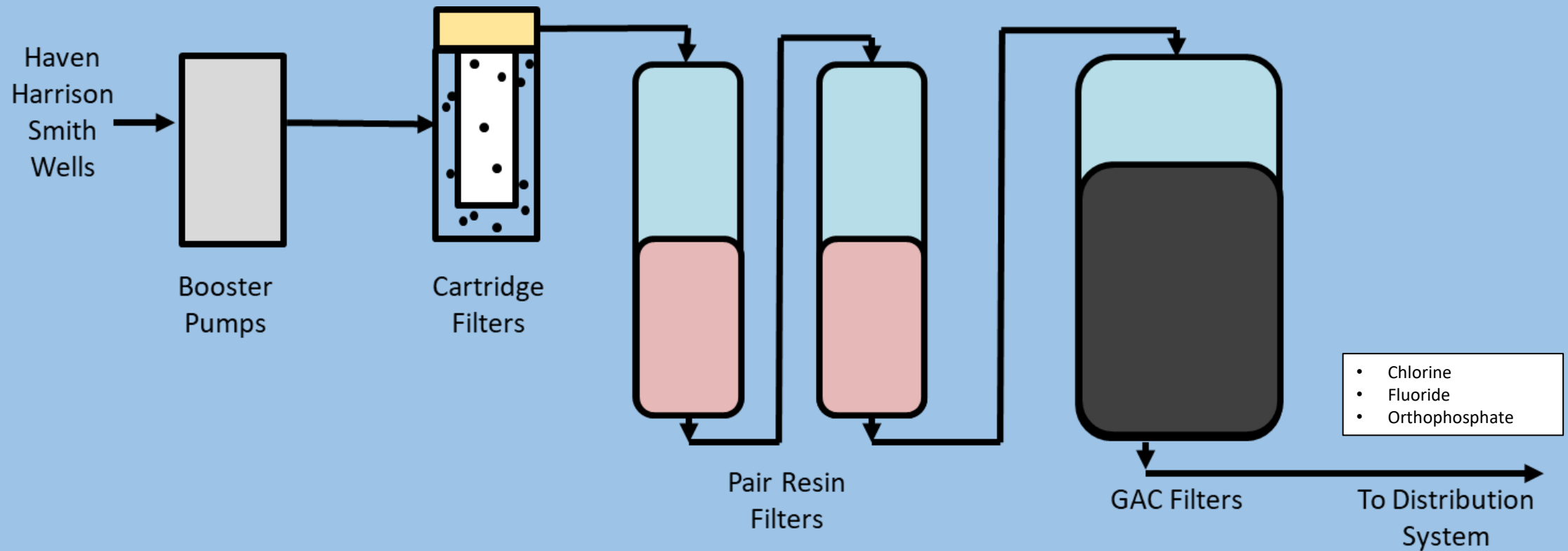
Final Treatment Facility Design



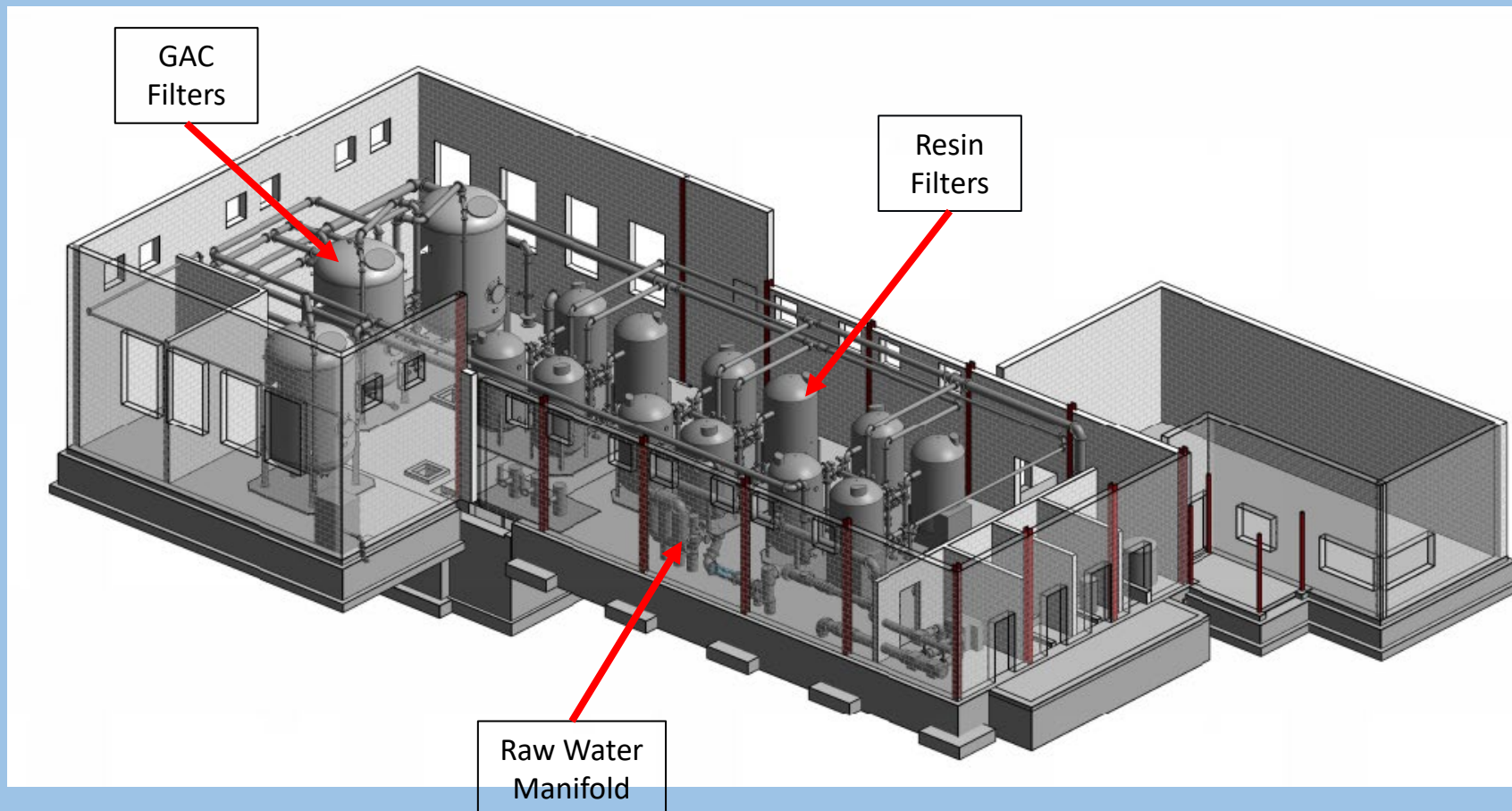
- City Water Staff
- Weston & Sampson

Pease WTF Process Schematic

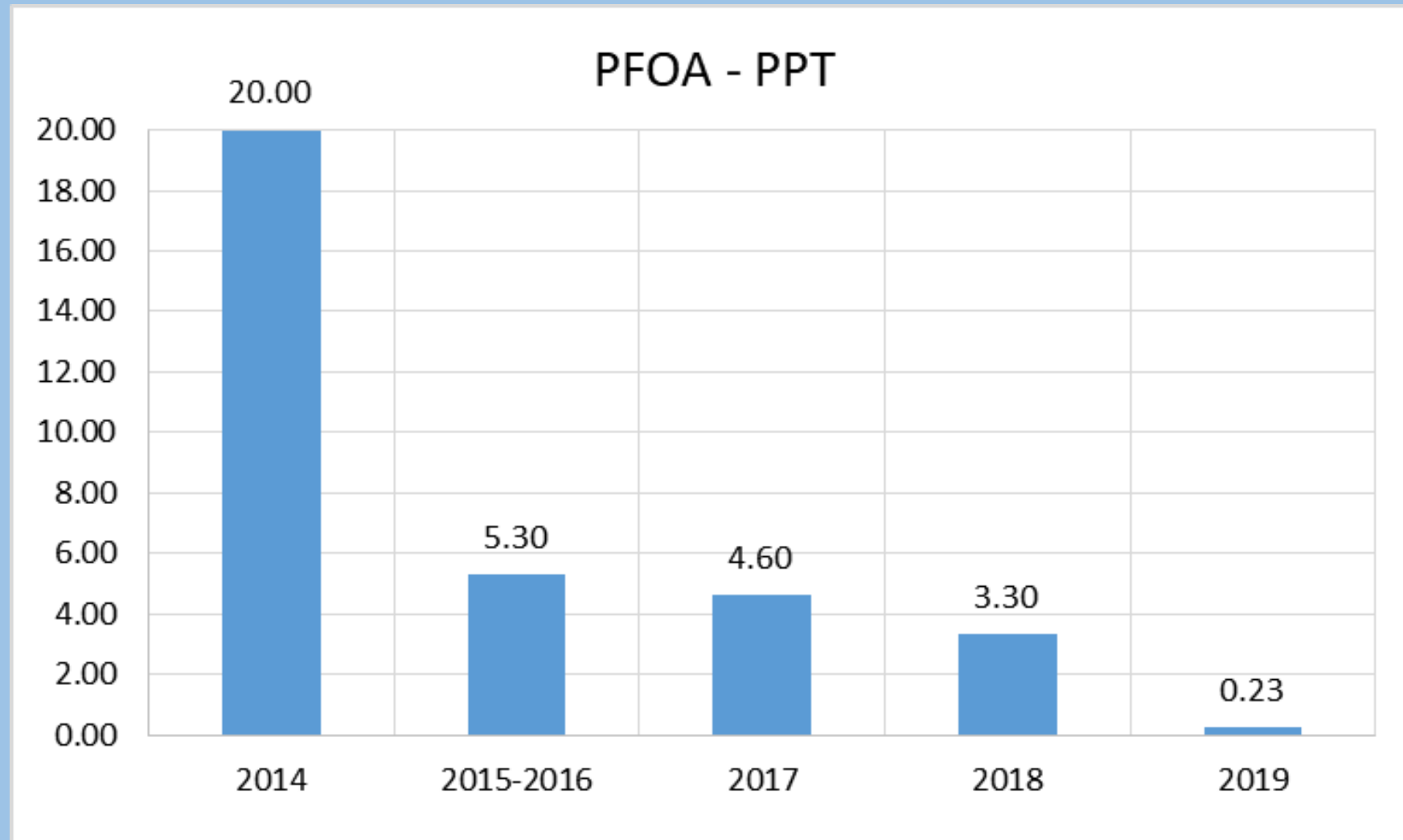
New Treatment System



Final Proposed Treatment Layout



PFAS Timeline – Lab Methods and Reporting Limits

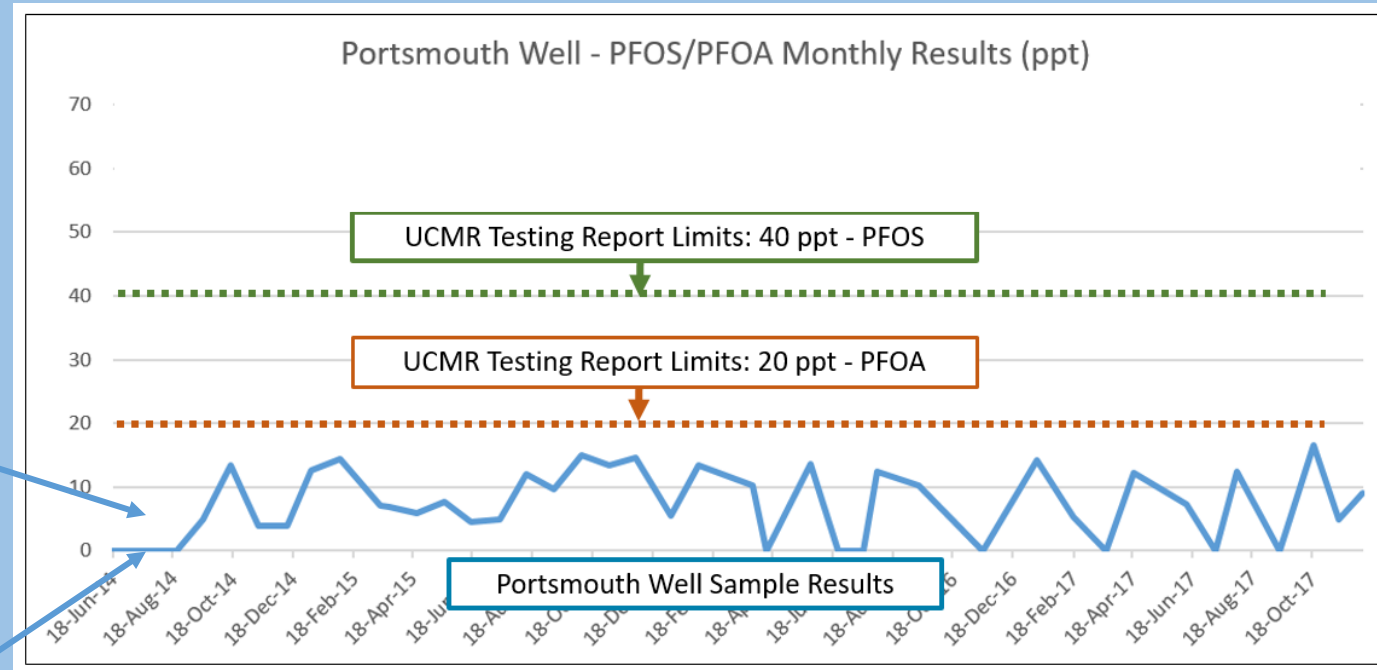


What Happens with Lower Detection and Reporting Limits?

- All water sources sampled initially in May 2014 and again in 2015 as part of the EPA's Unregulated Contaminant Monitoring Program (UCMR3) – Two Rounds of Sampling:

- Surface Water - “non detect”
- Madbury Wells - “non detect”
- Portsmouth Well - “non detect”
- Collins Well - “non detect”
- Greenland Well - “non detect”

- When resampled using lower detection limits (same as Pease sampling), sources now show low levels of detections



January 2019 Invitation to Bid



INVITATION TO BID

GRAFTON ROAD

DRINKING WATER TREATMENT PLANT UPGRADE

CITY OF PORTSMOUTH NEW HAMPSHIRE

OWNER: The City of Portsmouth, New Hampshire seeks sealed Bids for the construction of upgrades at the Grafton Road Drinking Water Treatment Plant. The work will consist of the renovations and additions of new treatment process to treat drinking water supplied to the Pease International Tradeport for Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS). The scope of work includes partial demolition of the existing +/- 4,000 square foot building to increase the overall size and height of the facility, including the additions of approximately 3,900 square feet of building area.

BID OPENING: Sealed Bids will be received until 2:00 P.M. Local Time on January 8, 2019 in the office of the Finance/Purchasing Department, City Hall, 1 Junkins Avenue, Portsmouth, NH 03801. After the official Bid closing time, the Bids will be publicly opened and read aloud.

BIDDING DOCUMENTS: Contract Documents may be viewed and downloaded as a Portable Document Format (PDF) file free of charge at www.accentblueprints.com. Copies may be obtained by completing an order online or by calling 978-362-8038 with payment of printing fee for each set. Copies may be shipped for an additional charge. All payments for printing and shipping are nonrefundable. Completed orders may be picked up at the offices of Accent Printing located at 99 Chelmsford Road, North Billerica, MA 01862 (978-362-8038), from 9 a.m. to 4 p.m. Copies may also be shipped to prospective bidders for an additional charge to cover handling and mailing fees. Any questions regarding bidding should be directed to the Purchasing Department at 603-610-7227. Any technical questions should be directed to Weston & Sampson's Project Manager, Margaret A. McCarthy, PE, in writing at mccarthy@wsinc.com.

PRE-BID CONFERENCE: A mandatory pre-bid conference will be held on December 5, 2018 at 1:00 P.M. at the Portsmouth Department of Public Works, First Floor, 680 Peverly Hill Road, Portsmouth, NH 03801, to familiarize Bidders with the Project. A site tour of the existing WTP will follow the conference.

BID SECURITY: Bid Security, certified treasurer's or cashier's check or bid bond, in the amount of 5 percent of the Bid shall accompany each Bid in accordance with the Instructions to Bidders.

CONTRACT SECURITY: The Bidder to whom a Contract is awarded shall furnish a Performance Bond and a Payment Bond each in amount equal to the Contract Price.

RESERVATION OF RIGHTS: OWNER reserves the right to reject any and all Bids, waive informalities in bidding or to accept the Bid or Bids, should the OWNER deem it in the Public interest to do so.

BID WITHDRAWAL: No Bid shall be withdrawn for a period of 90 days after the opening of Bids without consent of OWNER.

TIME FOR COMPLETION: The Work shall be completed within 670 calendar days from the date when the Contract Times commence to run. There are several Interim Milestones in addition to the time for Final Completion.

END OF SECTION

April 2019 - Start of Construction Kinsmen Corporation



June 2019 – GAC Building Foundation



2014

2015

2016

2017

2018

2019

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2021

2022

2023

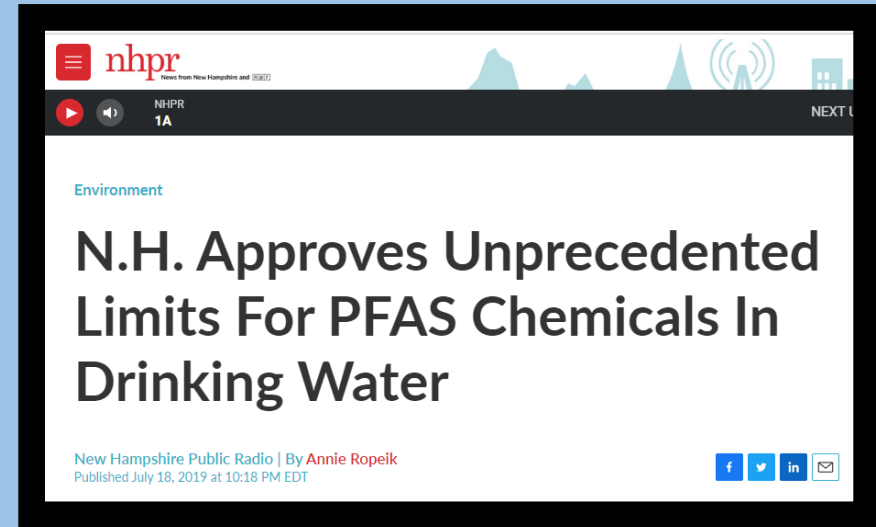
PFAS Regulatory Timeline

January 2009

- EPA Preliminary Health Advisories:
 - PFOA: 400 ppt
 - PFOS: 200 ppt

May 2016

- EPA Lifetime Health Advisories:
 - PFOA: 70 ppt
 - PFOS: 70 ppt



2009

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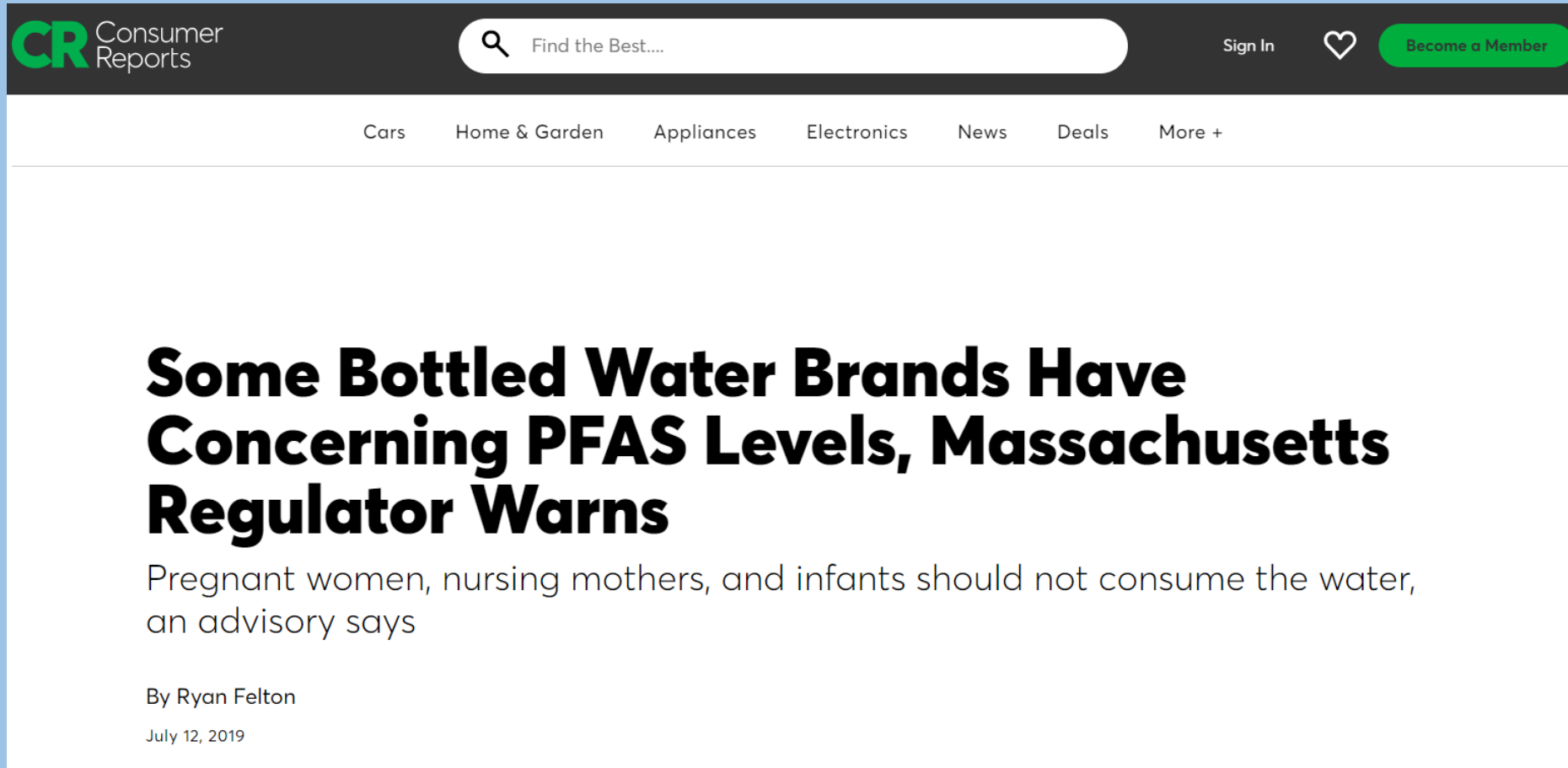
May 2012

- EPA issues UCMR 3 requiring sampling of 6 PFAS Compounds. This monitoring provides a basis for future regulatory actions to protect public health. Water Systems to Sample a 12-month period between 2013 - 2015

July 2019

- New Hampshire Sets Maximum Contaminant Levels in Drinking Water and Groundwater:
 - PFOA: 12 ppt
 - PFOS: 15 ppt
 - PFNA: 11 ppt
 - PFHxS: 18 ppt

PFAS In Bottled Water



The image is a screenshot of a web page from Consumer Reports. At the top, there is a navigation bar with the years 2014 through 2023. The year 2019 is highlighted. Below the navigation bar, the Consumer Reports logo is on the left, and a search bar with the text 'Find the Best....' is in the center. To the right of the search bar are links for 'Sign In', a heart icon, and a green button that says 'Become a Member'. Below the navigation bar, there is a horizontal menu with links for 'Cars', 'Home & Garden', 'Appliances', 'Electronics', 'News', 'Deals', and 'More +'. The main content area features a large, bold headline: 'Some Bottled Water Brands Have Concerning PFAS Levels, Massachusetts Regulator Warns'. Below the headline, there is a sub-headline: 'Pregnant women, nursing mothers, and infants should not consume the water, an advisory says'. At the bottom of the article preview, it says 'By Ryan Felton' and 'July 12, 2019'.

CR Consumer Reports

Find the Best....

Sign In

♥

Become a Member

Cars Home & Garden Appliances Electronics News Deals More +

Some Bottled Water Brands Have Concerning PFAS Levels, Massachusetts Regulator Warns

Pregnant women, nursing mothers, and infants should not consume the water, an advisory says

By Ryan Felton

July 12, 2019

Sharing Lessons Learned:

New Hampshire Water Works Association's Construction Field Day – Aug 2019



September 2019 – GAC Building Framing & Generator Installation





October 2019 – GAC Filter Installation



PFAS in Ski Wax

Outside

GEAR ((OUTDOOR-GEAR)) ADVENTURE ((OUTDOOR-ADVENTURE)) HEALTH ((HEALTH)) TRAVEL ((ADVENTURE-TRAVEL)) CULT



Nordic Skiing Has an Addiction to Toxic Wax

Fluorinated glide wax is being banned from elite competitions, and big brands like Swix say they're searching for environmentally friendly alternatives. But the seductively speedy—and noxious—compounds are unlikely to loosen their grip on the sport anytime soon.

When the [Environmental Defense Fund](https://www.outsideonline.com/2144781/6-best-environmental-groups-donate-better-world/) (EDF) emailed me in December, hoping to daylight a manufacturer filing an anonymous application to use a toxic chemical, the message carried the sort of dire rhetoric that the EDF has, in past campaigns, unleashed on Dow Chemical Company and DuPont. The phrases “lung waterproofing” and “concern for systemic and male reproductive toxicity” glinted on my screen alongside a note from the EDF’s lead senior scientist, Richard Denison. Denison described a new product whose key chemical ingredient was rejected for commercial use by the [Environmental Protection Agency](https://www.outsideonline.com/2164306/15-images-prove-why-we-desperately-need-strong-epa/) (EPA) late in 2018, and then oddly approved by the same agency last June, through a decision-making process that is largely hidden from the public.

2014

2015

2016

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March 2020 GAC Building:



May 2020



June 2020 - Demolition of Existing Building



July 2020 – NH Governor Signs PFAS MCLs into Law



In July 2020, New Hampshire House Bill 1264 was signed into law establishing the following MCLs:

Per- and polyfluoroalkyl substances (PFAS)	Maximum Contaminant Level nanograms/liter (parts per trillion or ppt)
Perfluorooctanoic acid (PFOA)	12
Perfluorooctane sulfonic acid (PFOS)	15
Perfluorohexane sulfonic acid (PFHxS)	18
Perfluorononanoic acid (PFNA)	11

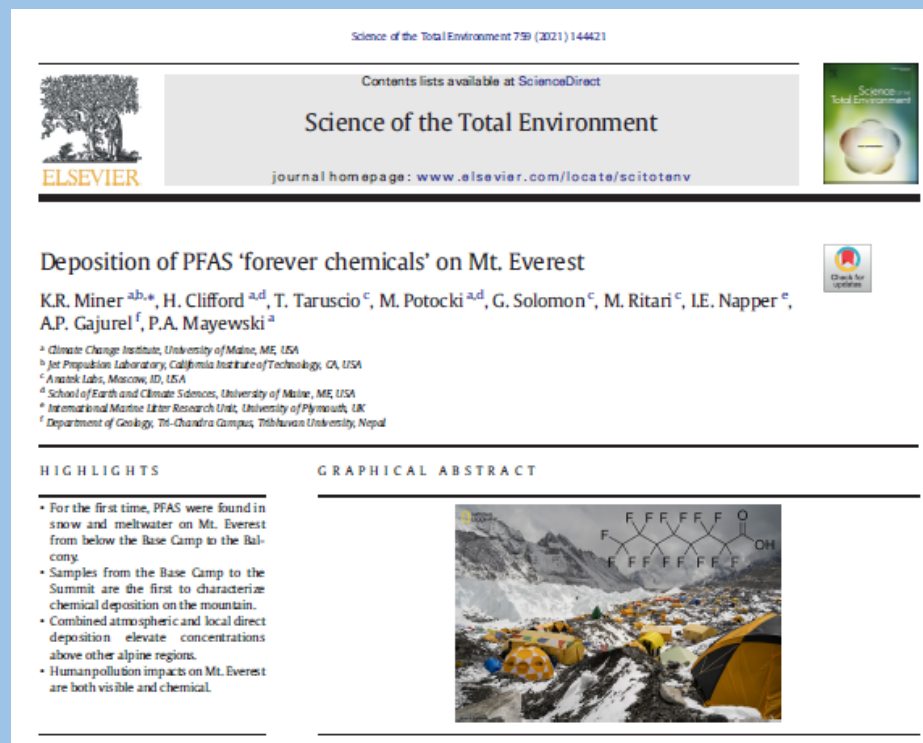
August 2020 – Resin Filter Installation



October 2020



PFAS on Mount Everest



From the 14 PFAS compounds tested for, we found **perfluorooctanesulfonic acid (PFOS)**, **perfluorooctanoic acid (PFOA)**, and **perfluorohexanoic acid (PFHxA)** in Mt. Everest snow and meltwater. The highest concentrations found were 26.14 ng/L and 10.34 ng/L PFOS at Base Camp and Camp 2, respectively. Mar 10, 2021

March 2021 – New Well Manifold Installation



Filter Room

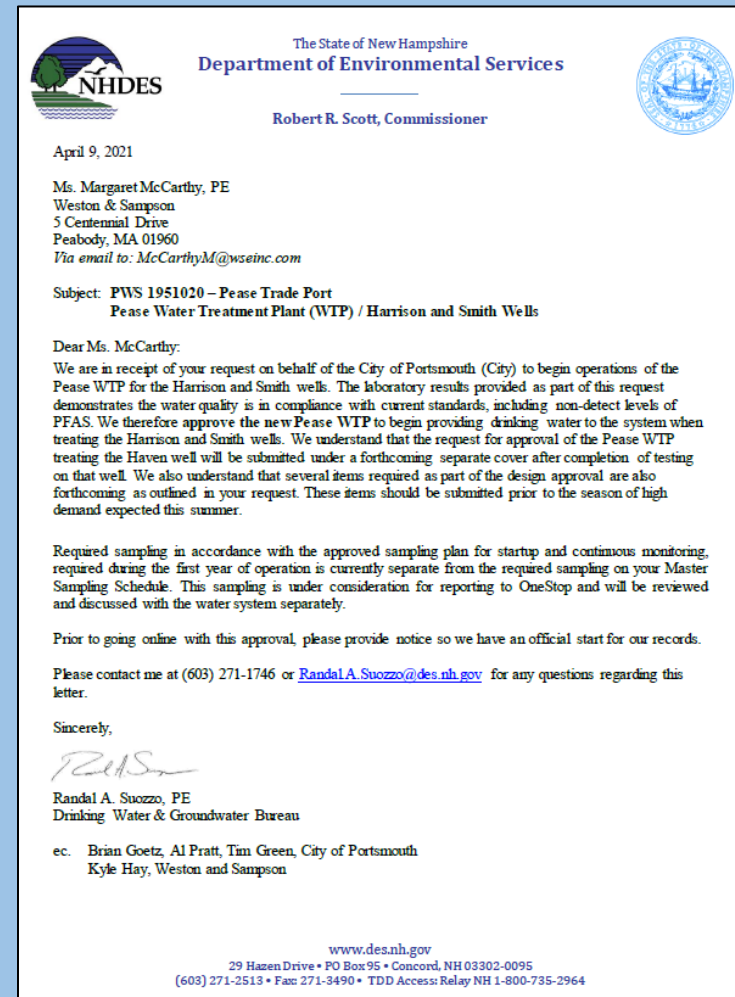


Control Room/Lab & Online Analyzers



Approval of New Treatment System

- Resin filters tested with Harrison and Smith water
- Data analysis submitted to NHDES for approval of system operation
- April 9, 2021 approval received



Two Years of Construction

April 2019

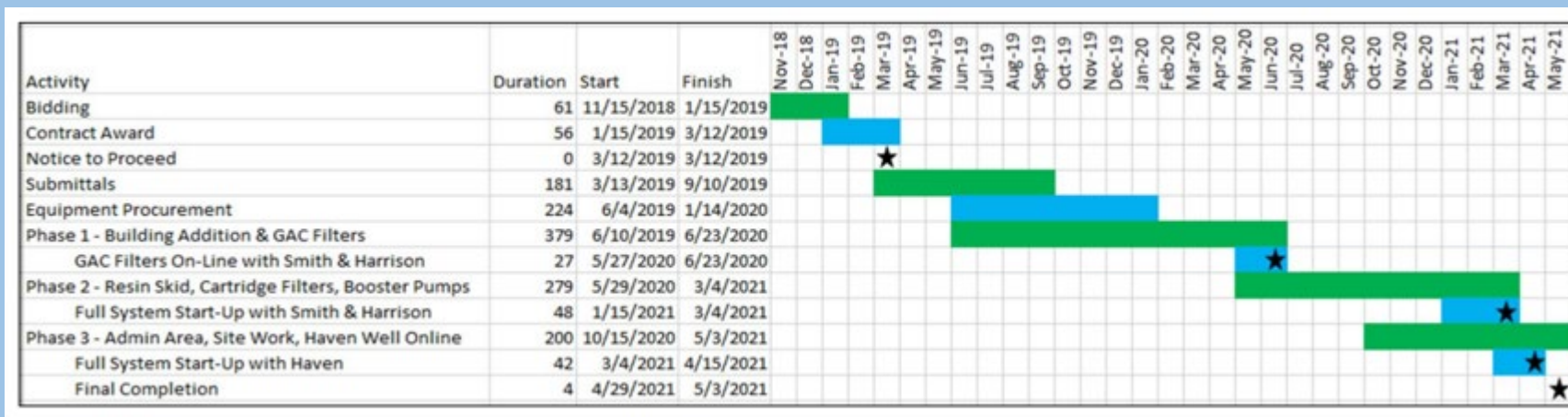


April 2021



On Time... and... On Budget

- \$10.8 Million Construction – Kinsmen Corp
- \$2 Million Engineering, Studies, Design, Piloting, Construction Admin



2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

May 4, 2021 Dedication



**City Officials, Congressional Delegation
and Air Force Representatives**



City Staff



Weston & Sampson Engineers

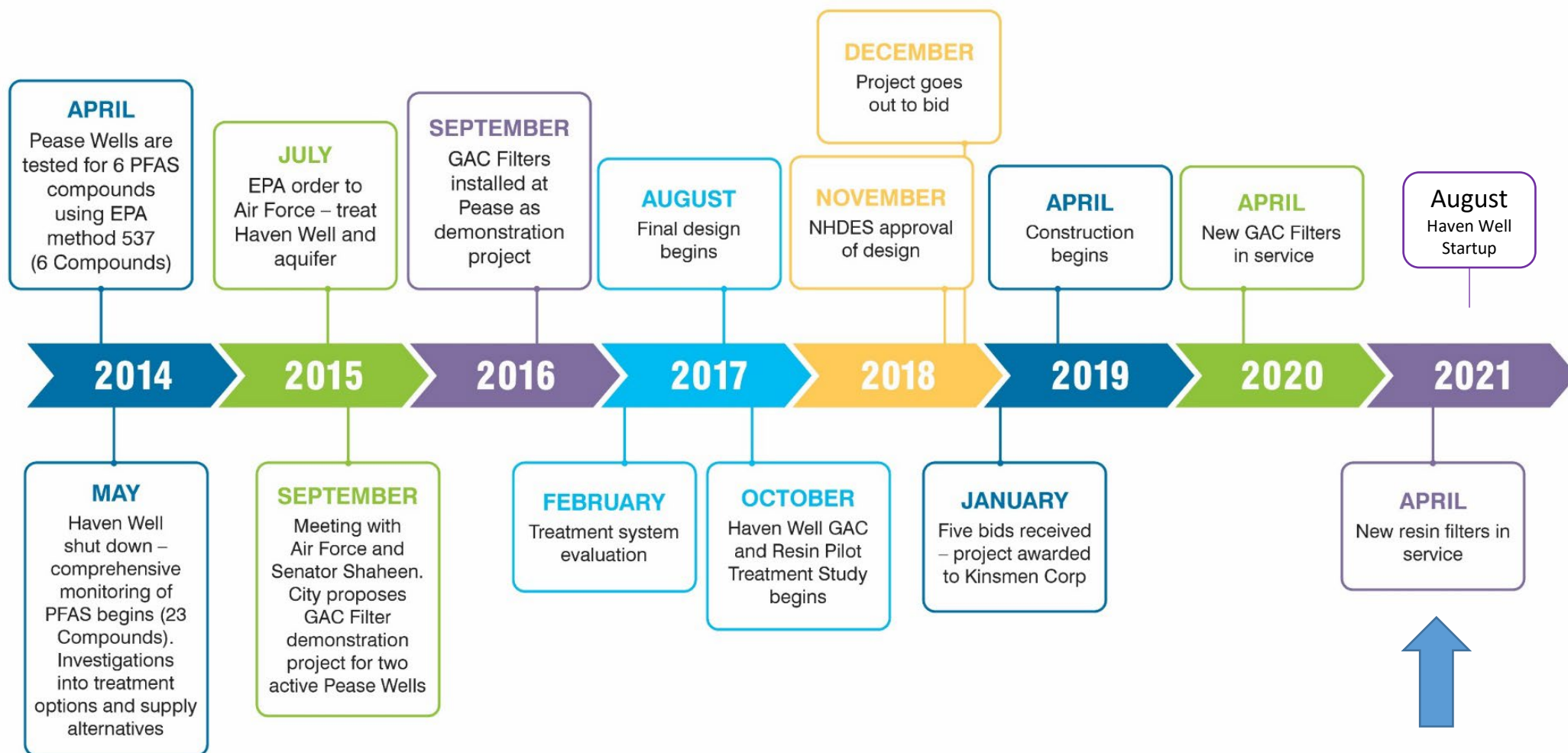
May 4, 2021 Dedication



Haven Well Startup – August 3, 2021



PEASE TRADEPORT PFAS TIMELINE:



Part of the Public
Interest Network

ENVIRONMENT AMERICA

TRENDING

Save the bees

Beyond plastic

Forests

Our Work ▾

States ▾

CLEAN WATER

SEPTEMBER 1, 2022



Protecting Our Waters

Update: New study finds PFAS in rainwater

2014

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2023

Updated Health Advisories



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CONTACT US

EPA Announces New Drinking Water Health Advisories for PFAS Chemicals, \$1 Billion in Bipartisan Infrastructure Law Funding to Strengthen Health Protections

Agency establishes new health advisories for GenX and PFBS and lowers health advisories for PFOA and PFOS

June 15, 2022

Compounds. This monitoring provides a basis for future regulatory actions to protect public health. Water Systems to Sample a 12-month period between 2013 - 2015

- June 2022
 - EPA issues Interim Updated PFOA and PFOS Health Advisories
 - PFOA = 0.004 parts per trillion (ppt)
 - PFOS = 0.02 ppt
 - GenX chemicals = 10 ppt (Final Advisory)
 - PFBS = 2,000 ppt (Final Advisory)

2018

2019

2020

2021

2022

2023

2019

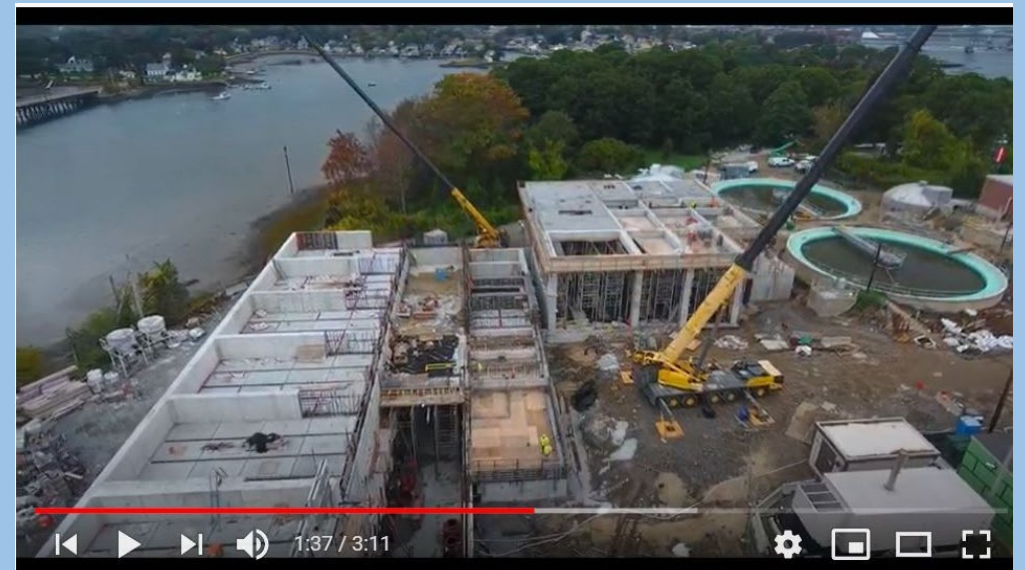
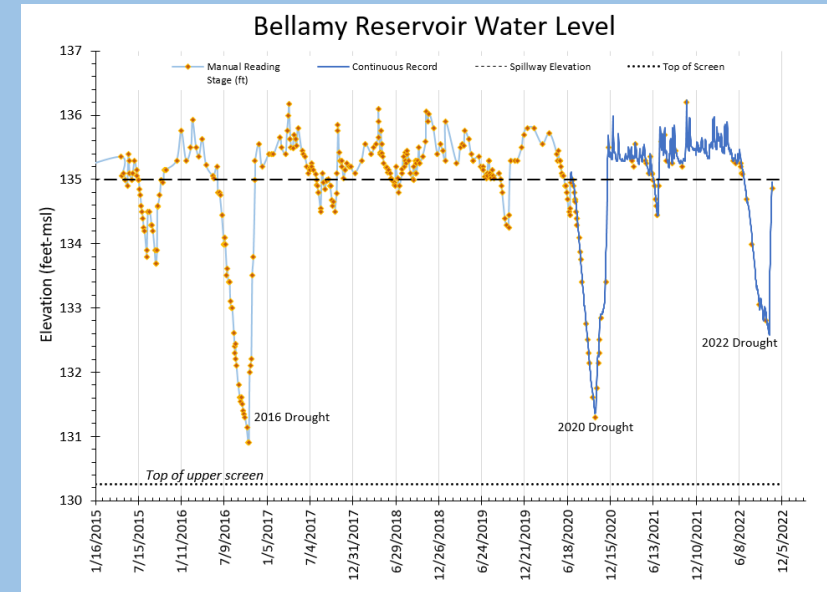
New Hampshire Sets Maximum Contaminant Levels in Drinking Water and Groundwater:

- PFOA: 12 ppt
- PFOS: 15 ppt
- PFNA: 11 ppt
- PFHxS: 18 ppt

8 Years... 2014 to 2022

Other Events:

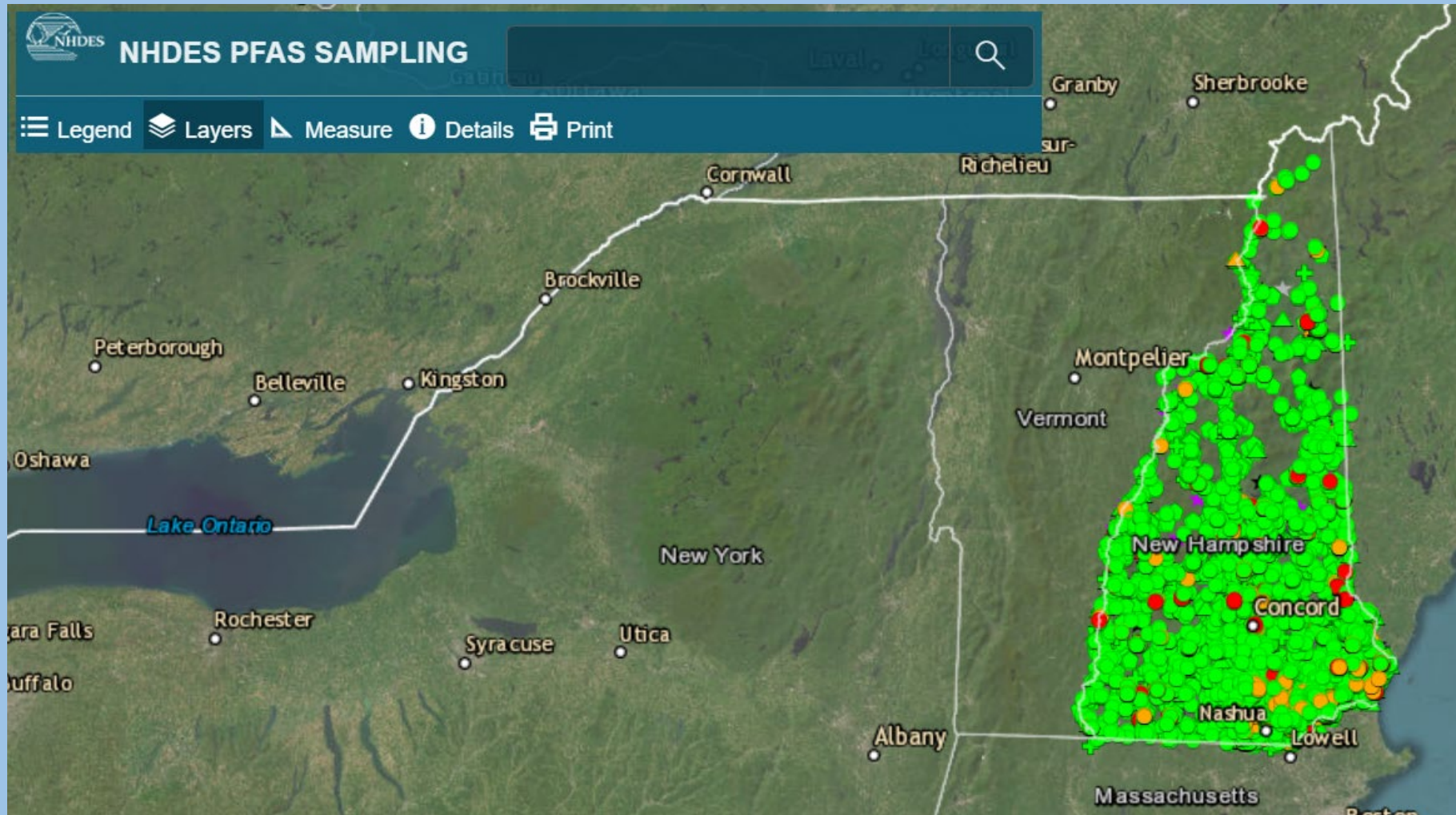
- Two major and one Minor Drought
 - 2016
 - 2020
 - 2022
- Covid-19
- City also constructed new Peirce Island Wastewater Treatment Facility
 - Nearly \$100 million project



October 2018 Aerial Progress Video Peirce Island WWTF Project

New Hampshire Sites with PFAS

February 2023



PEASE WATER TREATMENT FACILITY
PFAS RESULTS - POST TREATMENT

SAMPLED	PFAS*	Gallons Treated
4/27/2021	ND	2,717,039
5/4/2021	ND	4,354,049
5/11/2021	ND	6,387,665
5/12/2021	ND	6,830,373
5/18/2021	ND	9,391,617
6/15/2021	ND	23,133,046
7/19/2021	ND	41,445,555
8/4/2021	ND	52,901,428
8/5/2021	ND	53,782,078
8/11/2021	ND	58,558,918
8/18/2021	ND	64,975,798
8/25/2021	ND	69,830,038
9/15/2021	ND	86,914,498
10/13/2021	ND	106,446,219
11/17/2021	ND	123,708,814
12/14/2021	ND	135,102,720
1/12/2022	ND	145,754,577
2/10/2022	ND	160,343,640
2/16/2022	ND	163,485,793
3/16/2022	ND	174,946,090
4/13/2022	ND	189,692,270
5/17/2022	ND	207,992,500
6/16/2022	ND	228,834,350
7/18/2022	ND	256,890,179
8/16/2022	ND	287,679,548
9/20/2022	ND	315,416,836
10/19/2022	ND	332,261,840
11/16/2022	ND	345,721,188
12/14/2022	ND	359,024,412

* NH Regulated PFAS (PFOA, PFOS, PFHxS & PFNA)

Pease Water PFAS Treatment System Performance



Non-Detect for NH
Regulated Compounds
- 360 Million Gallons

Treatment Piloting Continues...

- The City is currently tracking these developments and is developing conceptual plans for additional treatment if necessary to comply with any new regulatory standard.



Tim Green, Treatment Operations Foreman

Our PFAS treatment pilot system – comparing four different filtration technologies

Forensics and Monitoring Continues...



Outreach Continues...



PEASE INTERNATIONAL TRADEPORT WATER SYSTEM
2020 TESTING RESULTS
PWSID 1951020

2021 WATER QUALITY RESULTS

Per- and Polyfluoroalkyl Substances (PFAS)

On September 30, 2019 the NHDES established limits on the concentrations of four per- and polyfluoroalkyl substances (PFAS) in drinking water. The NHDES maximum contaminant level (MCL) for drinking water and groundwater is 15 parts per trillion (ppt) for perfluorooctane-sulfonic acid (PFOS), 12 ppt for perfluorooctanoic acid (PFOA), 11 ppt for Perfluorononanoic Acid (PFNA), and 18 ppt for Perfluorohexane sulfonic acid (PFHxS). These limits are based on an annual rolling average of the sample results. The EPA Health Advisory concentration has remained at 70 (ppt) for (PFOS) and (PFOA) since 2016.

Over the past eight years, the Harrison Well and Smith Well in the Pease Tradeport water system, and Portsmouth Well #1 and Collins Well in the Portsmouth water system, have been routinely monitored for PFAS by the Air Force. Since the activation of the Haven Well, it has been sampled monthly. The City of Portsmouth has sampled all of the Portsmouth water supply sources at least twice per year, and since October 2019 is sampling quarterly. 2021 sample results are summarized in the PFAS table below.

All monitoring data is available online: cityofportsmouth.com/publicworks/water/pease-tradeport-water-system. For more online information about PFAS health effects: atsdr.cdc.gov/sites/pease/index.html

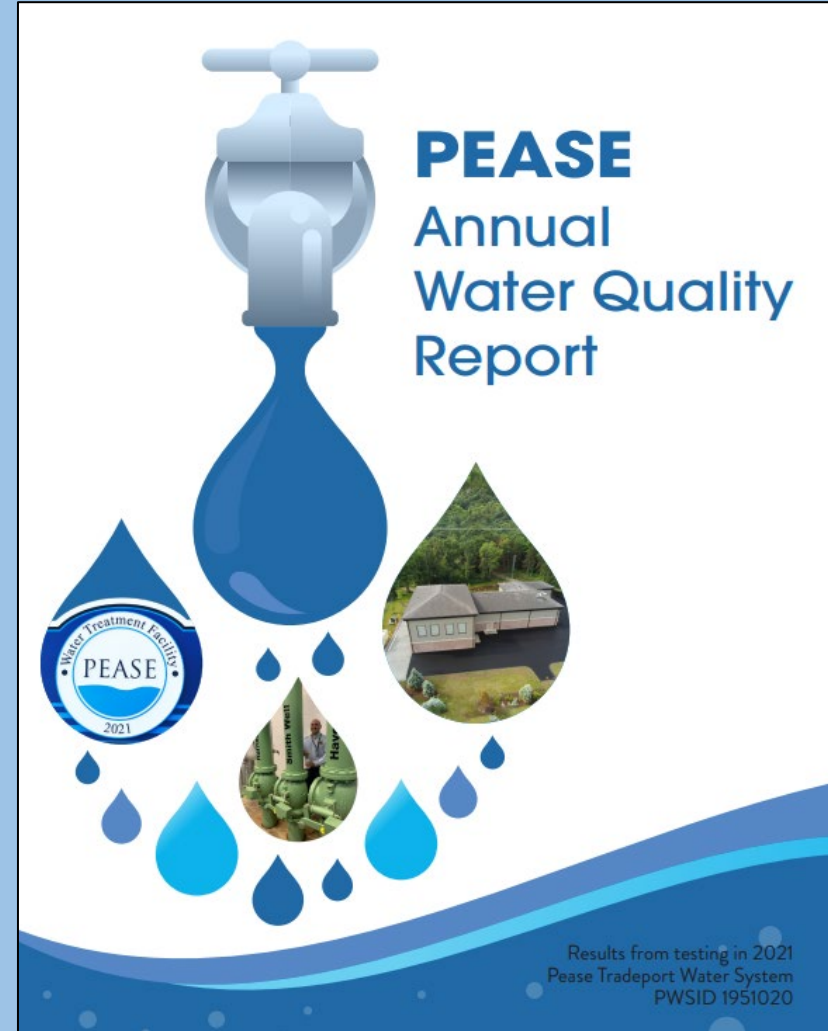
PER- AND POLYFLUOROALKYL SUBSTANCE (concentration* reported in ppt, or ppb)	NHDES MAXIMUM CONTAMINANT LEVEL (MCL)	PORTSMOUTH WATER SUPPLIED TO PEASE SYSTEM			PEASE TRADEPORT TREATED WELL WATER
		OUTRACK IN WELL #1	COLLINS WELL	HARRISON WELL	SMITH WELL
# of samples in 2021		13	13	4	13
% of water supplied in 2021		8.2%	2.9%	11.6%	77.3%
6:2 Fluorotelomer Sulfonate (6:2 FTS)	not regulated	Average Range	BD ND-1	ND ND-3	ND ND
Perfluorobutane-sulfonic acid (PFBS)	not regulated	Average Range	3 2-4	16 12-21	3 3-4
Perfluorobutanoic acid (PFBA)	not regulated	Average Range	3 2-4	5 3-7	2 2
Perfluoroheptanoic acid (PFHpA)	not regulated	Average Range	3 2-6	1 ND-2	2 ND
Perfluorohexane-sulfonic acid (PFHxS)	18	Average Range	7 6-9	2 2-3	2 ND
Perfluorohexanoic acid (PFHxA)	not regulated	Average Range	5 3-7	2 1-3	4 4-5
Perfluorononanoic acid (PFNA)	11	Average Range	BD ND-1	BD ND	ND ND
Perfluorooctane-sulfonic acid (PFOS)	15	Average Range	5 3-6	4 3-5	5 4-6
Perfluorooctanoic acid (PFOA)	12	Average Range	5 4-7	3 2-6	4 4-5
Perfluoropentanoic acid (PFPA)	not regulated	Average Range	6 4-9	3 1-6	4 4-5

TABLE ABBREVIATIONS & NOTES	
Due to laboratory analytical method limitations, low concentrations reported for these chemical are considered estimates, unless the measurement is above 2 ppt. (ppt).	
EPA Health Advisory Level for PFOS and PFOA concentration separately or combined is 70 ppt. (ppt). Averages are calculated using half of the method detection limit for samples that were less than per EPA risk assessment protocols.	
ND (none detected): Indicates that the substance was not found by laboratory analysis.	
BD (below detected level): Average calculated resulted in value below the detection limit.	
PFAS analyzed but not detected in the samples: 6:2 Fluorotelomer sulfonate (8:2 FTS), Perfluorohexanesulfonic acid (4:2 FTS), Perfluorododecanoic acid (PFDA), Perfluorotridecanoic acid (PFTrDA), Perfluorotetradecanoic acid (PFTrDA), Perfluoropentadecanoic acid (PFTrDA), Perfluorohexadecanoic acid (PFTrDA), Perfluorooctad	

Source Water Assessment

Portsmouth Water Division routinely updates inventories of potential contaminant threats and is actively pursuing opportunities to increase the protection of our groundwater supplies and the Bellamy Reservoir through property and easement acquisitions. NHDES prepared drinking water source assessment reports for all public water systems between 2000 and 2003 in an effort to assess the vulnerability of each of the State's public water supply sources. Included in the report is a map of each source water protection area, a list of potential and known contamination sources and a summary of available protection options. Results of the assessment, prepared in 2002, are provided in the table. Risk factors, such as proximity of highways and proximity of known contamination, are ranked and summarized in the summary of susceptibility ratings section in terms of the number of factors per risk category. The complete assessment report is available for review at the DPW office and online at the [NHDES website](https://www.nhdes.state.nh.us/).

SYSTEM	SOURCE INFORMATION	SUMMARY OF SUSCEPTIBILITY RATINGS		
		HIGH	MEDIUM	LOW
PORTSMOUTH	Greenland Well - GPW 003	4	3	5
	Portsmouth Well - GPW 004	5	4	3
	Collins Well - GPW 010	4	1	7
	Smith Well - GPW 001	4	3	5
PEASE	Harrison Well - GPW 009	not rated		



Results from testing in 2021
Pease Tradeport Water System
PWSID 1951020

2014

2015

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Regulations Continue...

January 2009

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 - PFOS: 200 ppt

May 2016

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 - PFOS: 15 ppt
 - PFNA: 11 ppt
 - PFHxS: 18 ppt

2023

- Proposed MCLs for PFAS Compounds

Water Operations Staff...

Keeping the Water System Running...



2019 - 2020



2020 - 2021

Staff Commitment – May 2014 to Now...

- Water system adjustments
- Technical research
- Technical meetings
- Water quality summaries
- Changing water quality health advisories and standards
- Negotiations with Air Force
- Contracts
- ***Public outreach and response to advocates and public officials, blood testing and health studies***
- ***Complex, Evolving, Stressful ... Almost 9 Years So far***

