The PFAS-Impacted
Pease International Tradeport Water System
10 Year Retrospective
(The Water System's Story)

City of Portsmouth

June 2024 Safe Water Advisory Group

2014

A Little Background:
- PFAS Regulatory Timeline
- Other Contaminated Sites

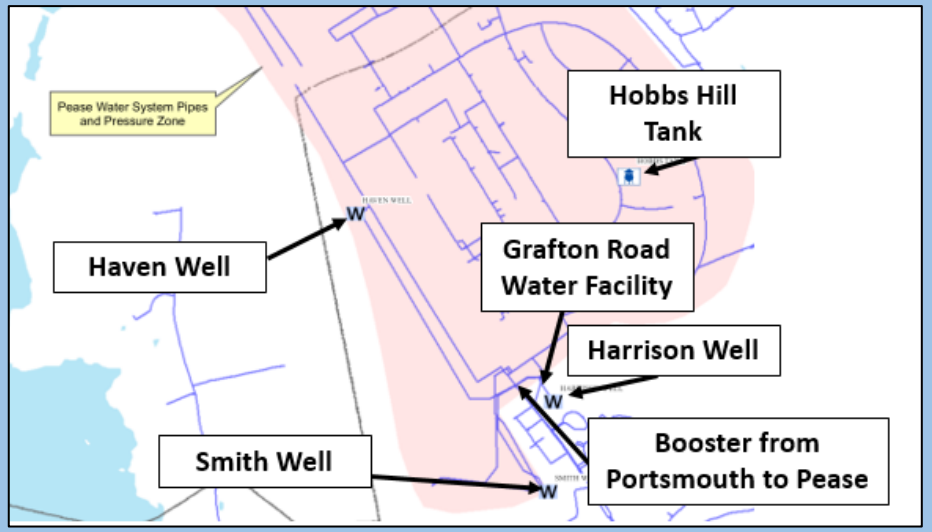
- January 2009
  - EPA Preliminary Health Advisories:
    - PFOA: 400 ppt
    - PFOS: 200 ppt

Known Sites with Contamination:

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

- 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…



Haven Well

Installed in 1875 at Haven Springs

Served Pease Air Base: 1956 to 1992

PDA/Portsmouth: 1992 to 2014

500 GPM Pump

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 Water Quality August 2013

Water Quality Met all Drinking Water Standards All Non Detects "ND"

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

NH DPHS PHL WATER ANALYSIS LAB
29 HAZEN DR
CONCORD NH 03302
Phone: (603) 271-2994
Fax: (603) 271-2997

ANALYTICAL RESULTS

Batch ID/Form: A305509 - CHEMICAL MONITORING **Submitting Lab ID:** 3000

PWS ID/Name: 1951020 - PEASE TRADE PORT - PORTSMOUTH **Report Date:** 08/08/2013

Analytical Method: 504.1

1,2-DIBROMO-3-CHLOROPROPANE	ND
1,2-DIBROMOETHANE(EDB)	ND

Analytical Method: 505

CHLORDANE	ND
TOXAPHENE	ND

Analytical Method: 524.2

1,1,1,2-TETRACHLOROETHANE	ND
1,1,1-TRICHLOROETHANE	ND
1,1,2,2-TETRACHLOROETHANE	ND
1,1,2-TRICHLOROETHANE	ND
1,1-DICHLOROETHANE	ND
1,1-DICHLOROETHENE	ND
1,1-DICHLOROPROPENE	ND
1,2,3-TRICHLOROBENZENE	ND
1,2,3-TRICHLOROPROPANE	ND
1,2,4-TRICHLOROBENZENE	ND
1,2,4-TRIMETHYLBENZENE	ND
1,2-DIBROMO-3-CHLOROPROPANE	ND
1,2-DIBROMOETHANE(EDB)	ND
1,2-DICHLOROBENZENE	ND
1,2-DICHLOROETHANE	ND
1,2-DICHLOROPROPANE	ND
1,3,5-TRICHLOROBENZENE	ND
1,3,5-TRIMETHYLBENZENE	ND
1,3-DICHLOROBENZENE	ND
1,3-DICHLOROPROPANE	ND
1,4-DICHLOROBENZENE	ND
2,2-DICHLOROPROPANE	ND
2-BUTANONE(MEK)	ND
2-CHLOROTOLUENE	ND
2-HEXANONE	ND
2-METHOXY-2-METHYLBUTANE(TAME)	ND
4-CHLOROTOLUENE	ND
4-METHYL-2-PENTANONE (MIBK)	ND
ACETONE	ND
BENZENE	ND
BROMOBENZENE	ND
BROMOCHLOROMETHANE	ND
BROMODICHLOROMETHANE	ND
BROMOFORM	ND
BROMOMETHANE	ND
CARBON DISULFIDE	ND
CARBON TETRACHLORIDE	ND
CHLOROBENZENE	ND
CHLOROETHANE	ND
CHLOROFORM	ND
CHLOROMETHANE	ND
CIS-1,2-DICHLOROETHENE	ND
CIS-1,3-DICHLOROPROPENE	ND
DIBROMOCHLOROMETHANE	ND
DIBROMOMETHANE	ND
DICHLORODIFLUOROMETHANE	ND
DIETHYL ETHER	ND
DIISOPROPYL ETHER (DIPE)	ND
ETHYL-T-BUTYL ETHER (ETBE)	ND
ETHYLBENZENE	ND
HEXACHLOROBUTADIENE	ND
ISOPROPYLBENZENE	ND
M/P-XYLENE	ND
METHYL-T-BUTYLETHER (MTBE)	ND
METHYLENE CHLORIDE	ND
N-BUTYLBENZENE	ND
N-PROPYLBENZENE	ND
NAPHTHALENE	ND
O-XYLENE	ND
P-ISOPROPYLTOLUENE	ND
SEC-BUTYLBENZENE	ND
STYRENE	ND
T-BUTANOL (TBA)	ND
T-BUTYLBENZENE	ND
TETRACHLOROETHENE	ND
TETRAHYDROFURAN(THF)	ND
TOLUENE	ND
TOTAL XYLENES	ND
TRANS-1,2-DICHLOROETHENE	ND
TRANS-1,3-DICHLOROPROPENE	ND
TRICHLOROETHENE	ND
TRICHLOROFLUOROMETHANE	ND
VINYL CHLORIDE	ND

Analytical Method: 525.2

2,2',3',4,6-PENTACHLOROBIPHENYL	ND
2,2',3,4,4'-HEPTACHLOROBIPHEN	ND
2,2',3,4,5',6,6'-OCTACHLOROBIPH	ND
2,2',4,4'-TETRACHLOROBIPHENYL	ND
2,2',4,4',5,6'-HEXACHLOROBIPHENYL	ND
2,3-DICHLOROBIPHENYL	ND
2,4,5-TRICHLOROBIPHENYL	ND
2-CHLOROBIPHENYL	ND
2-METHYLNAPHTHALENE	ND
4,4'-DDD	ND
4,4'-DDE	ND
4,4'-DDT	ND
ACENAPHTHENE	ND
ACENAPHTHYLENE	ND
ALACHLOR	ND
ALDRIN	ND
ALPHA-CHLORDANE	ND
ANTHRACENE	ND
ATRAZINE	ND
BENZO(A)ANTHRACENE	ND
BENZO(A)PYRENE	ND
BENZO(B)FLUORANTHENE	ND
BENZO(G,H,I)PERYLENE	ND
BENZO(K)FLUORANTHENE	ND
BENZYL BUTYL PHTHALATE	ND
BIS(2-ETHYLHEXYL) PHTHALATE	ND
BUTACHLOR	ND
CHRYSENE	ND
DI(2-ETHYLHEXYL)ADIPATE	ND
DI-N-BUTYL PHTHALATE	ND
DIBENZ(A,H)ANTHRACENE	ND
DIELDRIN	ND
DIETHYL PHTHALATE	ND
DIMETHYL PHTHALATE	ND
ENDRIN	ND
ENDRIN ALDEHYDE	ND
FLUORANTHENE	ND
FLUORENE	ND
GAMMA-CHLORDANE	ND
HEPTACHLOR	ND
HEPTACHLOR EPOXIDE	ND
HEXACHLOROBENZENE	ND
HEXACHLOROCYCLOPENTADIENE	ND
INDENO(1,2,3-CD)PYRENE	ND
ISOPHORONE	ND
LINDANE	ND
METHOXYCHLOR	ND
METOLACHLOR	ND
METRIBUZIN	ND
NAPHTHALENE	ND
PENTACHLOROPHENOL	ND
PHENANTHRENE	ND
PROPACHLOR	ND
PYRENE	ND
SIMAZINE	ND

Analytical Method: 525.2

TRANS-NONACHLOR	ND
TRIFLURALIN (TREFLAN)	ND

Analytical Method: 531.2

3-HYDROXY-CARBOFURAN	ND
ALDICARB	ND
ALDICARB SULFONE	ND
ALDICARB SULFOXIDE	ND
CARBARYL	ND
CARBOFURAN	ND
METHOMYL	ND
OXAMYL	ND

Analytical Method: 547

GLYPHOSATE	ND

Analytical Method: 555

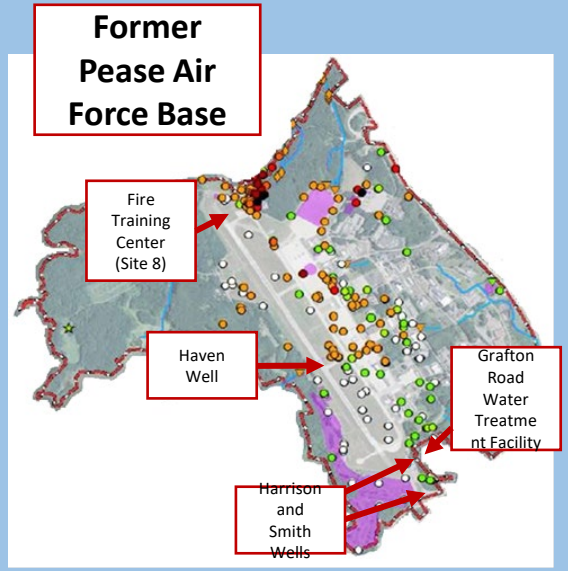
2,4-D	ND
ACIFLUORFEN	ND
DICAMBA	ND
DINOSEB	ND
PICLORAM	ND
SILVEX	ND

Analytical Method: LACHAT 10-109-12-2-A

FLUORIDE	ND

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"



2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

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.

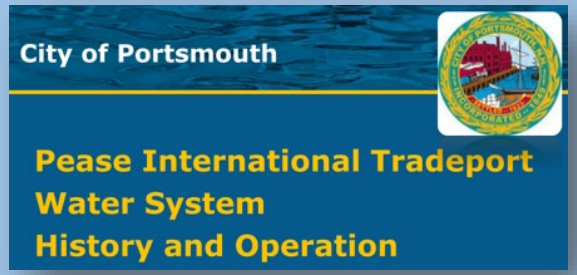
What Caused the Contamination? Aqueous Film-Forming Foam (AFFF)

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

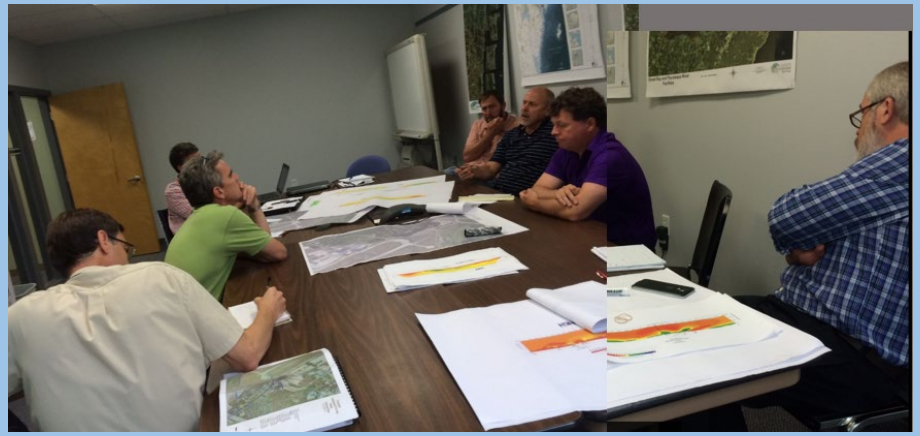
New Hampshire Sites with PFAS
May 2014

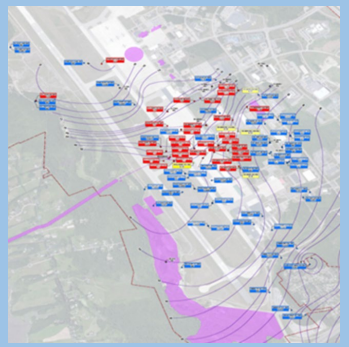
May 28, 2014: State, Health and Water System Officials Hold First Public Meeting

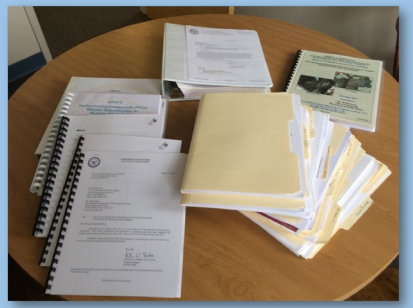


Pease Tradeport PFAS Investigation Begins

- 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

eeting with U.S. Air Force to discuss Pease

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
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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.

www.cityofportsmouth.com/publicworks/water

Community Advisory Board Forms Holds 14 Meetings in 2015

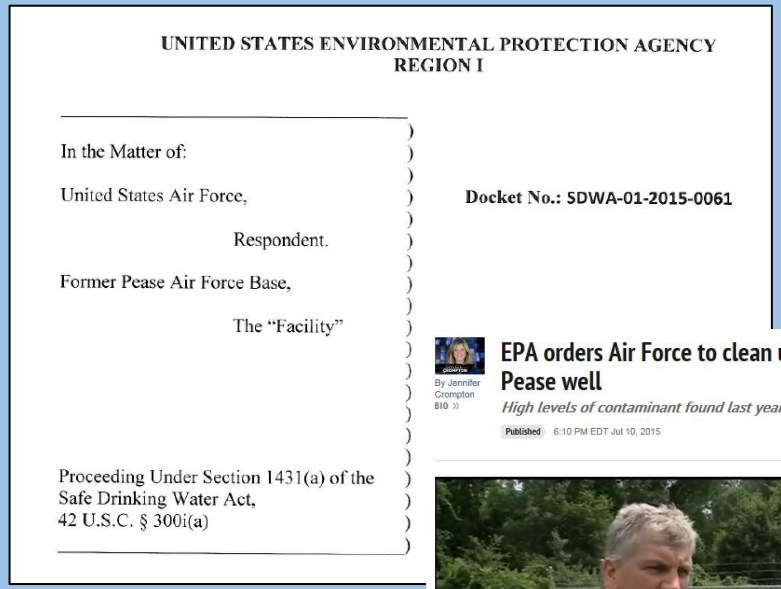
Community Advisory Board
Final Report On
PFC Contamination in Pease Tradeport Wells

Members

Chairman Rich DiPentima
Councilor Stefany Shaheen
Shelley Vetter, Owner and Director Discovery Child Enrichment Center
Newington Health Officer John Stowell
Portsmouth Health Officer Kim McNamara
Deputy Fire Chief James Heinz
Andrea Amico, Citizen and Parent

Mayor Robert Lister, Ex-officio
Deputy City Manager David Allen, Ex-officio
Deputy Public Works Director Brian Goetz, Ex-officio

EPA Order to Treat Haven Well Water
July 2015



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)

EPA orders Air Force to clean up contaminated Pease well

High levels of contaminant found last year

By Jennifer Crompton

Published 6:10 PM EDT Jul 10, 2015

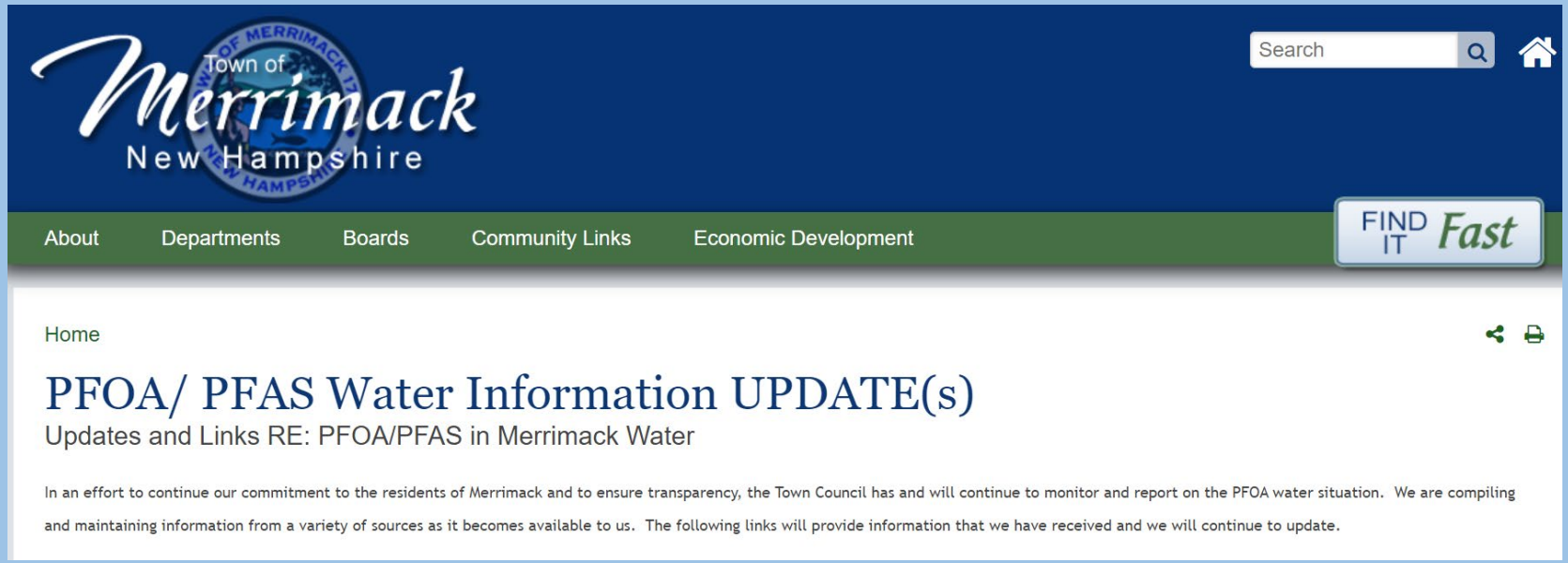
Play

WMUR9

- 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:

March 2016
PFOA Detected in Merrimack, NH

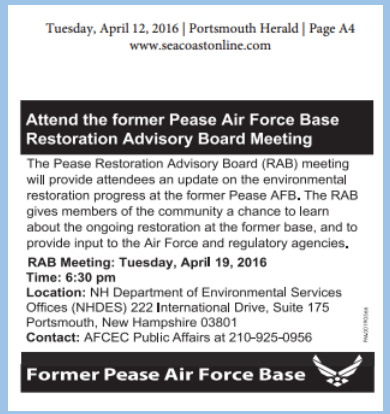


Local and Federal Legislative Delegation

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

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

Pease Restoration Advisory Board (RAB) Reinstated



Tuesday, April 12, 2016 | Portsmouth Herald | Page A4
www.seacoastonline.com

Attend the former Pease Air Force Base Restoration Advisory Board Meeting

The Pease Restoration Advisory Board (RAB) meeting will provide attendees an update on the environmental restoration progress at the former Pease AFB. The RAB gives members of the community a chance to learn about the ongoing restoration at the former base, and to provide input to the Air Force and regulatory agencies.

RAB Meeting: Tuesday, April 19, 2016
Time: 6:30 pm
Location: NH Department of Environmental Services Offices (NHDES) 222 International Drive, Suite 175 Portsmouth, New Hampshire 03801
Contact: AFCEC Public Affairs at 210-925-0956

Former Pease Air Force Base

RAB Members – March 2016

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 Protection 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.

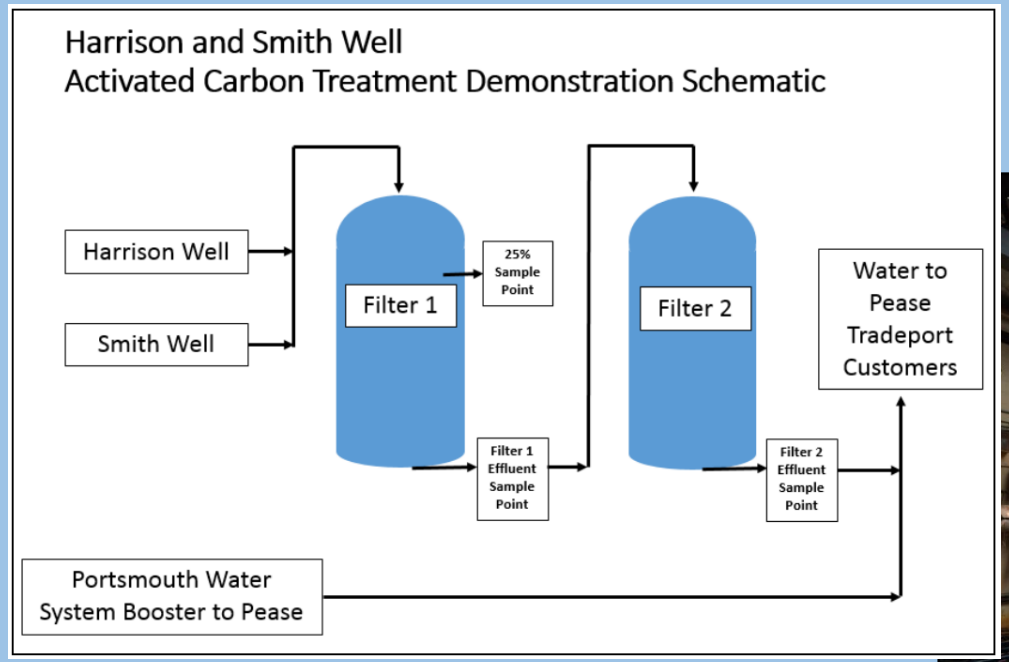
EPA's 2016 Lifetime Health Advisories

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



Treatment Design Options

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

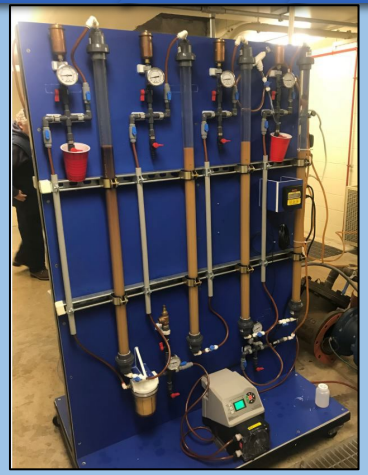
Oakdale, Minnesota
Activated Carbon

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



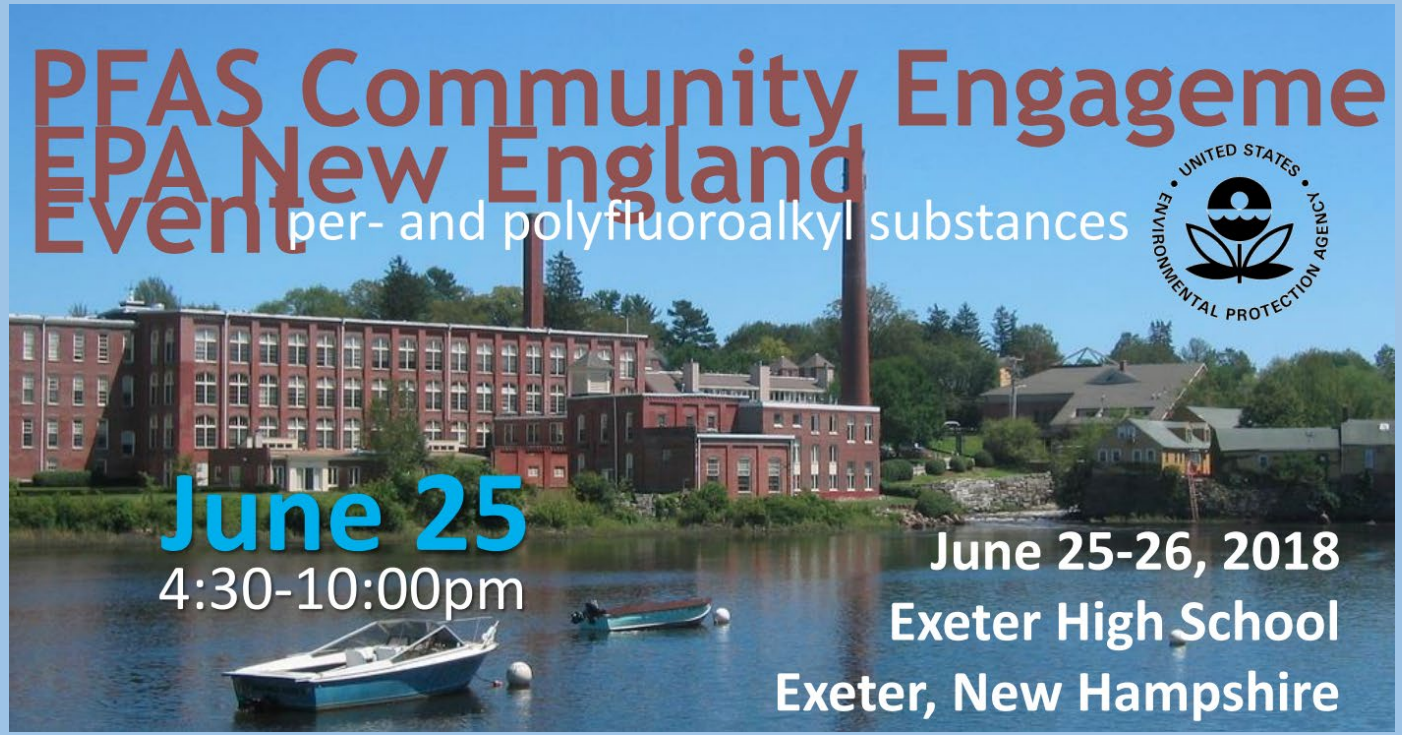
March 2018 – Continued Updates to City Council

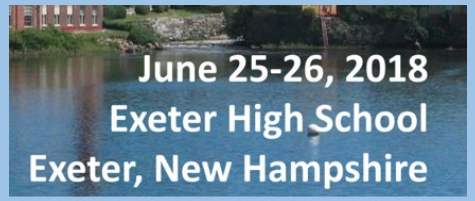
City Council 3.5.18

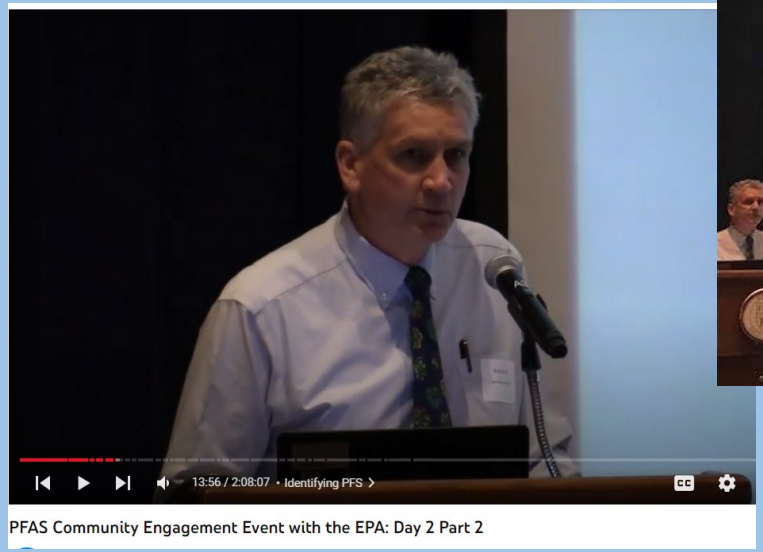
PFAS Update
Supporting Information
City of Portsmouth

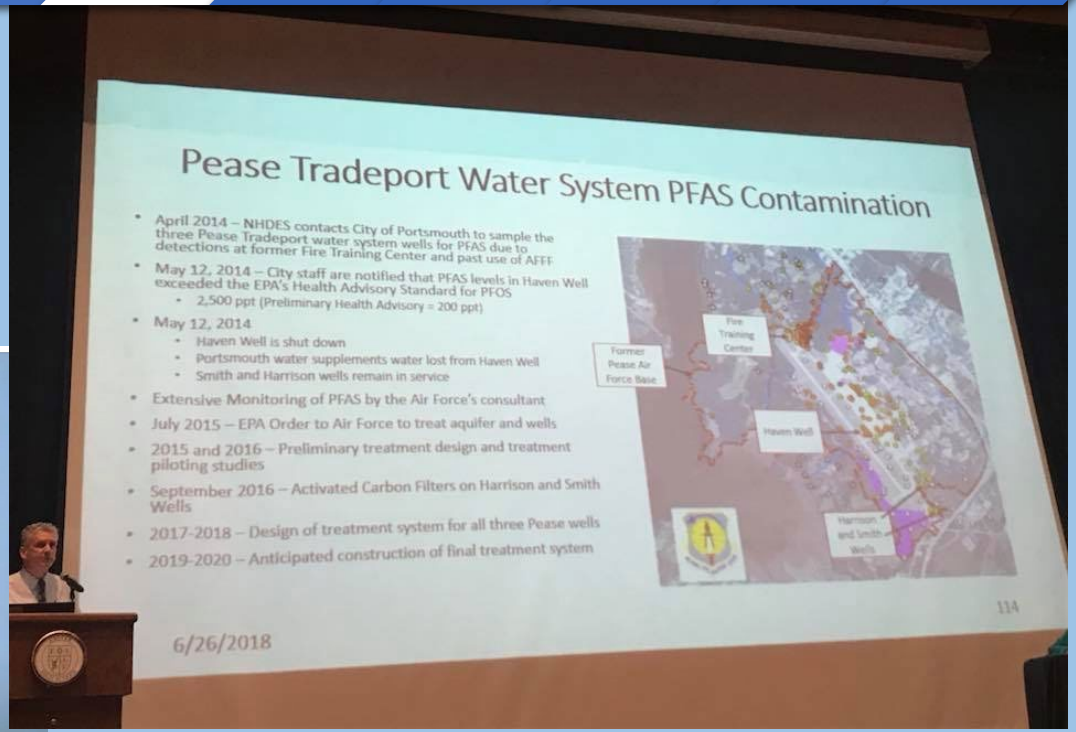
Portsmouth City Council Packet
March 5, 2018

EPA Begins Community Engagement Outreach









Brian Goetz
Pease Tradeport PFAS History

https://www.youtube.com/watch?v=omPEipLcjKE&list=PLU6cTkLWTQDWP9fWST-1tTrdZBZhN0xrS&index=18

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

Weston & Sampson

westonandsampson.com

5 Centennial Drive
Peabody, MA 01960 (HQ)
tel: 978.532.1900

REPORT

September 2018

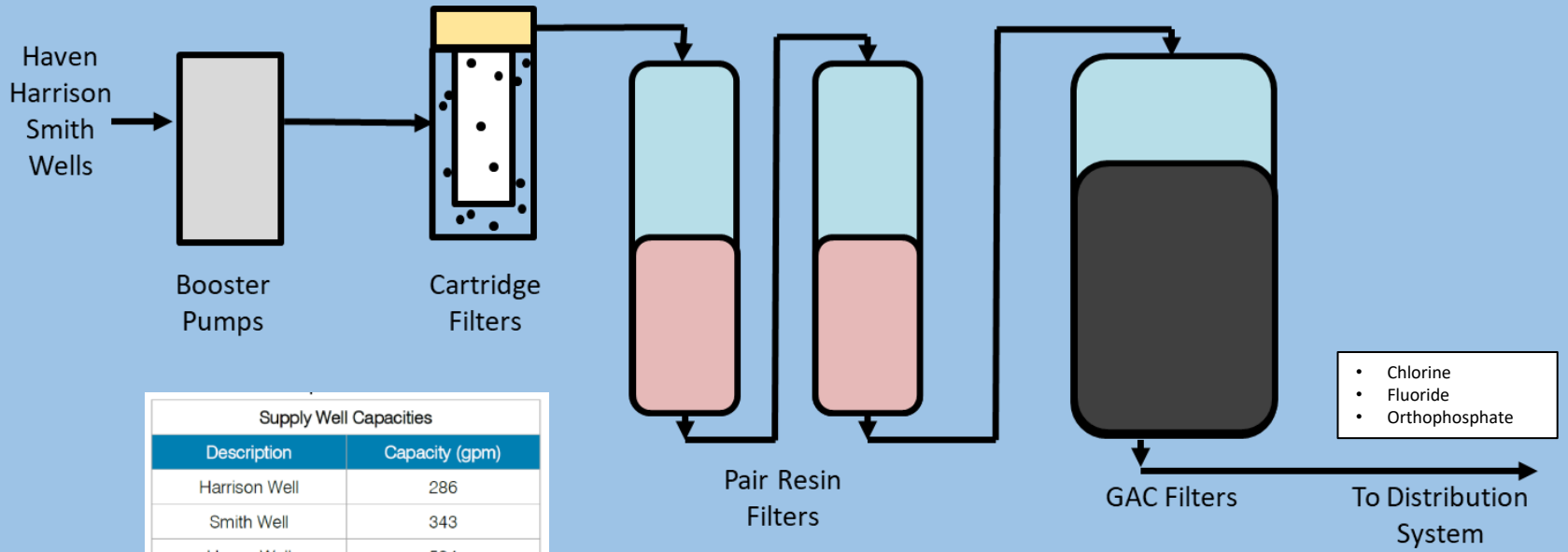
CITY OF
Portsmouth
NEW HAMPSHIRE

Haven Well Pilot Testing Program

Final Treatment Facility Design

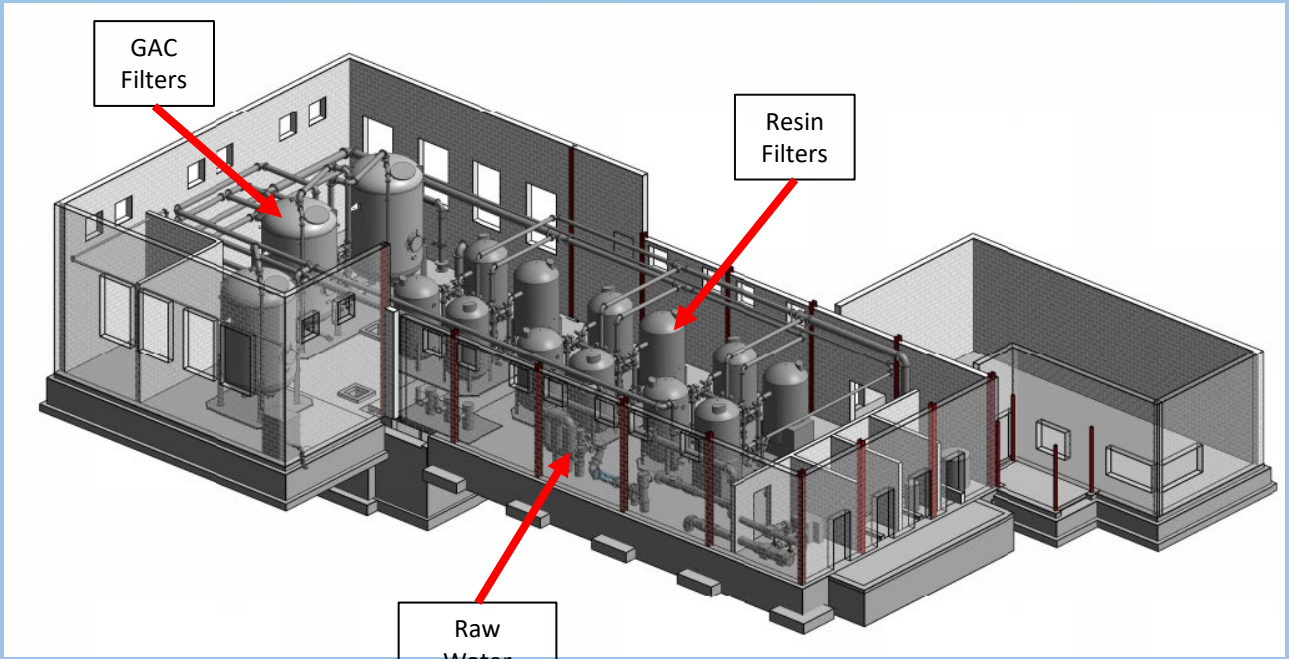
- City Water Staff
- Weston & Sampson

Pease WTF Process Schematic
New Treatment System



Supply Well Capacities	
Description	Capacity (gpm)
Harrison Well	286
Smith Well	343
Haven Well	534
TOTAL	1,163

Final Proposed Treatment Layout



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 mccarthym@wseinc.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.

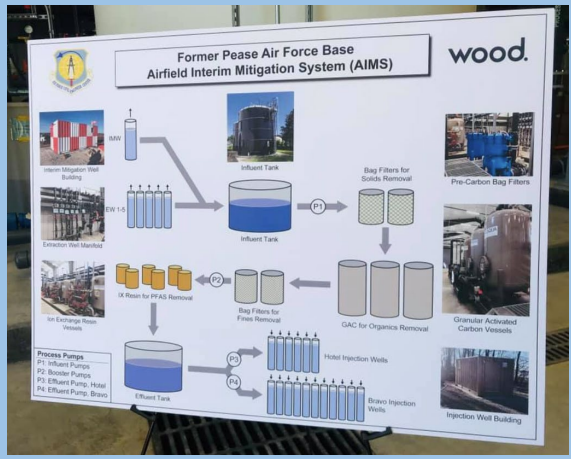
TIME FOR COMPLETION: The Work shall be completed within 670 calendar days from the date when the Contract Times commence to run. There are several Interim Milestones in addition to the time for Final Completion.

END OF SECTION

April 2019 - Start of Construction
Kinsmen Corporation

June 2019 – GAC Building Foundation

Air Force Interim Mitigation System Treatment Completed



Sharing Lessons Learned:

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

October 2019 – New GAC Filter Installation

March 2020 GAC Building:

June 2020 - Demolition of Existing Building

July 2020 – NH Governor Signs PFAS MCLs into Law

Seacoastonline

Sports Entertainment Lifestyle Opinion USA TODAY Obituaries eNewspaper Legals

NH House passes tough drinking water standards

Michael Casey Associated Press

Published 6:01 p.m. ET June 30, 2020

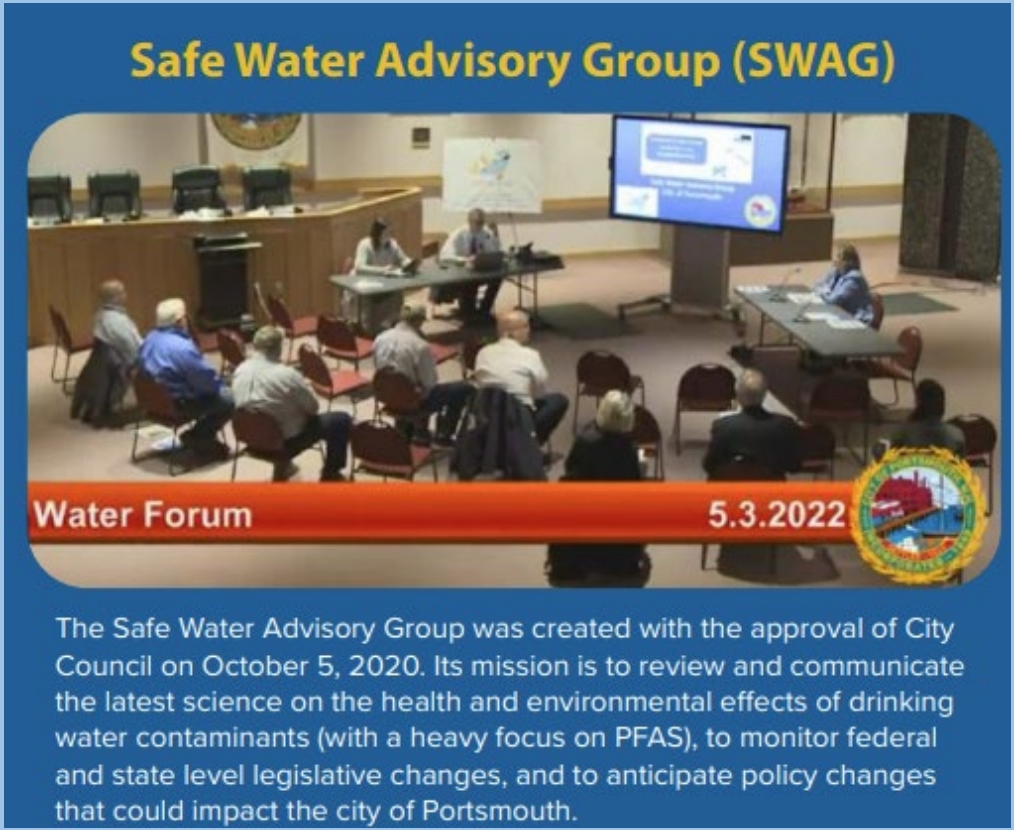
View Comments

A carbon filtration system was installed in Portsmouth in 2016 to treat Pease well water for PFAS contamination. *Rich Beauchesne/Seacoastonline, File*

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

October 2020 – Safe Water Advisory Group Forms Meets Quarterly



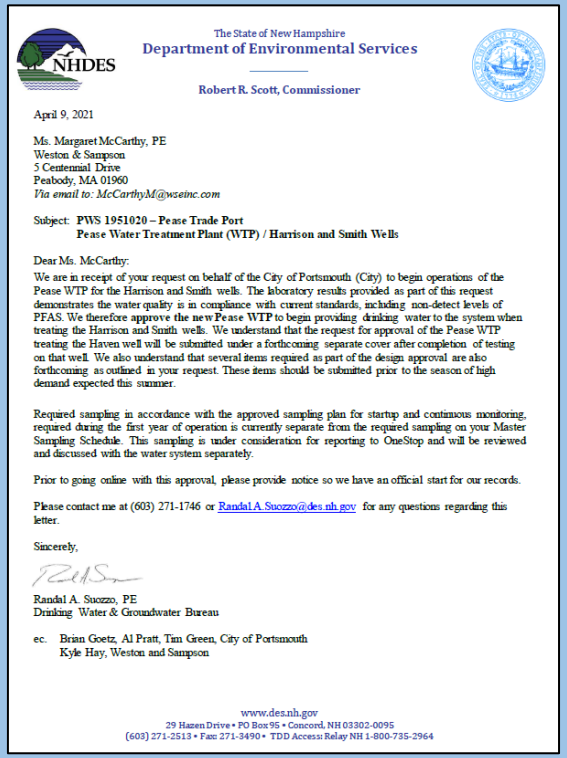
The Safe Water Advisory Group was created with the approval of City Council on October 5, 2020. Its mission is to review and communicate the latest science on the health and environmental effects of drinking water contaminants (with a heavy focus on PFAS), to monitor federal and state level legislative changes, and to anticipate policy changes that could impact the city of Portsmouth.

October 2020

Filter Room – Resin and GAC Filters – March 2021

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



The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

April 9, 2021

Ms. Margaret McCarthy, PE
Weston & Sampson
5 Centennial Drive
Peabody, MA 01960
Via email to: McCarthyM@wseinc.com

Subject: **PWS 1951020 – Pease Trade Port**
Pease Water Treatment Plant (WTP) / Harrison and Smith Wells

Dear Ms. McCarthy:

We are in receipt of your request on behalf of the City of Portsmouth (City) to begin operations of the Pease WTP for the Harrison and Smith wells. The laboratory results provided as part of this request demonstrates the water quality is in compliance with current standards, including non-detect levels of PFAS. We therefore approve the new Pease WTP to begin providing drinking water to the system when treating the Harrison and Smith wells. We understand that the request for approval of the Pease WTP treating the Haven well will be submitted under a forthcoming separate cover after completion of testing on that well. We also understand that several items required as part of the design approval are also forthcoming as outlined in your request. These items should be submitted prior to the season of high demand expected this summer.

Required sampling in accordance with the approved sampling plan for startup and continuous monitoring, required during the first year of operation is currently separate from the required sampling on your Master Sampling Schedule. This sampling is under consideration for reporting to OneStop and will be reviewed and discussed with the water system separately.

Prior to going online with this approval, please provide notice so we have an official start for our records.

Please contact me at (603) 271-1746 or Randal.A.Suozzo@des.nh.gov for any questions regarding this letter.

Sincerely,

Randal A. Suozzo, PE
Drinking Water & Groundwater Bureau

ec. Brian Goetz, Al Pratt, Tim Green, City of Portsmouth
Kyle Hay, Weston and Sampson

www.des.nh.gov
29 Hazen Drive • PO Box 95 • Concord, NH 03302-0095
(603) 271-2513 • Fax: 271-3490 • TDD Access: Relay NH 1-800-735-2964

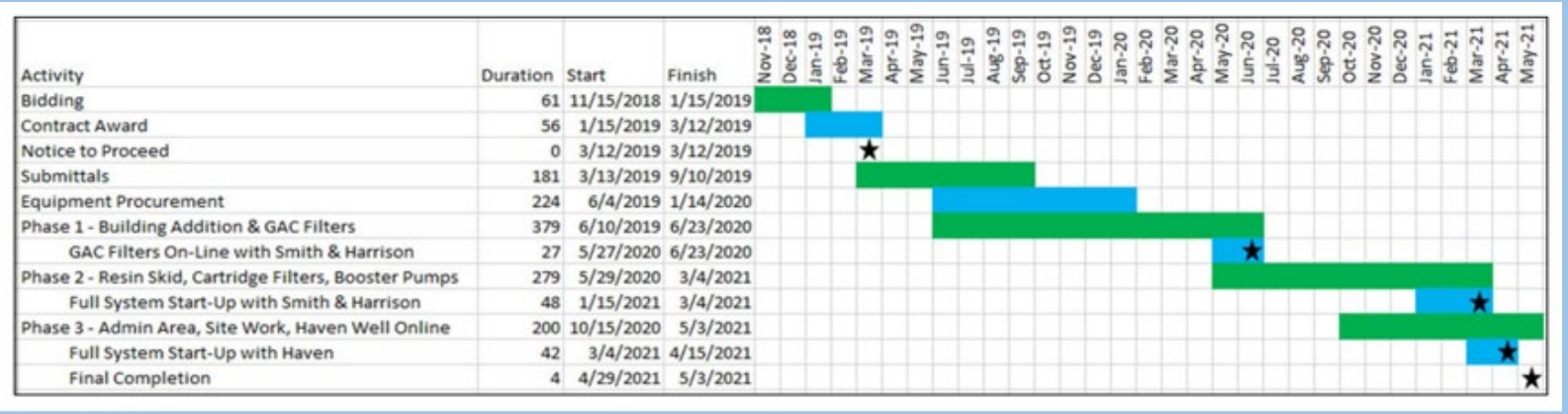
Two Years of Construction

April 2019

April 2021

On Time… and… On Budget

- $10.8 Million Construction – Kinsmen Corp
- $2 Million Engineering, Studies, Design, Piloting, Construction Admin
- Reimbursed by Air Force through various ENVIRONMENTAL SERVICES COOPERATIVE AGREEMENTS



Activity	Duration	Start	Finish
Bidding	61	11/15/2018	1/15/2019
Contract Award	56	1/15/2019	3/12/2019
Notice to Proceed	0	3/12/2019	3/12/2019
Submittals	181	3/13/2019	9/10/2019
Equipment Procurement	224	6/4/2019	1/14/2020
Phase 1 - Building Addition & GAC Filters	379	6/10/2019	6/23/2020
GAC Filters On-Line with Smith & Harrison	27	5/27/2020	6/23/2020
Phase 2 - Resin Skid, Cartridge Filters, Booster Pumps	279	5/29/2020	3/4/2021
Full System Start-Up with Smith & Harrison	48	1/15/2021	3/4/2021
Phase 3 - Admin Area, Site Work, Haven Well Online	200	10/15/2020	5/3/2021
Full System Start-Up with Haven	42	3/4/2021	4/15/2021
Final Completion	4	4/29/2021	5/3/2021

May 4, 2021 Dedication

City Officials, Congressional Delegation and Air Force Representatives

City Staff

Weston & Sampson Engineers

May 4, 2021 Dedication

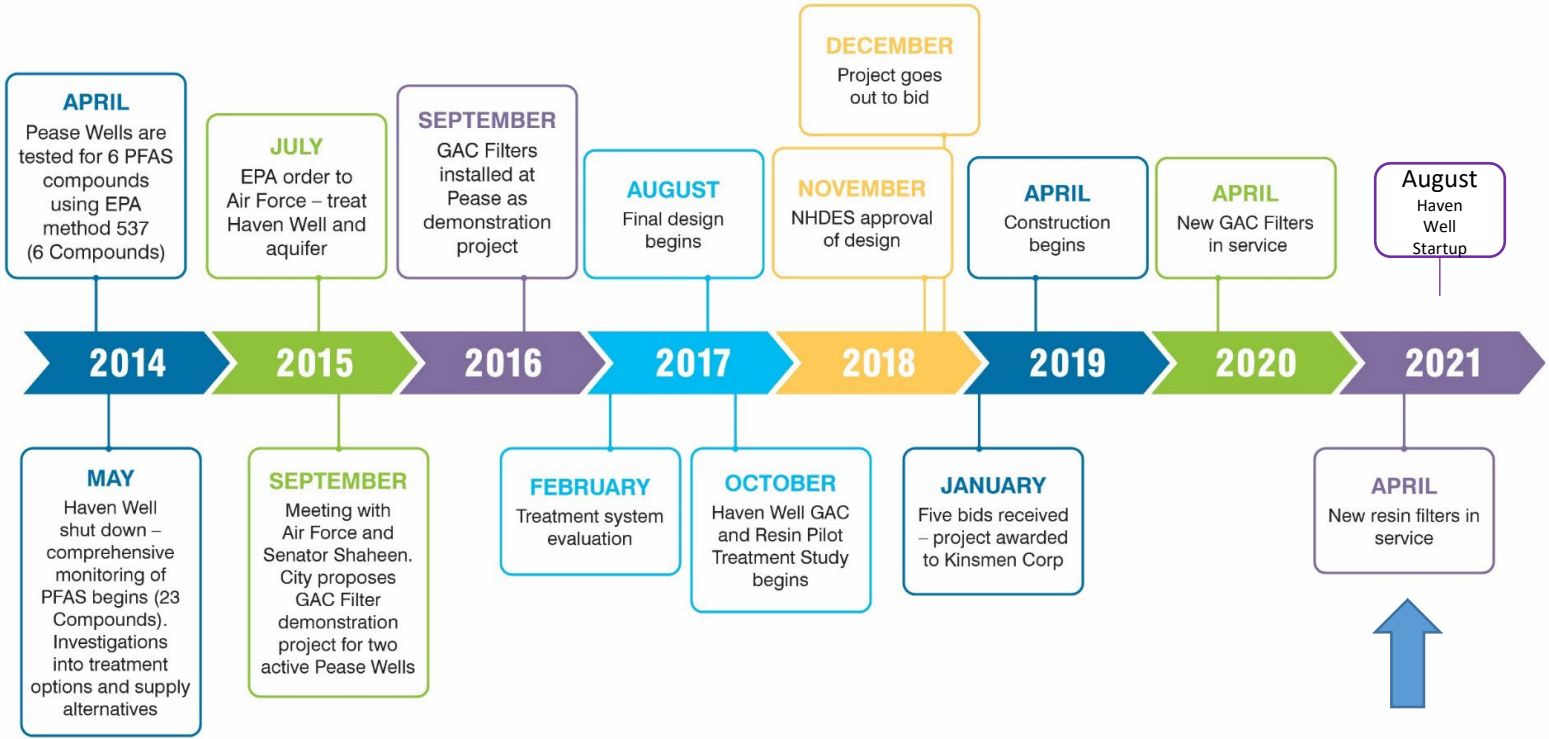
Seacoastonline BREAKING NEWS: Lonza plans expansion,

[News] Sports Edge Lifestyle Opinion USA TODAY Obituaries E-Edition Legal - NH

U.S. Rep. Chris Pappas, left, and U.S. Sen. Jeanne Shaheen receive a tour from Water Resource Manager Al Pratt on Tuesday morning at the Pease Water Treatment Facility in Portsmouth. *Olivia Falcigno*

Haven Well Startup – August 3, 2021

PEASE TRADEPORT PFAS TIMELINE:



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	177,308,269
4/13/2022	ND	191,791,889
5/17/2022	ND	210,179,427
6/16/2022	ND	231,225,649
7/18/2022	ND	260,357,668
8/16/2022	ND	291,147,037
9/20/2022	ND	318,884,325
10/19/2022	ND	335,729,329
11/16/2022	ND	349,323,603
12/14/2022	ND	362,626,827
2/6/2023	ND	388,305,448
3/17/2023	ND	405,866,564
4/17/2023	ND	421,965,419
5/18/2023	ND	439,080,277
6/13/2023	ND	459,095,921
7/19/2023	ND	483,871,264
8/18/2023	ND	506,897,443
9/18/2023	ND	529,683,296
10/16/2023	ND	548,525,684
11/20/2023	ND	568,411,143
12/13/2023	ND	580,595,324
1/17/2024	ND	598,451,012
2/16/2024	ND	613,409,008
3/19/2024	ND	629,203,957

* NH Regulated PFAS (PFOA, PFOS, PFHxS & PFNA)
ND = None Detected at Method Reportable Limit (2 ppt)

Pease Water PFAS Treatment System Performance

2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023

Updated Health Advisories

United States Environmental Protection Agency

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Environmental Topics | Laws & Regulations | Report a Violation | About EPA

News Releases: Headquarters | Water (OW) 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

- 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)

018 | 2019 | 2020 | 2021 | 2022 | 2023

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

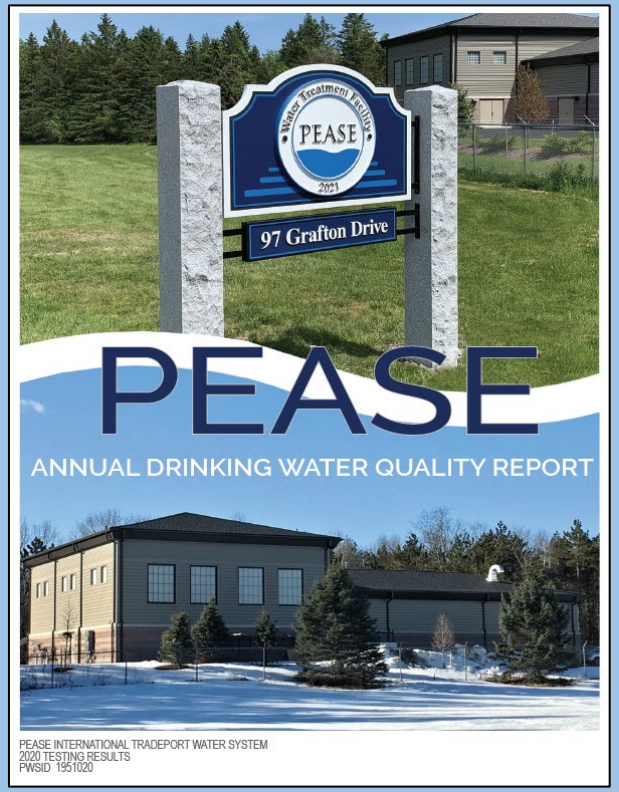
19

w Hampshire Sets Maximum Contaminant vels in Drinking Water and Groundwater:

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

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 (concentrations* reported in ng/L or ppt)	NHDES MAXIMUM CONTAMINANT LEVEL (MCL)		PORTSMOUTH WATER SUPPLIED TO PEASE SYSTEM: PORTSMOUTH WELL #1	PORTSMOUTH WATER SUPPLIED TO PEASE SYSTEM: COLLINS WELL	PORTSMOUTH WATER SUPPLIED TO PEASE SYSTEM: GREENLAND WELL	PEASE TRADEPORT TREATED WELL WATER: SUPPLIED TO PEASE SYSTEM
# 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	BD	BD	ND	ND
		Range	ND-1	ND-3	ND	ND
Perfluorobutane-sulfonic acid (PFBS)	not regulated	Average	3	16	3	ND
		Range	2 - 4	12 - 21	3 - 4	ND
Perfluorobutanoic acid (PFBA)	not regulated	Average	3	5	2	2
		Range	2 - 4	3 - 7	2	ND - 13
Perfluoroheptanoic acid (PFHpA)	not regulated	Average	3	1	2	ND
		Range	2 - 6	ND-2	2	ND
Perfluorohexane-sulfonic acid (PFHxS)	18	Average	7	2	2	ND
		Range	6 - 9	2 - 3	2 - 3	ND
Perfluorohexanoic acid (PFHxA)	not regulated	Average	5	2	4	ND
		Range	3 - 7	1 - 3	4 - 5	ND
Perfluorononanoic acid (PFNA)	11	Average	BD	BD	ND	ND
		Range	ND-1	ND-1	ND	ND
Perfluorooctane-sulfonic acid (PFOS)	15	Average	5	4	5	ND
		Range	3 - 6	3 - 5	4 - 6	ND
Perfluorooctanoic acid (PFOA)	12	Average	5	3	4	ND
		Range	4 - 7	2 - 6	4 - 5	ND
Perfluoropentanoic acid (PFPeA)	not regulated	Average	6	3	4	2
		Range	4 - 9	1 - 6	4 - 5	ND - 15

TABLE ABBREVIATIONS & NOTES:

Due to laboratory analytical method limitations, low concentrations reported for these chemicals are considered estimates unless the amount measured is above 2 ng/L (ppt).

EPA Health Advisory Level for PFOS and PFOA concentration separately or combined is 70 ng/L (ppt). Averages are calculated using half of the method detection limit for samples that were less than detection, 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.

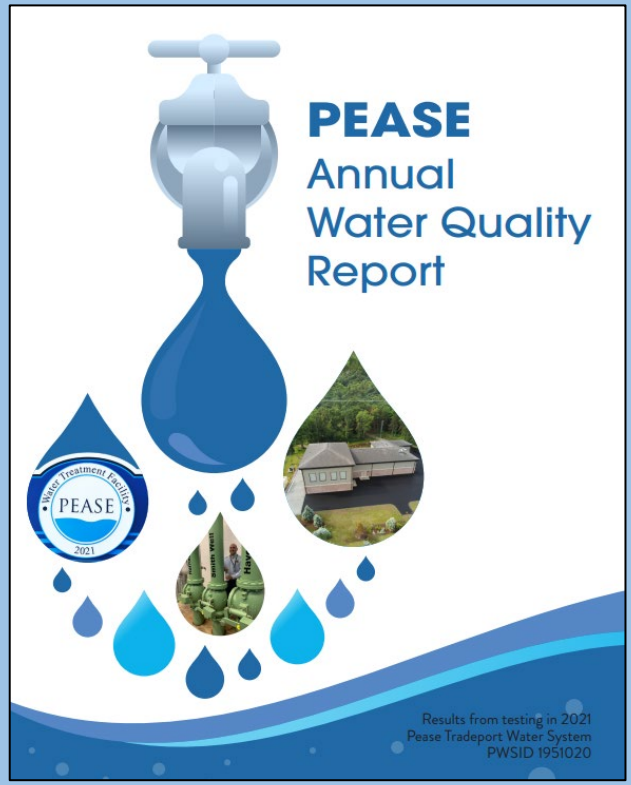
PFAS analyzed but not detected in the samples: 8:2 Fluorotelomer sulfonate (8:2 FTS); Perfluorohexanesulfonic acid (H2 FTS); Perfluorodecanoic acid (PFDA); Perfluorododecanoic acid (PFDoA); Perfluoroheptanesulfonic acid (PFHpS); Perfluoroundecanoic acid (PFUnA); Perfluoro-3-Methoxypropanoic Acid (PFMPA); Perfluoro-4-Methoxybutanoic Acid (PFMBA); Perfluoro(2-Ethoxyethane)sulfonic Acid (PFEESA); Nonafluoro-3,6-Dioxaheptanoic Acid (NFDHA); Perfluoropentanesulfonic Acid (PFPeS); 2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-Heptafluoropropoxy)-Propanoic Acid (HFPO-DA); 4,8-Dioxa-3H-Perfluorononanoic Acid (ADONA); 9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF3ONS); and 11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)

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.

SOURCE WATER ASSESSMENT RESULTS

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
PEASE	Smith Well - GPW 001	4	3	5
	Harrison Well - GPW 009	not rated		



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

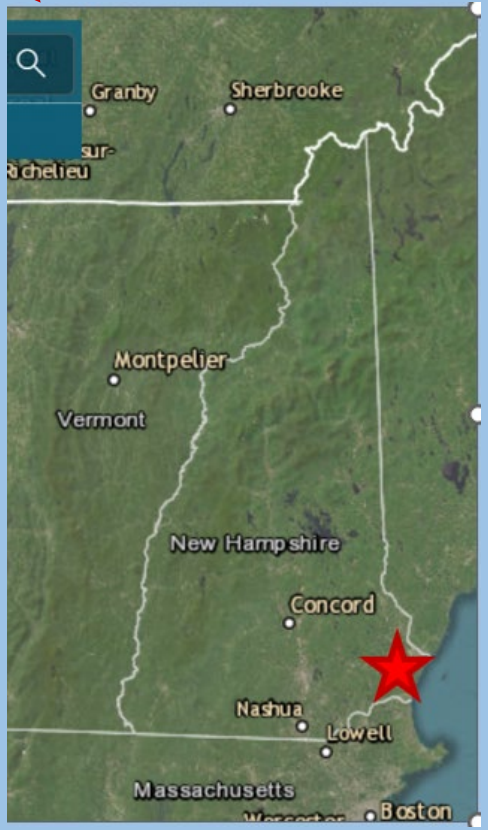
Regulations Continue…

- January 2009
  - EPA Preliminary Health Advisories:
    - PFOA: 400 ppt
    - PFOS: 200 ppt
- May 2016
  - EPA Lifetime Health Advisories:
    - PFOA: 70 ppt
    - PFOS: 70 ppt
- 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)

- 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
- 2023
  - Proposed MCLs for PFAS Compounds

2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

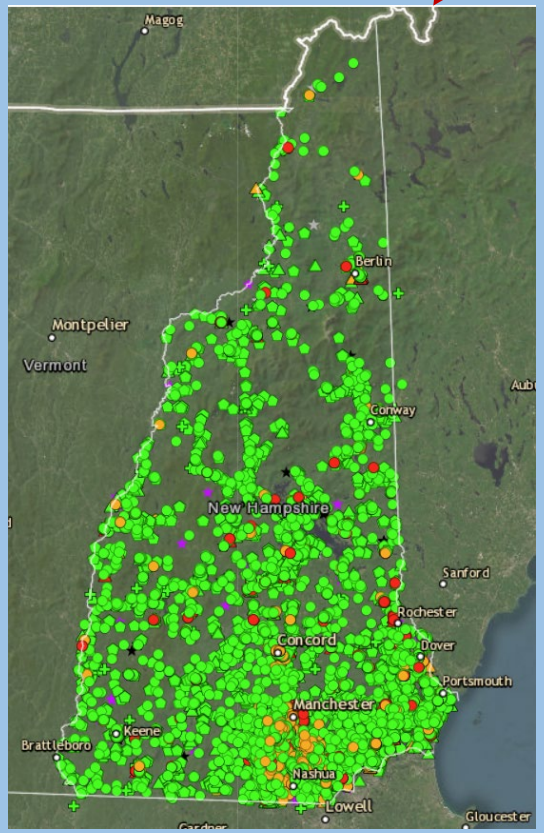
New Hampshire Sites with PFAS



NHDES Website - April 15, 2024:

To date, 12,288 wells have been sampled

3,369, or 27%, exceed the New Hampshire MCLs for PFOA and/or PFOS



https://nhdes.maps.arcgis.com/apps/dashboards/78fe1cb292af4cefbd49f281c43c658d