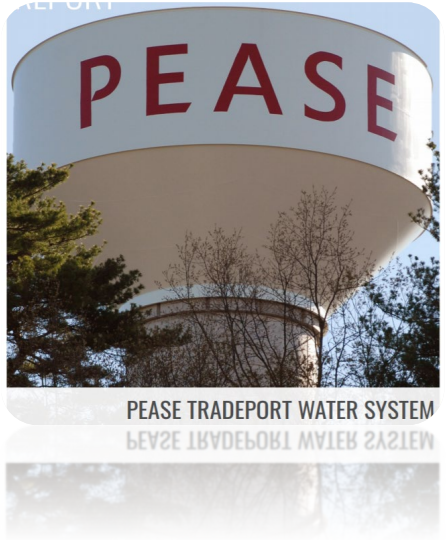
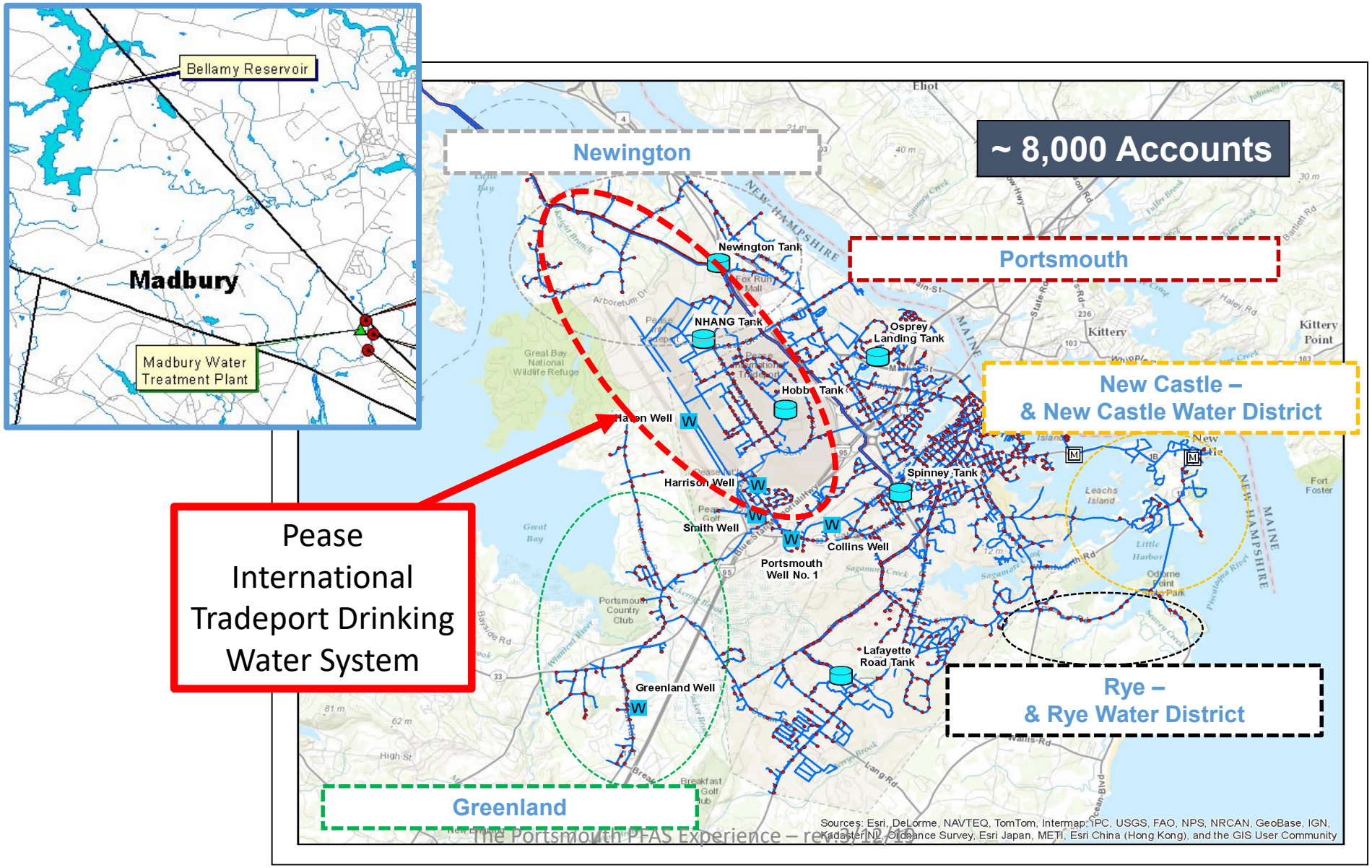


The Pease International Tradeport PFAS Experience and Response

Brian Goetz, Deputy Director of Public Works

2020 New Hampshire Water and Watersheds Conference
Plymouth State University

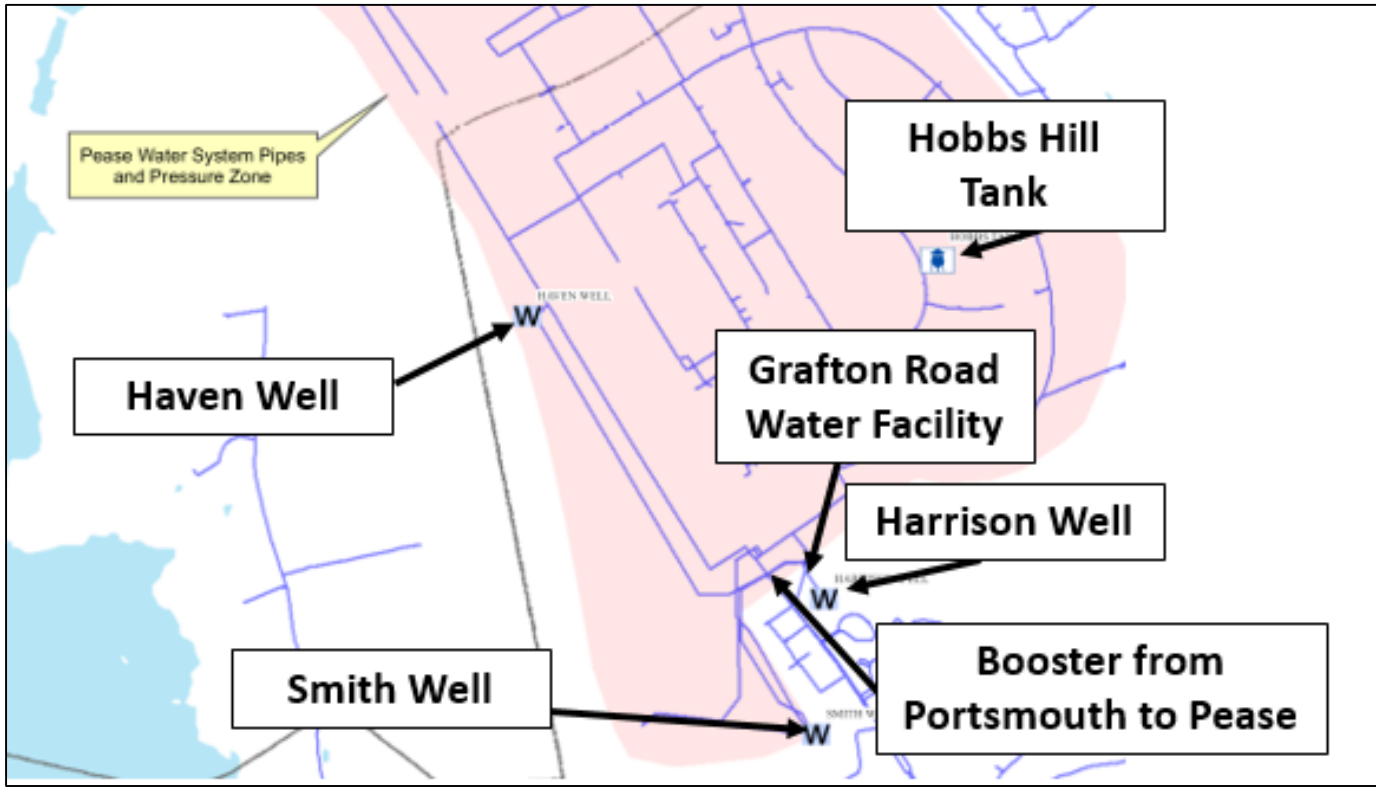
Portsmouth Regional Water System



The Pease International Tradeport

- Pease, which was a Strategic Air Command facility and Air Force base from the 1950's until 1991,
- The former Pease Air Force Base is located in Portsmouth and Newington, New Hampshire. The facility officially closed in April 1991 under the Defense Base Realignment
- Now home to more than 250 businesses employing over 10,500 workers, a commercial airport, the Air National Guard and a golf course
- Pease includes five secondary education institutions, various restaurants and daycare providers

Current Pease Tradeport
Grafton Road Water Facility

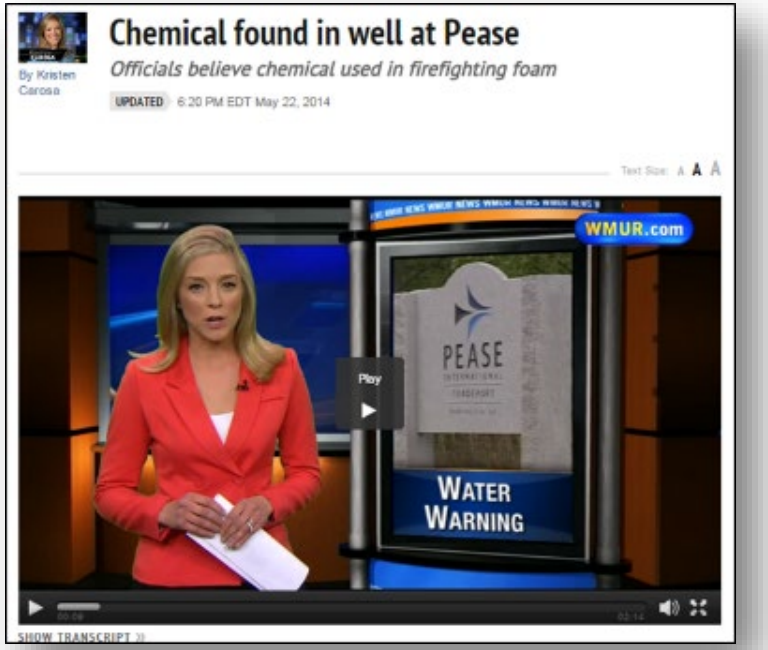


May 2014….

Article published May 22, 2014

Contaminated well shut down at Pease Tradeport

PORTSMOUTH — A well that serves the Pease International Tradeport has been shut down after testing positive for a chemical contaminant, according to the state Department of Environmental Services.



PEASE TRADEPORT PFAS TIMELINE

April 2014:
Pease Wells are Tested for 6 PFAS Compounds using EPA method 537 (6 Compounds).

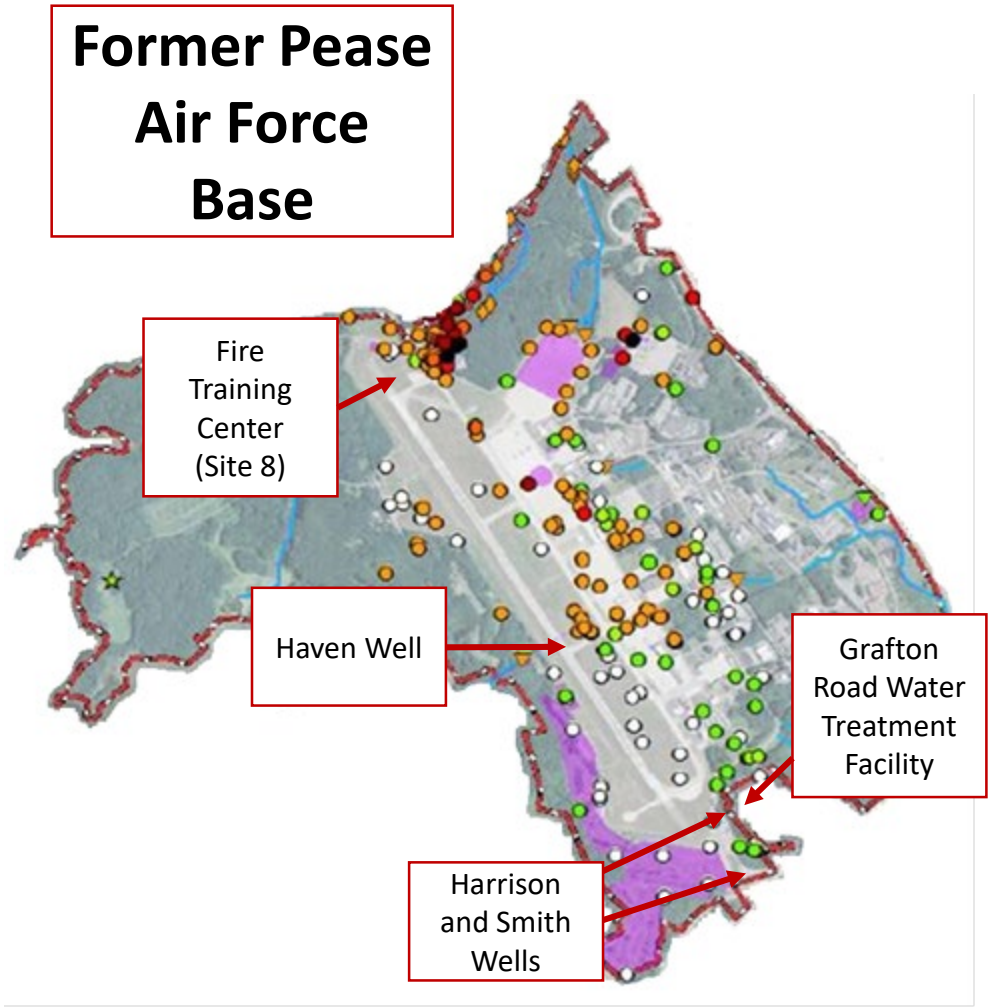
July 2015:
EPA Order to Air Force – Treat Haven Well and Aquifer

May 2014:
Haven Well Shut Down – Comprehensive Monitoring of PFAS Begins (23 Compounds). Investigations into Treatment Options and Supply Alternatives

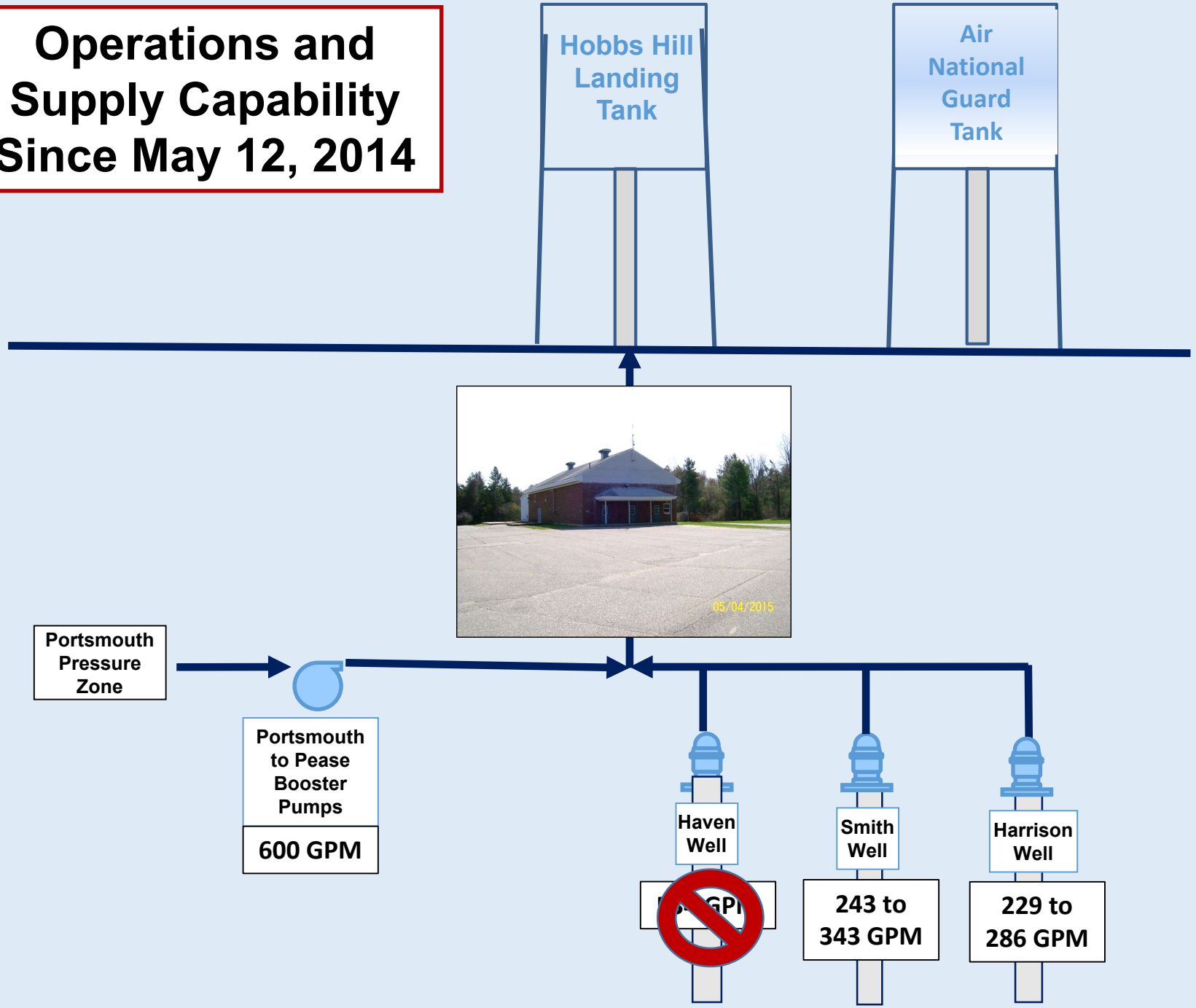
September 2015:
Meeting with Air Force and Congressional. City proposes GAC Filter Demonstration Project for Two Active Pease Wells

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 of 200 Parts-Per-Trillion (ppt)
  - Haven PFOS level = 2,500 ppt
- **May 12, 2014**
  - Haven Well is shut down
  - Portsmouth water supplements water lost from Haven Well (up to 500,000 gpday)
  - Smith and Harrison wells remain in service with lower detectable levels of PFAS



Operations and Supply Capability Since May 12, 2014



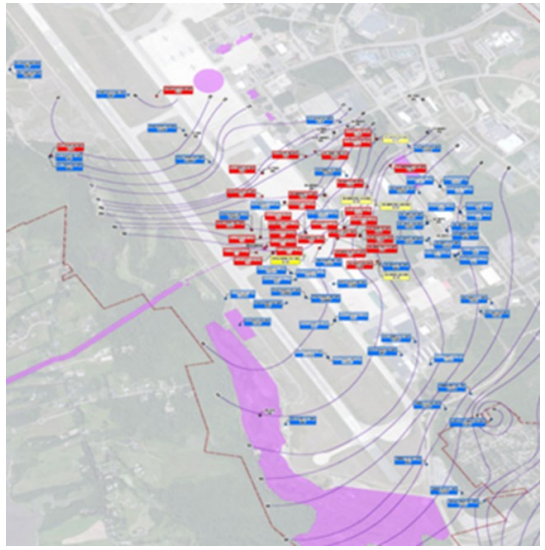

-135E Fire at Pease AFB January 1990
4:46 / 19:11

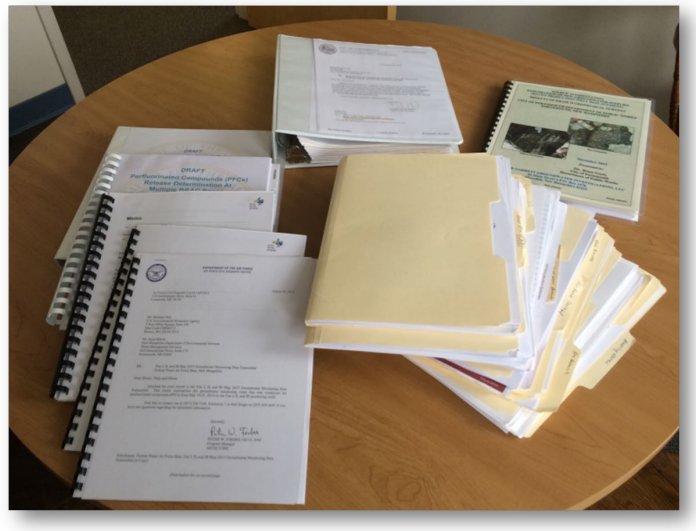
May 2014 - What Did We Know?

- Referred to as “PFCs” – not yet “PFAS”
- Health concerns at Parts per Trillion
- It Bio-accumulates
- Not just one compound… Many variants
- Any other water systems effected?
  - Washington County/Oakdale, MN - 2004
  - Decatur, Alabama - 2005
  - Ohio, West Virginia (C8 sites) – 2007

Pease Tradeport PFAS Investigation

- 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






Sentry Well
Sentry Well
Sentry Well
Harrison Well
Harrison Well
Sentry well
Sentry Well
MW-13
Sentry Well
MW-1
Sentry Well
Smith Well
Smith Well
Sentry Well
CSW-1S
CSW-1D
Sentry Well
Sentry Well
CSW-2R
Collins Well
Sentry Well
PSW-1
Sentry Well
Portsmouth Well #1

PFAS Regulatory Timeline

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

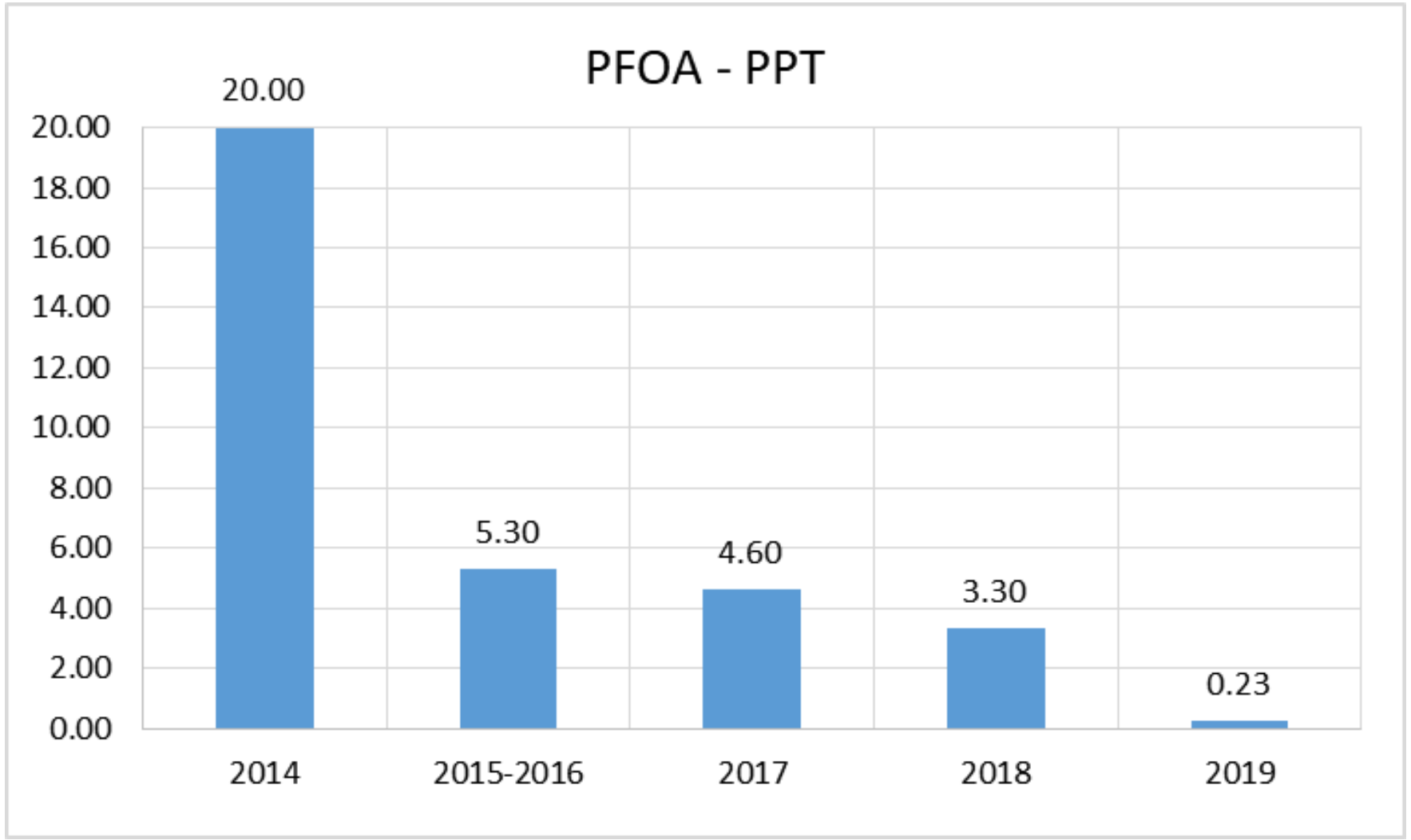
- May 2016
  - EPA Lifetime Health Advisories:
    - PFOA: 70 ppt
    - PFOS: 70 ppt

- 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

- 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

- December 2019:
  - A judge has ruled that New Hampshire will have to stop enforcing its strict new limits on PFAS chemicals at the end of the year due to ongoing lawsuit: "The legal issues raised by Plaintiffs' challenge are complex, the importance of public health is paramount and the expense imposed by the proposed rule is significant," - Merrimack Superior Court judge Richard McNamara

PFAS Timeline – Lab Methods and Reporting Limits



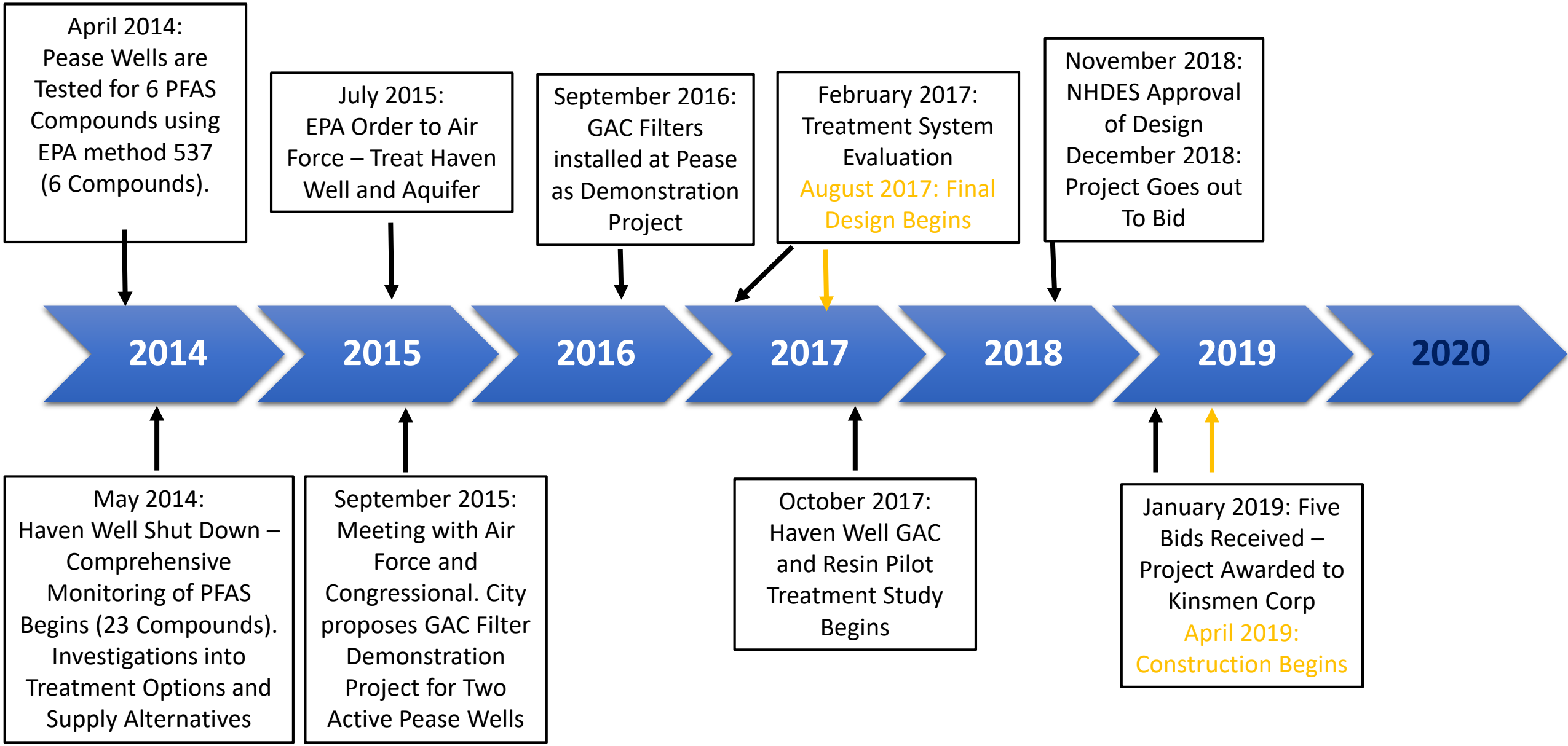
PFAS Sampling of Public Water Systems in New Hampshire

- 23 Systems Sampled as part of the UCMR3 Program
- 3/23 systems had detections
  - 13%
- July 19, 2016 letter request from NHDES to voluntarily sample again using lower detection limits and include more analytes
- 12/15 systems that resampled had detections:
  - 80%

PWSName	UCMR Detect	PFAS Detect with Lower Reporting Limits or Longer List of Analytes
Aquarion Water - NH	Yes	Yes
Chesterfield Central School	No	Not Sampled
Concord Water Department	No	Not sampled
Cow Hill Wellhouse	No	No
Derry Water Department	No	Yes (via Manchester testing)
Dover Water Department	Yes	Yes
Exeter Water Department	No	Not Sampled
Hudson Water Department	No	Yes
Keene Water Department	No	No
Laconia Waterworks	No	Yes
Lebanon Water Department	No	Not Sampled
Littleton Water & Light Dept.	No	Not Sampled
Lower Bartlett Water Pct.	No	No
Manchester Waterworks	No	Yes
Merrimack Village District	Yes	Yes
N. Walpole Village District/ Low	No	Not Sampled
Pennichuck Waterworks	No	Yes
Portsmouth Waterworks	No	Yes
Rochester Water Department	No	Yes
Salem Water Department	No	Yes
Seabrook Water Department	No	Yes
Somersworth Waterworks	No	Not Sampled
UNH - Durham Water System	No	Yes

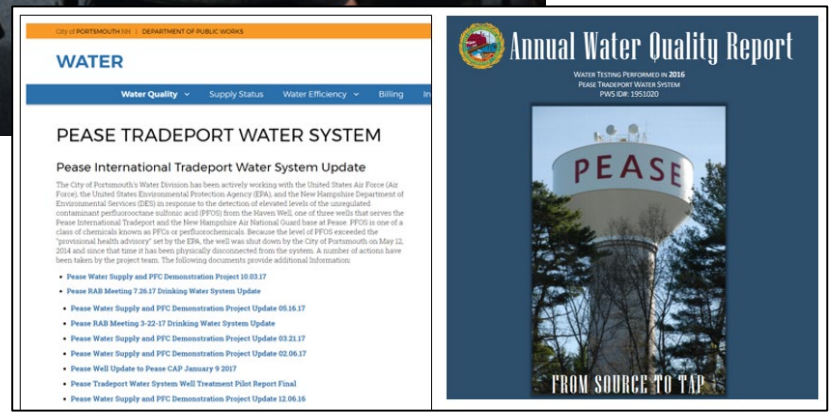
* Information from: Brandon Kernen, NHDES

PEASE TRADEPORT PFAS TIMELINE



Public Involvement and Outreach:

- Press Releases by NHDES and City
- Public Meeting at Pease – May 28, 2014
- Presentations to Portsmouth City Council and Other Groups
- Federal and State delegation involvement
- “Testing for Pease” Facebook Group Forms
- Haven Well Community Advisory Board
  - 14 public meetings in 2014
- Blood Testing – Health Study
  - March 31st, 2015 – Public Meeting where NHHS Announces Protocol for Pease Blood Testing
  - Three public meetings announcing blood test results
  - Long-term Health Study underway starting in 2019
- ATSDR Community Assistance Panel (CAP)
  - Formed in 2016 to address long-term health concerns
- Pease Restoration Advisory Board (RAB)
  - Reestablished in 2016 – Meets every quarter
- Extensive Information by City and State:
  - www.cityofportsmouth.com
  - Full page dedicated to PFAS in Annual Water Quality Report



Local and Federal Legislative Delegation

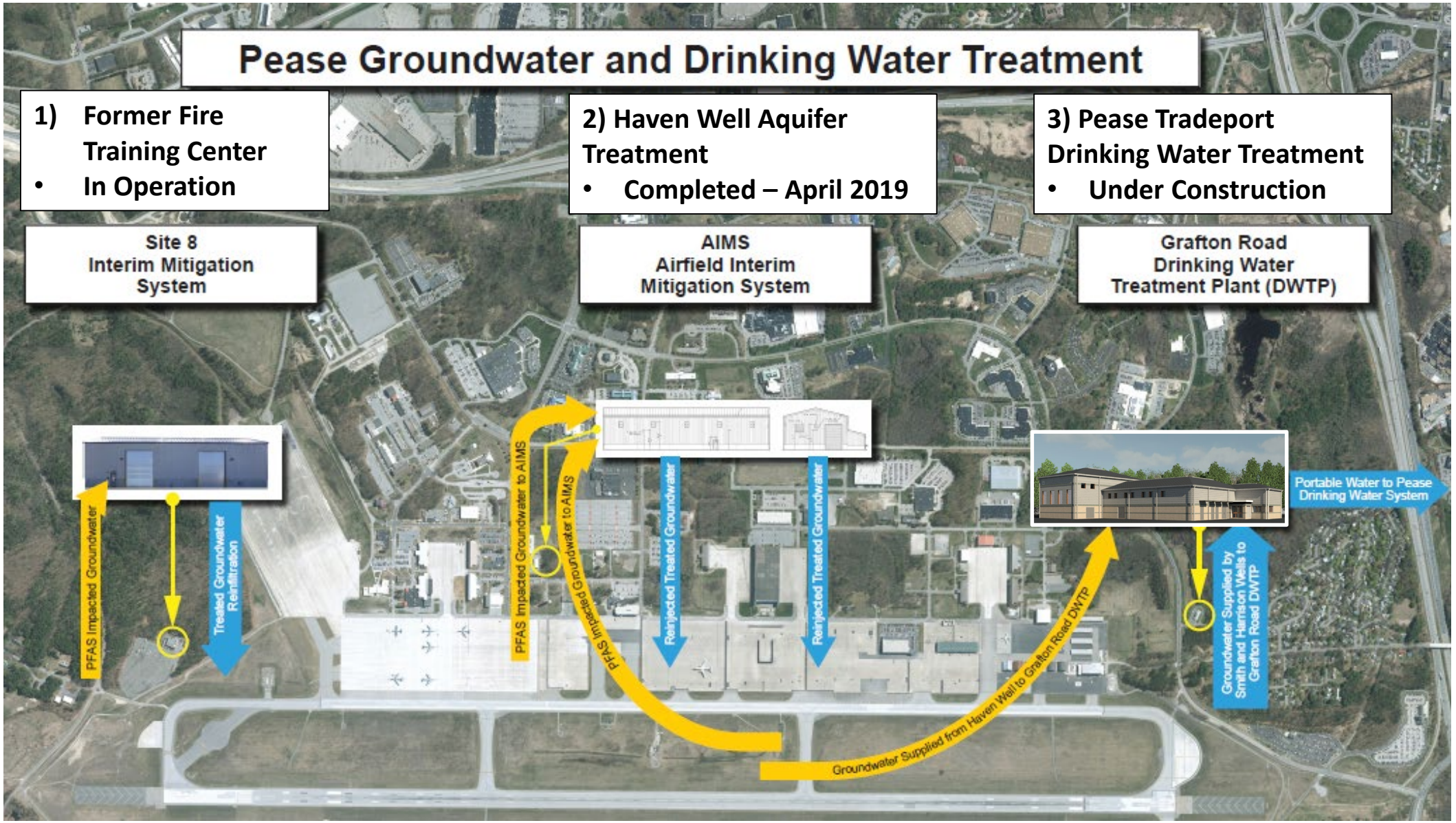
2016 – Governor (now Senator) Hassan meets with Testing for Pease representatives

- Advocated for
  - Treatment of Wells
  - Blood Testing and Health Studies

Pease PFAS Contamination Response: Chronology of Events

- May 12, 2014 - Haven Well is shut down
- Since May 12, 2014 - Pease water system is supplemented with water from Portsmouth's water system
- Ongoing Monitoring of PFCs by the Air Force's consultant
- July 2015 – EPA Order to Air Force to treat aquifer and wells
  - Site 8 Fire Training Center Treatment System
  - AIMS Airfield Aquifer Treatment System
  - Grafton Road Drinking Water Treatment System

Pease PFOA/PFOS Treatment Systems:



Pease Tradeport Water Treatment
Air Force Agreements

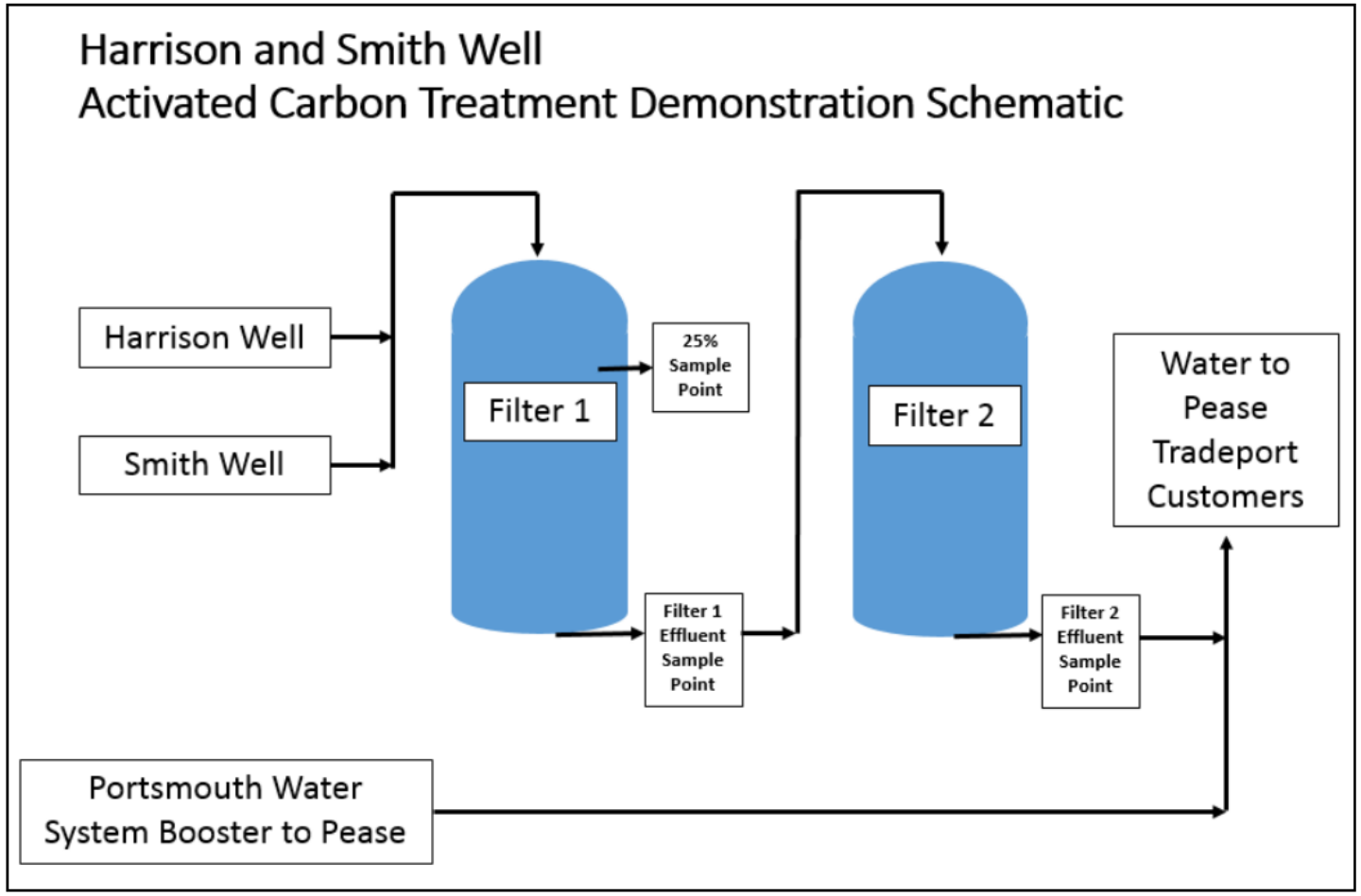
- Replacement Well Study - 2014
- Preliminary Design Study for Treatment System - 2015
- Pilot Testing and Activated Carbon Filter Demonstration Project - 2015
- Treatment Facility Comparative Analysis - 2016
- Final Treatment Facility Design – 2017-2018
- Construction – 2019-2021

Pease Tradeport Water System PFOA/PFOS Contamination Treatment Options

- Investigated other public water systems treating PFOA/PFOS contamination
- Piloted Activated Carbon System in 2016
- Installed Calgon two 20,000 lb. F-400 Granular Activated Carbon filters on Harrison and Smith wells to Demonstrate effectiveness in September 2016
- Flow rate through filters is 400 GPM

GAC Filter Installation – September 2016

Demonstration Filter Schematic



Haven Well Pilot Test – GAC and Resin October 2017

- Uncertain if GAC would perform well for significantly higher levels of PFAS.
- Compare the ability of media to remove PFAS from the Haven Well
  - IX Resin = ECT's SORBIX LC1
  - GAC = Calgon's F400
- Confirm design parameters and system sizing to be used in the preparation of the full-scale treatment system technology evaluation.
- Select PFAS-removal technology for full-scale implementation based on lifecycle cost comparison and risk

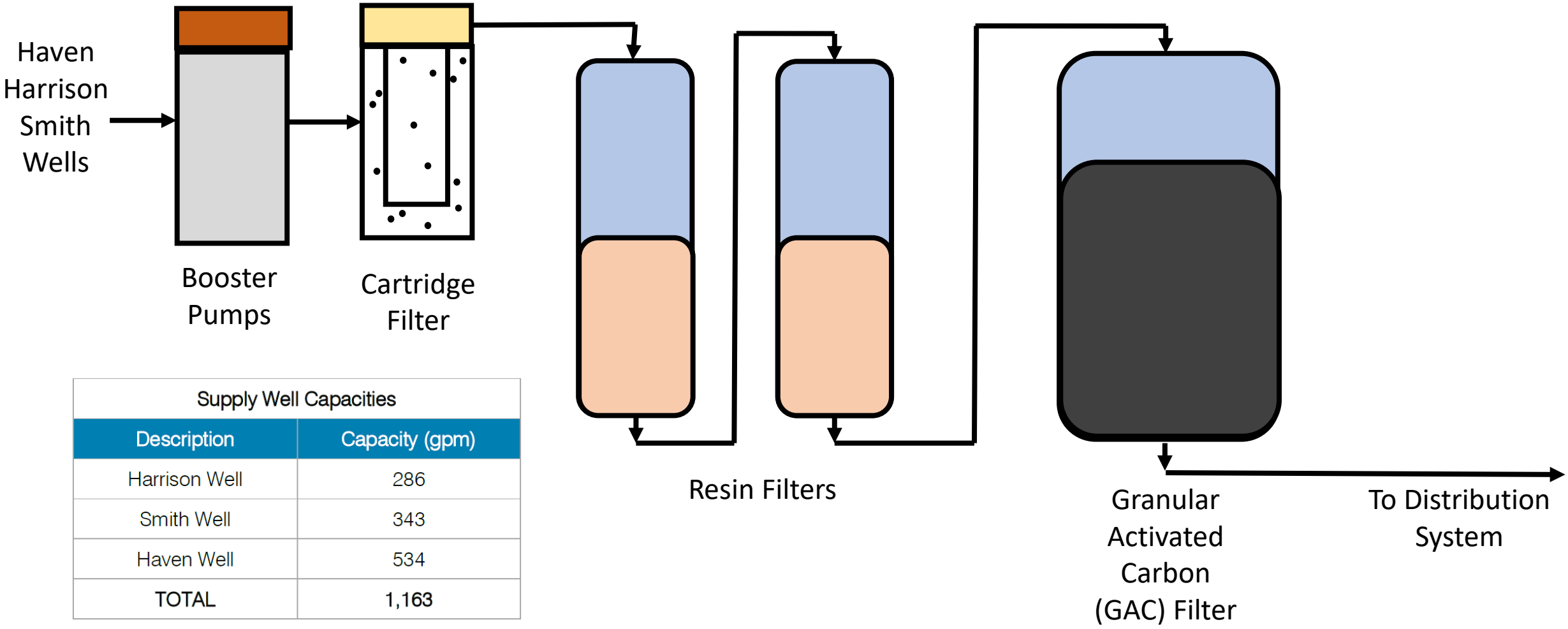
Pease Tradeport Water System PFAS Contamination - Treatment Options

- Installed Calgon F-400 Carbon filters on Harrison and Smith wells to Demonstrate effectiveness
- Piloted alternative treatment – resins
- Final design and construction includes resin and carbon filters

Haven Pilot Conclusions

- Resin outperforms GAC when raw water PFAS concentrations are high
- Resin removed short chain compounds better than GAC
- As regulations move PFAS limits lower, the advantages of resin over GAC goes up

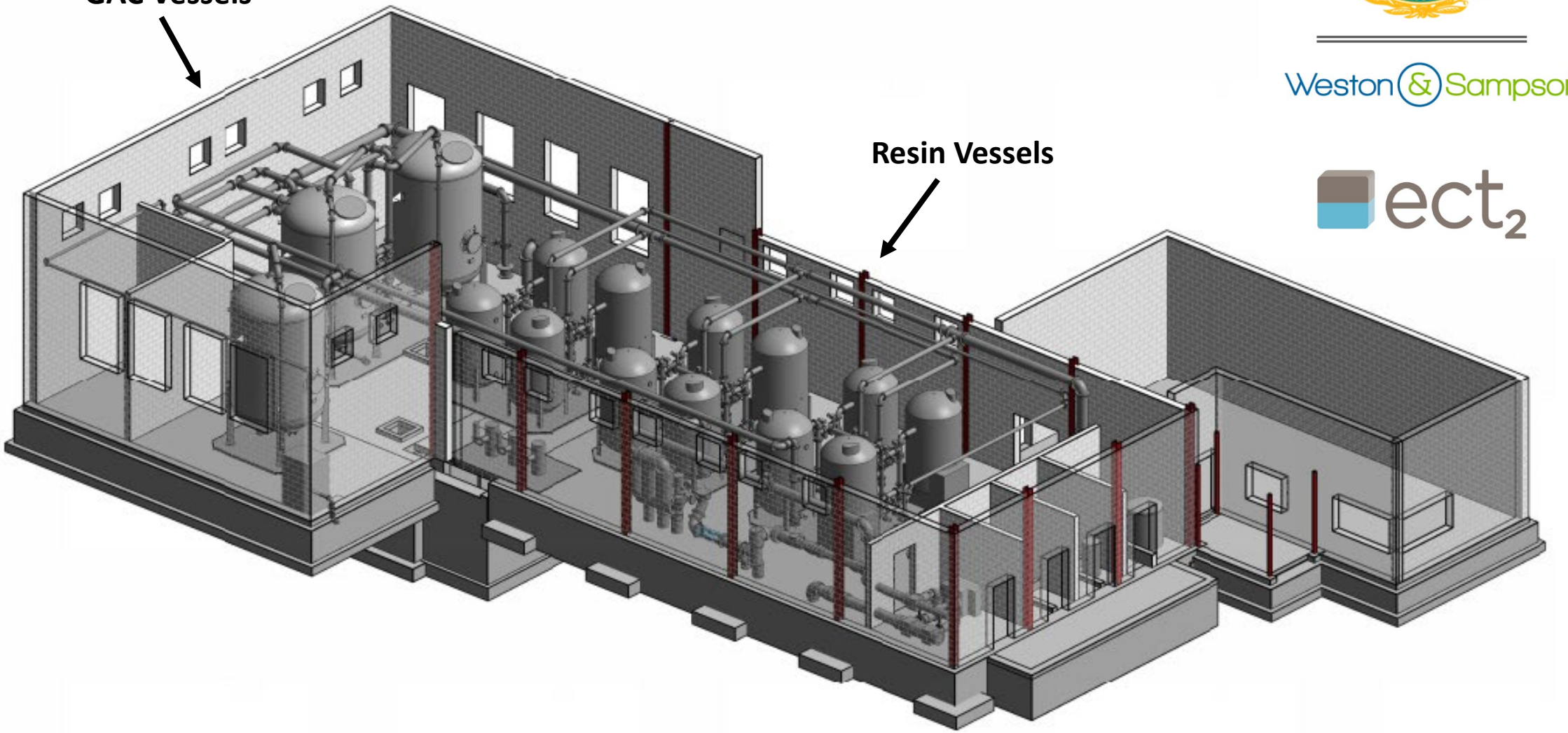
Grafton Road Water Facility Process Schematic
Current Treatment System Design



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

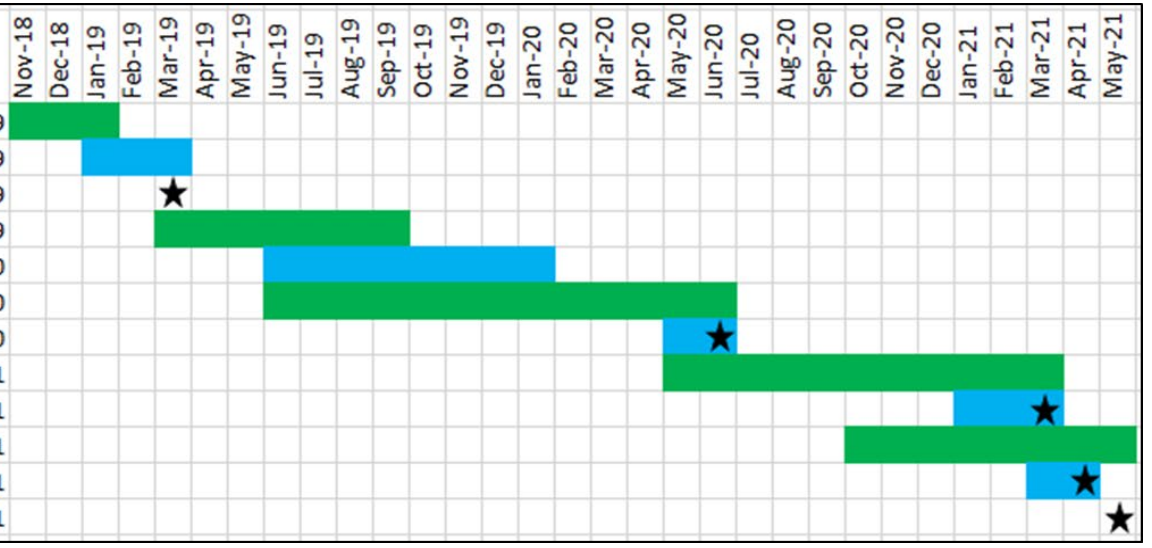
Current Rendering – Grafton Road Water Treatment Facility

Final Drinking Water Treatment Layout



Construction:

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

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Blood Testing and Health Studies

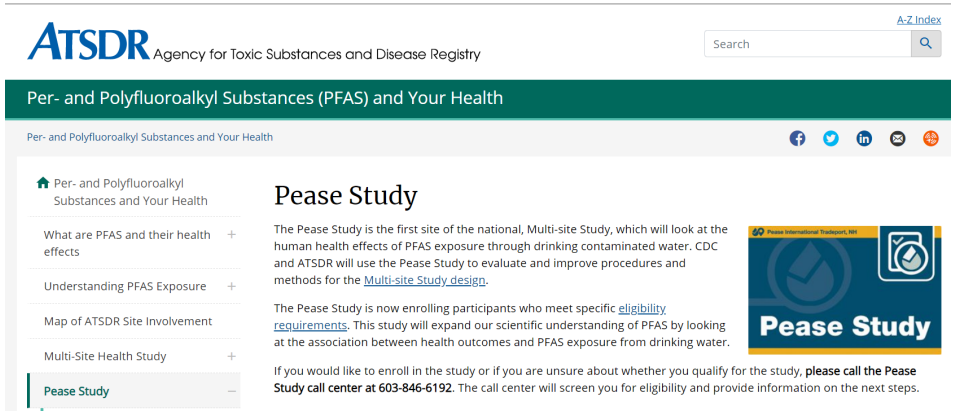
New Hampshire Department of Health and Human Services

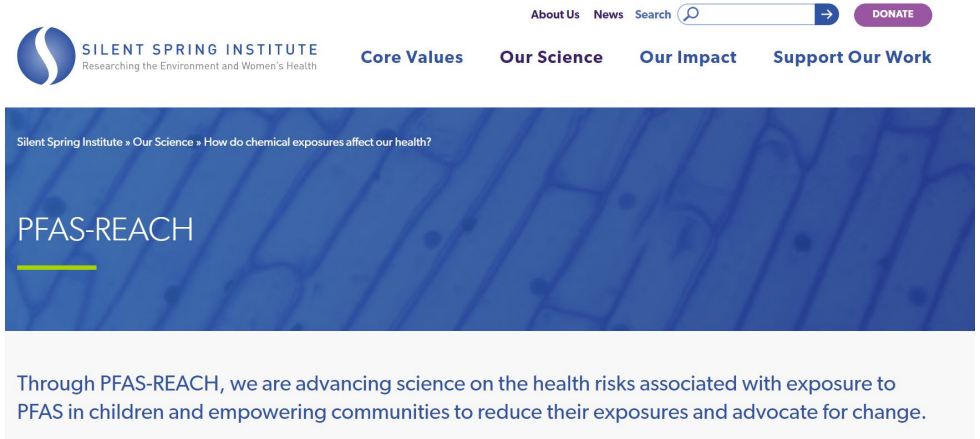
- Blood Testing
  - March 31st, 2015 – Public Meeting where NHHS Announces Protocol for Pease Blood Testing
  - 1,181 Adults tested
  - 366 Children tested
  - Three public meetings announcing blood test results

Other Ongoing Studies

- **https://www.dhhs.nh.gov/dphs/investigation-pease.htm**
- **https://www.atsdr.cdc.gov/pfas/Pease-Study.html**
- **https://silentspring.org/project/pfas-reach**
- **http://www.testingforpease.com/pfas-pease**

ATSDR Expert Panel Meeting – Atlanta – June 2019

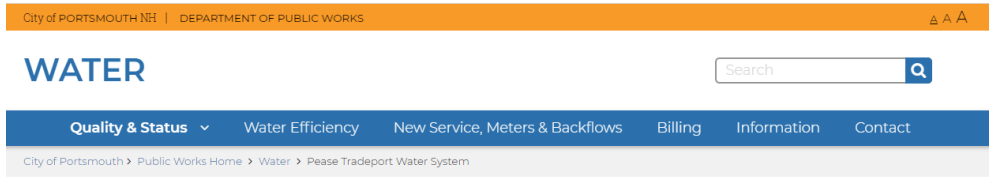




Public Outreach:

Meetings, Website, Press Releases

Portsmouth City Council Briefing by Brian Goetz, Deputy Director of Public Works – Sept 3, 2019



PEASE TRADEPORT WATER SYSTEM

WATER QUALITY AND RESPONSE TO PFAS COMPOUNDS

For information about the Portsmouth Water System's PFAS sampling, click **here**.

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 (NHDES) in response to the detection of elevated levels of the unregulated contaminant perfluorooctane sulfonic acid (PFOS) from the Haven Well in 2014. This well was
water system. PFOS is one of a class of chemicals known as **Per- and polyfluoroalkyl substan**
group of compounds resistant to heat, water, and oil. For decades, they have been used in hun
carpeting, apparels, upholstery, food paper wrappings, fire-fighting foams and metal plating. T
use of **firefighting foam at the air base** and the air base's fire training center. Because the leve
the well was shut down and it has been off ever since. A number of actions have been taken b
Portsmouth, the **Air Force Civil Engineering Center**, the EPA, the **NHDES** and the **Pease Develo**
part of the response.

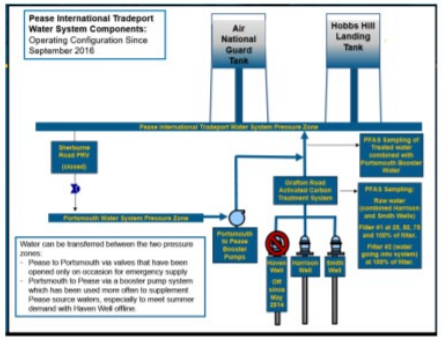
April 2014	Pease wells are sampled for PFAS compounds.
May 12, 2014	**PFAS results** are reported to City of Portsmouth and Haven continue to supply water to the Tradeport and are supplem

City of Portsmouth
Department of Public Works

July 31, 2019

PEASE TRADEPORT WATER SUPPLY UPDATE

The City's engineering consultant continues to sample the performance of the activated carbon filters based on the amount of water treated. With the newly adopted New Hampshire Maximum Contaminant Levels (MCLs) for PFOA, PFOS, PFHxS and PFNA in place we are now sampling at the recommended lab detection limit which goes down to 2 ppt. Per NHDES, any sample with "estimated numbers below the reporting limit are considered non-detects." Due to the loss of the Haven Well, in order to meet the Pease Tradeport Water System demand, water from the Portsmouth water system is boosted into the Pease system and blended with the treated water from the Harrison and Smith wells. Samples of that blended water are also taken. The following graphic and table provides a summary of the system configuration and testing results. Comprehensive sample data since the filters were changed out in November 2018 is attached. Per NHDES rules, after October 1, 2019, we will begin to report the data as a 4-quarter rolling average.



www.cityofportsmouth.com/publicworks/water

What Have We Learned ?

- People don’t understand the regulations – very complex
- Science and health studies are advancing rapidly
- Public water system operators dealing with this issue have to be able to explain all this to their customers

Sharing Lessons Learned:

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

Time Commitment

- Water System Operational Adjustments
- Research and Information Gathering
- Technical Meetings
- Negotiations with Air Force
- Contracts: Studies, Treatment Piloting, Design, Construction
- Public Outreach and Public Meetings