Pease Water Treatment System Update

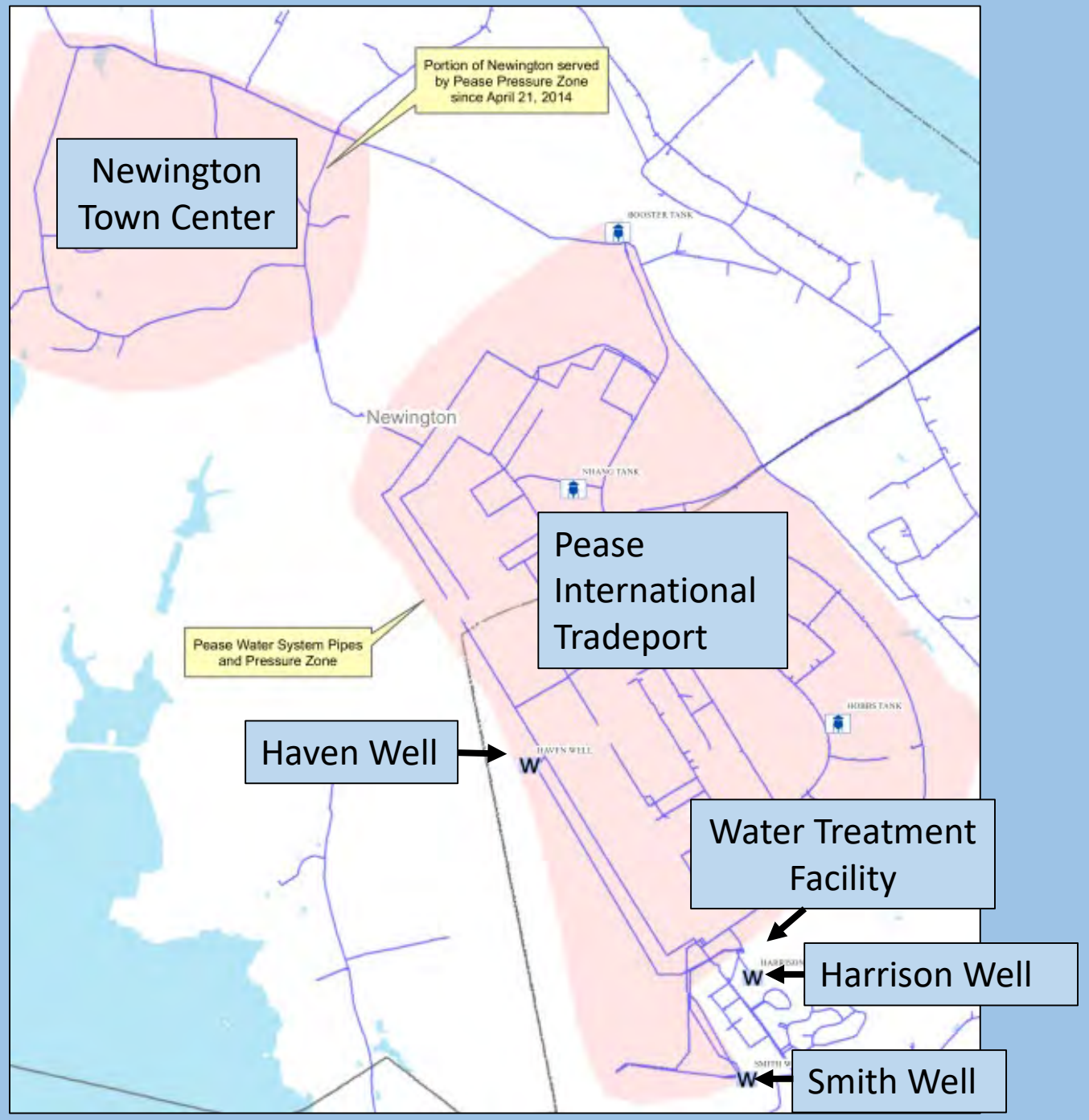
June 9, 2021

Pease Restoration Advisory Board

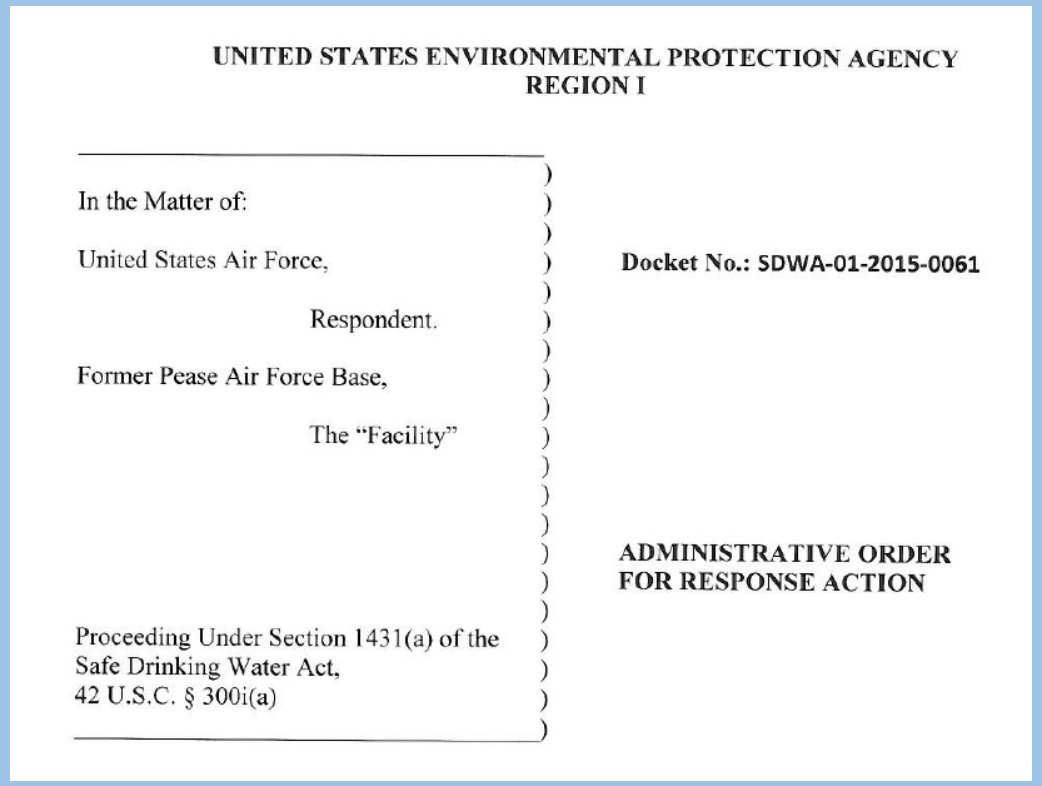
Pease Tradeport Water

- 3 Wells (Haven out of Service)
- 2 Storage Tanks
- 1 Treatment Facility (2021)
- Booster pumps from Portsmouth system
- 0.4 to 1.1 million gallons per day
- 17 Miles of Pipe
- 168 Public Fire Hydrants
- 228 Valves
- 2 Storage Tanks
- 130 Metered Customers

Pease Trade Port Water System Service Area



EPA Order to Treat Haven Well Water August 2015



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

In the Matter of:

United States Air Force,

Respondent.

Former Pease Air Force Base,

The "Facility"

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

Docket No.: SDWA-01-2015-0061

ADMINISTRATIVE ORDER FOR RESPONSE ACTION

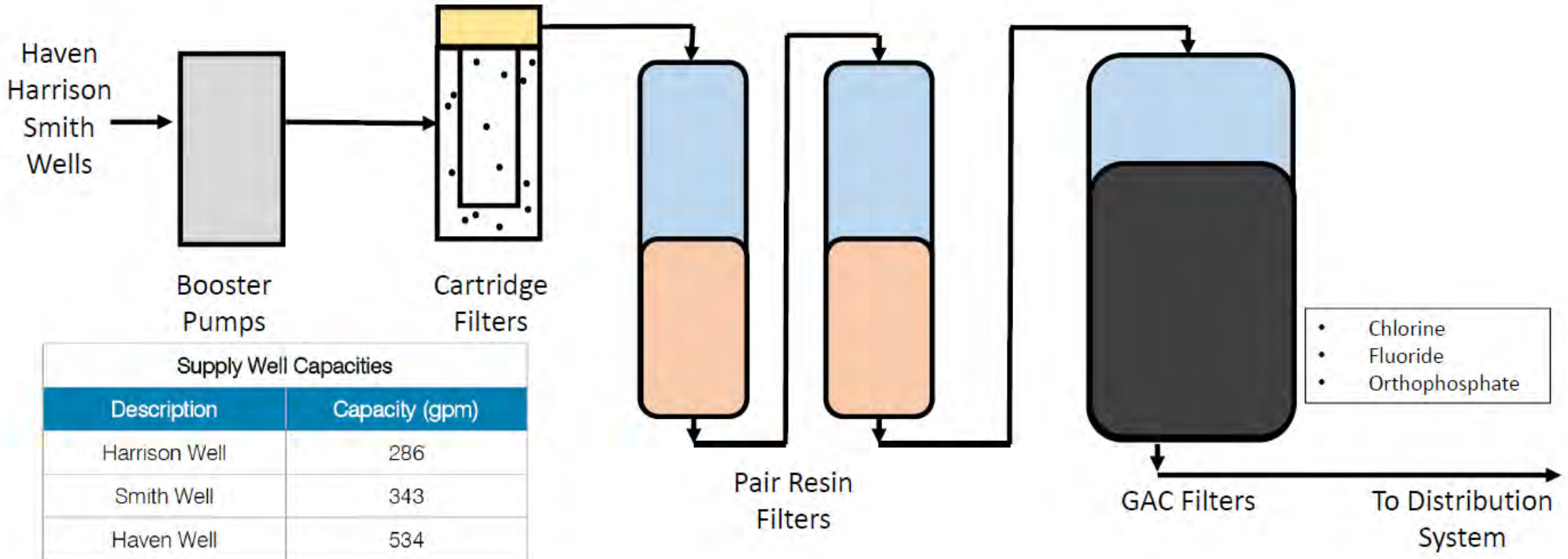
- Required Treatment System for Haven Well
- City signed agreement with Air Force to design and construct the system
- Air Force agreed to system that would also treat Harrison and Smith Wells

Grafton Road Well Treatment System:

Dual Filtration System:

- Resin Filters
- Activated Carbon Filters

Final Design Process Schematic



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

Pease Water Treatment Facility – Two Years of Construction

- Before – April 2018

- After – April 2020

Start of Construction

June 2019 GAC Building Foundation

October 2019 GAC Building Generator

Carbon Filter Installation – October/November 2019

Carbon Filter Installation – October/November 2019

March 2020 GAC Building:

May 2020

June 2020
Roof Demolition:

June 2020
Demolition of Existing Building:

Water Operations Staff… Keeping the Water System Running…

September 2020

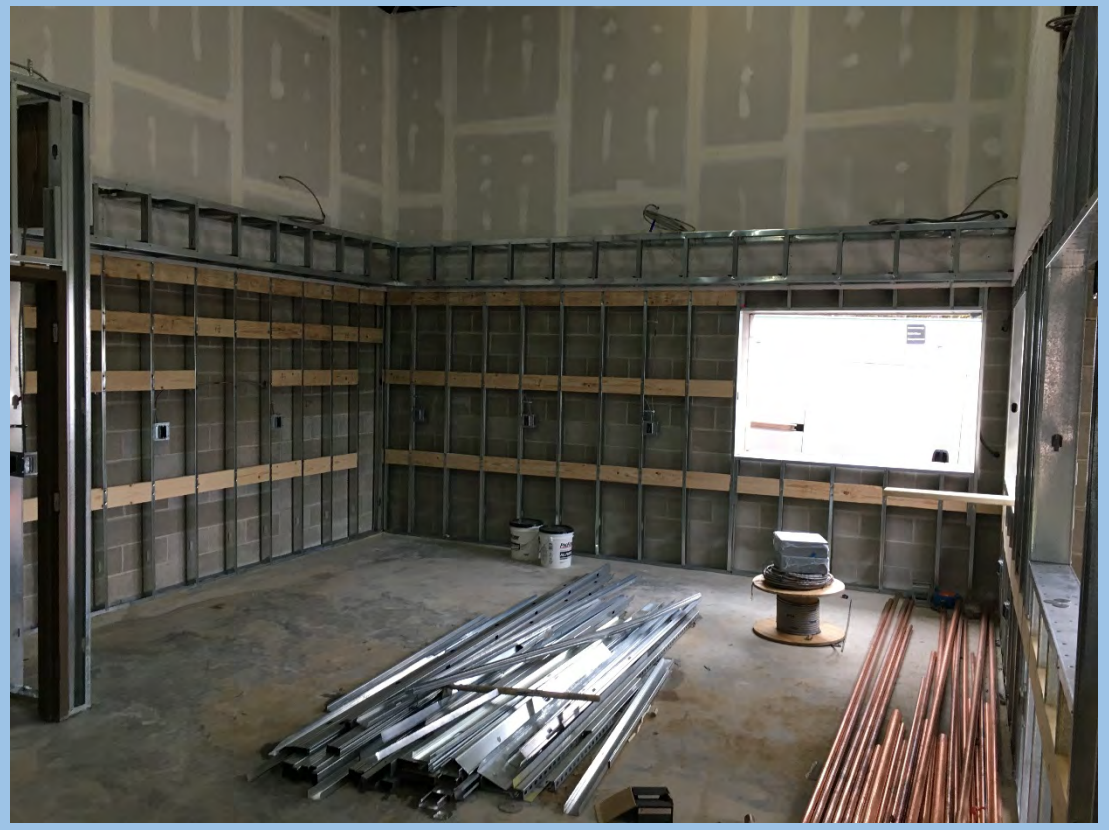
Pease Water Treatment Facility – Design Rendering:

Building Construction – October 2020

Mechanical Room

Online Analyzers

Control Room - Laboratory



Control Room - Laboratory

August 2020
Resin Filter Installation

March 2021 – New Well Manifold Installation

Piping

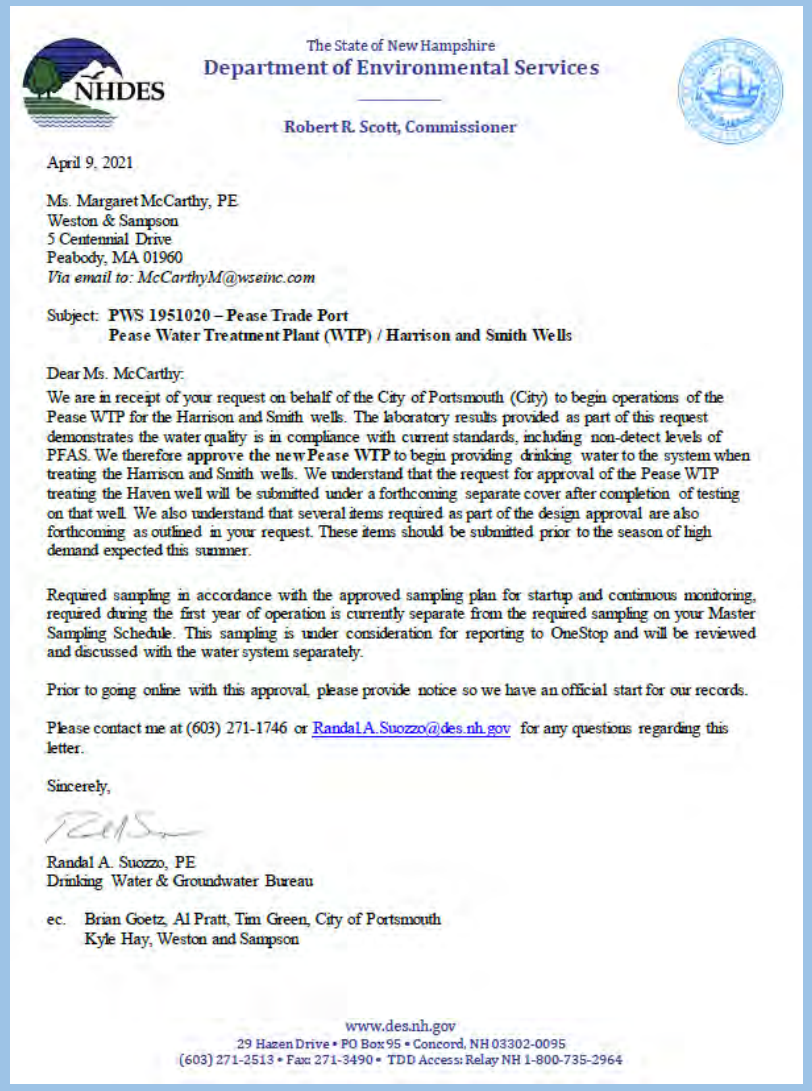
Final Pease Water Treatment System Filters

Activated Carbon Filters

Resin Filters

Completed Building

April 2021
Approval of New Treatment System



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.

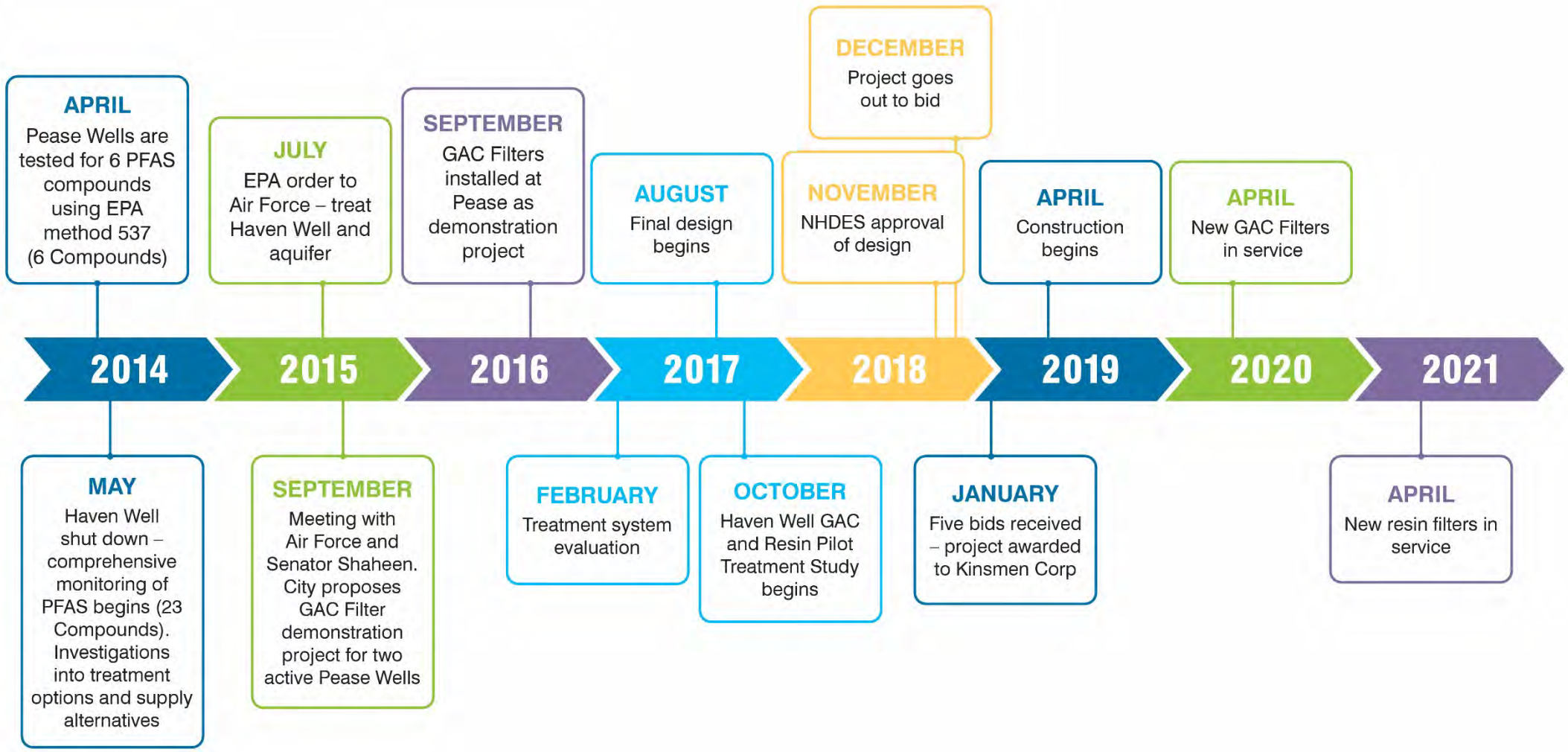
Sincerely,

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

PEASE TRADEPORT PFAS TIMELINE:



Project Team… Thanks!

- Water Operations and City Staff
- Weston & Sampson
- Pease Development Authority
- Air Force Civil Engineering Center
- Wood PLC
- New Hampshire DES
- EPA Region 1

May 4, 2021 Dedication

May 4, 2021 Dedication

Seacoastonline **BREAKING NEWS:** Lonza plans expansion, 2

[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 Reactivation - History of Well:

- **1875 - Installed at Haven Springs**
  - **A Primary Water Supply Source for the City of Portsmouth**
- **1956 to 1992 - Pease Air Base**
- **1992 - PDA/Portsmouth**
- **May 2014 - Taken out of Service due to exceedance of PFOS Preliminary Health Advisory**

Haven Well Reactivation: Testing in 2021

- Well pumped briefly through Pease Water Treatment Facility (to waste) and sampled for PFAS compounds
  - Non detection after treatment
- 5 Day pump test to AIMS Treatment System – May 3rd to 8th
- Comprehensive Water Quality Analysis Performed at end of test
  - All regulated drinking water contaminant parameters sampled
    - No VOCs, SOCs, detected
    - All other parameters meet drinking water standards

Haven Well Pump Testing May 2021

Haven Well

Water Level
And
Flow
Measurements

Haven Well PFAS Sample Results

- Significant drop in levels from 2014

PFAS Sampling (New Hampshire Regulated Compounds)	2014 (Ave of 2 Samples) PPT	2021 (Ave of 3 Samples) PPT
Perfluorohexanesulfonic Acid (PFHxS)	895	129
Perfluorooctanoic Acid (PFOA)	341	47
Perfluorononanoic Acid (PFNA)	17	4
Perfluorooctanesulfonic Acid (PFOS)	2,450	427

* PPT = Parts per Trillion

Haven Well Reactivation

- Data will be submitted to New Hampshire DES Drinking Water and Groundwater Bureau for approval to reactivate well
- PFAS sampling will occur weekly for the first month and monthly once well is turned on

PEASE

ANNUAL DRINKING WATER QUALITY REPORT

PEASE INTERNATIONAL TRADEPORT WATER SYSTEM
2020 TESTING RESULTS
PWSID 1951020

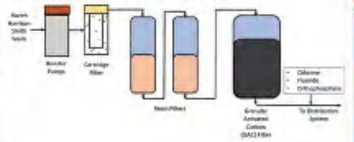
NEW WATER TREATMENT FACILITY

NEW WATER TREATMENT FACILITY FOR PFAS TREATMENT

Construction of the new Pease Water Treatment System continued in 2020 and was completed in April 2021. The completion marks the culmination of seven years of response to the presence of PFAS contaminants that were found in May 2014 to be impacting the three Pease drinking water wells. Past use of firefighting foam at the former Pease Air Base containing PFAS compounds contributed to this contamination. Subsequently, the Air Force agreed to work with the City to treat the drinking water serving the Pease International Tradeport System. The agreement provided the City with funds to reimburse the cost of construction of the final treatment system for all three wells, including a dual filtration system consisting of resin and granular activated-carbon filters. The construction of the new Pease Water Treatment Facility followed extensive research, pilot testing and design of a system to treat the contamination. In partnership with the Air Force, the City conducted a demonstration project starting in September 2016. This project involved the installation of granular activated carbon (GAC) filters for the Harrison and Smith Wells. Subsequently, the City was invited by the firm ECT2 to pilot resin filter technology for the treatment. The success of that pilot led to the inclusion of resin in the final facility, which together with granular activated carbon filters (GAC) will remove PFAS compounds from the drinking water. A celebration marking the completion of this new facility was held on May 4, 2021. Mayor Rick Beckstead, Deputy Director of Public Works Brian Goetz, Representative Chris Pappas, Senator Maggie Hassan, Testing for Pease co-founder Andrea Amico, Senator Jeanne Shaheen and Jennifer Miller, Acting Assistant Secretary of the Air Force for Energy, Installations, and Environment, attended the ceremony.

Water Treatment Facility
PEASE
2021

Grafton Road Water Facility Process Schematic
Final Treatment System Components



2020 WATER QUALITY RESULTS

	CONTAMINANT (UNIT OF MEASUREMENT)	IN COMPLIANCE	VIOLATION (Y/N)	LEVEL MEASURED	RANGE	MCLG	MCL	LIKELY SOURCE OF CONTAMINATION
DISINFECTION BYPRODUCTS	Total Coliform Bacteria	✓	N	NO total coliform bacteria detected in the 120 distribution system samples that were collected and analyzed in 2020				Naturally present in the environment
	Haloacetic Acids (ppb)	✓	N	Highest Level Measured: 6.0	5.9 - 6.0	N/A	60	Byproduct of drinking water disinfection
	Total Trihalomethanes (ppb) (Bromodichloromethane, Bromoform, Dibromomethane, Chloroform)	✓	N	Highest Level Measured: 8.4	2.6 - 8.4	N/A	80	Byproduct of drinking water chlorination
LEAD AND COPPER	Lead (ppb) 2019 data	✓	N	90th Percentile = 3	<1 - 7.0 0 sites above AL (22 sites sampled)	0	AL = 15	Corrosion of household plumbing systems; erosion of natural deposits
	Copper (ppm) 2019 data	✓	N	90th Percentile = 0.4	0.013 - 0.67 0 sites above AL (22 sites sampled)	1.3	AL = 1.3	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
INORGANIC CONTAMINANTS	Barium (ppb) 2018 & 2019 data	✓	N	Highest Level Measured: 9.4 Avg Source Level: 8.8	8.1 - 9.4	2000	2000	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
	Chlorine (ppm)	✓	N	Highest Level Measured: 1.29 Avg System Level: 0.68	0.15 - 1.29	MRDLG = 4	MRDL = 4	Water additive used to control microbes
	Chromium (total) (ppb) 2018 & 2019 data	✓	N	Highest Level Measured: 1.3 Avg Source Level: <1	<1 - 1.3	100	100	Discharge from steel and pulp mills; erosion of natural deposits
	Fluoride (ppm)	✓	N	Highest Level Measured: 1.06 Avg Level: 0.63	0.15 - 1.06	4	4	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
	Nitrate (as Nitrogen) (ppm) 2019 & 2020 data	✓	N	Highest Level Measured: 1.7 Avg Source Level: 1.4	1.1 - 1.7	10	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
RADIOACTIVE CONTAMINANTS	Compliance Gross Alpha (pCi/L) 2019 data	✓	N	Highest Level Measured: <1	<1	0	15	Erosion of natural deposits
	Uranium (ug/L) 2019 data	✓	N	Highest Level Measured: <1	<1	0	30	Erosion of natural deposits
	Combined Radium 226 + 228 (pCi/L) 2019 data	✓	N	Highest Level Measured: 1	<1 - 1	0	5	Erosion of natural deposits
*UNREGULATED SUBSTANCES	Manganese (ppb) 2019 UCMR data	✓	N	Average Source Level: 26	<1 - 26			Naturally-occurring element used in a variety of applications including use in steel production to improve hardness, stiffness and strength. Essential nutrient found in vitamin/mineral supplement and in fortified foods
PFAS	Per- and Polyfluoroalkyl Substances (PFAS)	✓	N	See PFAS section		Discharge from industrial processes, wastewater treatment, residuals from firefighting foam, runoff / leachate from landfills and septic systems		

*Unregulated Substances: samples collected from Harrison Well and Smith Well

WATER QUALITY PARAMETERS

The water quality parameters are routinely monitored to assess the general characteristics of the water supply. Note that the range of some of these parameters illustrates the differences between the characteristics of the surface water supply and the groundwater supply.

WATER QUALITY PARAMETERS	PARAMETERS (UNITS)	AVERAGE LEVEL	RESULTS RANGE	SECONDARY DRINKING WATER STANDARD SMCL
	Chloride (ppm)	115	41 - 176	250
	Copper (ppb)	3	<2 - 4	1000
	Iron (ppb)	20	10 - 40	300
	Manganese (ppb)	23	13 - 42	50
	pH	7.5	7.4 - 7.6	6.5 - 8.5
	Sulfate (ppm)	15	<1 - 15	250
	Conductivity (umos/com)	564	396 - 855	N/A
	Alkalinity (ppm)	113	108 - 122	N/A
	Hardness (ppm as CaCO3)	117	112 - 120	N/A
	Ortho-Phosphate (ppm)	0.95	0.67 - 1.13	N/A
	Sodium (ppm)	43	41 - 45	N/A
	Zinc (ppb)	3.2	<0.1 - 3.3	5000

2020 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. In response to the discovery of PFOS in the Haven Well in May 2014 at levels that exceeded the EPA Provisional Health Advisory (200 ppt at that time), the Haven Well was removed from service. This well has remained disconnected from the Pease Tradeport water system since this finding. The source of the PFAS at the Tradeport was aqueous film-forming foam that had been used to extinguish fires and in training exercises at the former Air Force Base.

Over the past seven 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. 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. Sample results from 2020 are summarized in the PFAS table in this report. All monitoring data is available online: cityofportsmouth.com/public-works/water/pease-tradeport-water-system
For more information about PFAS health effects: www.atsdr.cdc.gov/sites/pease/index.html

In September 2016, the City of Portsmouth installed a Granular Activated Carbon (GAC) filtration system to treat the water from the Harrison Well and Smith Well. Testing of this system has demonstrated effective removal of PFAS. The City of Portsmouth is currently upgrading the treatment facility on Grafton Road under an agreement with the Air Force. The upgraded treatment system is designed with a combination of GAC and anionic exchange resins that will be capable of treating water from the Haven Well, Smith Well and Harrison Well when completed in 2021. Additional information and routine updates on the progress of this project are on the City's website.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)	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	COLLINS WELL	GREENLAND WELL	PEASE TRADEPORT TREATED WELL WATER: SUPPLIED AFTER GAC TREATMENT
	# of samples in 2020			16	15	4	13
	% of water supplied in 2020			11.9%	4.6%	15.4%	68.1%
	Perfluorobutane-sulfonic acid (PFBS)	not regulated	Average	3	15	2	ND
			Range	2 - 4	11 - 19	1 - 3	ND
	Perfluorobutanoic acid (PFBA)	not regulated	Average	3	4	2	4
			Range	2 - 4	3 - 6	2	ND - 12
	Perfouoroheptanoic acid (PFHpA)	not regulated	Average	3	1	2	ND
			Range	2 - 4	ND - 2	1 - 2	ND
	Perfluorohexane-sulfonic acid (PFHxS)	18	Average	6	2	2	ND
			Range	4 - 8	1 - 3	1 - 3	ND
	Perfluorohexanoic acid (PFHxA)	not regulated	Average	4	2	3	BD
			Range	3 - 6	ND - 3	2 - 4	ND - <1
	Perfluorononanoic acid (PFNA)	11	Average	BD	ND	ND	ND
			Range	ND-1	ND	ND	ND
	Perfluorooctane-sulfonic acid (PFOS)	15	Average	4	4	3	ND
			Range	2 - 6	1 - 5	1 - 4	ND
	Perfluorooctanoic acid (PFOA)	12	Average	5	3	3	ND
			Range	3 - 6	1 - 5	2 - 4	ND - <1
	Perfluoropentanoic acid (PFPeA)	not regulated	Average	5	2	4	BD
			Range	3 - 7	ND - 4	2- 4	ND - 3

PFAS TABLE ABBREVIATIONS AND 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 using half of detection limits for non-detect values resulted in average below the detection limit.

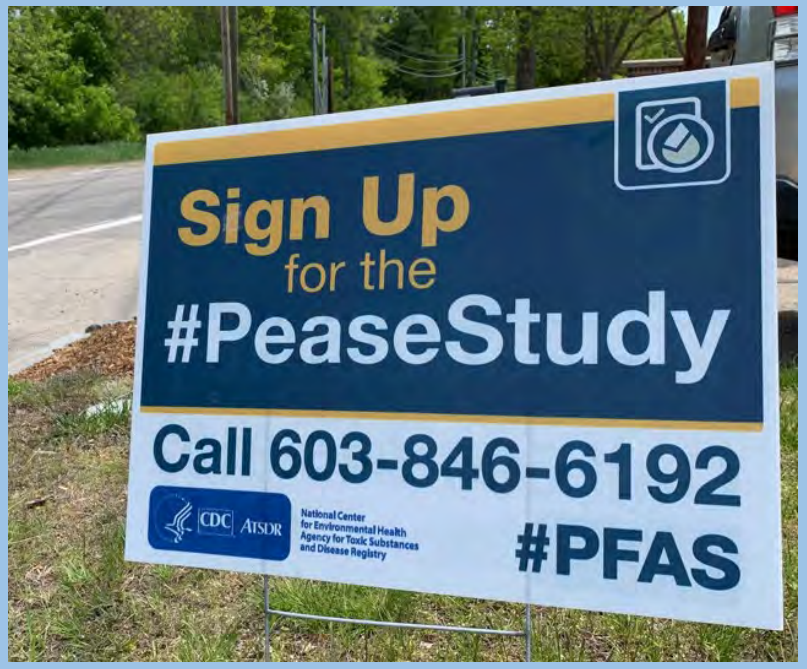
PFAS analyzed but not detected in the samples: 8:2 Fluorotelomer sulfonate (8:2 FTS), N-Ethyl perfluorooctane sulfonamide (EtFOSA), N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE), N-Methyl Perfluorooctane Sulfonamide (MEFOSA), N-Methyl Perfluorooctane Sulfonamidoethanol (MEFOSE), Perfluorodecane sulfonate (PFDS), Perfluorodecanoic acid (PFDA), Perfluorododecanoic acid (PFDoA), Perfluoroheptane sulfonate (PFHpS), Perfluorooctane sulfonamide (PFOSA), Perfluorotetradecanoic acid (PFTeDA), Perfluorotridecanoic acid (PFTrDA), and Perfluoroundecanoic acid (PFUnA).

DEFINITIONS AND TERMS

- AGQS (Ambient Groundwater Quality Standard): Groundwater quality standard established by the State of New Hampshire per Env-Or 600.
- AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
- MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
- MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- N/A (not applicable): Sampling was not completed by regulation or was not required.
- ND (none detected): Indicates that the substance was not found by laboratory analysis.
- ppm (parts per million): One part substance per million parts water (or milligrams per liter).
- ppb (parts per billion): One part substance per billion parts water (or micro-grams per liter).
- ppt (parts per trillion): One part substance per trillion parts water (or nanograms per liter).
- NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.
- TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.
- LRAA (Locational Running Annual Average): The average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters. Amount Detected values for TTHMs and HAAs are reported as LRAAs.

Community Involvement

- Safe Water Advisory Group (SWAG)
  - Mayor's panel formed in 2021
  - Meets every 6 weeks
- Seacoast Drinking Water Commission
  - Meets Monthly
- Pease Restoration Advisory Board (RAB)
  - Meets Quarterly
- Pease Study
  - Ongoing
- Pease REACH Study (Silent Spring/Testing for Pease)
  - Meets Quarterly
- New Hampshire Drought Management Task Force
  - Meets as Needed



Questions