Haven Well Update

excerpt from March 12, 2016
City Council Retreat
Levenson Room
Portsmouth Public Library

EMERGING CONTAMINANTS SUMMIT

DETECTION // TREATMENT // REGULATION

Excerpts from March 2, 2016 Presentation:

Water System Responds to Perfluorochemicals: A Case Study

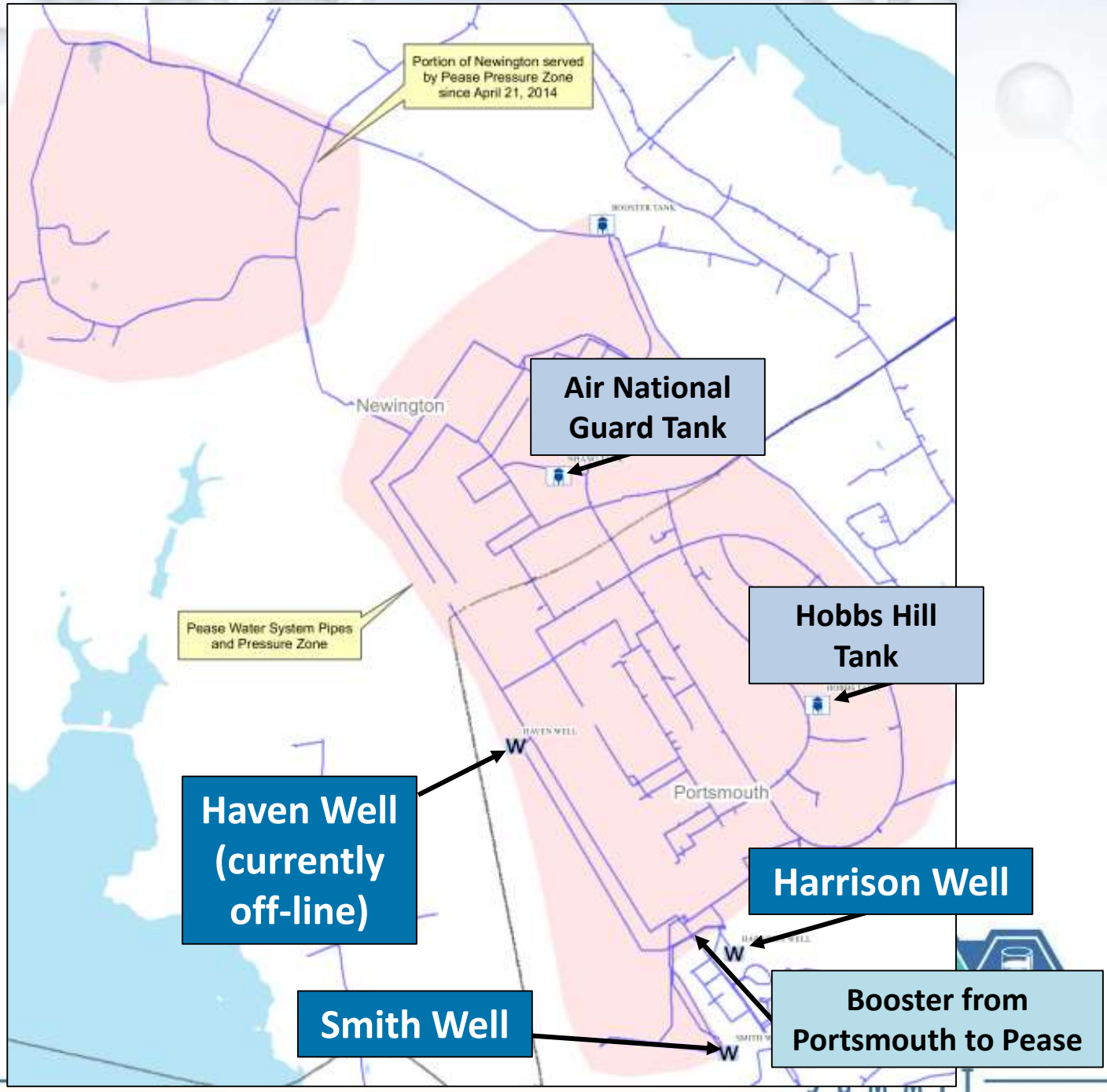
Brian Goetz

Deputy Director of Public Works

City of Portsmouth, New Hampshire

Pease Tradeport Water System

- 3 Wells
- 2 Storage Tanks
- Booster from Portsmouth to Pease
- 30 Miles of water main
- 0.4 to 1.0 Million Gallons per Day Usage



Haven Well

- Installed in 1875 (Haven Springs)
- Pease Air Base: 1956 to 1992
- PDA/Portsmouth: 1992 to 2014
- 500 GPM Pump

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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.

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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-TETRACHLORDETHANE	ND
1,1,1-TRICHLORDETHANE	ND
1,1,2,2-TETRACHLORDETHANE	ND
1,1,2-TRICHLORDETHANE	ND
1,1-DICHLORDETHANE	ND
1,1-DICHLORDETHENE	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
TETRACHLORDETHENE	ND
TETRAHYDROFURAN(THF)	ND
TOLUENE	ND
TOTAL XYLENES	ND
TRANS-1,2-DICHLOROETHENE	ND
TRANS-1,3-DICHLOROPROPENE	ND
TRICHLORDETHENE	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',3,4,4',5,5',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

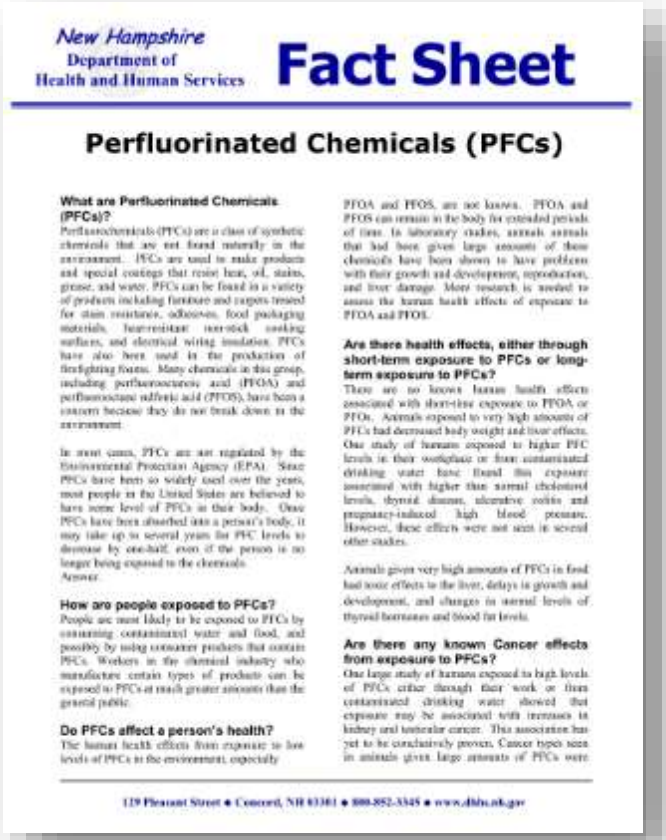
FLUORIDE	ND

Haven Well Shutdown: Chronology of Events

- April 2014 – City Contacted by EPA regarding their request that Air Force sample the Pease Wells for PFCs
- Air Force Consultant sampled all three Pease wells in mid-April 2014 for PFCs
- May 12, 2014 – City staff are notified that PFC levels in Haven Well exceeded the EPA's Health Advisory Standard for PFOS
  - 2.5 ug/L (Preliminary Health Advisory = 0.2 ug/L)
- May 12, 2014 - Haven Well is shut down
- Since May 12, 2014 - Pease water system is supplemented with water from Portsmouth's water system (50% of demand supplied by Portsmouth)

The Key Questions:

1. What are these contaminants?
2. What are their levels?
3. Where did they come from?
4. What are the health effects?
5. How will the water system replace the lost water?
6. Have other water systems been contaminated?
7. What are the treatment options?



New Hampshire
Department of
Health and Human Services

Fact Sheet

Perfluorinated Chemicals (PFCs)

What are Perfluorinated Chemicals (PFCs)?

Perfluorochemicals (PFCs) are a class of synthetic chemicals that are not found naturally in the environment. PFCs are used to make products and special coatings that resist heat, oil, stains, grease, and water. PFCs can be found in a variety of products including furniture and carpets treated for stain resistance, adhesives, food packaging materials, heat-resistant non-stick cooking surfaces, and electrical wiring insulation. PFCs have also been used in the production of firefighting foams. Many chemicals in this group, including perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS), have been a concern because they do not break down in the environment.

In most cases, PFCs are not regulated by the Environmental Protection Agency (EPA). Since PFCs have been so widely used over the years, most people in the United States are believed to have some level of PFCs in their body. Once PFCs have been absorbed into a person's body, it may take up to several years for PFC levels to decrease by one-half, even if the person is no longer being exposed to the chemicals.

Answer

How are people exposed to PFCs?

People are most likely to be exposed to PFCs by consuming contaminated water and food, and possibly by using consumer products that contain PFCs. Workers in the chemical industry who manufacture certain types of products can be exposed to PFCs at much greater amounts than the general public.

Do PFCs affect a person's health?

The human health effects from exposure to low levels of PFCs in the environment, especially PFOA and PFOS, are not known. PFOA and PFOS can remain in the body for extended periods of time. In laboratory studies, animals animals that had been given large amounts of these chemicals have been shown to have problems with their growth and development, reproduction, and liver damage. More research is needed to assess the human health effects of exposure to PFOA and PFOS.

Are there health effects, either through short-term exposure to PFCs or long-term exposure to PFCs?

There are no known human health effects associated with short-time exposure to PFOA or PFOs. Animals exposed to very high amounts of PFCs had decreased body weight and liver effects. One study of humans exposed to higher PFC levels in their workplace or from contaminated drinking water have found this exposure associated with higher than normal cholesterol levels, thyroid disease, ulcerative colitis and pregnancy-induced high blood pressure. However, these effects were not seen in several other studies.

Animals given very high amounts of PFCs in food had toxic effects to the liver, delays in growth and development, and changes in normal levels of thyroid hormones and blood fat levels.

Are there any known Cancer effects from exposure to PFCs?

One large study of humans exposed to high levels of PFCs either through their work or from contaminated drinking water showed that exposure may be associated with increases in kidney and testicular cancer. This association has yet to be conclusively proven. Cancer types seen in animals given large amounts of PFCs were

129 Pleasant Street ♦ Concord, NH 03301 ♦ 800-852-3345 ♦ www.dhhs.nh.gov

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1 – What are these Contaminants?

Perfluorinated Hydrocarbons –
In a Lot of Everyday Products

- Furniture and carpets treated for stain resistance, adhesives, food packaging materials, heat-resistant non-stick cooking surfaces, and electrical wiring insulation.
- PFCs have also been used in the production of firefighting foams.

2 – What are their Levels?

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 concenetration above PHA

J - estimated value

all results in µg/L

ND - non detect

PHA - Provisional Health Advisory

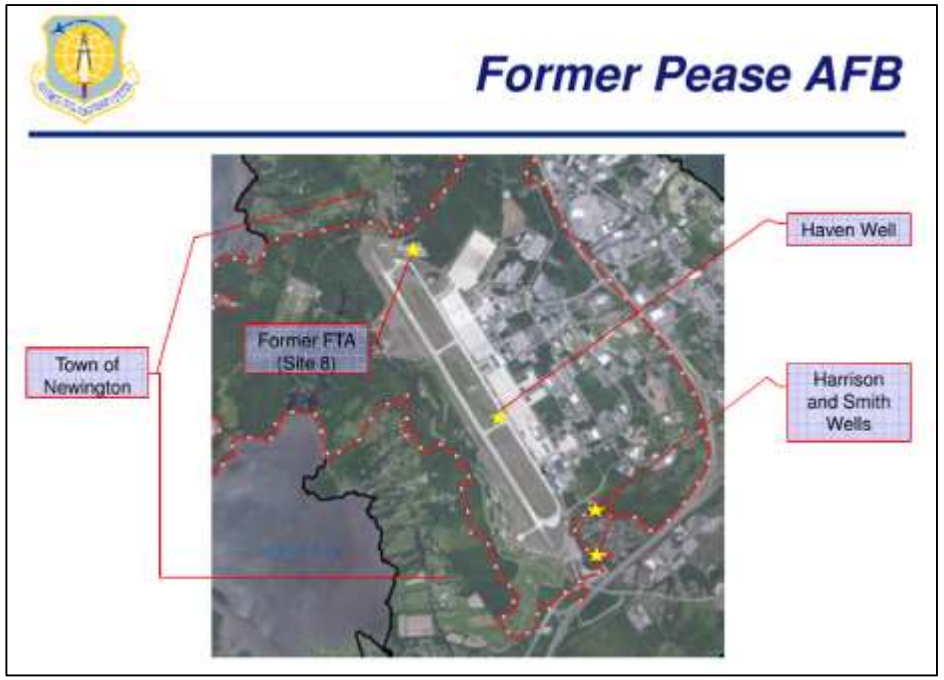
-- indicates no established PHA

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

Harrison and Smith Wells – below the PHA for PFOS

3 – Where Did They Come From?

- In 1970, the Air Force began using Aqueous Film Forming Foam (AFFF), a firefighting agent that contains PFCs, to extinguish petroleum fires.
- A few reported fires prior to 1992
- Potential releases and spills



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4 – What Are the Health Effects?

New Hampshire Department of Environmental Services:

Studies have shown that nearly all people have some level of PFCs in their blood. Potential health effects from exposure to low levels of PFCs are not well understood. To date studies have been inconclusive as to whether PFCs can affect growth and development, hormone levels including thyroid hormone, liver enzyme levels, cholesterol levels, immune function or occurrence of certain types of cancer. Further research is needed to determine whether PFCs can cause health changes in humans. The EPA states that existing evidence is too limited to support a strong link between PFCs and cancer in people.

http://des.nh.gov/media/pr/2016/20160304-saint-gobain.htm

5 – How Will the Water System Replace the Loss of the Haven Well?

- Loss of the largest water source serving the Pease Tradeport:
  - Safe yield of 534 Gallons per minute (GPM) – 769,000 Gallons per day (GPD)
- Portsmouth water system has been supplementing Pease through booster pumps:
  - Reduces the available water to Portsmouth's core water system by nearly 10%

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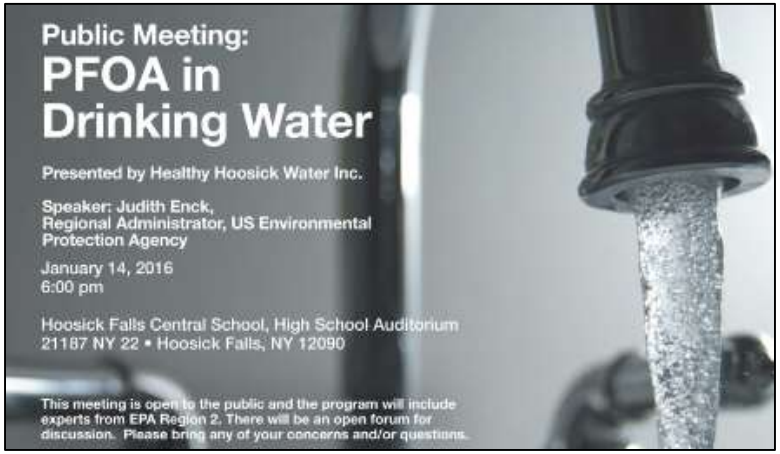
6 – Have Other Water Systems Been Contaminated by PFCs?

- Oakdale, Minnesota – 3M Manufacturing
- Newcastle, Delaware – Air Base
- Paulsboro, New Jersey – PFC Manufacturing
- Hoosick Falls, New York – PFC Manufacturing
- Merrimack, New Hampshire – PFC Manufacturing



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7 – What are the Treatment Options?

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

MDH

http://www.health.state.mn.us/index.html

Minnesota Department of Health

Oakdale and 3M Work Together to Remove Perfluorochemicals

From the Spring 2010 Minnesota Department of Health Public Water Supply Unit, © *Waterline*, Minnesota Department of Health

May 2014:
Technical Response Team Forms

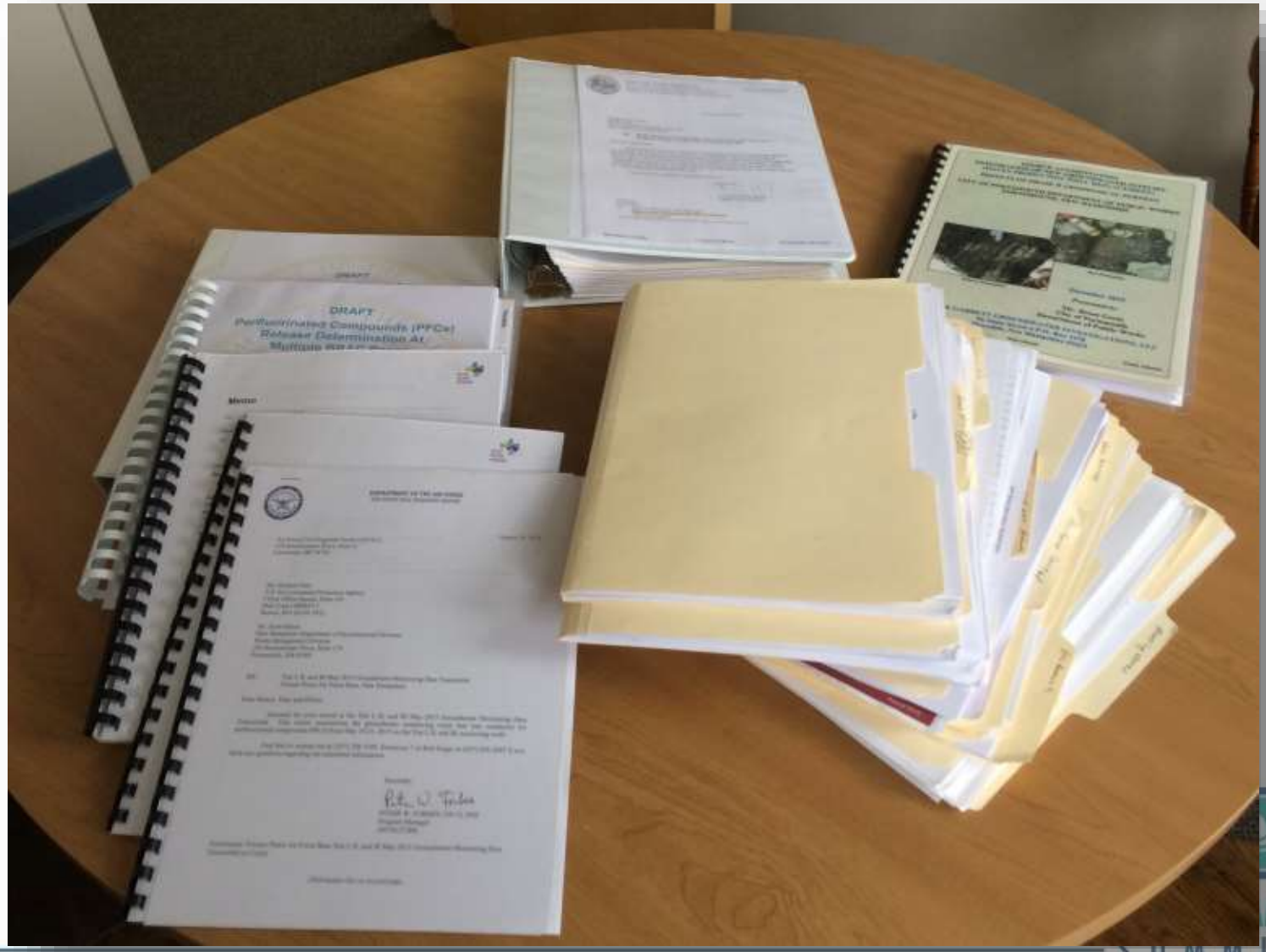
- Weekly meetings (initially) either in-person or via teleconference:
  - City of Portsmouth Staff
    - City consultants
  - Pease Development Authority
  - Environmental Protection Agency
  - New Hampshire Department of Environmental Services
    - Waste Division
    - Drinking Water and Groundwater Bureau
  - Air Force Civil Engineering
    - Air Force Consultants
  - New Hampshire Health and Human Services
  - Agency for Toxic Substances and Disease Registry (ATSDR)
  - Others, depending on topic

The Response and Action Plan

- Data Collection
- Forensic Analysis on Contamination
- Health Information
- Water System Operational Changes
  - Existing Supplies
  - Alternative Supplies
  - Treatment Options
- Public Outreach

EMERGING CONTAMINANTS SUMMIT

Volumes of Information…



May 22, 2014 – Press Release

an official NEW HAMPSHIRE government website

dhhs New Hampshire Department of HEALTH AND HUMAN SERVICES

Families & Children | Women | Teens | Adults | Seniors | People with Disabilities

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- Job Opportunities
- Topics A to Z
- Contact

Press Release

Unregulated Contaminant Found In Pease Tradeport Water System

Publish Date:
May 22, 2014

Contact:
Public Information Office

Concord, NH – The New Hampshire Department o
(DHHS), Division of Public Health Services, and th
of Environmental Services (DES) are today annou
(PFOS) from a well that serves the Pease Tradepo
PFOS is one of a class of chemicals known as PFC
"provisional health advisory" set by the U.S. Envi
shut down by the City of Portsmouth.

The water in the other two wells servicing Pease
advisory level. Out of an abundance of caution, th
tested, since the systems at Pease and Portsmou
used to service the city of Portsmouth. The result
wells or surface water sources that serve the Port

Department of Public Works, 680 Peverly Hill Rd, Portsmouth, NH 03801 Phone: (603) 427-1530, Fax: (603) 427-1539 | Contact

Pease Tradeport Water Information

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. Therefore, all sources of supply currently serving the Pease Tradeport Water System are below the provisional standard

May 22, 2014 News Release and Information regarding Pease International Tradeport Water System

City of Portsmouth Information Regarding Pease International Tradeport Water System

Additional information related to this issue can be found by clicking here.

Union Leader Article - May 22, 2014

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

Air Force Involvement

- Funding all the technical work and site monitoring
- September 2014 agreement with City to fund:
  - City's technical support
  - Search for replacement groundwater source

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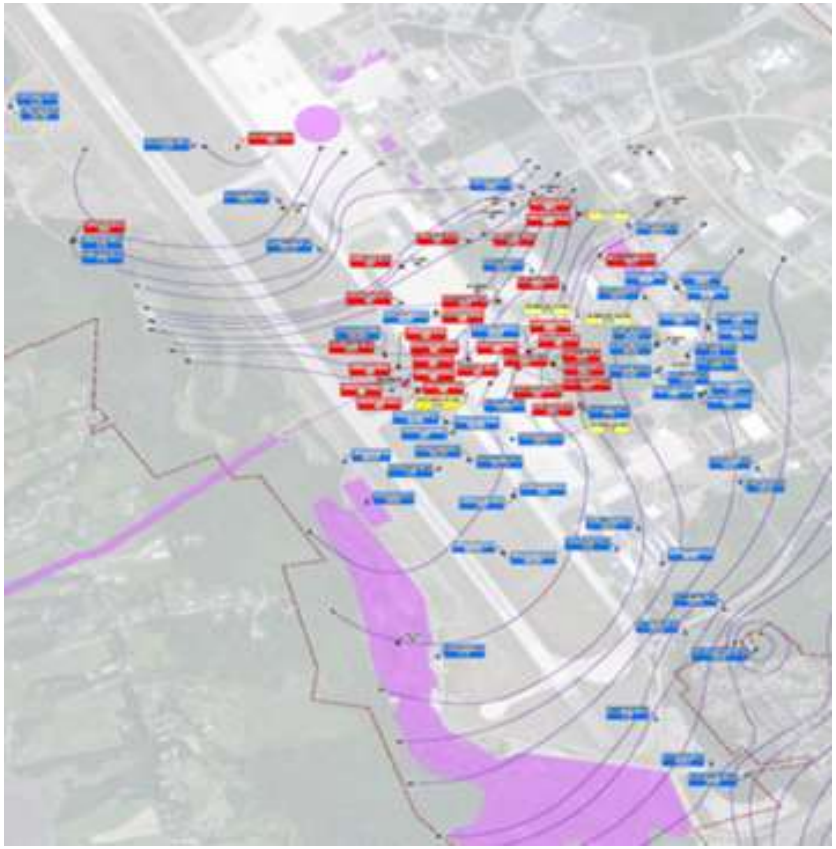
Extensive Monitoring Program Developed

- Weekly PFC sampling of water supply wells
- Sentry well network sampling
- Installation of new sentry wells to fill data gaps
- Hydrogeological evaluations



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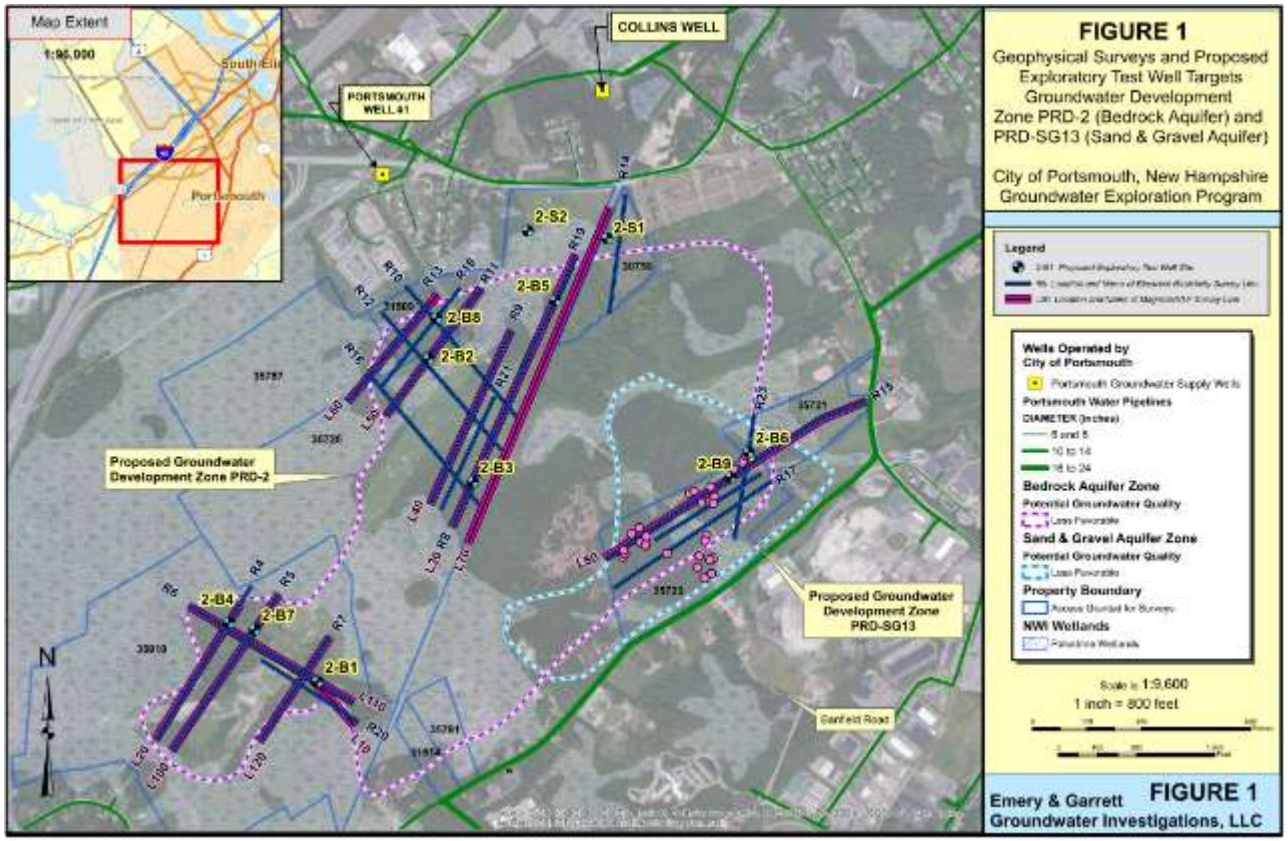
Fall 2014
Replacement Well Study



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Continued Public Outreach Throughout 2014

- City Website
  - Water System Status
  - Water Quality Monitoring Data
  - Public Meetings
- New Hampshire Department of Health and Human Services
  - Health Effects

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Congressional Delegation Support for:

1) Treatment of Wells
2) Aquifer Restoration
3) Biomonitoring of those effected

EMERGING CONTAMINANTS SUMMIT

March 2015 – Blood Testing Program Announced

By Jennifer Crompton
BIO »

Blood tests planned for those concerned about Pease contamination

Well shut down after contaminants found

UPDATED 6:21 PM EDT Mar 25, 2015

Text Size: A A A

SHOW TRANSCRIPT »

May 2015
Community Advisory Board Forms
14 Meetings Held in 2015

EMERGING CONTAMINANTS
SUMMIT

June 17, 2015 Public Meeting – First Blood Test Results

EMERGING CONTAMINANTS SUMMIT

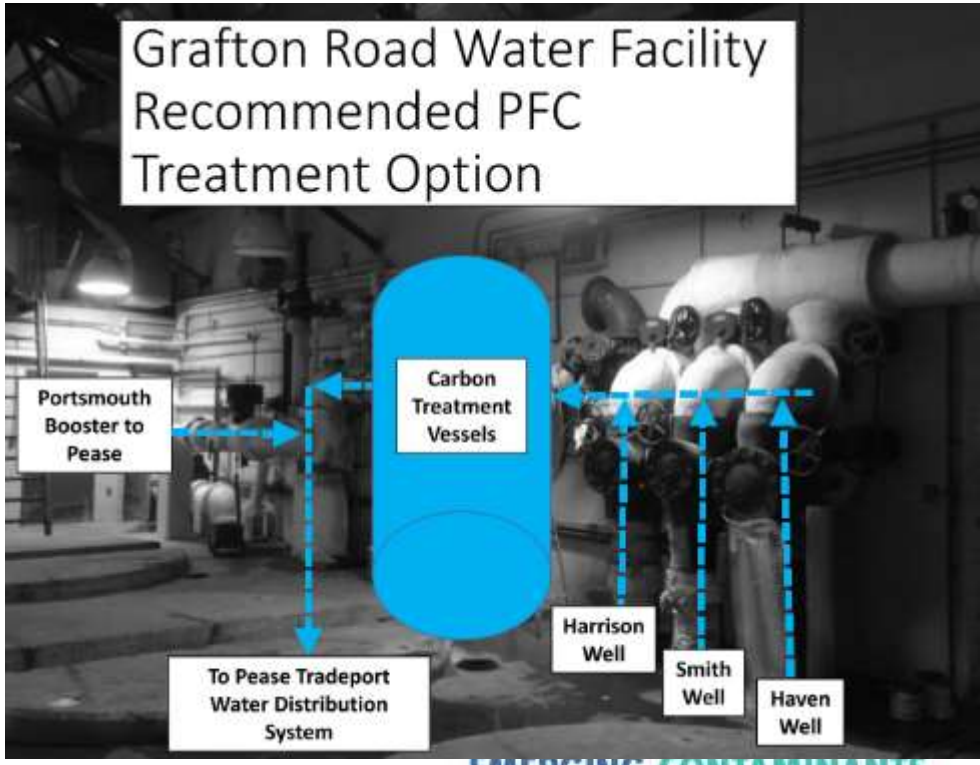
July 8, 2015
EPA Issues Administrative Order to Air Force:

- Treat Haven Well
- Aquifer Restoration

EMERGING CONTAMINANTS SUMMIT

September 1, 2015 Meeting with Air Force and Senator Shaheen

- City presses for treatment of all three Pease Wells
  - Haven to address PFOS PHA exceedance
  - Smith and Harrison to demonstrate treatment and as a contingency

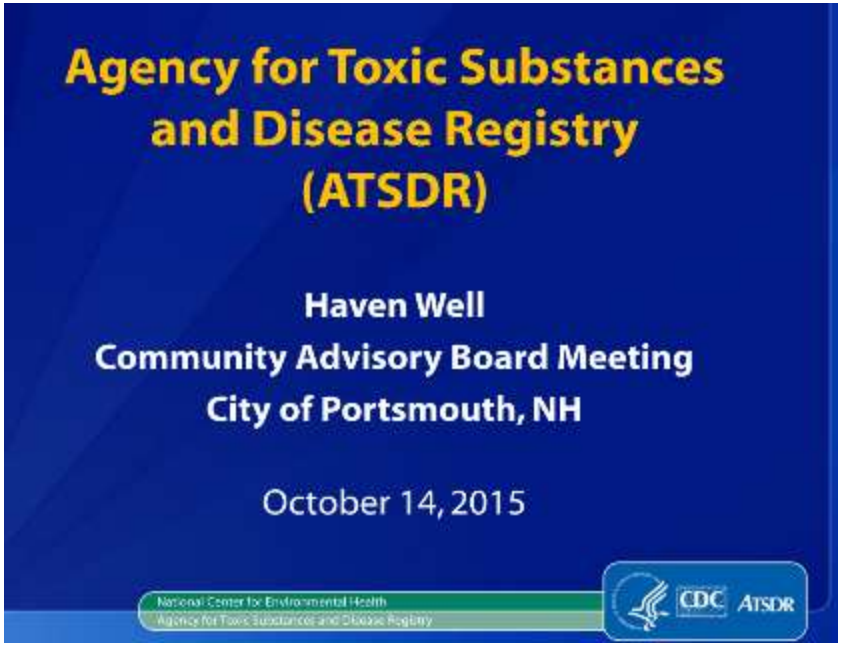


September 9, 2015
Community Advisory Board
Pediatric Blood Testing Results

9.9.15 Community Advisory Board Haven Well Contamination

EMERGING CONTAMINANTS SUMMIT

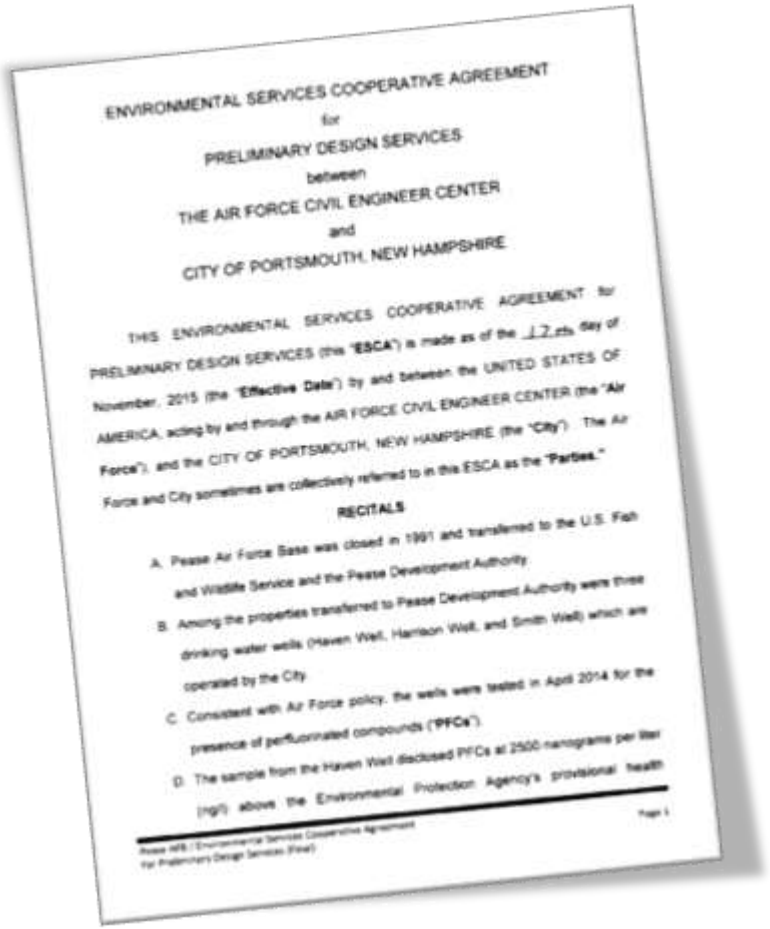
October 14, 2015
Community Advisory Board Meeting with ATSDR



- **New Hampshire Department of Health and Human Services (NH DHHS) requested**
  - scientific and technical assistance
  - comments on their biomonitoring protocol and
  - CDC laboratory analysis of serum samples collected in the community
- **New Hampshire Department of Environmental Services (NH DES) identified**
  - a need to evaluate people's exposures to Perfluorinated Chemicals (PFCs) contamination in drinking water

EMERGING CONTAMINANTS SUMMIT

November 2015
Air Force Agreement to Treat All Three Pease Wells



ENVIRONMENTAL SERVICES COOPERATIVE AGREEMENT
for
PRELIMINARY DESIGN SERVICES
between
THE AIR FORCE CIVIL ENGINEER CENTER
and
CITY OF PORTSMOUTH, NEW HAMPSHIRE

THIS ENVIRONMENTAL SERVICES COOPERATIVE AGREEMENT for PRELIMINARY DESIGN SERVICES (this "**ESCA**") is made as of the 12th day of November, 2015 (the "**Effective Date**") by and between the UNITED STATES OF AMERICA, acting by and through the AIR FORCE CIVIL ENGINEER CENTER (the "**Air Force**"), and the CITY OF PORTSMOUTH, NEW HAMPSHIRE (the "**City**"). The Air Force and City sometimes are collectively referred to in this ESCA as the "**Parties.**"

RECITALS

A. Pease Air Force Base was closed in 1991 and transferred to the U.S. Fish and Wildlife Service and the Pease Development Authority.

B. Among the properties transferred to Pease Development Authority were three drinking water wells (Haven Well, Harrison Well, and Smith Well) which are operated by the City.

C. Consistent with Air Force policy, the wells were tested in April 2014 for the presence of perfluorinated compounds ("**PFCs**").

D. The sample from the Haven Well disclosed PFCs at 2500 nanograms per liter (ng/l) above the Environmental Protection Agency's provisional health

Page 1

EMERGING CONTAMINANTS SUMMIT

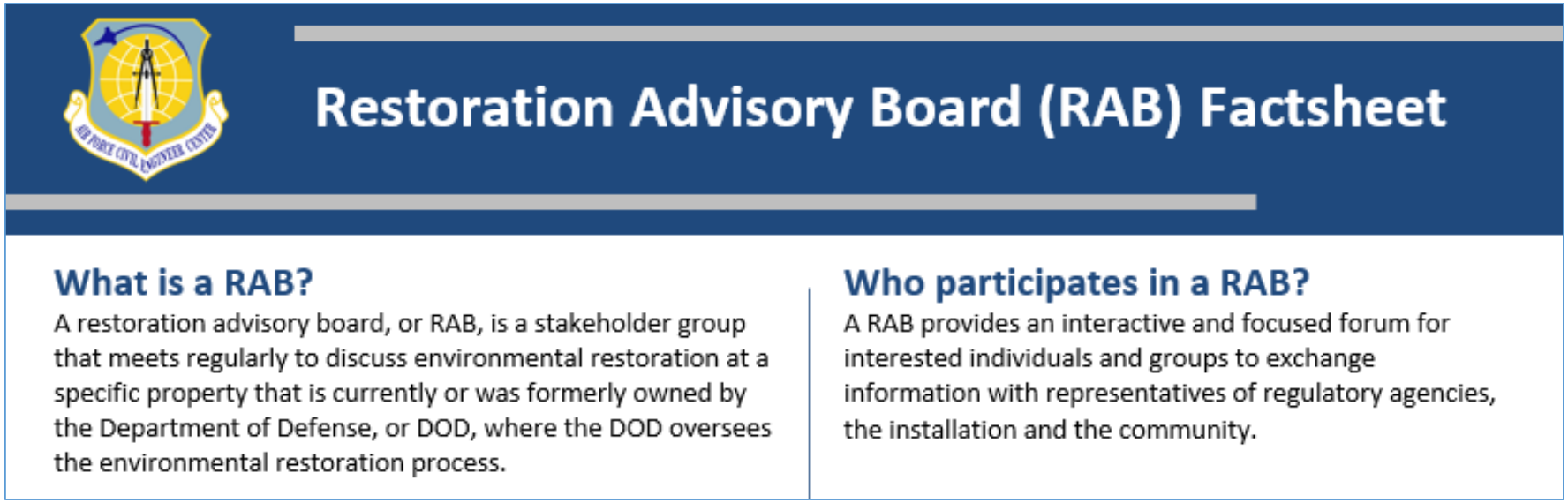
Well Treatment

- Preliminary Design – Complete ($60,000)
- Within Six Months of next Air Force Agreement:
  - Piloting - $59,000
  - Harrison/Smith Carbon Filters - $837,000
  - Final Design of full treatment system upgrades - $587,000
- Construction of all treatment system upgrades (8 to 12 months)
  - Current cost estimate of $8 to $9 million

Looking Ahead for 2016

- Design and construction of treatment systems
- Continued monitoring of PFCs aquifer cleanup
- Spring – Release of Final Round of Blood Testing
  - 471 Tested during first round
  - 1,107 Tested during second round
- Blood Testing and Biomonitoring Follow-up

Restoration Advisory Board (RAB) March 16, 2016 – First Meeting



Restoration Advisory Board (RAB) Factsheet

What is a RAB?

A restoration advisory board, or RAB, is a stakeholder group that meets regularly to discuss environmental restoration at a specific property that is currently or was formerly owned by the Department of Defense, or DOD, where the DOD oversees the environmental restoration process.

Who participates in a RAB?

A RAB provides an interactive and focused forum for interested individuals and groups to exchange information with representatives of regulatory agencies, the installation and the community.

- Brian Goetz, Deputy Director of Public Works, is the staff representative coordinating the City's Involvement

Community Assistance Panel (CAP)

- ATSDR establishing CAP in Portsmouth to address questions and concerns about health impacts related to the PFC contamination at Pease
- The CAP provides an avenue for ATSDR to inform the community of site-specific findings as they become available.
- Kim McNamara, Health Officer, is the staff representative coordinating the City's Involvement

Questions?