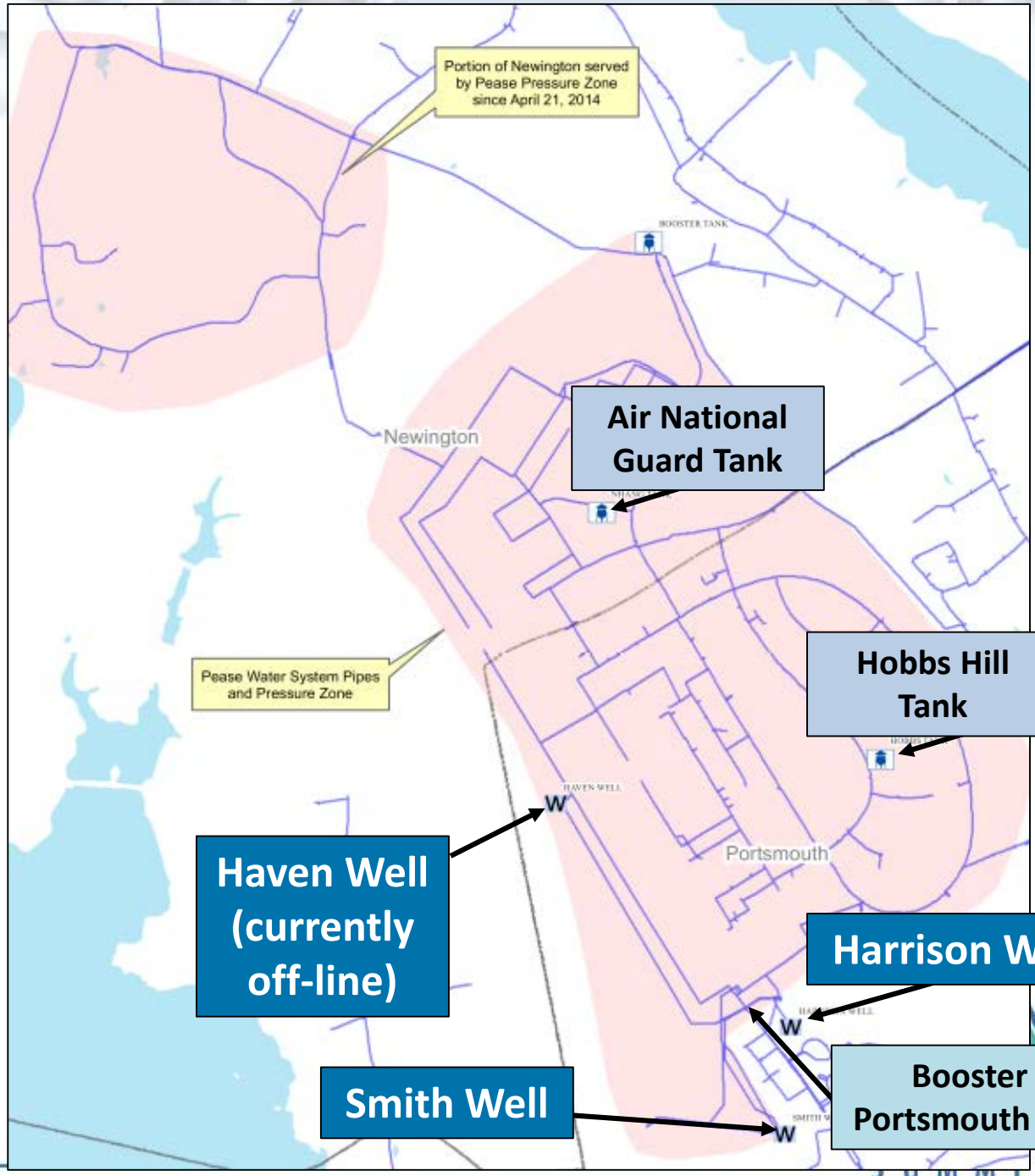
Pease Tradeport Water System: PFC Monitoring, Treatment Demonstration Project and Haven Well Update

Portsmouth City Council
December 5, 2016
Updated for Pease CAP Meeting
January 9, 2017

Pease Tradeport Water System

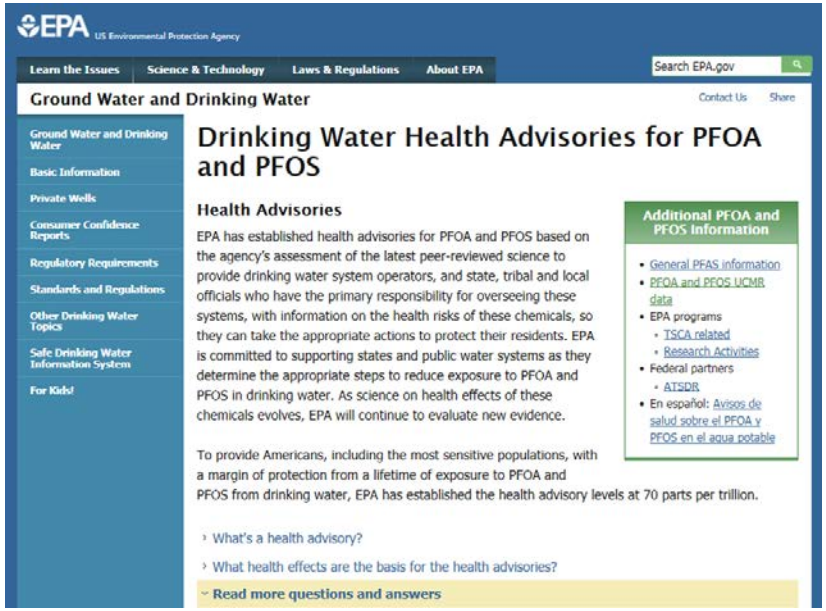
- 3 Wells
- 2 Storage Tanks
- Booster from Portsmouth to Pease
- 30 Miles of water main
- 0.4 to 1.0 Million Gallons per Day Usage



Haven Well Shutdown: Chronology of Events

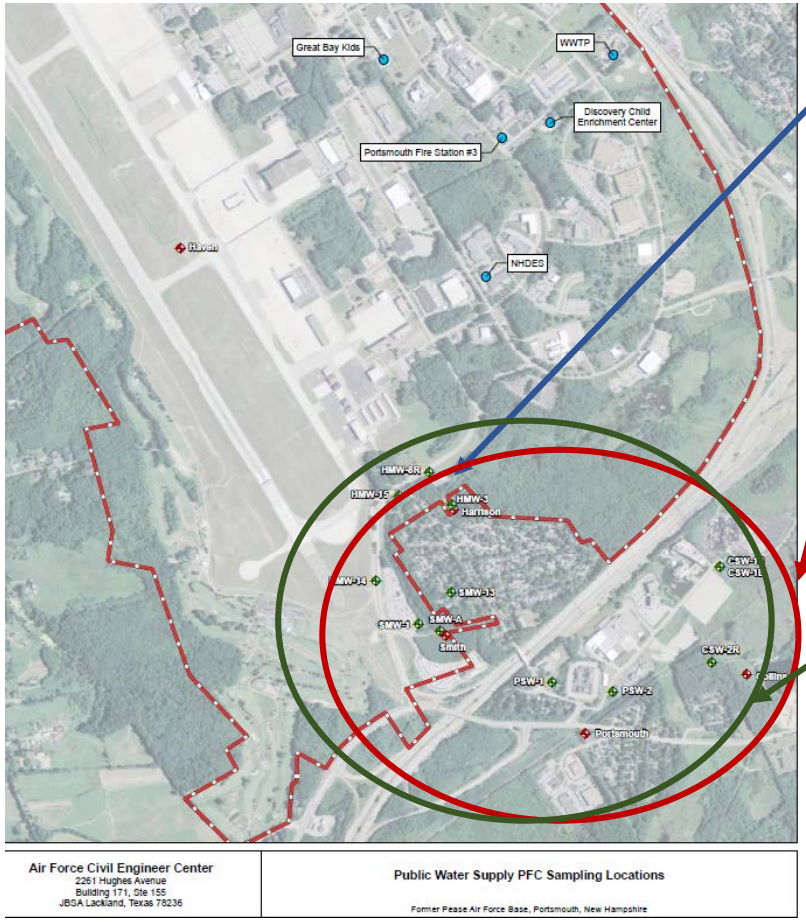
- April 2014 – City Contacted by EPA regarding their request that Air Force sample the Pease Wells for PFCs
- Air Force Consultant sampled all three Pease wells in mid-April 2014 for PFCs
- May 12, 2014 – City staff are notified that PFC levels in Haven Well exceeded the EPA's Health Advisory Standard 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)
- Ongoing Monitoring of PFCs by the Air Force's consultant
- Ongoing technical work both by Air Force and City staff/consultants
- September 2016 – Activated Carbon Filters Installed to Treat Harrison and Smith Wells

Regulatory Advisory Update – May 2016



- "To provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOA and PFOS from drinking water, EPA has established the health advisory levels at 70 parts per trillion."
- "EPA's health advisory level for PFOA and PFOS offers a margin of protection for all Americans throughout their life from adverse health efforts resulting from exposure to PFOA and PFOS in drinking water."
- "These health advisories are specifically for PFOA and PFOS and do not apply to other perfluoroalkyl substances (PFASs). The Agency is continuing to gather information about other PFAS."

PFC Monitoring Locations



Activated Carbon Filters for Smith and Harrison Wells – Based on Filter Run volumes

Production Well Monitoring – New Schedule with Filters on line:

- Smith – monthly
- Harrison – monthly
- Portsmouth – monthly
- Collins - monthly

Sentry Wells

- 11 Wells - Quarterly

"No increasing trends identified"

– AMEC (Air Force) November 16, 2016 Update

Well Treatment – Carbon Filters

- Preliminary Design – Complete
- Piloting – performed in summer 2016 - Pilot Report on City Website
- Demonstration filters for Harrison and Smith Wells – on line September 2016
- Design of treatment system upgrades for all three wells (8 to 12 months) – pending next agreement with Air Force
- Construction start - anticipated in late 2017

Harrison/Smith Well Filters

Mailer to all Pease Customers:

City of
Portsmouth
Department of Public Works

September 8, 2016

TREATMENT PLAN FOR PEASE TRADEPORT WATER SUPPLY

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

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

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

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

TREATMENT SYSTEM COMPONENTS AND OPERATION

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

ONGOING WATER QUALITY MONITORING

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

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

Additional information can be accessed at:

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

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

Filter performance

- Sampling for PFCs utilizing the same method and laboratory as the Air Force's sampling (Maxxam lab)
- 8 rounds of sampling since September 22, 2016
  - PFOS – ND "Non Detect"
  - PFOA – ND
  - A few intermittent "J" estimated compounds detected in some samples but they come and go
- Other water quality parameters are being sampled for consideration in final design of new treatment system

Filter performance

Sample	PFOA (ppt)	PFOS (ppt)	Combined (ppt)
Harrison (average – Since September 2016)	6	24	30
Smith (average)	ND	11	11
Carbon Filters (8 rounds)	ND	ND	ND

ppt = parts per trillion

Filter performance

Table 3 – Treated water PFAS concentrations

Bed Volumes	Sample Location	6:2 Fluorotelomer sulfonate (6:2 FTS)	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)	Perfluorobutanesulfonic acid (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecane sulfonate (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoA)	Perfluoroheptane sulfonate (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanesulfonic acid (PFHxS)	Perfluorohexanoic acid (PFHxA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (PFOSA)	Perfluorooctanesulfonic acid (PFOS)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnA)	PFOS+PFOA
USEPA Health Advisory (HA):		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	-	-	0.07	-	-	-	-	0.07
Method Detection Limit (MDL)		0.0065	0.0055	0.0053	0.0049	0.0040	0.0061	0.0019	0.0066	0.0043	0.0066	0.0057	0.0036	0.0047	0.0040	0.0046	0.0053	0.0046	0.0058	0.0033	0.0036	0.0052	0.0032	0.0037	-
Reported Detection Limit (RDL)		0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	-
70	Filter 2 Effluent	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
646	Filter 1 - 25%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
646	Filter 2 Effluent	ND	ND	ND	ND	0.0065 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
996	Filter 1 - 25%	ND	ND	ND	ND	ND	ND	0.0022 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
996	Filter 1 Effluent	ND	ND	ND	ND	ND	ND	0.0021 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
996	Filter 2 Effluent	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0053 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1325	Filter 1 - 25%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1325	Filter 1 Effluent	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1325	Filter 2 Effluent	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2002	Filter 1 - 25%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0082 J	ND	ND	ND	0.0062 J	ND	0.0052 J	ND	ND	ND	ND	0.0082 J	0.0084 J	ND
2002	Filter 1 Effluent	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0049 J	ND	ND	ND	ND	0.0078 J	0.0081 J	ND
2002	Filter 2 Effluent	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0040 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3066	Filter 1 - 25%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3066	Filter 1 Effluent	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3795	Filter 1 - 25%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3795	Filter 1 Effluent	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5025	Filter 1 - 25%	Samples submitted, awaiting results																							
5025	Filter 1 Effluent	Samples submitted, awaiting results																							

Notes:
Grey text indicates the parameter was not analyzed or not detected.
All concentrations in µg/L - micrograms per liter
All values in micrograms per liter
D - duplicate sample
J - The result is an estimated value.
B - Detected in Blank.
Q - The analyte is both B qualified because of blank detection and J qualified because of an additional QC issue or low concentration

USEPA - Environmental Protection Agency
NA - Not Analyzed or Not Applicable
µg/L - micrograms per liter
ND - Not detected
HA - Health Advisory screening value (EPA 2016)
— - Not applicable

Filter performance

- “PFAS compounds reported as J values in table 2 are insignificant. No repetitive occurrence of any individual J value concentration was seen in the 8 PFC sampling events to date. Thus, it cannot be determined whether their measurement “as present” is due to lab error, lab method, sampling equipment, etc. The J value occurrences are not similar to the concentrations measure in the untreated Harrison and Smith Well sampling.”

Weston & Sampson memo: January 6, 2017

- Well sample results and information posted on City website

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

Pease Tradeport Water Information

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), theUnited 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. The following documents provide additional Information:

- Pease Tradeport Water System Well Treatment Pilot Report Final
- Pease Water Supply and PFC Demonstration Project Update 12.06.16
- Drinking Water Health Advisories
- Portsmouth announces upgraded water filtration at Pease Tradeport
- Pease Water Supply Update 09_08_16
- Pease Water Treatment System and Piloting Overview RAB Tour 07.14.16
- Pease Water Supply Update 06_30_16
- Portsmouth Signs Agreement with Air Force to Proceed with Pease Tradeport Well Treatment System Project
- Haven Well Update to City Council March 12 2016
- Pease Trade Port Water System Overview and History
- Pease Water System Operations Update 03.31.15
- Pease Water Supply Update 08/13/14

Pease well monitoring and sampling results: :

The Air Force's consultants under the direction of the EPA and DES and in cooperation with the City of Portsmouth have been sampling PFCs in and around the effected Portsmouth drinking water wells. Once validated, this data is posted below:

- Pease Well PFC Results Most Recent 10 19 2016
- Pease Well PFC Results thru 10 19 2016
- Pease Well PFC Results Most Recent 08 30 2016
- Pease Well PFC Results thru 08 30 2016
- Pease PFC Sampling Locations
- Pease Well PFC Results Most Recent 06_23_2016
- Pease Well PFC Results thru 06_23_2016

Looking Ahead:

- Continued sampling and assessment of Harrison/Smith filter performance
- Design and construction of final treatment system for all three wells - Harrison, Smith and Haven
- Determine operating parameters for treatment system filter media changeouts. Research other water systems doing similar treatment to assist with this determination.
- Explore other potential treatment technologies
- Continued monitoring of PFCs in wells (Air Force)
- Aquifer mitigation work (Air Force project)
- Public Outreach

CAP Submitted Questions

1. What is the influent and effluent data pre and post treatment for the Smith and Harrison wells?

- Sampling for the influent is based on Air Force consultants sampling of Smith and Harrison Wells
- Data for well influent and filter effluent sampling is included on slides 10 and 11. Detailed well sampling data since 2014 is on City website.

Weston & Sampson memo: January 6, 2017

2. What are the method detection limits for PFCs in the pre and post treatment data?

- Method detection limits (MDL) are listed on the slide that includes “Table 3 – Treated water PFAS concentrations.” These method limits vary by compound
- Laboratory methods for both pre and post treatment data are performed by MAXXAM laboratory, doing both the Air Force and filter sample analysis

Weston & Sampson memo: January 6, 2017

3. What lab is analyzing the pre and post treatment data?

- MAXXAM – This laboratory has been performing the analysis for all Pease samples since May 2014

4. When does the City anticipate the Haven Well being treated and back on line?

- We are working with the Air Force on the next agreement that will cover the final design of the treatment system that will treat all three wells. Once that agreement is in place design is project to take approximately 8 to 12 months. It will need Air Force and regulatory review for concurrence of final design. After that it will go to bid and then construction.
- Additional sampling of Haven Well raw water was performed as part of the demonstration project and that analysis will help dictate final treatment design.

5. Does the city of Portsmouth have a plan to treat the Collins and Portsmouth wells that have detectable levels of PFCs in them? If no, please explain why.

- At this time we will continue to have the Air Force monitor these two wells monthly. Current PFOA and PFOS levels are below the health standard and no treatment is planned at the moment. This is consistent with DES's approach in response to the wells near Merrimack, NH and also what is occurring in other parts of the country.

6. I'd like to see information on field and lab blanks, and whether/how that information factors into the reported values. It would also be helpful if the influent data were presented next to the breakthrough test results.

- Field blanks are used in groundwater sampling programs for monitoring wells and does not apply to sampling at the sample taps in a water treatment system. As for lab blanks, we assume the author is referring to method blanks used by the laboratory to detect interference or corruption of their testing instrumentation. Lab reports will be provided in the final demonstration project report but only one method blank revealed an extremely low j value with the exact concentration reported in the filter sample result (PFBS in samples 996).

Weston & Sampson memo: January 6, 2017

Thank You