WHERE DOES MY PORTSMOUTH WATER COME FROM?

Water supplied to Portsmouth Water System customers comes from a combination of surface water and groundwater sources. The surface water supply is the Bellamy Reservoir which is located in Madbury and Dover. Water flows by gravity from the reservoir to the Water Treatment Facility in Madbury where it is treated using a coagulation, dissolved air floatation, and dual media filtration process. The treated water is chlorinated with sodium hypochlorite prior to distribution into the system. There are currently three groundwater wells in Madbury (Madbury Wells #2, #3 and #4) that are pumped with the treated surface water through a transmission main to the Booster Pumping Station in Newington. Customers in Madbury, Durham, and some customers along Fox Point Road in Newington receive water from the transmission main. Water is pumped from the Newington Booster Pumping Station to customers through the Portsmouth distribution system. Portsmouth is also served by three groundwater wells, two of which, Portsmouth #1 Well and Collins Well, are located off Route 33 (Greenland Road). The area in Greenland served by the public water system and a southern portion of Portsmouth is supplied primarily by the Greenland Well located off Post Road in Greenland.

The specific source(s) of water at your home or business is dependent upon your location. For example, if you live in or near downtown Portsmouth, your water is primarily from Madbury which is a blend of the treated surface water and the wells in Madbury. If you live in the southern or western sides of the City your water is more likely from the wells in Portsmouth and Greenland. The flows from these sources also vary seasonally based on water demand.

SOURCE WATER ASSESSMENT

The 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.

The New Hampshire Department of Environmental Services (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 a list of potential and known contamination sources, and a summary of available protection options. The results of the assessment, prepared in 2002 are noted in the Source Water Assessment Results table. Risk factors, such as proximity of highways and/or known contamination, are ranked and summarized in the following table of Susceptibility Ratings in terms of the number of factors per risk category.

SOURCE WATER ASSESSMENT RESULTS

Source Information	Summary of Susceptibility Ratings		
	High	Medium	Low
Greenland Well - GPW 003	4	3	5
Portsmouth Well - GPW 004	5	4	3
Madbury Well 2 - GPW 006	2	4	6
Madbury Well 3 - GPW 007	0	5	7
Madbury Well 4 - GPW 008	2	4	6
Bellamy Reservoir - 009	1	6	5
Collins Well - GPW 010	4	1	7

The complete Assessment Report is available for review at the Portsmouth Water Division's office at 680 Peverly Hill Road. Please call (603) 427-1530 for an appointment to view the report.

You may also visit the Drinking Water Source Assessment Reports website at: http://des.nh.gov/organization/divisions/water/dwgb/dwspp/reports/documents/portsmouth.pdf

FLUORIDATION

Your public water supply is fluoridated. According to the CDC, if your child under the age of six months is exclusively consuming infant formula reconstituted with fluoridated water, there may be an increased chance of dental fluorosis. Consult your child's health care provider for more information. Dental fluorosis, in its moderate or severe forms, may result in brown staining and or pitting of the permanent teeth, before they erupt from the gums. Concerns for dental fluorosis arise when fluoride levels are greater than 2 mg/L. Portsmouth Water System fluoride concentration averaged 0.6 mg/L in 2016.

HOW IS MY WATER TREATED AND PURIFIED?

Water from the Bellamy Reservoir is treated at the Portsmouth Water Treatment Facility (WTF) located in Madbury. As the water from the reservoir enters the WTF, sodium hydroxide and an aluminum-based coagulant is added to adjust the pH and initiate the coagulation-flocculation process. The water passes through flocculation basins where the coagulant reacts with the particulates in the water causing small particles to adhere to one another creating floc (larger clump of particles). The floc floats to the top of Dissolved Air Floatation (DAF) basins where they are skimmed off and pumped to drying beds. The water is further treated by passing through dual media filters consisting of sand and anthracite to remove smaller suspended particles and turbidity (which is a measure of cloudiness of the water). After filtration, sodium hypochlorite (bleach) is added to the water and given time to ensure proper disinfection. The treated water is pumped through the transmission main from Madbury along with the water pumped from the three groundwater wells in Madbury to the Booster Pumping Station in Newington. As the water leaves the WTF, sodium hydroxide (used to adjust the final pH and alkalinity), fluoride as hydrofluorosilicic acid (used to prevent tooth decay) and poly/ortho-phosphate (sequestering chemical to reduce precipitation of iron and manganese and corrosion inhibitor used to protect distribution system pipes) are added.

Sodium hypochlorite and poly/ortho-phosphate are added to the water supplied by the Portsmouth #1 Well, Collins Well, and Greenland Well. Fluoride as hydrofluorosilicic acid is also added at the Greenland Well.

IS THERE LEAD IN MY WATER?

LEAD AND COPPER RESULTS

Contaminant (units)	Regulatory Requirements		Your Water Results		Month & Year of Testing	# of Sites Exceeding Action Level / Total # of Sites	Violation (Yes/No)	Common Source of Contaminant
	Action Level	MCLG	90th Percentile Sample Value	Range of Detected Values				
Lead (ppb)	15	0	7	1.1 to 144	December 2016	2 / 30	No	Corrosion of household plumbing systems, erosion of natural deposits
Copper (ppm)	1.3	1.3	0.135	0.005 to 0.338		0 / 30	No	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

The City of Portsmouth Water Division takes the responsibility of protecting your health very seriously and we want you to make informed decisions about your drinking water. Lead is not present in the water when it leaves our treatment and well facilities, or in the water mains that run below the streets. However, lead can be present in old service line connections or in household plumbing. Due to the age of many homes in Portsmouth and surrounding towns, and associated potential for leaded plumbing components, we encourage customers to have their water tested by a certified laboratory, particularly if there are children under six or pregnant women in the household. We actively adjust the water chemistry at the treatment facility and well facilities in accordance with our Corrosion Control Program to reduce the potential for lead in households to dissolve into the water and end up at the tap. But if lead is present in your plumbing system and is in contact with water, some risk remains. More information about our corrosion control program and answers to frequently asked questions, please visit: www.cityofportsmouth.com in the Public Works Water section.

A common material used in plumbing until the 1980s, lead is also a powerful toxin that is harmful to human health. Pregnant women, infants and young children are particularly vulnerable because even low levels of lead in the blood of children can result in behavior and learning problems, lower IQ and hyperactivity, slowed growth, hearing problems and anemia. Adults who drink water with lead concentrations over 15 ppb over many years could develop kidney problems or high blood pressure.

Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high-quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead. Information and assistance is available from NH Department of Health and Human Services **(603) 271-4507** or www.dhhs.nh.gov.

The City of Portsmouth samples for lead and copper from 30 homes every three years. The 2016 lead and copper testing resulted in 28 sites with lead levels below the EPA Action Level (AL) of 15 ppb, of which 20 were below the laboratory method detection limit of 1 ppb. The AL exceedances at two sites were determined to be caused by internal plumbing.

REGULATED CONTAMINANTS THAT WERE DETECTED

During the past year, the Portsmouth DPW-Water Division has taken hundreds of water samples in order to monitor and test for the presence of radioactive, biological, inorganic, volatile organic and synthetic organic contaminants. The table below shows only those contaminants that were detected in the water. Many more parameters were tested for, but not detected, thus not included in this report. The state requires us to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent data are included, along with the year in which the samples were taken.

MICROBIOLOGICAL CONTAMINANTS

Contaminant (Units)	Your Water Results		Regulatory Requirements		Violation? (Yes/No)	Likely Source of Contamination
	Level Measured	Results Range	MCL	MCLG		
Total Organic Carbon (% removal)	Average % Removal: 64.4	58.1 to 75.4	TT: minimum removal 45% - 50%	NA	NO	Naturally present in the environment
Turbidity (NTU)	Highest Measurement: 0.10	0.02 to 0.10	1	NA	NO	Soil runoff
Turbidity (Lowest monthly percent of samples meeting limit)	100%	NA	TT=95% of samples < or = 0.3 NTU	NA	NO	

RADIOACTIVE CONTAMINANTS

Contaminant (Units) (Year(s) Sampled)	Your Water Results		Regulatory Requirements		Violation? (Yes/No)	Likely Source of Contamination
	Level Measured	Results Range	MCL	MCLG		
Compliance Gross Alpha (pCi/L) (2013 & 2016)	Highest Level Measured: 1	<1 to 1	15	0	NO	Erosion of natural deposits
Uranium (ug/L) (2013 & 2016)	Highest Level Measured: 1	<1 to 1	30	0	NO	Erosion of natural deposits
Combined Radium 226 + 228 (pCi/L) (2016)	Highest Level Measured: 1.96	<1 to 1.96	5	0	NO	Erosion of natural deposits

INORGANIC CONTAMINANTS

Contaminant (Units)	Your Water Results		Regulatory Requirements		Violation? (Yes/No)	Likely Source of Contamination
	Level Measured	Results Range	MCL	MCLG		
Arsenic (ppb)	Highest Level Measured: 1.4 Average Source Level: <1	<1 to 1.4	10	0	NO	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics production wastes
Barium (ppb)	Highest Level Measured: 19.9 Average Source Level: 13.1	5.7 to 19.9	2000	2000	NO	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Chlorine (ppm)	Highest Level Measured: 1.94 Average System Level: 0.73	0.03 to 1.94	MRDL = 4	MRDLG=4	NO	Water additive used to control microbes
Chromium (total) (ppb)	Highest Level Measured: 10.3 Average Source Level: <5	<5 to 10.3	100	100	NO	Discharge from steel and pulp mills; erosion of natural deposits
Fluoride (ppm)	Highest Level Measured: 1.34 Average Level: 0.60	0.15 to 1.34	4	4	NO	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate (as Nitrogen) (ppm)	Highest Level Measured: 7.5 Average Source Level: 2.6	0.81 to 7.5	10	10	NO	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits

REGULATED CONTAMINANTS THAT WERE DETECTED CONTINUED...

DISINFECTION BYPRODUCTS

Contaminant (Units)	Your Water Results		Regulatory Requirements		Violation? (Yes/No)	Likely Source of Contamination
	Level Measured	Results Range	LLRA MCL	MCLG		
Haloacetic Acids (HAA) (ppb)	Highest LLRA: 37	22 to 46	60	NA	NO	By-product of drinking water disinfection
Total Trihalomethanes (TTHM) (Bromodichloro-methane, Bromoform, Dibromomethane, Chloroform) (ppb)	Highest LLRA: 80	45 to 87	80	N/A	NO	By-product of drinking water chlorination

* Highest LLRA occurred at the Woodbury Ave. sample site during the 2nd quarter, 2016. Highest levels were measured on July 28, 2016.

UNREGULATED CONTAMINANT MONITORING

The City of Portsmouth participated in the third stage of the EPA's Unregulated Contaminant Monitoring Rule (UCMR3) program in 2014 and 2015 by performing additional tests on our drinking water. UCMR3 benefits the environment and public health by providing the EPA with data on the occurrence of contaminants suspected to be in drinking water, in order to determine if EPA needs to introduce new regulatory standards to improve drinking water quality. Contact us for more information on this program. The City is also scheduled to participate in the fourth UCMR monitoring event which is scheduled to begin in 2018.

UNREGULATED SUBSTANCES

Substance (unit of measure)	Year Collected	Average Detected	Range		Typical Source
			Low	High	
Chlorate (ppb)	2015	73	35	110	Agricultural defoliant or desiccant; disinfection byproduct; and used in production of chlorine dioxide
Chromium-6 (hexavalent chromium) (ppb)	2015	0.25	0.06	0.46	Naturally-occurring element; used in making steel and other alloys; chromium-3 or -6 forms are used for chrome plating, dyes and pigments, leather tanning, and wood preservation
Strontium (ppb)	2015	151	34	379	Naturally occurring element; Historically used commercially in the faceplate glass of cathode-ray tube televisions to block X-ray emissions
Per- and Polyfluoroalkyl Substances (PFAS)	2016	See PFAS Table in this report for summary of results from 2016			Surfactant or emulsifier; used in fire-fighting foam, circuit board etching acids, alkaline cleaners, floor polish, and as a pesticide active ingredient for insect bait traps; U.S. manufacture of PFOS phased out in 2002; however, PFOS still generated incidentally. Perfluorinated aliphatic carboxylic acid (PFOA); used for its emulsifier and surfactant properties in or as fluoropolymers (such as Teflon), fire-fighting foams, cleaners, cosmetics, greases and lubricants, paints, polishes, adhesives and photographic films

GENERAL WATER QUALITY PARAMETERS

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

GENERAL WATER QUALITY PARAMETERS

Parameters (Units)	Your Water Results		Secondary Drinking Water Standard SMCL
	Average Source Level	Results Range	
Chloride (ppm)	101	29 to 310	250
Copper (ppb)	11.3	<5 to 28	1000
Iron (ppb)	<5	<5 to 721	300
Manganese (ppb)	<5	<5 to 48.8	50
pH	NA	6.24 - 7.67	6.5 - 8.5
Sulfate (ppm)	15	4 to 29	250
Conductivity (umos/com)	453	190 to 1295	NA
Alkalinity (ppm)	78	12 to 176	NA
Hardness (ppm as CaCO3)	96	11 to 213	NA
Ortho-Phosphate (ppm)	1.0	0.45 to 1.77	NA
Sodium (ppm)	50.3	13 to 142	NA

PER– AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are currently unregulated by the Safe Drinking Water Act (SDWA); however, the USEPA Health Advisory concentration is 70 parts per trillion (ppt) for perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). Studies indicate that exposure to PFOA and PFOS over certain levels may result in adverse health effects, including developmental effects to fetuses during pregnancy or to breastfed infants (e.g., low birth weight, accelerated puberty, skeletal variations), cancer (e.g., testicular, kidney), liver effects (e.g., tissue damage), immune effects (e.g., antibody production and immunity), thyroid effects and other effects (e.g., cholesterol changes).

In response to the discovery of PFOS in the Haven Well in May 2014 at levels exceeding the USEPA Provisional Health Advisory level (200 ppt at that time), the Haven Well was removed from service. This well has remained disconnected from the 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 three years, the Harrison Well and the Smith Well on the Pease Tradeport Water System, and Portsmouth #1 Well and Collins Well in the Portsmouth Water System have been routinely monitored for PFAS by the Air Force. The City of Portsmouth samples all of the other Portsmouth water supply sources routinely. Sample results from 2016 are summarized in the PFAS Table in this report. All of the monitoring data is available on the City of Portsmouth website: www.cityofportsmouth.com in the Drinking Water Quality link.

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 negotiating with the Air Force for the design and upgrades to the Pease Water Treatment Facility on Grafton Road that will allow for the treatment of all three Pease Wells with a GAC system.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

PER- AND POLYFLUOROALKYL SUBSTANCE (concentrations* reported in **ng/L** or **ppt**)		**PORTSMOUTH #1 WELL**	**COLLINS WELL**	**GREENLAND WELL**	**MADBURY WELL 2**	**MADBURY WELL 3**	**MADBURY WELL 4**	**BELLAMY RESERVOIR**	**WATER TREATMENT PLANT**
# of samples in 2016:		11	12	2	1	2	1	2	1
6:2 Fluorotelomer sulfonate (6:2 FTS)	Average	ND	ND	7	ND	ND	ND	ND	ND
	Range	ND	ND	ND to 7	ND	ND	ND	ND	ND
Perfluorobutane-sulfonic acid (PFBS)	Average	4	9	3	4	4	4	4	ND
	Range	ND to 6	ND to 16	ND to 4	4	ND to 4	4	ND to 4	ND
Perfluorobutanoic acid (PFBA)	Average	8	9	ND	ND	ND	ND	ND	ND
	Range	ND to 9	ND to 13	ND	ND	ND	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	Average	6	ND	ND	ND	ND	ND	ND	ND
	Range	ND to 8	ND	ND	ND	ND	ND	ND	ND
Perfluorohexane-sulfonic acid (PFHxS)	Average	9	6	6	4	ND	ND	ND	ND
	Range	6 to 12	ND to 8	ND to 6	4	ND	ND	ND	ND
Perfluorohexanoic acid (PFHxA)	Average	7	9	ND	ND	ND	ND	ND	ND
	Range	ND to 10	ND to 7	ND	ND	ND	ND	ND	ND
**Perfluorooctane-sulfonic acid (PFOS)	Average	6	6	9	ND	ND	ND	ND	ND
	Range	ND to 8	ND to 7	7 to 14	ND	ND	ND	ND	ND
**Perfluorooctanoic acid (PFOA)	Average	7	6	ND	ND	ND	ND	ND	ND
	Range	ND to 13	ND to 7	ND	ND	ND	ND	ND	ND
Perfluoropentanoic acid (PFPeA)	Average	8	6	6	ND	ND	ND	ND	ND
	Range	ND to 10	ND to 9	ND to 7	ND	ND	ND	ND	ND
** PFOS + PFOA	Average	10	7	9	ND	ND	ND	ND	ND
	Range	6 to 14	ND to 12	7 to 14	ND	ND	ND	ND	ND

* Due to laboratory analytical method limitations, low concentrations reported for these chemicals are considered estimates unless the amount measured is above 20 ng/L (ppt)

** EPA Health Advisory Level and NHDES AGQS for PFOS and PFOA concentration separately or combined is 70 ng/L (ppt)

ND = Not Detected above laboratory method 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), Perfluoroheptane sulfonate (PFHpS),Perfluorodecanoic acid (PFDA), Perfluorododecanoic acid (PFDoA), Perfluorononanoic acid (PFNA), Perfluorooctane sulfonamide (PFOSA), Perfluorotetradecanoic acid (PFTeDA), Perfluorotridecanoic acid (PFTrDA), and Perfluoroundecanoic acid (PFUnA)

ABBREVIATIONS USED IN THIS REPORT

- **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.
- **N/A:** Not applicable
- **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.
- **ND (Not detected):** Indicates that the substance was not found by laboratory analysis.
- **NHDES:** New Hampshire Department of Environmental Services
- **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 micrograms 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 Participation

Please share with us your thoughts about the information in this report and the City of Portsmouth website. We welcome your input and the opportunity to answer any questions you have about the water supply. You are also invited to voice your concerns at any regularly scheduled City Council meeting. Meetings are typically held twice each month on Monday evenings starting at 7:00 p.m. at Portsmouth City Hall, 1 Junkins Avenue, Portsmouth, NH.

Meeting dates may be found on our website at www.cityofportsmouth.com or by calling (603) 431-2000 for the date of the next meeting.

City of Portsmouth
Department of Public Works
Water Division
680 Peverly Hill Road
Portsmouth, NH 03801

Additional information and water supply updates are posted at the www.cityofportsmouth.com. Please let us know if you ever have any questions or concerns about your water. For more information about this report, or for any questions relating to your drinking water, please call Albert Pratt, P.E., Water Resource Manager, at (603) 520-0622, or Brian Goetz, Deputy Director of Public Works, at (603) 766-1420.