2020 BROOKHAVEN NATIONAL LABORATORY Water Quality CONSUMER CONFIDENCE REPORT

For questions about this report, or to speak with someone regarding your drinking water, please contact:

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BNL publishes an annual water quality report to provide on-site drinking-water consumers with an overview of the Lab's water quality during the previous calendar year. The purpose of this report is to inform you about where your water comes from; what analytical tests are conducted; what they reveal; how the results compare to New York State standards; and to educate you about the importance of preventative measures. Educated consumers are more likely to help protect their drinking water sources.

With the exception of a violation for missing the collection of an iron sample at the Water Treatment Facility in June, BNL's drinking water and the supply and distribution system were in compliance with all applicable county, state, and federal regulations regarding drinking-water quality, monitoring, operations, and reporting in 2019.

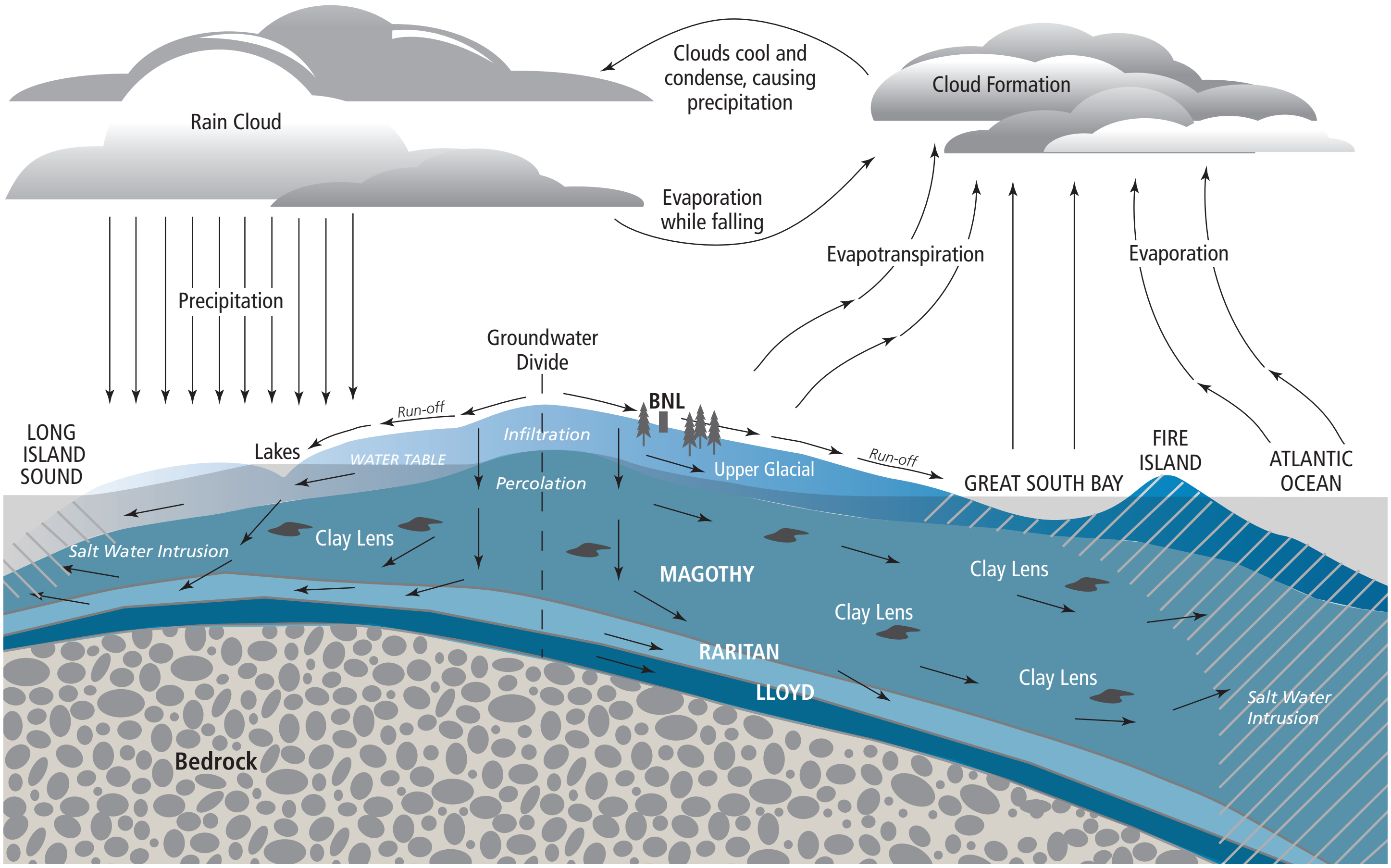
Overseeing the Lab's water supply system, which includes five wells dedicated to pumping drinking water and the on-site Water Treatment Plant, BNL's Energy & Utilities (EU) Division is committed to providing over 3,000 employees, facility users, contractors, and guests annually with safe drinking water.

BNL's drinking water is regularly tested using an independent laboratory approved by the New York State Department of Health (NYSDOH). Analytical data are reviewed by the Lab's Environmental Protection Division (EPD) to ensure that testing results comply with all applicable regulatory standards. In addition, EU and EPD work with BNL's Groundwater Protection Group to make sure our potable-water supply is not adversely impacted by possible groundwater contamination or remediation operations.

Where Does Our Water Come From?

The Long-Island aquifer system is made up of three primary formations. From the surface to approximately 150 feet below is the Upper Glacial aquifer, from 150 to 1,000 feet below is the Magothy aquifer, and from 1,000 to about 1,600 feet below is the Lloyd aquifer. As designated by the U.S. Environmental Protection Agency (EPA), Long Island's aquifer system is one of 78 "sole source" aquifers in the nation recognized under the aquifer-protection program authorized by the U.S. Safe Drinking Water Act (SDWA).

The Lab's five in-service drinking-water wells draw up to 1,000 gallons per minute, or about 1.34 million gallons of water per day from the Upper Glacial aquifer to supply drinking water, process cooling water, and fire protection. The water from three wells (4, 6, and 7) is processed at BNL's on-site Water Treatment Plant. Water from two other wells (10 and 11) is pumped directly to the distribution system after disinfection and pH adjustments. Last year, BNL pumped approximately 357 million gallons of water.



Long Island Aquifer System

What's in Our Drinking Water?

Although rivers, lakes, streams, ponds, and reservoirs are all sources of tap and bottled drinking water, most Long Island residents get their water from groundwater wells that are drilled into the underlying aquifer system. As water travels over land surfaces or through the ground, it dissolves naturally occurring minerals and radioactive material. Water can also pick up substances resulting from the presence of animals or from human activities. Contaminants that may be present in source water include: microbiological contaminants; inorganic contaminants; pesticides and herbicides; organic chemical contaminants; and radioactive contaminants.

In order to ensure that tap water is safe to drink, New York State and the EPA prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. In addition, regulations from NYSDOH and the Food and Drug Administration establish limits for contaminants in bottled water, which must provide the same protection for public health.

Source water is treated to remove substances or reduce their concentration before the water is fit for human consumption. Regardless, drinking water, including bottled water, may reasonably be expected to contain at least small amounts of contaminants; however, that does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling EPA's Safe Drinking Water Hotline at (1-800-426-4791).

Some people may be more vulnerable to disease-causing microorganisms or pathogens in drinking water than others. Immuno-compromised persons such as those with cancer undergoing chemotherapy, who have undergone organ transplants, with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice from their health care provider about their drinking water.

Guidelines from EPA and the Centers for Disease Control on appropriate means to reduce the risk of illness from Cryptosporidium, Giardia, and other microbial pathogens are also available at EPA's Safe Drinking Water Hotline.

BNL's Source Water Assessment

As required under the 1996 Safe Drinking Water Act, NYSDOH performed an assessment of the source water used by the Lab's public water system to evaluate known and possible contamination sources. The assessment includes a susceptibility rating for each well based on the risk posed by the presence of potential sources of contamination within the well's contributing area and the likelihood that the contaminants will travel through the environment to reach the well. Although the susceptibility rating is an estimate of the potential for source-water contamination, it does not mean that the water delivered to consumers is or will become contaminated. If a contaminant is present, it does not necessarily mean that there is a health risk.

Results from the assessment concluded that two on-site wells are rated as having a very high susceptibility to industrial solvents, primarily due to point sources of contamination along transportation routes and from previous spills within the source area. If industrial solvents were to impact water quality at a well, the contamination would be removed by treatment facilities (air-stripping or carbon filtration) before the water is delivered to the consumer. BNL recently determined that four of its supply wells are susceptible to Per- and Polyfluoroalkyl Substances (PFAS) contamination. Although drinking water standards have not been established for PFAS, in 2016 the USEPA established a Lifetime Health Advisory Level (HAL) of 70 ng/L. This non-enforceable advisory level applies to the combined concentrations of two PFAS compounds, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonate (PFOS). Although combined PFOA/PFOS levels in water entering the distribution system have not exceeded the HAL, BNL has proactively removed one well from service and has restricted the operation of a second well. BNL is also preparing to return to service granular activated carbon filtration systems at two other supply wells to remove PFAS before the water is released into the distribution system. The potable supply wells and water leaving the Water Treatment Plant are now tested for PFAS on a quarterly basis. If a supply well cannot provide water that meets the HAL, it would be immediately removed from service.

A copy of the complete assessment may be reviewed by contacting Doug Paquette (631) 344-7046 or Jason Remien (631) 344-3477.

Water Conservation Measures

BNL's water conservation program has achieved dramatic reductions in water use since the mid-1990's. The Lab continually evaluates water conservation as part of facility upgrades, such as replacing existing conventional plumbing fixtures with low-flow devices, or new construction. BNL's Water Management Plan describes how the Lab designs and operates buildings and facilities to be sustainable and water efficient. It also outlines our efforts to meet legislative requirements by implementing best-management practices and details the steps being implemented to reduce BNL's water consumption. For more information on BNL's water use efficiency and management, please see BNL's Site Sustainability Plan for fiscal year 2020 at *https://www.bnl.gov/about/sustainability/reports.php.*

To help the Lab conserve water, start by being conscious of your personal use, e.g., reduce faucet flow, decrease running water while not in use, and report any drips, leaks, or other plumbing problems promptly to your Facility Project Manager. Regarding process and research use, make sure temperature controls operate properly to minimize flow and specify re-circulating water or air-cooled systems for new devices.

While it is important to conserve water, the EPA encourages that you run your tap water for 30 seconds to 2 minutes and only use cold water for drinking or cooking. Due to the aging infrastructure at BNL, iron and lead may leach into the water from the pipes. Flushing the water will help to remove any contaminants that may have built up while the water was sitting in the pipes.

Water Treatment Process

BNL's Water Treatment Plant typically treats up to 2 million gallons of "raw" water per day to remove naturally occurring iron and manganese from the groundwater.

Of the five in-service drinking-water wells, Wells 4, 6, and 7 provide high-iron source water which must be passed through a sand filter before being distributed around the site. This water is chlorinated and the pH is adjusted before it enters the distribution system. Chlorine is a disinfection agent and prevents the spread of water borne diseases.

Water from Wells 4, 6, and 7 is aerated to reduce carbon dioxide gas and aid in iron oxidation. Lime is added to raise the pH to provide for proper corrosion control. A polymer is added to aid in flocculation in the filtration process. Flocculation, or the formation of particle aggregates which settle out of the water as sediment, begins in the retention tank. To help form "floc," water is sent from the retention tank to a slow-mix tank.

Filtration is performed using a rapid sand filter made up of sand and anthracite coal to remove all particles. Filtered water is stored in the "wet well" before it is pumped into air-stripping towers, which remove volatile organic compounds, if present, from the water being treated.

Up to 250,000 gallons of treated water is stored at the clear well before its final chlorination and distribution. Pumps send finished water from the Water Treatment Plant to the two elevated storage tanks. Wells 10 and 11 pump water that is low in iron, and does not require treatment for iron. However, they do receive chlorine for disinfection and sodium hydroxide for pH correction prior to being sent to the two elevated storage tanks. The water from the two storage tanks is delivered on site at 55 to 70 pounds of pressure per square inch via 45 miles of distribution pipe.

For more information on the Lab's water treatment process, visit the Water Quality website at *https://www.bnl.gov/water/.*

Plant Upgrades

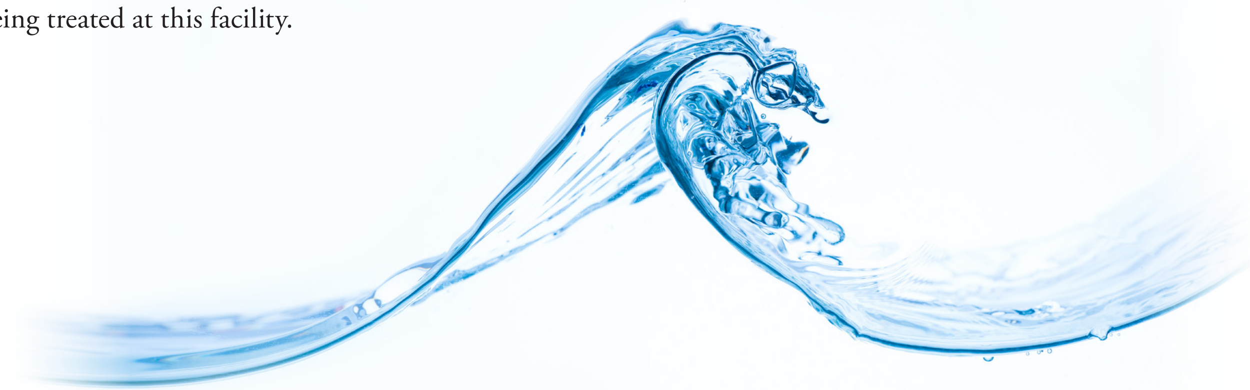
In April 2019, the Lab completed Phase II of the Water Treatment Plant Lime room upgrade project. This project involved the addition of the second lime mixing tank, pump, electrical controls. and piping systems. This addition allows for greater redundancy and the ability to perform required maintenance. Overall, this new system will allow for better control of the system pH and corrosion control for the water being treated at this facility.

BNL's Water-Main Flush Program

In accordance with American Water Works Association recommendations, unidirectional flushing of water mains using fire hydrants within a water distribution system is the most effective and economical way to cleanse and improve water quality.

Iron can get into drinking water from corrosion of cast iron, steel, and galvanized iron pipes that are used throughout the site for water distribution. The Lab's water-mains are flushed twice per year to improve the quality of the water delivered to facilities by the Lab's on-site taps, and to help eliminate rusty water.

Visit the Water Quality website at *http://www.bnl.gov/water/* for some tap-water recommendations to be sure your on-site drinking water is the best possible quality.



BNL's 2019 Drinking Water Sampling Results

With the exception of a violation for missing the collection of an iron sample at the Water Treatment Facility in June, BNL's drinking water and the supply and distribution system were in compliance with all applicable county, state, and federal regulations regarding drinking-water quality, monitoring, operations, and reporting in 2019. Through water sampling and testing, results show that the compounds listed below were not detected or below the minimum detection limit (MDL). Twenty-seven out of the total 147 contaminants tested were detected and are summarized in the table starting on Page 7.

1,1-dichloroethane
1,1-dichloroethene
1,1-dichloropropene
1,1,1-trichloroethane
1,1,1,2-tetrachloroethane
1,1,2-trichloroethane
1,1,2,2-tetrachloroethane
1,2-dichlorobenzene
1,2-dichloroethane
1,2-dichloropropane
1,2,3-trichlorobenzene
1,2,3-trichloropropane
1,2,4-trichlorobenzene
1,2,4-trimethylbenzene
1,3-dichlorobenzene
1,3-dichloropropane
1,3,5-trimethylbenzene
1,4-dichlorobenzene
1,4-dichlorobutane
2,2-dichloropropane
2,4,-D
2,4,5,-TP (silvex)
2-chlorotoluene
3-hydroxycardofuran
4-chlorotoluene
4-isopropyltoluene
alachlor
aldicarb
aldicarb sulfone
aldicarb sulfoxide
aldrin
ammonia
antimony
arsenic
asbestos
atrazine
benzene
benzo (A) pyrene
beryllium
bromobenzene
bromochloromethane
bromomethane
butachlor
cadmium
carbaryl
carbofuran
carbon tetrachloride
cesium-137
chlordane
chlorobenzene
chlorodifluoromethane
chloroethane
chloromethane
chromium
cis-1,2-dichloroethene
cis-1,3-dichloropropene
cyanide (as free cyanide)
dalapon
di(2-ethylhexyl) adipate
di(2-ethylhexyl) phthalate
dibromomethane
dicamba
dichlorodifluoromethane
dieldrin
dinoseb
diquat
e. coli
endothall
endrin
ethylbenzene
fluoride
freon-113
glyphosate
gross alpha
heptachlor
heptachlor epoxide
hexachlorobenzene
hexachlorobutadiene
hexachlorocyclopentadiene
isopropylbenzene
lindane
m,p-xylene
manganese
mercury
methomyl
methoxychlor
methyl tert-butyl ether
methylene blue active substances (MBAS)
methylene chloride
metolachlor
metribuzin
n-butylbenzene
n-propylbenzene
nitrite
odor
oxamyl
o-xylene
pentachlorophenol
picloram
propachlor
radium-228*
sec-butylbenzene
selenium
silver
simazine
strontium-90
styrene
tert-butylbenzene
tetrachloroethene
thalium
toluene
total coliform bacteria
total polychlorinated biphenals (PCBs)
toxaphene
trans-1,2-dichloroethene
trans-1,3-dichloropropene
trichloroethene
trichlorofluoromethane
tritium
vinyl cloride

Notes: * Radium-228 was tested in 2011 and will be retested in 2020.
Contaminants on this list include results from BNL compliance samples, surveillance samples, and Suffolk County Department of Health Services samples.

Types of Contaminants

- **disinfectant and disinfection by-products:** formed when disinfectants used in water treatment plants react with bromide and/or natural organic matter (i.e., decaying vegetation) present in the source water. Different disinfectants produce different types or amounts of disinfection by-products. Disinfection by-products for which regulations have been established have been identified in drinking water, including trihalomethanes, haloacetic acids, bromate, and chlorite.
- **inorganics:** dissolved salts and metals, which can occur naturally or result from stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, farming, etc.
- **microbiological:** bacteria and viruses, which may come from sewage, livestock operations, wildlife, etc.
- **organic:** natural and synthetic compounds, including volatile organic compounds (VOCs). These chemicals are by-products of industrial processes, residential uses and petroleum production, and they can also come from gas stations, stormwater runoff, septic systems, etc.
- **perfluorinated:** man-made compounds used in firefighting foams and stain proof coatings.
- **pesticides & herbicides:** substances for, respectively, eliminating problem insects and plants, which may come from a variety of sources, such as agricultural operations, stormwater runoff, residential uses, etc.
- **radioactive:** naturally occurring, or from oil and gas production, mining activities, nuclear facilities, etc.
- **synthetic organic:** man-made compounds used for a variety of industrial and agricultural purposes.
- **volatile organic:** emitted by products including contaminants: paints and lacquer; paint strippers; cleaning supplies; pesticides, building materials and furnishings; office equipment such as copiers and printers; correction fluids and carbonless copy paper; graphics and craft materials including glues and adhesives; permanent markers; and photographic solutions.

CONTAMINANT	UNIT OF MEAS.	DATE OF DETECTION	VIOLATION (YES/NO)	LEVEL DETECTED	RANGE OF RESULTS	MCLG	REGULATORY LIMIT (MCL)	LIKELY SOURCE OF CONTAMINATION
Chlorine Residual, Free	mg/L	12/9/19	No	0.7	0.3 – 1.2	NS	4	Water additive to control microbes.
DISINFECTION BY-PRODUCTS								
Haloacetic Acids	µg/L	8/5/19	No	13	5–13	NS	60	By-product of drinking water disinfection needed to kill harmful organisms.
Total Trihalomethanes	µg/L	8/5/19	No	37	18-37	NS	80	By-product of drinking water chlorination needed to kill harmful organisms; formed when source water contains large amounts of organic matter.
INORGANIC CONTAMINANTS								
Barium	mg/L	6/3/19	No	0.06	0.013– 0.06	2	2	Erosion of natural deposits.
Chloride	mg/L	6/3/19	No	66.7	38.6 – 66.7	NS	250	Naturally occurring; indicative of road-salt contamination.
Color	units	6/3/19	No	10	< 5 - 10	NS	15	Naturally ocurring; presence of metals such as iron and manganese
Hexavalent Chromium	µg/L	8/15/19	No	0.73	<0.03 – 0.73	NS	NS	Erosion of natural deposits.
Iron*	µg/L	3/20/19	Yes	46	<20 – 46	NS	300	Naturally occuring; corrosion of plumbing.
Nickel	µg/L	6/3/19	No	1.8	0.67 - 1.8	NS	100	Nickel enters groundwater and surface water by dissolution of rocks and soils, from atmospheric fallout, or from biological decays.
Nitrates	mg/L	6/3/19	No	0.56	<0.5 – 0.56	10	10	Erosion of natural deposits; runoff from fertilizer use; leaching from septic tanks and sewage.
Sodium	mg/L	11/4/19	No	45.3	24.3 - 45.3	NS	NS	Naturally occurring; road salt; water softeners.
Sulfates	mg/L	7/17/19	No	13	9.4 – 13	NS	250	Naturally occurring.
Zinc	mg/L	7/17/19	No	0.02	<0.02 - 0.02	NS	5	Naturally occurring.

CONTAMINANT	UNIT OF MEAS.	DATE OF DETECTION	VIOLATION (YES/NO)	LEVEL DETECTED	RANGE OF RESULTS	MCLG	REGULATORY LIMIT (MCL)	LIKELY SOURCE OF CONTAMINATION
PERFLUORINATED CONTAMINANTS								
PFBS (Perfluorobutanesulfonic Acid)	µg/L	8/15/19	No	0.003	<0.002 - 0.003	NS	50	Degradation of stain proof coatings
PFHpA (Perfluoroheptanoic Acid)	µg/L	11/7/19	No	0.003	<0.002 - 0.003	NS	50	Degradation of stain proof coatings
PFHxS (Perfluorohexanesulfonic Acid)	µg/L	11/7/19	No	0.016	<0.002 - 0.016	NS	50	Used in firefighting foam
PFOA (Perfluorooctanoic Acid)	ng/L	8/15/19	No	6.6	<2 – 6.6	NS	70	Used in firefighting foam
PFOS (Perfluorooctanesulfonic Acid)	ng/L	11/7/19	No	35.1	< 2 - 35.1	NS	70	Used in firefighting foam, fabric protection
PFNA (Perfluorononanoic Acid)	µg/L	8/15/19 & 11/7/19	No	.002	<0.002 - 0.002	NS	50	Sufactant used for plastic production
RADIOACTIVE CONTAMINANTS								
Gross Beta Activity (a)	pCi/L	10/16/19	No	2.54	<1.77 - 2.54	NS	50	Decay of natural deposits and atmospheric fallout.
SYNTHETIC ORGANIC CONTAMINANTS								
1,4 Dioxane	µg/L	8/15/19	No	0.12	<0.1-0.12	NS	50	Historic release of solvents to the ground.
VOLATILE ORGANIC CONTAMINANTS								
Bromodichloromethane	µg/L	1/7/19	No	2.9	<0.5 – 2.9	NS	80**	By-product of drinking water chlorination needed to kill harmful organisms.
Bromoform	µg/L	4/1/19	No	1.2	<0.5 - 1.2	NS	80**	By-product of drinking water chlorination needed to kill harmful organisms.
Chloroform	µg/L	1/7/19	No	2.7	<0.5 – 2.7	NS	80**	By-product of drinking water chlorination needed to kill harmful organisms.
Dibromochloromethane	µg/L	1/7/19	No	2.5	<0.5 – 2.5	NS	80**	By-product of drinking water chlorination needed to kill harmful organisms.

SAMPLING AT THE CONSUMER'S TAP (Tap water samples were collected throughout the Laboratory site) (b)

CONTAMINANT	UNIT OF MEAS.	DATE OF SAMPLING (MO./YR.)	AL EXCEEDANCE (YES/NO)	90th PERCENTILE RESULT	RANGE OF RESULTS	MCLG	REGULATORY LIMIT (AL)	LIKELY SOURCE OF CONTAMINATION
Copper	mg/L	8/10/17	No	0.041	<0.02 – 0.105	1.3	1.3	Corrosion of plumbing.
Lead	µg/L	8/10/17	No	5.3	<1.0 – 22.6	0	15	Corrosion of plumbing.

Table Notes:
Table includes results from BNL compliance samples, surveillance samples, and Suffolk County Department of Health Services samples.
* Please see article on Page 9 for explanation of sample collection violation and health advisory information.
** MCL is the sum of the four compounds (Bromocloromethane, Bromoform, Chloroform, and Dibromochloromethane).
NS = drinking-water standard not specified
WTP = Water Treatment Plant
(a) The State considers 50 pCi/L to be the level of concern for beta particles.
(b) Sampling at the consumer's tap for lead and copper is performed every 3 years; next sampling is scheduled for 2020. Please see article on Page 10 for health advisory information.

Iron Exceedance

We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether your drinking water meets NYSDOH standards. During the 2nd quarter of 2019, we did not monitor or test for iron at the entry point to the distribution system from the Water Treatment Plant and therefore cannot be sure of the quality of your drinking water during that time. At the time sampling was required, the water treatment plant was down for maintenance. The error was not discovered until after the quarter was over. A sample was immediately taken, which was below the regulatory limit. Procedures have been updated and personnel trained to ensure sampling requirements are met.

Iron is a common metal and a dietary mineral that is essential for maintaining human health. It is used in construction materials, in drinking water pipes, in paint pigments and plastics, and as a treatment for iron deficiency in humans. Iron can be elevated in drinking water in areas where there are high concentrations of iron in soil and rocks, and where iron salts are used in the water treatment process. Iron can also get into drinking water from corrosion of cast iron, steel, and galvanized iron pipes used for water distribution. Elevated levels of iron in water can result in a rusty color and sediment, a metallic taste, and reddish or orange staining.

Although iron is essential for good health, too much iron can cause adverse health effects. For example, oral exposure to very large amounts of iron can cause effects on the stomach and intestines (nausea, vomiting, diarrhea, constipation and stomach pain). These effects occur at iron exposure levels higher than those typically found in drinking water, and usually diminish once the elevated iron exposure is stopped. A small percentage of people have a condition called hemochromatosis, in which the body absorbs and stores too much iron. People with hemochromatosis may be at greater risk for health effects resulting from too much iron in the body (sometimes called "iron overload") and should be aware of their overall iron intake. The New York State standard for iron in drinking water is 0.3 milligrams per liter and is based on the effects of iron on the taste, odor and appearance of the water.

Testing for Per- and Polyfluoroalkyl Substances (PFAS)

In 2013, the EPA required large water providers to start testing for six common PFAS chemicals under the third Unregulated Contaminant Monitoring Rule (UCMR 3). As a medium size system, BNL was not required to participate in this testing program. In 2017, Suffolk County Department of Health Services began routine testing of all water supply systems, including BNL's, for PFAS. PFAS chemicals were detected in three of BNL's water supply wells. In these initial tests, Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) were detected at concentrations below the current EPA Health Advisory Level of 70 ng/L (ppt) that was established specifically for these two chemicals. Following repeated confirmed detections of PFAS in the supply wells, the Lab started routine quarterly testing for PFAS. The results of the testing are provided on Page 8 of this report.

EPA's health advisories are non- enforceable and non-regulatory and provide technical information to states agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water contamination. New York State is currently evaluating whether to establish enforceable drinking water standards for PFOS and PFOA at concentrations that may be lower than the current EPA advisory level. The other four PFAS chemicals would continue to be regulated under the current New York State limit of 50 ug/L (ppb) for unregulated contaminants. EU is monitoring the sample results and can utilize Granular Activated Carbon filters to remove PFAS, if necessary. All future results of PFAS sampling or changes to the water system will be reported in the Annual Water Report. For further information, please contact Jason Remien (ext.3477) or Chris Bruno (ext. 8262).

Lead and Copper Testing

Lead and copper enters drinking water primarily through plumbing materials. In 1991, the EPA established a “lead and copper rule” to limit the concentration of lead and copper in public water. BNL is required to sample for lead and copper at 20 consumer taps every 3 years and to notify those occupants of the buildings tested with the results. Results from testing performed in 2017 are shown in the table to the right. While lead was detected in some samples, the action limit was not exceeded. Testing will be performed again in 2020.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women, infants, and young children. It is possible that lead levels in your building may be higher than at other buildings at the Laboratory as a result of materials used in your building's plumbing. Brookhaven Lab is responsible for providing high quality drinking water. When your water has been sitting in the pipes for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using 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 (1-800-426-4791) or at *http://www.epa.gov/safewater/lead.*

2017 Lead and Copper Sampling Results

Location	Faucet	Lead (µg/L)	Copper (mg/L)
Apt. 13D	kitchen	< MDL	0.01
Apt. 1A	kitchen	1.6	0.11
Apt. 24A	kitchen	6.8	0.007
Apt. 26B	kitchen	1.2	0.01
Apt. 28A	kitchen	1.2	0.006
Apt. 34E	kitchen	< MDL	0.014
Apt. 36B	kitchen	1.6	0.005
Apt. 40M	kitchen	< MDL	0.005
Apt. 42A	kitchen	< MDL	0.023
Apt. 4B	kitchen	4.1	0.009
Apt. 5B	kitchen	5.3	0.041
Apt. 6A	kitchen	1.3	0.01
Apt. 8C	kitchen	< MDL	0.016
Bldg. 153	bathroom	< MDL	0.036
Bldg. 170	bathroom	< MDL	0.008
Bldg. 371	bathroom	22.6	0.084
Bldg. 460	kitchen	3.6	0.105
Bldg. 535	bathroom	< MDL	0.041
Bldg. 703	bathroom	< MDL	0.025
Bldg. 911	bathroom	< MDL	0.011

Notes:
Action Level for Lead is 15 µg/L.
Action Level for Copper is 1.3 mg/L.

Chlorine Disinfectant and Its By-Products

Each day, more than 200 million people in the U.S. consume water that has been disinfected to kill unwanted microorganisms found in source water. Worldwide, one of the most commonly used and effective disinfectants is chlorine. A form of chlorine known as sodium hypochlorite is used by BNL for disinfection of its potable water.

Although disinfectants are effective in killing unwanted microorganisms in source water, they can react with naturally occurring organic matter and inorganics to form disinfectant by-products which may pose health risks. Under the SDWA, disinfectants and their by-products are regulated. The Lab had no violations in 2019; annual averages for chlorine residual and by-products are based on results from finished tap water.

Disinfection Residual	2019 Annual Running Average	MRDLG
chlorine*	0.7 mg/L	4 mg/L
Disinfection By-product	**2019 Annual Average**	**MCL**
total trihalomethanes[1]	37 µg/L	80 µg/L
haloacetic acids (five)[2]	13 µg/L	60 µg/L

Notes:
* BNL range of results for chlorine is 0.3 - 1.2 mg/L; maximum found in Bldg. 640.
[1] Total trihalomethanes is the sum of the concentration of chloroform, bromodichloromethane, dibromochloromethane, and bromoform.
[2] Haloacetic acids (five) is the sum of the concentration of mono-, di-, and trichloroacetic acids, and mono- and dibromoacetic acids.

Other Water Quality Indicators

The following maximum values were measured in samples of well water or finished water at the BNL Water Treatment Plant in 2019. Although the Lab is required to test these indicators, there are no MCLs set for these parameters.

Other indicators tested, but not detected, include cyanide and methylene blue active substances.

Indicator	BNL Sample	MCL
alkalinity†	62 mg/L	NS
calcium†	16.1 mg/L	NS
conductivity†	395 µmhos/cm	NS
pH	9.0 standard units	NS

Notes:
NS = drinking-water standard not specified
† = measure of water hardness or dissolved salts

Definitions Used in this Report

- **90th percentile value:** The reported copper and lead values represent the 90th percentile. A percentile is a value on a scale of 100 that indicates the percent of a distribution that is equal to or below it. The 90th percentile is equal to or greater than 90 percent of the lead and copper values detected in the water system.
- **action level (AL):** The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a drinking-water supplier must follow.
- **maximum contaminant level (MCL):** The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLG as possible.
- **maximum contaminant level goal (MCLG):** 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.
- **maximum residual disinfectant level (MRDL):** The highest level of a disinfectant allowed in drinking water. There is convincing evidence that the addition of disinfectants is necessary for control of microbial contaminants.
- **maximum residual disinfectant level goal (MRDLG):** The concentration of a drinking-water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of using disinfectants to control microbial contamination.
- **micrograms per liter (µg/L):** Equals one part of liquid in one billion parts of liquid or parts per billion (ppb).
- **micromhos per centimeter (µmhos/cm):** A measure of the ability of water to conduct electricity. Conductivity effectively measures the concentration of ions, such as dissolved salts.
- **milligrams per liter (mg/L):** Equals one part of liquid per million parts of liquid, or parts per million (ppm).
- **minimum detection limit (MDL):** The lowest level to which an analytical parameter can be measured with certainty by the analytical lab performing the measurement. While results below the MDL are sometimes measureable, they represent values that have a reduced statistical confidence associated with them (less than 95 percent confidence).
- **picocuries per liter (pCi/L):** Picocuries per liter is a measure of radioactivity in water equal to one trillionth of a curie.
- **nanograms per liter (ng/L):** Equals one part of liquid in one trillion parts of liquid or parts per trillion (ppt).
- **treatment technique (TT):** A required process intended to reduce the level of a contaminant in drinking water.
- **volatile organic contaminants (VOCs):** Organic chemicals that have a high vapor pressure at ordinary room temperature. Their high vapor pressure results from a low boiling point, which causes large numbers of molecules to evaporate or sublimate from the liquid or solid form of the compound and enter the surrounding air. VOCs include both man-made and naturally occurring chemical compounds.

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