Brookhaven National Laboratory

2013 Water Quality Consumer Confidence Report

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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 and what they reveal, and how the results compare to state standards. ***Last year, as in the past, BNL's drinking water and the supply system that produces it was in full compliance with all applicable county, state, and federal regulations regarding drinking-water quality, monitoring, operations, and reporting.***

Overseeing the Lab's water supply system, which includes five wells dedicated to pumping drinking water and the on-site Water Treatment Facility (WTF), BNL's Energy & Utilities (E&U) Division is committed to providing approximately 3,300 employees, facility-users, contractors, and guests annually with safe drinking water. E&U is proud to report that BNL's tap water has never reached or exceeded a maximum contaminant level (MCL) or any other water quality standard.

BNL's drinking water is regularly tested using an independent laboratory approved by the New York State Department of Health (NYSDOH). Analytical data is then reviewed by the Lab's Environmental Protection Division (EPD) to ensure that testing results comply with all applicable regulatory standards. In addition, E&U and EPD closely monitor its potable-water supply to be sure it is not adversely impacted by groundwater contamination or remediation operations.

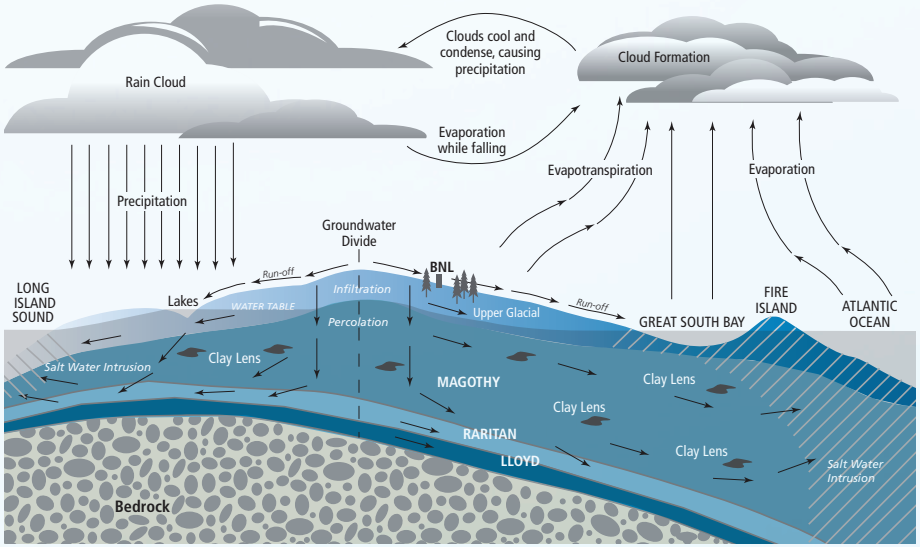
If you have any questions about this report or would like to talk with someone regarding your drinking water, please contact Bill Chaloupka, Utilities Complex Manager, E&U Division, Ext. 7136; Jason Remien, Acting Manager, Environmental Protection Division, Ext. 3477; or the Suffolk County Department of Health Services, (631) 852-5810. For copies of this report, and past reports, contact Sherry Johnson, Ext. 5658.

Where Does Our Water Come From?

Water supplied by BNL comes from beneath the ground and is referred to as groundwater. The water is stored in a sandy, geological formation known as an aquifer. Water in the aquifer originates as precipitation that percolates down through the soil, and this groundwater may be source water for natural springs or man-made wells.

The Long-Island aquifer system is made up of three primary formations (see diagram, above right). From the surface to approximately 150 feet below is the Upper Glacial aquifer, from 150 to 1,000 feet below is the Magothy, and from 1,000 to about 2,000 feet below is the Lloyd. As designated by the U.S. Environmental Protection Agency (EPA), Long Island's aquifer system is one of 72 "sole source" aquifers in the nation recognized under the aquifer-protection program authorized by the U.S. Safe Drinking Water Act.

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 to supply drinking water, process cooling water, or fire protection on site. The water is processed at BNL's WTF and sent to two storage towers before distribution on site via 45 miles of pipeline. Last year, BNL pumped some 400,000,000 gallons for use on site.



Are There Contaminants in Our Drinking Water?

Although rivers, lakes, streams, ponds, and reservoirs are all sources of tap and bottled drinking water, BNL and all of Long Island draw drinking water from groundwater wells that are drilled into the aquifer. 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 human activity or the presence of animals. Contaminants that may be present in water include: microbial; inorganic chemical, organic chemical, and radioactive contaminants, as well as pesticides and herbicides.

In order to ensure that tap water is safe to drink, NY State and EPA prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. In addition, regulations from NYSDOH and the Federal Drug and Food 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. Some people may be more vulnerable to disease-causing microorganisms or pathogens in drinking water than others. Immuno-compromised persons such as persons 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 ways to reduce the risk of illness from cryptosporidium, giardia, and other microbial pathogens are available at EPA's Safe Drinking Water Hotline, (800) 426-4791, or *http://www.epa/gov/safewater.*

BNL's 2012 Drinking-Water Sampling Results

Of the 125 drinking water contaminants for which BNL tests its drinking water at the well, after treatment at the Lab's Water Treatment Facility, or at the consumer's tap, as shown in the table below, 12 compounds were detected, but were not in violation of the law. Each drinking-water contaminant has an allowable MCL. Water for drinking that exceeds MCLs for one or more compounds is in violation of the law. As required, other compounds tested, but not detected, are listed in the table to the right.

CONTAMINANT AND UNIT OF MEASUREMENT	DATE OF DETECTION	VIOLATION (YES/NO)	LEVEL DETECTED	DETECTION LOCATION	RANGE OF RESULTS	MCLG	REGULATORY LIMIT (MCL/TT/AL)	LIKELY SOURCE OF CONTAMINATION
INORGANIC CONTAMINANTS								
Barium (mg/L)	06/05/12	No	0.042	Wells 4 & 10	0.015 - 0.042	2	2	Erosion of natural deposits
Chlorides (mg/L)	06/05/12 07/10/12	No	52	Well 4, 11 & Bldg. 400	48-52	NS	250	Naturally occurring; indicative of road-salt contamination
Color	07/10/12	No	15	Bldg. 400	<5-15	NS	15	Natural presence
Iron (µg/L) [a]	06/05/12	No	4,400	Well 6	10-4,400	NS	300	Naturally occurring
Manganese (µg/L)	06/05/12	No	250	Well 4	<10-250	NS	300	Naturally occurring; indicative of landfill contamination
Nitrates (mg/L)	06/05/12	No	0.75	Well 11	0.17-0.75	10	10	Runoff from fertilizer use; leaching from septic tanks and/or sewage; erosion of natural deposits
Sodium (mg/L)	07/10/12	No	32.4	Bldg. 400	26-32.4	NS	NA	Naturally occurring or due to road salt, water softeners, and/or animal waste
Sulfates (mg/L)	06/05/12	No	13	Well 7 & 11	6.5-13	NS	250	Naturally occurring
Zinc (mg/L)	06/05/12	No	0.02	Wells 4, 6, 7 & 10	<0.01-0.02	NS	5	Naturally occurring or due to mining waste or corrosion of household plumbing
VOLATILE ORGANIC CONTAMINANTS								
Total Trihalomethanes (µg/L)	10/01/12	No	19.3	Well 7	<0.5-19.3	NS	80	By-product of water chlorination
SAMPLING AT THE CONSUMER'S TAP (Tap water samples were collected throughout the Laboratory site) * – See table below								
CONTAMINANT AND UNIT OF MEASUREMENT	**DATE OF SAMPLING (MO./YR)**	**AL EXCEEDANCE (YES/NO)**	**90th PERCENTILE RESULT**	**DETECTION LOCATION**	**RANGE OF RESULTS**	**MCLG**	**AL ACTION LEVEL**	**LIKELY SOURCE OF CONTAMINATION**
Copper (mg/L)	07/10/12	No	0.07	Bldg. 153	<0.02-0.13	1.3	1.3	Corrosion of household plumbing
Lead (µg/L)	07/10/12	No	3.42	Bldg. 460	<1.0-7.7	0	15	Corrosion of household plumbing

(a) Iron is removed from water in Wells 4, 6 and 7 at BNL's Water Treatment Facility.
* Sampling at the consumer's tap is performed every 3 years; next sampling is scheduled for 2015.
NS = drinking-water standard not specified.

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 by your 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 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 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 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 per 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).
- treatment technique (TT): A required process intended to reduce the level of a contaminant in drinking water.
- volatile organic compounds (VOCs): Man-made compounds used for a variety of industrial and manufacturing purposes. VOCs are not readily dissolved in water and will tend to separate from the water and form gasses.

Lead and Copper Testing

Lead and copper enters drinking water primarily through plumbing materials. In 1991, 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 consumers' taps every 3 years and to notify those occupants of buildings tested with the results. Results from testing performed in 2012 are shown in the table to the right and summarized in the table above.

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 high as a result of materials in the plumbing. When your water has been sitting for several hours, minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using the water for drinking or cooking. If you are concerned about lead in your water and wish to have it tested, contact Jason Remien, Ext. 3477. 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.*

2012 Lead and Copper Sampling Results

Location	Faucet	Lead	Copper
Apt. 1A	kitchen	2.30 µg/L	< MDL
Apt. 4C	kitchen	5.54 µg/L	< MDL
Apt. 5B	kitchen	< MDL	< MDL
Apt .6A	kitchen	1.91 µg/L	< MDL
Apt. 8C	kitchen	< MDL	< MDL
Apt. 13D	kitchen	< MDL	< MDL
Apt. 24A	kitchen	2.62 µg/L	< MDL
Apt. 26A	kitchen	1.51 µg/L	< MDL
Apt. 28B	kitchen	1.34 µg/L	< MDL
Apt. 34E	kitchen	< MDL	< MDL
Apt. 36A	kitchen	< MDL	< MDL
Apt 40G	kitchen	< MDL	< MDL
Apt. 42A	kitchen	2.4 µg/L	< MDL
Bldg. 153	bathroom	< MDL	0.13 mg/L
Bldg .170	bathroom	2.36 µg/L	< MDL
Bldg. 371	bathroom	3.42 µg/L	0.03 mg/L
Bldg. 460	kitchen	7.70 µg/L	0.09 mg/L
Bldg. 535	bathroom	1.56 µg/L	0.06 mg/L
Bldg. 703	bathroom	1.3 µg/L	0.07 mg/L
Bldg. 911	bathroom	< MDL	0.02 mg/L

< MDL = Less than the minimum detection limit.

Chlorine Disinfectant and Its By-Products

Each day, more than 200 million people in the US 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 called 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 Safe Drinking Water Act, disinfectants and their by-products are regulated and must be tested. The Lab had no violations in 2012; averages for chlorine residual and by-products are based on results from finished tap water.

Disinfection Residual	2012 Running Annual Average	MRDLG
chlorine *	0.6 mg/L	4 mg/L
Disinfection By-product	**2012 Running Annual Sample**	**MCL**
total trihalomethanes[1]	30.5 µg/L	80 µg/L
haloacetic acids (five)[2]	17.3 µg/L	60 µg/L

* BNL range of results for chlorine is 0.3-1.2 mg/l; maximum found in Bldg. 49 Tower on 07/10/12 and 12/03/12.
[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. Although the Lab is required to test for these indicators, there are no drinking-water standards for these parameters. Other indicators tested, but not detected, include: ammonia, cyanide, methylene blue active substances, and total coliform.

Indicator	BNL Sample	MCL
alkalinity†	56.0 mg/L	NS
calcium†	14.0 mg/L	NS
conductivity†	349 µmhos/cm	NS
pH‡	5.9 standard units	NS

NS = drinking-water standard not specified.
† = measure of water hardness or dissolved salts.
‡ = pH equals minimum value.

Compounds (Not Detected)

1,1,1,2-tetrachloroethane
1,1,1-trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-trichloroethane
1,1-dichloroethane
1,1-dichloroethene
1,1-dichloropropene
1,2,3-trichlorobenzene
1,2,3-trichloropropane
1,2,4-trichlorobenzene
1,2,4-trimethylbenzene
1,2-dichlorobenzene
1,2-dichloroethane
1,2-dichloropropane
1,3,5-trimethylbenzene
1,3-dichlorobenzene
1,3-dichloropropane
1,4-dichlorobenzene
2,2-dichloropropane
2,4,5,-TP (Silvex)
2,4,-D
2-chlorotoluene
4-chlorotoluene
4-Isopropyltoluene
alachlor
aldrin
antimony
arsenic
asbestos
atrazine
benzene
benzo(A)pyrene
beryllium
bis(2-ethylhexyl)adipate
bis(2-ethylhexyl) phthalate
bromobenzene
bromochloromethane
bromomethane
butachlor
cadium
chromium
carbon tetrachloride
chlordane
chlorobenzene
chloroethane
chloromethane
cis-1,2-dichloroethene
cis-1,3-dichloropropene
dalapon
dibromomethane
dicamba
dichlorodifluoromethane
dieldrin
dinoseb
endrin
ethylbenzene
fluoride
gross alpha
gross beta
heptachlor
heptachlor Epoxide
hexachlorobenzene
hexachlorobutadiene
hexachlorocyclopentadiene
isopropylbenzene
lindane
m,p-xylene
mercury
methoxychlor
methyl tert-butyl ether
methylene chloride
metolachlor
metribuzin
n-butylbenzene
n-propylbenzene
nickel
o-xylene
pentachlorophenol
picloram
propachlor
radium-228
sec-butylbenzene
selenium
silver
simazine
strontium-90
styrene
tert-butylbenzene
tetrachloroethene
thallium
toluene
total PCB's
toxaphene
trans-1,2-dichloroethene
trans-1,3-dichloropropene
trichloroethene
trichlorofluoromethane
tritium
vinyl chloride

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 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 has also identified one well that is susceptible to radionuclide contamination, specifically tritium. Although tritium has never been detected in this well, the Lab controls water-pumping operations to reduce the potential for impact. In addition to testing the supply-well water, BNL uses a network of groundwater-monitoring wells to track potential sources and contamination. If a supply well could not provide water that meets drinking-water standards, it would be immediately removed from service.

A copy of the complete assessment may be reviewed by contacting Doug Paquette, Ext. 7046, or Jason Remien, Ext. 3477.

Water Conservation Measures

BNL's water conservation program has achieved dramatic reductions in water use since the mid 1990s. The Lab continually evaluates water conservation as part of facility upgrades or new construction. Total water consumption in 2012 was approximately 71 million gallons less than in 2011.

To help the Lab conserve water, start by being conscious of your personal uses, i.e., 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.

The annual BNL Water Quality Consumer Confidence Report is published by the Community, Education, Government & Public Affairs Directorate with the assistance of the Environmental Protection Division and the Energy & Utilities Division. It is distributed to approximately 3,300 on-site drinking water consumers served daily by federal public water system No. 5111891 at Brookhaven National Laboratory, Upton, New York 11973, which is owned and operated by the U.S. Department of Energy and operated under contract by Brookhaven Science Associates, LLC.

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