2014 BROOKHAVEN NATIONAL LABORATORY Water Quality CONSUMER CONFIDENCE REPORT

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 New York State standards.

Last year, as in the past, BNL's drinking water and the supply and distribution system 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, 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 contaminate 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 work with BNL's Groundwater Protection Group to make sure its potable water supply is not adversely impacted by possible groundwater contamination or remediation operations.

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

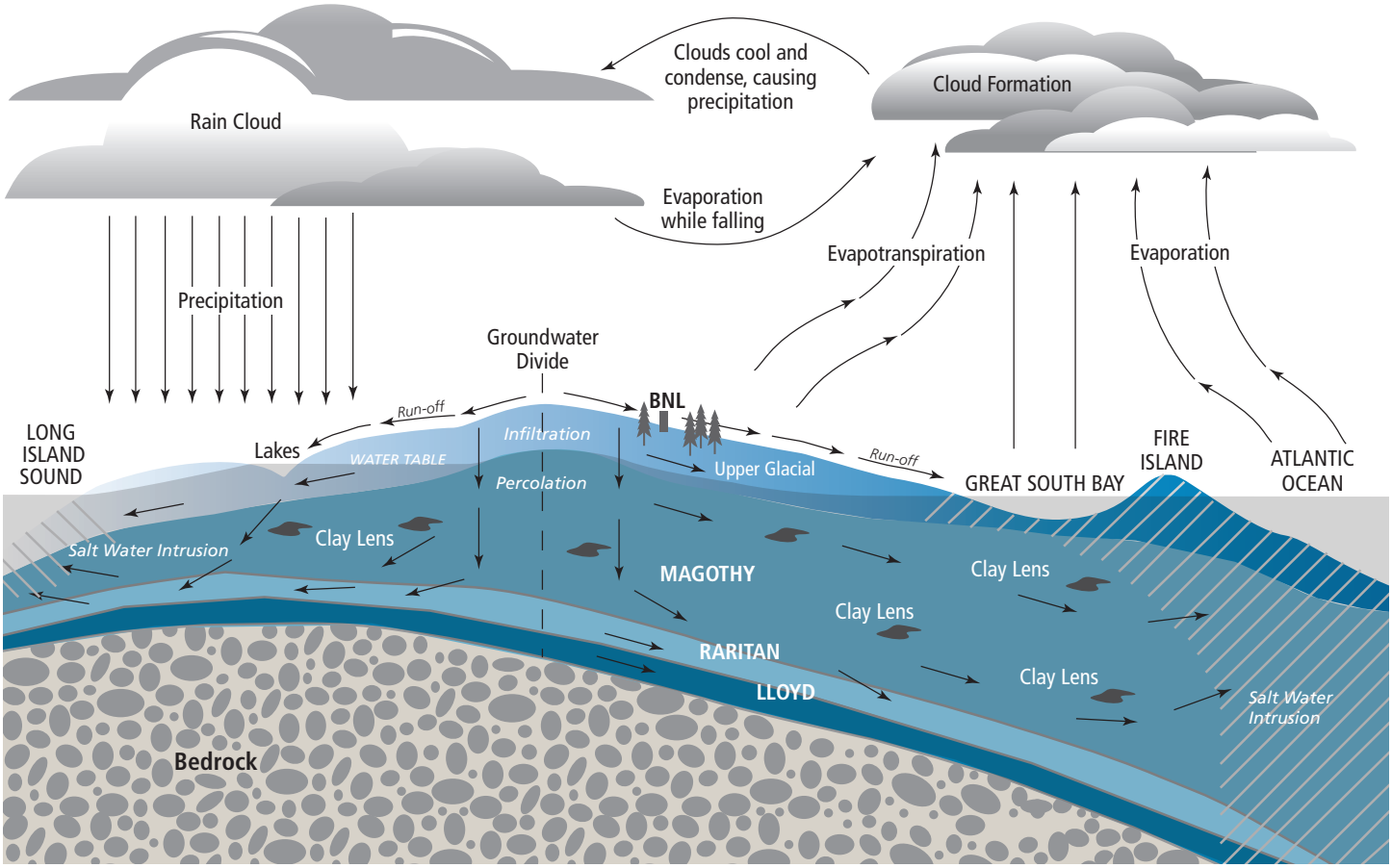
- **Chris Bruno**
  Utilities Complex Manager
  E&U Division
  (631) 344-8262
- **Jason Remien**
  Interim Manager
  Environmental Protection Division
  (631) 344-3477
- **Suffolk County Department of Health Services**
  (631) 852-5810

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 Figure on Page 2). 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 (USEPA), 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 from three wells (4, 6, and 7) is processed at BNL's Water Treatment Facility. Two wells (10 and 11) are pumped directly to the distribution system. Two elevated storage tanks sit on a distribution system of 45 miles of pipeline. Last year, BNL pumped approximately 419 million gallons for use on site.



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, BNL and most Long Islanders get their 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: disinfectants and disinfection by-products, microbes; organic chemicals; inorganic chemicals; synthetic chemicals; radioactive contaminants; and pesticides and herbicides.

In order to ensure that tap water is safe to drink, New York State and the USEPA 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 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 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 USEPA 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/*, or visit the NYSDOH web site at *http://health.state.ny.us*.

Types of Contaminants

- **disinfectant and disinfection by-product:** 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.
- **microbiological:** bacteria and viruses, which may come from sewage, livestock operations, wildlife, etc.
- **inorganic chemical:** dissolved salts and metals, which can occur naturally or result from storm-water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, farming, etc.
- **pesticide & herbicide:** substances for, respectively, eliminating problem insects and plants, which may come from a variety of sources, such as agricultural operations, storm-water runoff, residential uses, etc.
- **organic chemical:** 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, storm-water runoff, septic systems, etc.
- **radioactive:** naturally occurring, or from oil and gas production, mining activities, nuclear facilities, etc.
- **synthetic organic chemical:** man-made compounds used for a variety of industrial and agricultural purposes.
- **volatile organic:** emitted by products including: paints and lacquers, 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.

BNL's 2013 Drinking Water Sampling Results

Of the 140 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 consumers' tap, as shown in the table on Page 4 and 5, 24 compounds were detected, but were not in violation of the law. Each drinking water contaminant has an allowable maximum contaminant level (MCL). Water for drinking that exceeds MCLs for one or more compounds is in violation of the law. Other parameters tested, but less than the minimum detection limit (MDL), include:

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-trimethylbenzene
1,2-dichlorobenzene
1,2-dichloroethene
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
3-hydroxycardofuran
4-chlorotoluene
4-isopropyltoluene
alachlor
aldicarb
aldicarb sulfone
aldicarb sulfoxide
aldrin
ammonia
arsenic
asbestos
atrazine
benzene
benzo(a)pyrene (PAH)
bromobenzene
bromomethane
butachlor
cadmium
carbaryl
carbofuran
carbon tetrachloride
chlordane
chlorobenzene
chloroethane
chloromethane
chromium
cis-1,2-dichloroethene
cis-1,3-dichloropropene
cyanide (as free cyanide)
dalapon
di(2-ethylhexyl)adipate
di(2-ethylhexyl)phthalate
dibromochloropropane
dibromomethane
dicamba
dichlorodifluoromethane
dieldrin
dinoseb
diquat
e.coli
endothall
endrin
ethylbenzene
ethylene dibromide (EDB)
flouride
glyphosate
heptachlor
heptachlor epoxide
hexachlorobenzene
hexachlorobutadiene
hexachlorocyclopentadiene
isopropylbenzene
lindane
m-xylene
mercury
methomyl
methoxychlor
methyl tert-butyl ether
methylene blue active substances (MBAS)
methylene chloride
metolachlor
metribuzin
n-butylbenzene
n-propylbenzene
nickel
nitrite
odor
o-xylene
p-xylene
oxamyl (Vydate)
propachlor
sec-butylbenzene
selenium
silver
simazine
strontium-90
styrene
tert-butylbenzene
tetrachloroethene
thallium
toluene
total coliform bacteria
total polychlorinated biphenals (PCBs)
toxaphene
trans-1,2-dichloroethene
trans-1,3-dichloropropene
trichloroethene (TCE)
trichlorofluoromethane
tritium
vinyl chloride
zinc

CONTAMINANT AND UNIT OF MEASUREMENT	DATE OF DETECTION	VIOLATION (YES/NO)	LEVEL DETECTED	DETECTION LOCATION	RANGE OF RESULTS	MCLG	REGULATORY LIMIT (MCL)	LIKELY SOURCE OF CONTAMINATION
DISINFECTANTS								
Chlorine Residual (mg/L)	04/22/13	No	1.4	Bldg. 363	0.4 - 1.4	NS	4	Water additive to control microbes
DISINFECTION BY-PRODUCTS								
Haloacetic acids (µg/L)	08/12/13	No	16	Bldg. 1005 & Bldg. 363	NA	NS	60	By-product of drinking water disinfection needed to kill harmful organisms
Total Trihalomethanes (µg/L)	08/12/13	No	28	Bldg. 1005	NA	NS	80	By-product of drinking water disinfection needed to kill harmful organisms
INORGANIC CONTAMINANTS								
Antimony (µg/L)	01/07/13	No	0.52	Bldg. 400	<0.022 - 0.52	6	6	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Barium (mg/L)	07/15/13	No	0.0439	Bldg. 400	<0.0197 - 0.0439	2	2	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Beryllium (µg/L)	07/15/13	No	0.7	Bldg. 400	<0.15 - 0.7	4	4	Discharge from metal refineries and coil-burning factories; discharge from electrical, aerospace, and defense industries
Chloride (mg/L)	06/10/13	No	60.8	Well 10	46.2 - 60.8	NS	250	Naturally occurring; indicative of road-salt contamination
Color (units)	07/15/13	No	10	Bldg. 400	<5 - 10	NS	15	Large quantities of organic chemicals; inadequate treatment; high disinfectant demand and the potential for production of excess amounts of disinfectant by-products such as trihalomethanes; the presense of metals such as copper, iron and mangenese; decaying leaves, plants, and soil organic matter; color has no health effects
Iron (µg/L)	07/15/13	No	89.3	Bldg. 400	<5.9 - 89.3	NS	300	Naturally occurring
Lead (µg/L)	06/10/13	No	1.2	Well 10	<0.047 - 1.2	0	AL = 15	Corrosion of household plumbing systems; erosion of natural deposits
Manganese (µg/L)	07/15/13	No	28.5	Bldg. 400	<0.5 - 28.5	NS	300	Naturally occurring; indicative of landfill contamination
Nitrate (mg/L)	06/10/13	No	0.81	Well 11	0.17 - 0.81	10	10	Runoff from fertilizer use; leaching from septic tanks and/or sewage; erosion of natural deposits

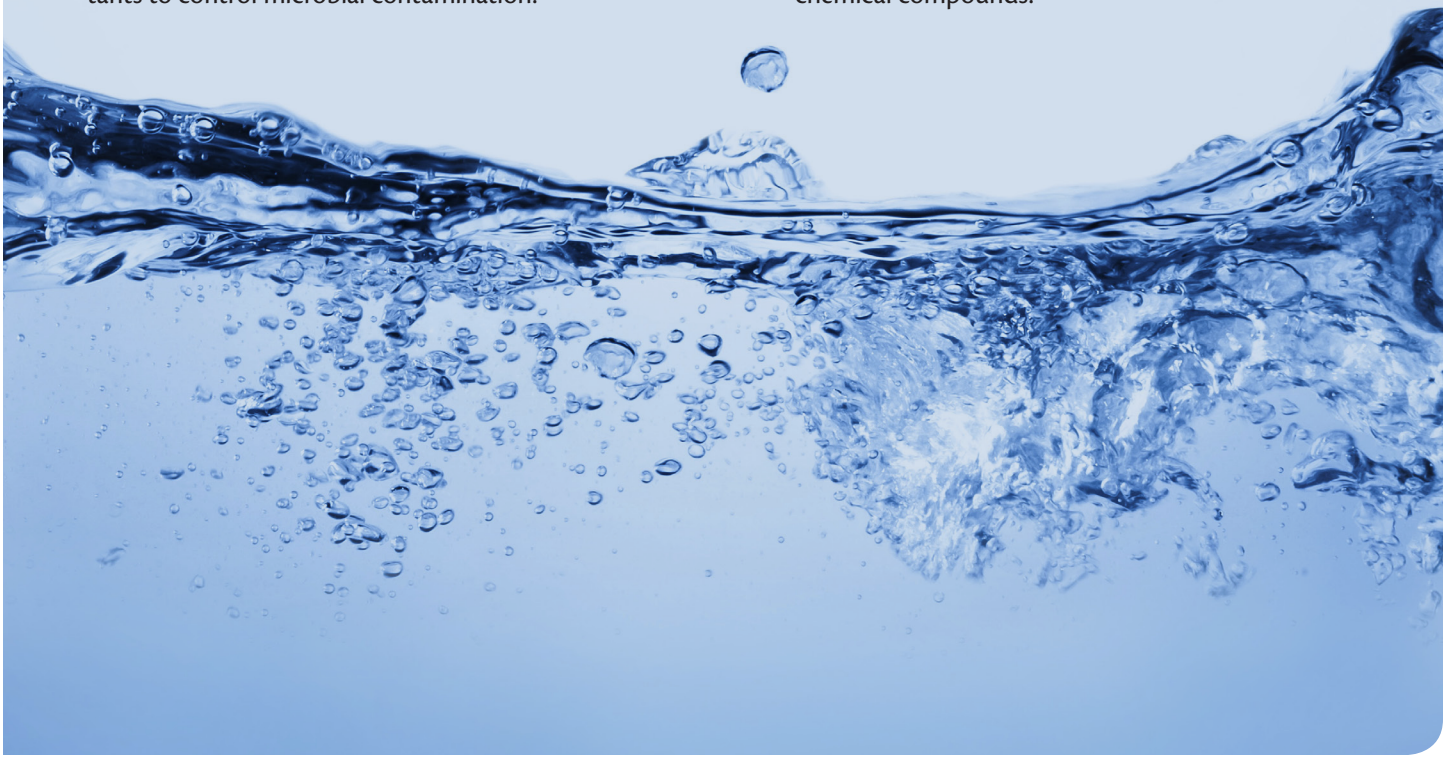
continued on next page

CONTAMINANT AND UNIT OF MEASUREMENT	DATE OF DETECTION	VIOLATION (YES/NO)	LEVEL DETECTED	DETECTION LOCATION	RANGE OF RESULTS	MCLG	REGULATORY LIMIT (MCL)	LIKELY SOURCE OF CONTAMINATION
Sodium (mg/L)	07/15/13	No	26.2	Bldg. 400	20.1 - 26.2	NS	NA	Naturally occurring or due to road salt, water softeners, and/or animal waste
Sulfate (mg/L)	06/10/13	No	11.5	Well 11	9.07 - 11.5	NS	250	Naturally occurring
RADIOACTIVE CONTAMINANTS								
Gross Alpha Activity (pCi/L)	01/10/13	No	1.32	Well 11	<0.76 - 1.32	NS	15	Erosion of nautral deposits
Gross Beta Activity (pCi/L) (a)	01/10/13	No	1.61	Well 6	<0.94 - 1.61	NS	50	Decay of natural deposits and man-made emissions
SYNTHETIC ORGANIC CONTAMINANTS, INCLUDING PESTICIDES AND HERBICIDES								
Pentachlorophenol (µg/L)	06/10/13	No	0.069	Well 4	<0.04 - 0.069	0	1	Discharge from wood preserving factories
Picloram (µg/L)	06/10/13	No	0.1	Well 4	<0.1 - 0.1	NS	50	Herbicide runoff
VOLATILE ORGANIC CONTAMINANTS								
1,2,4-Trichlorobenzene (µg/L)	04/22/13	No	0.5	WTP Effluent	<0.5 - 0.5	NS	5	Discharge from textile-finishing factories
Bromochloromethane (µg/L)	10/07/13	No	3.0	WTP Effluent	<0.5 - 3.0	NS	80	By-product of drinking water chlorination needed to kill harmful organisms
Bromoform (µg/L)	01/07/13	No	3.4	WTP Effluent	<0.5 - 3.4	NS	80	By-product of drinking water chlorination needed to kill harmful organisms
Chloroform (µg/L)	10/07/13	No	3.0	WTP Effluent	<0.5 - 3.0	NS	80	By-product of drinking water chlorination needed to kill harmful organisms
Dibromochloromethane (µg/L)	01/07/13	No	3.1	WTP Effluent	<0.5 - 3.1	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) *								
CONTAMINANT AND UNIT OF MEASUREMENT	**DATE OF SAMPLING**	**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

Table Notes:
* Sampling at the consumers' tap is performed every 3 years; next sampling is scheduled for 2015.
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.

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 contaminate 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 contaminate 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.
- **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.
- **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.



Lead and Copper Testing

Lead and copper enters drinking water primarily through plumbing materials. In 1991, USEPA 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 2012 are shown in the table to the right. Testing will be performed again in 2015.

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 for drinking or cooking. If you are concerned about lead in your water and wish to have it tested, contact Jason Remien, (631) 344-3477.

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/*.

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

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 these indicators, there are no MCLs set for these parameters.

Other indicators tested, but not detected, include: ammonia, cyanide, methylene blue active substances, and total coliform.

Indicator	BNL Sample	MCL
alkalinity†	48.2 mg/L	NS
calcium†	12.7 mg/L	NS
conductivity†	331 µmhos/cm	NS
pH	5.9 standard units	NS

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

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 Safe Drinking Water Act, disinfectants and their by-products are regulated. The Lab had no violations in 2013; averages for chlorine residual and by-products are based on results from finished tap water.

Disinfection Residual	2013 Annual Running Average	MRDLG
chlorine*	0.7 mg/L	4 mg/L
Disinfection By-product	**2013 Annual Average**	**MCL**
total trihalomethanes[1]	28 µg/L	80 µg/L
haloacetic acids (five)[2]	16 µg/L	60 µg/L

Notes:
* BNL range of results for chlorine is 0.4 - 1.4 mg/L; maximum found in Bldg. 363 on 04/22/13.
[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.

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 (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 1990s. The Lab continually evaluates water conservation as part of facility upgrades or new construction. BNL continues to replace existing conventional plumbing fixtures with low-flow devices.

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. 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 Environmental Protection Division and the Energy & Utilities Division, with assistance from the Community, Education, Government & Public Affairs Directorate. 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 managed by Brookhaven Science Associates for the U.S. Department of Energy's Office of Science.

U.S. DEPARTMENT OF ENERGY

Printed on 100% Recycled Paper

BROOKHAVEN NATIONAL LABORATORY