the Bulletin

BROOKHAVEN NATIONAL LABORATORY

2012 BNL Water Quality Consumer Confidence Report

May 25, 2012

BNL's Drinking Water Complies With All Health, Safety Regulations

Last year, as in the past, Brookhaven Lab's drinking water and the supply system that produces it were in full compliance with all applicable county, state, and federal regulations regarding drinking-water quality, monitoring, operations, and reporting.

In fact, the Energy & Utilities (E&U) Division, which is responsible for the Lab's water supply system, is proud to report that BNL's tap water has not reached or exceeded what are called primary maximum contaminant levels (MCLs), which safeguard drinking-water consumers' health.

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) and the New York State Department of Health (NYSDOH) have prescribed regulations that limit the amounts of certain contaminants in water provided by public water systems such as BNL's. 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. To provide the same protection to those who drink bottled water, the U.S. Food & Drug Administration and the NYSDOH have established regulations to limit contaminants in bottled water.

Of the 125 drinking-water contaminants for which BNL tests its drinking water at the well, after treatment at the Water Treatment Facility, or at the consumers' tap, 16 compounds were detected in the Lab's drinking water in 2011 (see table on page 1, below; tables on pages 2 and 3; and a discussion of those compounds on page 3).

Reducing 'Rusty' Water Around the Site

2012 Water-Main Flush Program Started

From May 14th to 18th, water treatment engineers of BNL's Water Treatment Facility (WTF) worked their way around the site to flush BNL's water mains. By systematically opening and closing fire hydrants, they began the Lab's 2012 water-main flushing program.

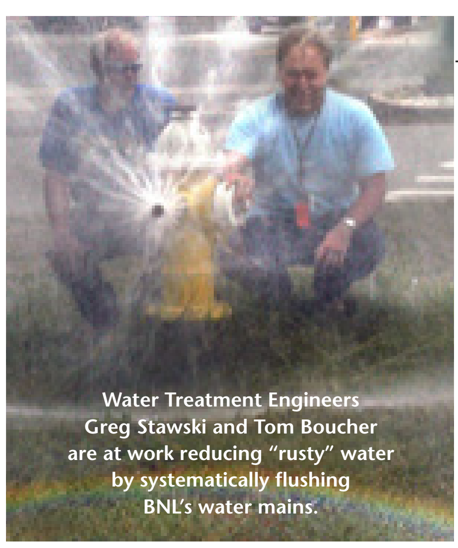
According to the American Water Works Association, unidirectional flushing of water mains using fire hydrants within a water-distribution system is the most effective and economical way to cleanse a water-distribution system and, improve water quality.

Performed three times a year, on-site water-main flushing will also take place in July and September. Closer to the weeks selected in those months, the hydrant-flushing schedule will be announced.

Much of Long Island's groundwater is high in iron, as a result of naturally occurring, iron-containing minerals within the aquifer. Water that enters BNL's distribution system, however, has very low iron for one of two reasons: either because it comes from one of the two drinking-water wells that produces water naturally low in iron; or because, if it comes from one of the three high-iron wells, the water is then treated in a multi-step process to remove iron at the Water Treatment Facility (see photo essay on page 4).

While being delivered around site via 45 miles of underground water mains, BNL water picks up insoluble iron via two sources: First, between 1941, when Camp Upton was reopened on site during World War II, and 1963, when the WTF was commissioned, BNL did not treat its water for iron; as a result, some 700 pounds of iron per year—or 7.7 tons over 22 years—was deposited in the water mains. Second, the site has cast-iron and ductile iron water mains which add insoluble iron into the system as a result of oxidation. So, depending on a building's location along the water-distribution system, "rusty" water may be an issue.

Because iron at levels usually found in water does not pose a health risk for most people, the EPA regulates it via secondary, or aesthetic, standards (see pages 2 and 3).



Joseph Rubino D0790804

Water Treatment Engineers Greg Stawski and Tom Boucher are at work reducing "rusty" water by systematically flushing BNL's water mains.

Visit the WTF: 6/15

Once you've looked at the pictures and read all about the Water Treatment Facility (WTF), why don't you come to see it for yourself—by going on a lunchtime tour for BNL employees, facility-users, and other on-site guests.

Organized by Tour Program coordinator Elaine Lowenstein of the Community Relations Office, the WTF tour will take place on Friday, June 15th, from 12 noon to 1 p.m. Meet in the upper lobby of Berkner Hall by 12 noon sharp!

2012 BNL Water Quality Consumer Confidence Report

This special edition of the Brookhaven Bulletin is Brookhaven National Laboratory's 14th annual Consumer Confidence Report. This report is published yearly for the BNL drinking-water consumer, to present an overview of water quality during the previous calendar year. Because the Lab is the on-site drinking-water supplier, BNL is required by the federal Safe Drinking Water Act (SDWA) of 1976, as amended in 1996, to produce an annual report on the quality of its drinking water.

In addition to reminding consumers of the importance and need to protect drinking-water sources, the report's purpose is to inform drinking-water consumers:

- where our water comes from
- what analytical tests are conducted
- what those tests reveal about the water
- how those results compare to state standards

Among its other responsibilities, BNL's Energy & Utilities (E&U) Division is committed to providing all employees, facility-users, and other guests with safe drinking water while they are on site. To do so, E&U operates BNL's drinking-water supply system, which is considered by the EPA to be a "small community public water system" because it serves between 501 and 3,300 people. BNL's water supply system includes five wells dedicated to pumping drinking water and the Water Treatment Facility in Bldg. 624 (see photo essay on page 4).

To make sure that the Lab's drinking water meets all applicable local, state and federal water-quality standards, E&U has BNL's drinking water regularly tested using an independent laboratory approved by the NYSDOH.

To ensure that testing results comply with all applicable regulatory standards, analytical data are reviewed by the Lab's Environmental Protection (EP) Division. In addition, E&U and EP work with BNL's Environmental Restoration Projects to make sure that the Lab's potable-water supply is not adversely impacted by groundwater contamination or remediation operations.

For more information and/or copies of the complete analyses of BNL's 2011 drinking-water samples discussed in this report, go to www.bnl.gov/bnlweb/pubaf/bulletin.html or www.bnl.gov/bnlweb/pubaf/water/reports.htm, or contact:

- Bill Chaloupka, Utilities Complex Manager, Energy & Utilities Division, Ext. 7136, chaloupka@bnl.gov
- Jason Remien, Group Leader, Environmental Compliance, Ext. 3477, remien@bnl.gov
- Suffolk County Department of Health Services, (631) 852-5810

Latest Results From Lead & Copper Testing At 20 Representative Faucets Around Site

Since 1986 in the U.S., the use of lead in plumbing pipes, fixtures, fittings, and solder has been restricted by law, when the federal Safe Drinking Water Act was first amended to require a rule regulating lead and copper at the drinking-water consumer's tap.

Posing certain health risks to most people if consumed in excess, lead and copper enter drinking water mainly as a result of corrosion of plumbing materials. As a result, the federal "lead and copper rule" was issued in 1991 by the EPA to limit the concentration of these two metals in public water. In October 2007, the rule was revised, requiring water suppliers to reduce water corrosiveness in an attempt to protect public water-system consumers from excessive exposure to lead and copper even further.

To find out how well they are doing this, water suppliers are required to sample a representative number of consumers' taps, with the frequency of sampling depending upon the size of the system and the system's lead and copper results.

BNL, for instance, is required to sample for lead and copper at 20 consumers' taps every three years (see list, below). BNL's sampling was last required and performed in 2009, and those aggregate results are reported below. Sampling will again take place in 2012, and those results will be reported in 2013.

The lead-and-copper rule revision also requires that BNL notifies occupants of buildings that are part of the lead and copper tap-water sampling program of the test results for their specific faucets. These results are published in the annual Consumer Confidence Report, which is distributed to all on-site drinking-water consumers, including on-site residents.

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 in other Lab buildings as a result of materials in your building's plumbing. The Lab is responsible for providing high-quality drinking water, but it cannot control the variety of materials used in plumbing components.

So, 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, contact Jason Remien, Ext. 3477, about its testing. For information on lead in drinking water, call the Safe Drinking Water Hotline (1-800-426-4791) or go to http://www.epa.gov/safewater/lead.

location	faucet	lead	copper
		2009 sampling results	
Apt. 1A	kitchen	16 µg/l	0.110 mg/l
Apt. 4C	kitchen	2 µg/l	0.030 mg/l
Apt. 5B	kitchen	5 µg/l	0.050 mg/l
Apt. 6A	kitchen	1 µg/l	0.040 mg/l
Apt. 13D	kitchen	<MDL	0.010 mg/l
Apt. 24D	kitchen	<MDL	0.008 mg/l
Apt. 26A	kitchen	<MDL	0.020 mg/l
Apt. 28B	kitchen	<MDL	0.010 mg/l
Apt. 34E	kitchen	<MDL	0.020 mg/l
Apt. 36A	kitchen	<MDL	0.020 mg/l
Apt. 40G	kitchen	<MDL	0.030 mg/l
Apt. 42A	kitchen	4 µg/l	0.070 mg/l
Bldg. 51	bathrm.	<MDL	<MDL
Bldg. 153	bathrm.	6 µg/l	0.140 mg/l
Bldg. 170	bathrm.	14 µg/l	0.080 mg/l
Bldg. 371	bathrm.	4 µg/l	0.120 mg/l
Bldg. 460	bathrm.	4 µg/l	0.180 mg/l
Bldg. 535	bathrm.	<MDL	0.160 mg/l
Bldg. 703	bathrm.	2 µg/l	0.180 mg/l
Bldg. 911	bathrm.	39 µg/l	0.580 mg/l

LEAD AT CONSUMERS' TAP*

MCLG: 0 µg/l
BNL range: <1 to 39 µg/l
AL at the 90th percentile: 15 µg/l
BNL 90th percentile value: 14 µg/l
location of 90th-percentile sample: Bldg. 170 bathroom
location of highest sample: Bldg. 911 bathroom
sampling date: 08/10/2009 **violation?** No

COPPER AT CONSUMERS' TAP*

MCLG: 1.3 mg/l
BNL range: <0.005 to 0.580 mg/l
AL at the 90th percentile: 1.3 mg/1
BNL 90th percentile value: 0.180 mg/l
location of 90th percentile sample: Bldg. 703 bathroom
location of highest sample: Bldg. 911 bathroom
sampling date: 08/10/2009 **violation?** No

Sampling conducted every 3 years.

* Discussed in "2011: 16 Parameters Detected in BNL's Drinking Water," on page 3.

What Is in Our Drinking Water?

Although rivers, lakes, streams, ponds, and reservoirs are all sources of tap and bottled drinking water, BNL and the rest of Long Island draw drinking water from groundwater wells that are drilled into the aquifer (see story below).

As water travels over land surfaces or through the ground, it dissolves naturally occurring minerals and radioactive material. In addition, water can pick up substances resulting from human activity or the presence of animals. Contaminants that may be present in water include:

- **microbial contaminants:** bacteria and viruses, which may come from sewage, livestock operations, wildlife, etc.
- **inorganic chemical contaminants:** 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.
- **pesticides & herbicides:** 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 contaminants:** 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 contaminants:** can be naturally occurring, or from oil and gas production, mining activities, nuclear facilities, etc.

Because of the presence of contaminants, source water is often "finished," or treated, to remove substances or reduce their concentration before that water is fit for human consumption (see photo essay on page 4).

Regardless, drinking water, including bottled water, may reasonably be expected to contain at least small amounts of contaminants. The presence of contaminants, however, does not necessarily indicate that the water poses a health risk (see table on page 3).

Some people may be more vulnerable to illness-causing microorganisms or pathogens in drinking water than others. People whose immune systems are compromised may be particularly at risk of infections. Those people include: cancer patients who are undergoing chemotherapy, people who have undergone organ transplants, persons with HIV/AIDS or other immune system disorders, and some elderly people and infants. These people or their caregivers should seek advice from their health-care providers.

Guidelines from the U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control on ways to reduce the risk of illness by cryptosporidium, giardia, and other microbial pathogens are available from the EPA's Safe Drinking-Water Hotline, (800) 426-4791. More information about drinking-water contaminants can be obtained from the EPA at www.epa.gov/safewater; or from the New York State Department of Health at www.health.state.ny.us.

2011 Analytical Data
Inorganic Chemicals, Bacteria, Radioactivity

The following maximum values were measured in samples of well water or finished water at the Water Treatment Plant. The 11 parameters noted in this table as detected in BNL water are discussed on page 3.

WATER-QUALITY INDICATORS

indicator	*BNL sample*	*MCL*
alkalinity†	50.0 mg/l	NS
ammonia	<MDL	NS
calcium†	15.0 mg/l	NS
chlorides*	76.0 mg/l	250 mg/l
color	<MDL	15 units
conductivity†	310 μmhos/cm	NS
cyanide	<MDL	NS
methylene blue active substances	<MDL	NS
nitrates*	0.9 mg/l	10 mg/l
nitrites	<MDL	1.0 mg/l
odor	<MDL	3 units
pH	5.9 standard units	NS
sulfates*	12.0 mg/l	250 mg/l
total coliform*	1 positive sample	ND

METALS

metal	*BNL sample*	*MCL*
antimony	<MDL	6.0 μg/l
arsenic	<MDL	50 μg/l
barium*	0.055 mg/l	2.0 mg/l
beryllium	<MDL	4.0 μg/l
cadmium	<MDL	5.0 μg/l
chromium	<MDL	100 μg/l
fluoride	<MDL	2.2 mg/l
iron*	3,300 μg/l	300 μg/l
lead	<MDL	15 μg/l
manganese*	90 μg/l	300 μg/l
mercury	<MDL	2.0 μg/l
nickel	0.12 μg/l	100 μg/l
selenium	<MDL	50 μg/l
silver	<MDL	100 μg/l
sodium*	42.0 mg/l	NS
thallium	<MDL	2.0 μg/l
zinc*	0.03 mg/l	5.0 mg/l

OTHER

parameter	*BNL sample*	*MCL*
asbestos	<MDL	7 MFL

RADIOACTIVITY

parameter	*BNL well max.*	*MCL*
gross alpha*	3.09 pCi/l	15 pCi/l
gross beta	<MDL	50 pCi/l**
tritium	<MDL	20,000 pCi/l
radium-228	<MDL	5 pCi/l
strontium-90	<MDL	8 pCi/l

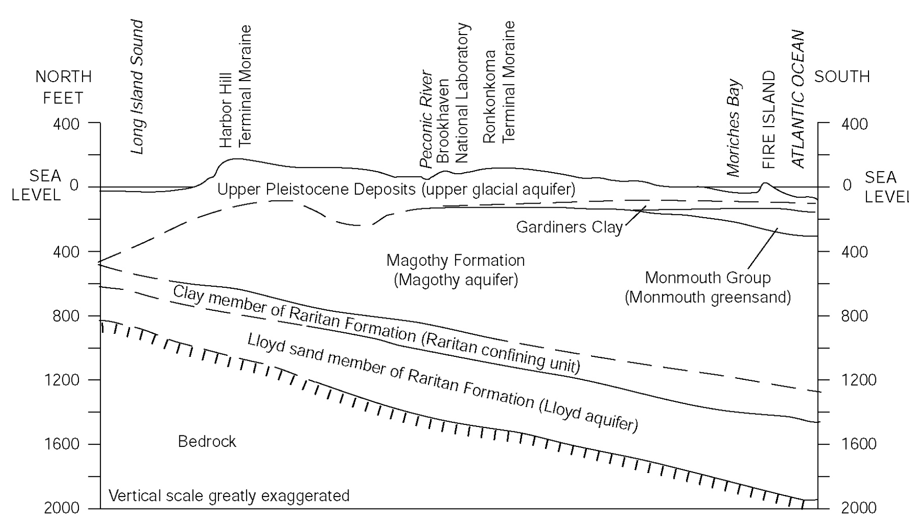
<MDL: less than the minimum detection limit.
NS: drinking-water standard not specified.
† measure of water hardness or dissolved salts.
* Discussed in "2011: 16 Parameters Detected in BNL's Drinking Water," page 3.
** New York State considers 50pCi/l to be the level of concern for beta particles.

Long Island's 'Sole Source' Aquifer Is Brookhaven Lab's Water Source

All of the water supplied by BNL comes from beneath the ground and is referred to as groundwater. That water is stored beneath the ground 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 below): From the surface to about 150 feet down is the Upper Glacial aquifer, from 150 to 1,000 feet is the Magothy, and from 1,000 to about 2,000 feet is the Lloyd. Drilled into the Upper Glacial, 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 a day for use as drinking water, process cooling water, or fire protection. Last year, in total, BNL pumped some 488,824,000 gallons.

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. Long Island's regional aquifer was so named on June 21, 1978, following a 1975 petition to the EPA by the Environmental Defense Fund.



BNL's Source Water Assessed

As required by the 1996 amendments to the Safe Drinking Water Act, an assessment of the source water used by BNL's public water system was done by NYSDOH, as noted below. Based upon available hydrogeological, land use, and water-quality susceptibility information, the assessment of Brookhaven Lab's source water provides the Laboratory with additional information for use in protecting the source of BNL's drinking water.

As part of the assessment, known and possible contamination sources were evaluated. The assessment includes a susceptibility rating for each well, which is 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, then it does not necessarily mean that there is a health risk. For a discussion of contaminants detected in 2011, see "2011: 16 Parameters Detected in BNL's Drinking Water" on page 3.

BNL's drinking water is pumped from five in-service, on-site wells (see story above and photo essay on page 4). According to NYSDOH source-water assessment, two wells are rated as having a very high susceptibility to industrial solvents. This is 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 the well, then this contamination would be removed by treatment facilities (air stripping or carbon filtration) before the water is delivered to the consumer.

In addition, 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 cannot provide water that meets drinking-water standards, then the Lab would immediately remove it from service.

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

2011 Analytical Data
Organic Compounds, Pesticides, Micro-Extractables

With one exception noted in the table below and shown in the table on page 3, the following compounds were not detected in source water from the Lab's five drinking-water wells or finished water at the Water Treatment Facility:

compounds	*BNL max.*	*MCL*
dichlorodifluoromethane	<MDL	5 μg/l
chloromethane	<MDL	5 μg/l
vinyl chloride	<MDL	2 μg/l
bromomethane	<MDL	5 μg/l
chloroethane	<MDL	5 μg/l
trichlorofluoromethane	<MDL	5 μg/l
1,1-dichloroethene	<MDL	5 μg/l
methylene chloride	<MDL	5 μg/l
trans-1,2-dichloroethene	<MDL	5 μg/l
1,1-dichloroethane	<MDL	5 μg/l
cis-1,2-dichloroethene	<MDL	5 μg/l
2,2-dichloropropane	<MDL	5 μg/l
bromochloromethane	<MDL	5 μg/l
1,1,1-trichloroethane	<MDL	5 μg/l
carbon tetrachloride	<MDL	5 μg/l
1,1-dichloropropene	<MDL	5 μg/l
1,2-dichloroethane	<MDL	5 μg/l
trichloroethene	<MDL	5 μg/l
1,2-dichloropropane	<MDL	5 μg/l
dibromomethane	<MDL	5 μg/l
trans-1,3-dichloropropene	<MDL	5 μg/l
cis-1,3-dichloropropene	<MDL	5 μg/l
1,1,2-trichloroethane	<MDL	5 μg/l
total trihalomethanes*	23.2 μg/l	80 μg/l
1,1,2,2-tetrachloroethane	<MDL	5 μg/l
1,3-dichloropropane	<MDL	5 μg/l
chlorobenzene	<MDL	5 μg/l
bromobenzene	<MDL	5 μg/l
1,2,3-trichloropropane	<MDL	5 μg/l
2-chlorotoluene	<MDL	5 μg/l
4-chlorotoluene	<MDL	5 μg/l
1,3-dichlorobenzene	<MDL	5 μg/l
1,4-dichlorobenzene	<MDL	5 μg/l
1,2-dichlorobenzene	<MDL	5 μg/l
1,2,4-trichlorobenzene	<MDL	5 μg/l
hexachlorobutadiene	<MDL	5 μg/l
tetrachloroethene	<MDL	5 μg/l
1,1,2,2-tetrachloroethane	<MDL	5 μg/l
1,2,3-trichlorobenzene	<MDL	5 μg/l
benzene	<MDL	5 μg/l
toluene	<MDL	5 μg/l
ethylbenzene	<MDL	5 μg/l
m,p-xylene	<MDL	5 μg/l
p-xylene	<MDL	5 μg/l
o-xylene	<MDL	5 μg/l
styrene	<MDL	5 μg/l
isopropylbenzene	<MDL	5 μg/l
n-propylbenzene	<MDL	5 μg/l
1,3,5-trimethylbenzene	<MDL	5 μg/l
tert-butylbenzene	<MDL	5 μg/l
1,2,4-trimethylbenzene	<MDL	5 μg/l
sec-butylbenzene	<MDL	5 μg/l
4-isopropyltoluene	<MDL	5 μg/l
n-butylbenzene	<MDL	5 μg/l
methyl tertiary butyl ether	<MDL	50 μg/l
lindane	<MDL	200 ng/l
heptachlor	<MDL	400 ng/l
aldrin	<MDL	5 μg/l
heptachlor epoxide	<MDL	200 ng/l
dieldrin	<MDL	5 μg/l
endrin	<MDL	200 ng/l
methoxychlor	<MDL	40 μg/l
toxaphene	<MDL	3 μg/l
chlordane	<MDL	2 μg/l
polychlorinated biphenyls (PCBs)	<MDL	500 ng/l
2,4,5-TP (silvex)	<MDL	10 μg/l
dinoseb	<MDL	50 μg/l
dalapon	<MDL	50 μg/l
pichloram	<MDL	50 μg/l
dicamba	<MDL	50 μg/l
pentachlorophenol	<MDL	1 μg/l
hexachlorocyclopentadiene	<MDL	5 μg/l
bis(2-ethylhexyl)phthalate*	<MDL	50 μg/l
bis(2-ethylhexyl)adipate	<MDL	50 μg/l
hexachlorobenzene	<MDL	5 μg/l
benzo(A)pyrene	<MDL	50 μg/l
2,4-D	<MDL	50 μg/l
alachlor	<MDL	2 μg/l
simazine	<MDL	50 μg/l
atrazine	<MDL	3 μg/l
metolachlor	<MDL	50 μg/l
metribuzin	<MDL	50 μg/l
butachlor	<MDL	50 μg/l
propachlor	<MDL	50 μg/l

<MDL: less than the minimum detection limit.
* discussed in "2011: 16 Parameters Detected in BNL's Drinking Water," page 3.

2011: 16 Parameters Detected in BNL's Drinking Water

As marked with an asterisk in the analytical data on pages 1 and 2, as well as below, the 16 parameters discussed, including the three chlorine disinfectants and its by-products, were detected in BNL's drinking water at concentrations well below the maximum contaminant level (MCL). Hence, there were no violations of the federal Safe Drinking Water Act, as amended, or any other applicable government regulation. For more information regarding these contaminants, go to EPA's web site at www.epa.gov/safewater/hfacts.html.

CONTAMINANT AND UNIT OF MEASUREMENT	DATE OF DETECTION	VIOLATION (YES/NO)	LEVEL DETECTED	DETECTION LOCATION	RANGE OF RESULTS	MCLG	REGULATORY LIMIT (MCL, TT, or AL)	LIKELY SOURCE OF CONTAMINATION
MICROBIOLOGICAL CONTAMINANTS								
Total Coliform Bacteria (a)	06/06/11	No	1 Positive	Bldg. 490	NA	0	No positive samples	Naturally present in the environment
RADIOACTIVE CONTAMINANTS								
Gross Alpha (pCi/L)	09/13/11	No	3.09	Well 7	<1.1 - 3.09	0	15	Erosion of natural deposits
INORGANIC CONTAMINANTS								
Barium (mg/L)	06/07/11	No	0.055	Well 11	<0.025 - 0.055	2	2	Erosion of natural deposits
Chlorides (mg/L)	06/07/11	No	76	Well 11	36 - 76	0	250	Naturally occuring; indicative of road-salt contamination
Iron (µg/L) (b)	06/07/11	No	3,300	Well 6	<40 - 3,300	0	300	Naturally occuring
Manganese (µg/L)	06/07/11	No	90	Well 6	<10 - 90	0	300	Naturally occurring; indicative of landfill contamination
Nickel (µg/L)	06/07/11	No	0.12	Well 4	<0.005 - 0.12	0	None	Nickel enters groundwater and surface water by dissolution of rocks and soils, from atmospheric fallout, from biological decays and from waste disposal
Nitrates (mg/L)	06/07/11	No	0.9	Well 11	<0.05 - 0.9	0	10	Runoff from fertilizer use; leaching from septic tanks and/or sewage; erosion of natural deposits
Sodium (mg/L)	06/07/11	No	42.0	Well 11	19.0 - 42.0	0	None	Naturally occuring or due to road salt, water softeners, and/or animal waste
Sulfates (mg/L)	06/07/11	No	12	Well 11	8.0 - 12.0	0	250	Naturally occuring
Zinc (mg/L)	07/12/11	No	0.03	Bldg. 400	0.01 - 0.03	0	5	Naturally occuring or due to mining waste or corrosion of household plumbing
VOLATILE ORGANIC CONTAMINANTS								
Total Trihalomethanes	01/04/11	No	23.2	Well 11	<0.5 - 23.2	0	80	By-product of water chlorination
SAMPLING AT THE CONSUMER'S TAP (Tap water samples were collected throughout the Laboratory site) *								
CONTAMINANT AND UNIT OF MEASUREMENT	**DATE OF SAMPLING (MO./YR)**	**AL EXCEEDANCE (YES/NO)**	**90th PERCENTILE RESULT**	**DETECTION LOCATION OF MAX**	**RANGE OF RESULTS**	**MCLG**	**AL ACTION LEVEL**	**LIKELY SOURCE OF CONTAMINATION**
Copper (mg/L)	08/10/09	No	0.18	Bldg. 911	<0.005 - 0.58	0	1.3	Corrosion of household plumbing
Lead (µg/L)	08/10/09	No	14.0	Bldg. 911	<1.0 - 39	0	15.0	Corrosion of household plumbing

Notes:
(a) 1 positive total coliform sample collected; all subsequent samples collected were negative. BNL collects less than 40 samples per month and is considered to be in violation only when two or more samples are total coliform positive; therefore, there was no violation resulting from the one positive sample.
(b) Iron is removed from water in Wells 5, 6 and 7 at the Water Treatment Facility.
* Sampling at the consumer's tap is performed every 3 years; next sampling is scheduled for 2012 and will be reported in the 2013 water report.

2011 Analytical Data

Chlorine Disinfectant and Its By-Products

Daily, 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 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.

As a result, the Safe Drinking Water Act was amended in 1996 to regulate disinfectants and their by-products. In accordance with the amendment, BNL has been complying with these rules since 2004. BNL's 2011 averages for chlorine residual and by-products are based on results from finished tap water. There were no violations in 2011.

disinfection residual	2011 running annual average	MRDLG
chlorine*	0.6 mg/l	4 mg/l
disinfection by-products	**2011 BNL annual sample**	**MCL**
total trihalomethanes[1]	21 µg/l	80 µg/l
haloacetic acids (five)[2]	13 µg/l	60 µg/l

* BNL range of results for chlorine is 0.3-1.1mg/l; maximum found in Bldg. 1005 on 05/05/11.

** Sampled at Bldg. 363 on 08/02/11.

[1] Total trihalomethanes is the sum of the concentrations 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.

Definition of Terms Used in this Consumer Confidence 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, then triggers treatment and/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 what is called the maximum contamination level goal (MCLG) as possible.
- **maximum contamination 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 concentration of a disinfectant allowed in drinking water. Disinfectants have been proven to be necessary for controlling microbial contamination of water and eliminating water-borne illnesses.
- **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.
- **treatment technique:** A required process intended to reduce the level of a contaminant in drinking water.
- **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).
- **micrograms per liter (µg/l):** Equals one part of liquid per billion parts of liquid, or parts per billion (ppb).
- **volatile organic contaminants (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.

2011 Water-Conservation Measures

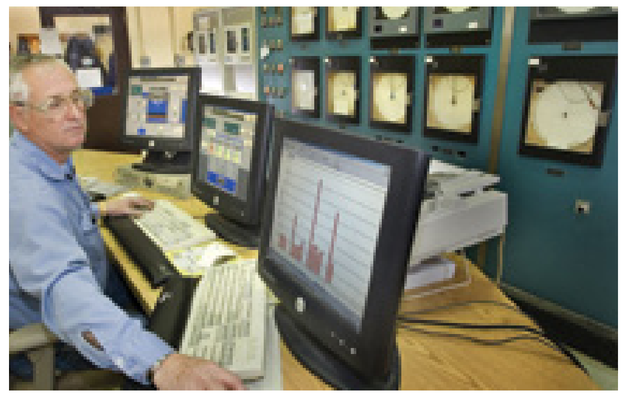
BNL's Water Managment Involves You

Since 1999, the Lab has reduced its water consumption by some 46 percent. But, in 2009, when President Obama signed Executive Order 13514, BNL, among other federal entities, has been required to reduce its water use by another 26 percent by 2020. Since the order was signed, however, the Lab's water usage has instead increased, due to more research activity, which is a good thing, as well as operational issues, which are being addressed by the Lab's water-management plan.

So what can you do to conserve the Lab's water? Start by being conscious of your personal uses, i.e., reduce faucet flow, decrease running water while not using it, etc., and report any drips, leaks, and 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.

BNL Drinking Water: Step by Step From Source to Finished Product

STEP 1. Of the five in-service drinking-water wells, wells 4, 6 and 7 provide high-in-iron source water, which must be "finished" at BNL's Water Treatment Facility (WTF) before being distributed around site. At one of these wells, Phil Pizzo is seen performing preventive maintenance on a pump motor. Wells 10 and 11 pump water that is low in iron, so it does not require treatment. This water is simply chlorinated and pH-adjusted before entering the water distribution system. — Roger Stoutenburgh CN10-144-00



In the control room of BNL's Water Treatment Facility (WTF), Bldg. 624 on Upton Road, is Richard Lutz. — Roger Stoutenburgh D2820306

STEP 10. At the clear well, where up to 250,000 gallons of "finished" water is stored before its final chlorination and distribution, Richard Lutz (left) and Jack Kulesa take samples. — Roger Stoutenburgh CN10-146-00

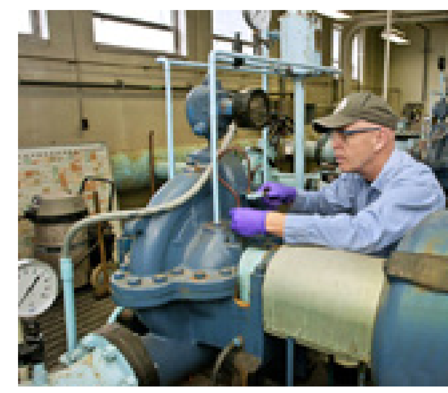
Although BNL's "raw" water comes from five in-service, on-site drinking-water wells drilled into the Upper Glacial aquifer (see page 3), the Lab's "finished" drinking water is produced with pride by the staff of BNL's Water Treatment Facility (WTF) of the Energy & Utilities Division.

Producing BNL's finished water are five water-treatment engineers, each having NYSDOH grade IIA/IIB certification. In alphabetical order, they are: Tom Boucher, Jack Kulesa, Richard Lutz, Phil Pizzo, and Greg Stawski. Also on the WTF staff is Bob DeAngelis, an operator. They are supervised by Water System Supervisor Frank Mancini, who is NYSDOH grade IA certified. WTF operations are overseen by Utilities Complex Manager Bill Chaloupka.

To make what is called potable water for BNL's daily transient and resident population of approximately 3,000 people , WTF staff employ "federal public water system no. 511891." The centerpiece of this system is the WTF itself, located in and around Building 624 on Upton Road. Able to handle up to 6 million gallons per day, the WTF was built in 1963 to remove iron and manganese from the Lab's source water. Over the years, the facility has undergone a series of upgrades, most recently in 1995-96.

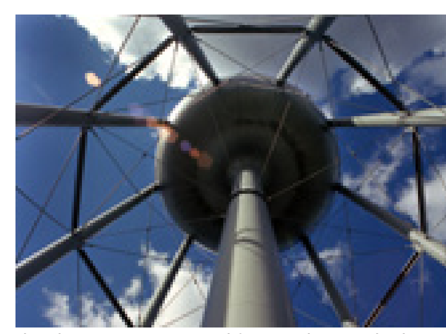
The step-by-step flow of water through the water-treatment process and the on-the-job performance of the WTF's certified staff are shown in the following photos.

STEP 2. Chlorine is added to water from all the wells to kill microbes and oxidize iron. Bob DeAngelis is pictured inspecting a liquid sodium hypochlorite storage tank. — Joseph Rubino D4720411



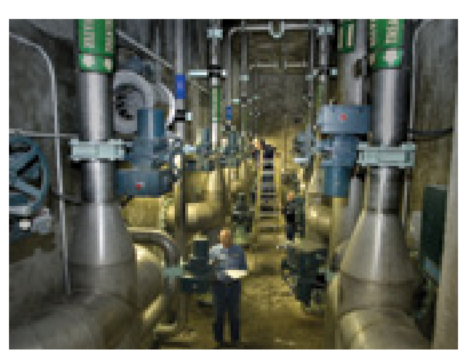
STEP 11. The high-service pumps send finished water from the WTF to the two water towers on site. Bob DeAngelis is seen checking a pump. — Joseph Rubino D740411

STEP 3. Aeration reduces carbon dioxide gas and aids in iron oxidation. At the aeration tank, Phil Pizzo and Greg Stawski are seen sampling the water. — Roger Stoutenburgh D2850306



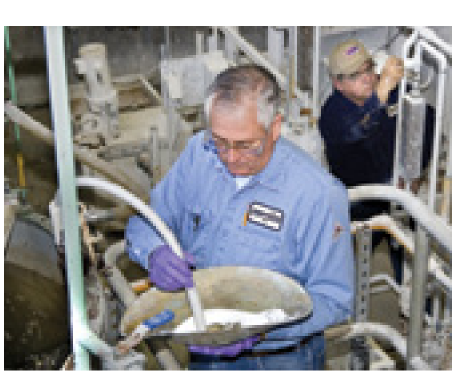
STEP 12. Water from the Lab's two storage towers is delivered on site at 55 to 70 pounds of pressure per square inch via 45 miles of distribution pipe. Viewed from its base is the larger of the Lab's towers, which holds one million gallons of water. — Roger Stoutenburgh CN10-44-00

STEP 4. Lime is added to raise the pH and soften the water. Greg Stawski is pictured as he feeds lime into the hopper. — Roger Stoutenburgh D2800306



STEP 7. To remove all particles, filtration is performed using a rapid sand filter made up of sand and anthracite coal. Seen inspecting the valves in the filtration valve gallery are: (front to back) Richard Lutz, Phil Pizzo, and Greg Stawski. — Roger Stoutenburgh D2750306

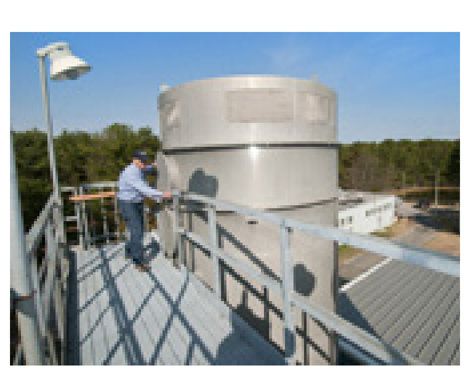
STEP 13. Drinking water is sampled at different intervals in various locations, depending upon the test, and samples are analyzed by an independent, certified lab. Results are reported to the Suffolk County Department of Health Services and to BNL's Environmental Protection Division, which ensures that the Lab's water complies with all applicable regulations. Seen testing BNL water quality is Tom Boucher. — Roger Stoutenburgh CN10-41-00



STEP 5. Polymer is added to aid in flocculation (see step 6). Richard Lutz (front) is seen adding polymer into a rapid-mix tank, as Phil Pizzo adjusts the flow rate. — Roger Stoutenburgh D2810306

STEP 8. The wet well stores filtered water before it is pumped into the air-stripping towers. Viewed in the wet-well pump room, Richard Lutz (front) works on a check valve, while Jack Kulesa inspects pump seals. — Roger Stoutenburgh CN10-38-00

STEP 6. 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. Pictured at the retention tank, Jack Kulesa (left) is checking for floc. — Roger Stoutenburgh CN10-35-00



STEP 9. Bob DeAngelis inspects one of the air-stripping towers, which remove volatile organic compounds (VOCs) from water being treated. — Joseph Rubino D4760411

BNL Water Quality Consumer Confidence Report

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- **editor:** Karen Ratel, Environmental Protection Division, Ext. 3711, ratel@bnl.gov
- **editorial board:** Bill Chaloupka, Energy & Utilities Division, Ext. 7136, chaloupka@bnl.gov; Bob Lee, Environmental Protection Division, Ext. 3148, blee@bnl.gov; Jennifer Higbie, Environmental Protection Division, Ext. 5919, higbie@bnl.gov, Sherry Johnson, Community Relations Office, Ext. 5658, sjohnson@bnl.gov
- **Web:** www.bnl.gov/bnlweb/pubaf/water/quality.htm www.bnl.gov/bnlweb/pubaf/water/reports.htm
- **mail:** P.O. Box 5000 Upton NY 11973

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