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City of Baltimore
Annual Water Quality Report
Baltimore City Department of Public Works

Reporting Period: January 1, 2008 to December 31, 2008

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The Bureau of Water and Wastewater strives to provide the best possible customer service. You can help us by using the 311 system. If you have a water, sewer or storm drain issue which requires our assistance, please call 311. Examples of these would be: no water in my house, broken main spotted on 1st Street, sewage flowing in a stream, storm drain filled with trash....

By using 311 Baltimore is able to provide you with a tracking number which is directly tied to your service request. By using 311 we can make sure your request is processed, tracked, completed and evaluated for customer satisfaction. By calling your "Uncle Joe who works for the City" to fix the problem, there really is no way of telling what happened to your request. Perhaps Uncle Joe forgot to relay the information or gave it to the wrong person.

If you don't like to talk on the phone you can always utilize 311 on-line: https://baltimore.customerservicerequest.org/web_intake_balt/Controller.

If you have a question you would like answered which is not a request for service you can send it to Water@baltimorecity.gov. Examples of these would be: When is fishing season at Loch Raven?, How is my drinking water

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Emerging Water Treatment Technologies: Membrane Filtration

In 2008, the City's three water treatment facilities produced approximately 230 million gallons per day (MGD) on average, to sufficiently supply the 1.8 million consumers in the City of Baltimore and the metropolitan area.

As a part of the overall "multiple barrier" treatment process, the City employs the Rapid Sand Filtration technique, a widely-used and accepted water treatment system dating back to the early part of the 20th century. This water purification method principally involves running water through a filter bed of sand media which separates impurities and other suspended solids from water and allows clean water to percolate through the tiny voids of the fine sand particles. The amount of suspended solids in drinking water is tightly regulated by the Maryland Department of the Environment and closely monitored at the filtration plants. Water clarity is used as one indicator of the potential for water to harbor harmful microorganisms; the clearer the water, the better the water.

Though the sand filtration process is technically complex in terms of engineering, chemical and mechanical aspects, it is conceptually simple and involves running water through a bed of sand media to allow water through the media pores and to extract and separate very small particles on the sand bed surface.

In the current water treatment system, processes upstream of the filtration process in the treatment train help in the removal of a significant portion of larger particles and other impurities through chemical application and extended detention times in settling tanks. These upstream processes reduce filter loading and extend individual filter runtimes during the filtration process, assuring that the treatment plants can meet both quantity and quality demands.

The rapid sand filtration system has proven to be effective, simple, cost effective, reliable and easy to maintain and operate and provides water of high clarity. However with continued increased emphasis on water clarity, and in an effort to ensure that "raw" water of varying clarity can be successfully treated, the metropolitan water system is working with Baltimore area engineers and scientists to explore a newer and more technologically advanced method of filtration: **membranes**. As part of a study to design a water filtration plant that can treat raw water from the Susquehanna River, membrane filtration is being evaluated as a part of the treatment train.

Membranes are very thin hollow tubes which allow water to pass through, while retaining extremely small particles ensuring that very high water clarity can be acheived. They are more suitable for raw water which can change quality very quickly.

The process of membrane filtration involves forcing water through the membrane wall to separate impurities. (see Figure 1). Filtration takes place from the outer surface of the fiber to the hollow inner core. Filtered water passes through the wall of the fibers while particulates

Figure 1: Hollow Membrane Tube - MEMCOR®

in the feed stream are retained on the outside of the fiber wall.

Membrane configurations come in a pressure mode filtration system or in the submerged membrane filtration system.

The submerged membrane systems, as illustrated in Figure 2, operate in an open tank design. Feed water typically flows by gravity into the membrane cell. A suction pump draws filtrate water through the membranes. Submerged systems are ideal for retrofitting existing basins and increasing capacity in a small footprint.

Figure 2: Submerged Membrane - MEMCOR®

Pressurized membrane systems (Figure 3) operate in a closed environment. Feed water is pressurized through the membranes. Both the submerged and pressurized systems have fully-automated processes including backwash, cleaning and membrane integrity testing.

Figure 3: Pressurized Membrane - MEMCOR®

The City along with its "water partners" in the surrounding jurisdictions will continue to explore promising treatment techniques to provide high-quality water to regional consumers.

BALTIMORE CITY WATER QUALITY REPORT FOR 2008

During the year 2008 the City performed approximately 150,000 water quality analyses as part of a continuous effort to assure the water you drink meets or exceeds regulatory standards. The water is analyzed for over 90 different drinking water contaminants. A summary of the finished water quality results is provided below. The data represents the most recent testing done in accordance with the requirements of EPA's Water Testing Regulations and were the only regulated substances found in your drinking water.

TERMS AND ABBREVIATIONS — What They Mean in Plain English

Term / Abbreviation	Definition	What it Means
PPM	Parts per million	1 ppm is the same as one drop in 10 gallons of water.
PPB	Parts per billion	1 ppb is the same as one drop in 10,000 gallons of water.
HLD	Highest Level Detected	Same
MCL	Maximum Contaminant Level	The highest level of a contaminant allowed by health regulations established by the Environmental Protection Agency.
MCLG	Maximum Contaminant Level Goal	Health related goals. The MCL is set as close to this "goal" as possible but with consideration to achievability and cost.
NTU	Nephelometric Turbidity Units	Units of measurement used to report the level of turbidity or "cloudiness" in the water.
AL	Action Level	If the "Action Level" for a particular contaminant is exceeded, a response that may include additional treatment steps and / or public education may have to be initiated by the water system.
TT	Treatment Technique	A "Treatment Technique" is a required process that is intended to reduce the amount of a specific contaminant in drinking water.
pCi/L	picoCuries per Liter	A measure of the level of radioactivity in the water.
TURBIDITY	Relates to a condition where suspended particles are present in the water.	Turbidity measurements are a way to describe the level of "cloudiness" of the water.
TOTAL / FECAL COLIFORMS	Indicator Bacteria	Type of bacteriological tests routinely used to determine if contamination has occurred in a drinking water system.
MRDL	Maximum Residual Disinfectant Level	Disinfectant level beyond which some people may experience irritating effects. Based on running annual average of monthly averages of distribution system samples computed quarterly.

MICROBIOLOGICAL CONTAMINANTS

SUBSTANCE	MCLG	MCL	ASHBURTON PLANT	MONTEBELLO PLANTS	MAJOR SOURCES
TOTAL COLIFORMS	0	The presence of coliform bacteria in more than 5% of monthly samples will exceed the MCL.	Highest monthly percentage of positive samples: 0%	Highest monthly percentage of positive samples: 0%	Naturally present in the environment.
FECAL COLIFORMS and E. COLI	0	A routine sample and a repeat sample are total coliform positive, and one is also fecal coliform or E. Coli positive.	Highest monthly percentage of positive samples: 0%	Highest monthly percentage of positive samples: 0%	Human and animal fecal waste.

TURBIDITY

SUBSTANCE	MCLG	MCL	ASHBURTON PLANT		MONTEBELLO PLANTS		MAJOR SOURCES
TURBIDITY[1]	None	Treatment Technique (TT)	HLD	LOWEST %	HLD	LOWEST %	Soil run-off.
		Filtration	0.35 NTU	99.7	0.29 NTU	100	

1. Turbidity cannot exceed 1 NTU and must be less than or equal to 0.3 NTU in at least 95% of measurements taken each month. Lowest % is the lowest percentage of monthly filtered water turbidity samples less than 0.3 NTU.

LEAD AND COPPER TESTING

Lead and copper testing was last required by regulatory standards in 2006. During that year, the testing involved 53 "tier 1" or high risk homes. To determine compliance, the 53 test results were arranged from the lowest value to the highest. The 90th percentile value is identified by: 53 x 0.9 = 47.7. Therefore, the 48th value, arranged from lowest to highest, must be below the "action level" for lead and copper. Our system met this compliance standard. Testing is required again in 2009.

LEAD AND COPPER TESTING RESULTS (2006)

SUBSTANCE	ACTION LEVEL	90TH PERCENTILE	SAMPLE RESULTS GREATER THAN ACTION LEVEL
LEAD	15 ppb	12 ppb	3
COPPER	1,300 ppb	209 ppb	0

To minimize your exposure to lead and copper, if the tap has not been used for several hours, it is recommended that you flush your tap for at least 30 seconds before using water for drinking or cooking and don't consume hot water from the tap. To conserve water, consider keeping a container of drinking water in your refrigerator.

ARSENIC RESULTS

SUBSTANCE	MCL	ASHBURTON PLANT	MONTEBELLO PLANTS	MAJOR SOURCES
ARSENIC	0.010 ppm	<0.002 ppm	<0.002ppm	Erosion of natural deposits.

INORGANIC CONTAMINANTS

SUBSTANCE	MCLG	MCL	ASHBURTON PLANT		MONTEBELLO PLANTS		MAJOR SOURCES
			HLD	RANGE	HLD	RANGE	
BARIUM	2 ppm	2 ppm	0.02 ppm	0.02 ppm	0.04 ppm	0.03 - 0.04 ppm	Discharge of drilling wastes & metal refineries; erosion of natural deposits.
NITRATE (AS NITROGEN)	10 ppm	10 ppm	2.36 ppm	0.78-2.36 ppm	2.88 ppm	1.09 - 2.88 ppm	Run-off from fertilizer use; leaching from septic tanks; erosion of natural deposits.

FLUORIDE

SUBSTANCE	MCLG	MCL	ASHBURTON PLANT			MONTEBELLO PLANTS			MAJOR SOURCES
			HLD	RANGE	AVERAGE	HLD	RANGE	AVERAGE	
FLUORIDE	4 ppm	4 ppm	1.51 ppm	0.10 - 1.51 ppm	0.99 ppm	1.39 ppm	0.03 - 1.39 ppm	0.95 ppm	Water additive that promotes strong teeth.

CHLORINE

SUBSTANCE	MRDLG	MRDL	RUNNING ANNUAL AVG. OF MONTHLY SAMPLES COMPUTED QUARTERLY	MAJOR SOURCE
CHLORINE	4 ppm	4 ppm	0.54 ppm (Based on 4,592 distribution system samples collected in 2008)	Water treatment additive to disinfect supply.

RADIOACTIVE CONTAMINANTS

SUBSTANCE	MCLG	MCL	ASHBURTON PLANT	MONTEBELLO PLANTS	MAJOR SOURCES
BETA PHOTON EMITTERS	0 mrem/yr	50 pCi/L*	3+/-2 pCi/L	3+/-2 pCi/L	Erosion of natural deposits.
ALPHA EMITTERS	0 pCi/L	15 pCi/L	<1 pCi/L	1+/-1 pCi/L	Erosion of natural deposits.

*The MCL for Beta Photon Emitters is 4 millirems per year (a measure of radiation absorbed by the body). The EPA considers 50 pCi/l to be a level of concern for this contaminant.

VOLATILE ORGANIC CHEMICALS

SUBSTANCE	MCLG	MCL	ASHBURTON PLANT			MONTEBELLO PLANTS			MAJOR SOURCES
			HLD	RANGE	*AVERAGE	HLD	RANGE	*AVERAGE	
TOTAL THM'S	N/A[1]	80 ppb	81 ppb	13 - 81 ppb	42 ppb	83 ppb	18-83 ppb	44 ppb	By-product of drinking water chlorination.
HAA(5)	N/A[1]	60 ppb	101 ppb	4-101 ppb	32 ppb	95 ppb	2-95 ppb	39 ppb	By-product of drinking water chlorination.

1. Not applicable because there are individual MCLG's for individual THM's and HAA(5)'s. *The averages listed are running annual averages. Compliance is based on these values.

Important Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised people such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly citizens and infants can be particularly at risk from infections. These people should seek advice about drinking water from their healthcare providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Cryptosporidium (crip-toe-spor-ID-ee-um) is a protozoan, a single-celled parasite that can invade and reside in the intestines of animals and people. This organism is found in some surface water (lakes, reservoirs, rivers, etc.) And also groundwater under the influence of surface water. Infection of healthy individuals by this organism can cause a gastrointestinal illness referred to as cryptosporidiosis (crip-toe-spor-id-ee-o-sis), which may produce symptoms including diarrhea, headache, abdominal cramps, nausea, vomiting and low-grade fever. The symptoms usually last one to two weeks.

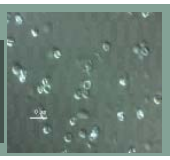
For immunocompromised people, however, the infection can continue and last for several months. Because there are no effective medical treatments, prolonged infection can be fatal for severely immunocompromised individuals. Human transmission routes include ingestion of contaminated food or drinking water or through direct contact with contaminated fecal matter. The City monitors its raw water sources for the presence of Cryptosporidium using the services of environmental laboratories employing the latest available and approved analytical methods.

CRYPTOSPORIDIUM RESULTS

Liberty: 0.0 Oocyst/Liter

Loch Raven: 0.00 Oocyst/Liter

Susquehanna River: 0.1 Oocyst/Liter



Microscopic view of Cryptosporidium oocysts

SECONDARY CONTAMINANTS

Sodium levels in the water supply are often of concern to consumers who contact our facilities. Sodium naturally occurs in raw waters but the concentration can be increased due to the influence of run-off from road surfaces treated with rock salt during snow and ice removal efforts. During the year 2008, the average sodium concentrations measured in the finished water from the Ashburton and Montebello Water Treatment Plants were 17.2 ppm and 18.7 ppm respectively and are considered low.

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processed?, What are those big domes at Back River?....You can also call 311 for those more general questions or go to www.baltimorecity.gov for answers.

In order to run Baltimore in an efficient manner, the 311 system was established. Circumventing the system means that your request gets lost and may never be addressed.

Baltimore County residents who receive water bills from Baltimore City: please call 410-396-5352 with your water customer service requests and inquiries.

All Baltimore City water customers can call 410-396-5398 for billing inquiries.

Eleventh Annual Water Quality Report

This is the eleventh edition of Baltimore City's Annual Water Quality Report that the Department of Public Works is pleased to make available to Baltimore's customers. This report for our Water System (PWSID#:0300002) contains information regarding the quality of the water you drink, as well as educational and important public health notices and contacts. The information in this Drinking Water Quality Report, covering the year 2008, is being provided to you in addition to other notices that may be required by law.

Questions about this report, questions about drinking water quality, or information on source water assessments and requests for additional copies should be directed to one of the City's Water Quality Laboratories (Ashburton - 410-396-0150 or Montebello - 410-396-6040).

We are pleased to inform you that tours of the treatment plants are again being offered; however, some restrictions may continue to be observed based on ongoing facility security requirements.

This report, along with more information about water quality, system history and common water quality concerns, can be accessed through the Baltimore City Department of Public Works' Web Site at: http://www.baltimorecity.gov

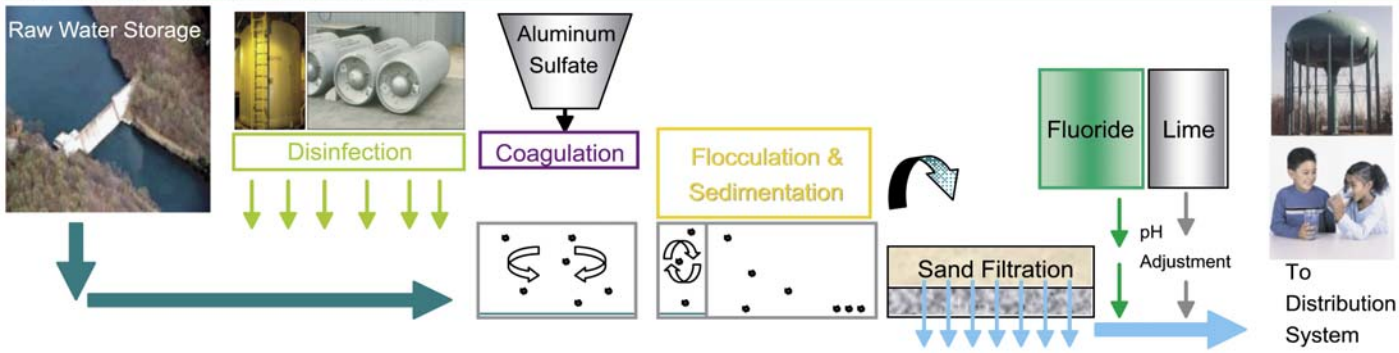
What Are the Sources of Baltimore's Water?

Baltimore uses surface water from rainfall and snowmelt as the source of its water. This water, approximately 75 billion gallons of storage volume at maximum capacity, is collected and stored in the City owned and operated watersheds. Liberty Reservoir supplies raw water to the Ashburton Treatment Plant and is located on the North Branch Patapsco River. Loch Raven Reservoir supplies water to the Montebello Filtration Plants (1 and 2) and is located in Baltimore County on the Gunpowder Falls. Prettyboy Reservoir is located approximately six miles south of the Maryland and Pennsylvania State line and is within the drainage area of Loch Raven Reservoir. Water is released from Prettyboy Reservoir into Gunpowder Falls, which drains into Loch Raven Reservoir. The City also maintains a raw water supply intake located along the Susquehanna River, which was last used in 2008.

The City of Baltimore is currently involved in continuing negotiations with the Susquehanna River Basin Commission to secure future rights to withdraw adequate volumes of water from the Susquehanna River in times of drought to meet water demands. The Commission, an agency composed of gubernatorial representatives from Maryland, New York and Pennsylvania and the Federal Government, was established in 1970 to manage the resources of the Susquehanna River basin.

Baltimore's Water Treatment Process

When the water reaches the filtration plants, sufficient chlorine is added to kill many of the microorganisms that could otherwise potentially cause illness...



Consumers should be aware that drinking water, including bottled water, might reasonably be expected to contain at least small amounts of some contaminants.

How Can Impurities Get In the Water Supply?

As water travels over the surface of the land, it dissolves naturally-occurring minerals and can pick up substances resulting from the presence of animals or from human activity. Contaminants may include:

- *Viruses and bacteria that may come from sewage treatment plants, septic systems, live-stock, and wildlife*
- *Salts and metals that can be naturally-occurring or result from storm water runoff, wastewater discharges, and farming*
- *Organic chemicals that are by-products of industrial processes and petroleum production, agriculture, gas stations, storm water runoff, and septic systems*
- *Radioactive contaminants, which can be naturally occurring. In order to assure that tap water is safe to drink, the Environmental Protection Agency (EPA) sets regulations that limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations set limits for contaminants in bottled water that must provide the same protection for public health. Consumers should be aware that drinking water, including bottled water, might reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).*

You Can Help with Water System Security

Water system security continues to be an enormously important issue. If you notice suspicious activities in or around local water utilities, such as persons cutting, or climbing facility fencing, loitering, tampering with equipment or other similar activities, please contact your local law enforcement agency immediately by dialing 911. For other suspicious activities that may appear non-threatening such as persons videotaping or photographing facilities, equipment or structures, please call 410-396-0150.