BUFFALO WATER AUTHORITY 1995 WATER QUALITY REPORT

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Buffalo's Waterfront

Water is Life ... Don't waste it !

INTRODUCTION

In response to growing concerns about the quality and safety of drinking water, the water industry is undergoing significant changes. Communication with consumers, regarding the quality of water, is imperative in establishing and building the trust and confidence in this product that is the cornerstone of life. A link to the community, through communication, is essential to inform, educate, increase understanding and gain this confidence. The Buffalo Water Authority (BWA) wants consumers to know we care about water quality issues.

The following is the second annual water quality report compiled by the BWA. This report is an attempt to answer your concerns about the quality and safety of water supplied to Buffalo's households and businesses. We also wish to give the consumer a sense of the BWA's future.

Included in this report is information regarding the raw water supply, water treatment and distribution, along with water quality parameters set by the state and federal government, and how Buffalo's water compares with these parameters. As you will see, the quality of Buffalo's water easily meets and exceeds the most stringent standards outlined by state and federal regulators.

The BWA is committed to serving the community by revamping and modernizing the water treatment process to take advantage of the most effective and economical technology available. Many changes have recently taken place, and more will be undertaken in the near future in response to the changing environment and stricter government regulations.

We are eager to respond to any question or comments you may have. Please forward your remarks to:

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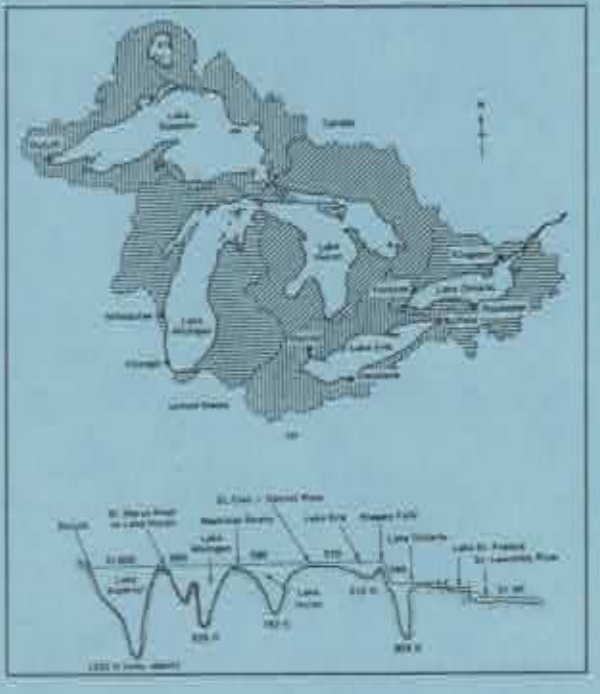
Water Treatment As A Natural Process

The source of all Buffalo's water is Lake Erie. Lake Erie is the shallowest of the Great Lakes, with an average depth of only 85 feet. It also has the shortest detention time of the Great Lakes. Water remains in the lake for only 2.6 years before it is replaced by fresh water (as compared with 191 years in Lake Superior or 22.6 years in Lake Huron). It is also the siltiest of the Great Lakes. Its bottom consists of finely grated sand, easily upset during turbulent storms.

The combination of its shallowness, short detention time and sandy unstable bottom bestows a great asset upon this body of water. The lake is able to quickly flush itself of harmful contaminants such as pesticides and other organic wastes. When Lake Erie becomes turbulent, fine particles of sand and silt become agitated and suspended throughout the lake. Organic contaminants will tightly cling to these particles and will be quickly flushed from the lake. Therefore water treatment begins as a natural process due to the structure and makeup of Lake Erie.



Buffalo's Water Treatment Process

Emerald Channel Intake

Buffalo's water intake is located in Lake Erie at the mouth of the Niagara River. This region is known as the Emerald Channel, due to the sparkling clarity of the water in this area. When the water temperature exceeds 50 degrees Fahrenheit, chlorine or potassium permanganate is added to the water at the intake. This is to control zebra mussels, and to help combat taste and odor problems created by their presence. The water is gravity fed to an onshore screen house located at the Colonel Ward Pumping Station Complex, by a 12 X 12 foot conduit. At this screen house, water is filtered through meshed screens, capturing objects such as fish and sticks.

Gravity delivers the water through a conduit where chlorine, fluoride, and polyaluminum chloride (PAC) are added. Chlorine is used to disinfect the water, and control zebra mussels and other organisms. Fluoride is added to guard against tooth decay. PAC is a chemical coagulant designed to cause fine particles in the water to bind together forming floc.

Pumps direct the rushing water to an underground basin. Once thoroughly mixed, most of the debris in the water is allowed to settle out into the settling basin as sludge. The sludge is pumped to the Buffalo Sewer Authority for further treatment.

The water, still containing some floc, is directed over rapid sand filters. It is here, by gravity and water pressure, final filtration takes place.

The quality and safety of the water is tested by an in house laboratory at every stage of the treatment process. The water is then pumped through the water mains to the community, where further tests are conducted from samples taken throughout the city, including private homes, businesses and public facilities. This is done to make certain the water continues to remain high in quality and safety.

Water Distribution

Water is essential for all life. Besides drinking, bathing and recreation, water is used to fight fire, and has countless industrial applications. The City of Buffalo pumps approximately 110 million gallons of treated water every day. This water must be transported, after treatment, throughout the city. Pumps transport the treated water from a 28 million gallon clear well, located below the filter beds, through two large conduits. After receiving a pressure boost from auxiliary pumps, the water travels through 800 miles of pipes and 25,000 valves to 90,000 service connections and 7,800 fire hydrants.

This enormous network of pipes, valves, service connections and hydrants is diligently maintained, day and night, throughout all seasons. A crew of 57 service workers is called upon to respond to any number of circumstances that can interrupt the distribution of treated water.

GETTING TO THE BOTTOM OF IT

Buffalo Water Dept. Worker Carl Malcewski climbs out of a deep hole in Gittere St Sunday as co-workers John Trimper left; Tom Huthmacher, second from right; and Mackewiak prepare to pump the hole dry. A break in a 6 inch water main eroded soil beneath the street, causing a cave-in, which swallowed a parked car. The car, which was towed away, was not seriously damaged. Water service to the area, interrupted about noon, was restored in less than three hours.

Drinking Water Standards

The Safe Drinking Water Act (SDWA) was passed in 1974 because of congressional concerns about organic contaminants in drinking water and uneven state supervision of public drinking water supplies.

The SDWA requires the USEPA to set enforceable standards for health-related drinking water contaminants to apply to all public water systems.

In addition to health related enforceable standards, the SDWA required the USEPA to set nonenforceable federal guidelines for contaminants that may adversely affect the aesthetic quality of drinking water.

In 1979 and 1980 the focus of the USEPA efforts was on (1) synthetic organic chemicals(SOC) in drinking water resulting from industrial contamination of surface water supplies and on (2) organic contaminants that were produced in the disinfection process, i.e. trihalomethanes(THM).

Supplemental lead and copper testing was completed in December 1993. Action levels were set for these contaminants.

The results for 1994's required testing are listed in the following table. The allowable concentration is the maximum contaminant level (MCL).

NOTES

CONC = Concentration

< - Less than

BDL = Below Detectable Limits

NLS = No Set Limit

NTU = Nephelometric Turbidity Unit

POC's = Primary Organic Compounds(59 Total)

SOC's = Synthetic Organic Compounds(43 Total)

THM's = Trihalomethanes

BWA Test Results For 1994 - 1995

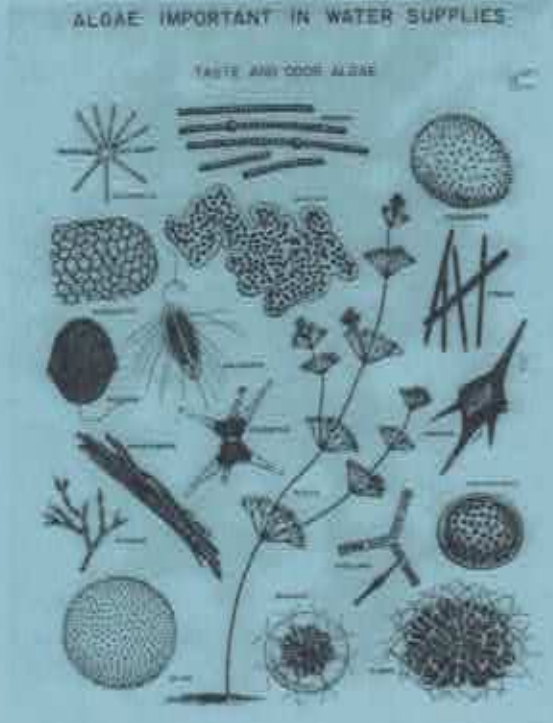
Compounds	Allowable	Entry&Distribution	
Primary Inorganic	**MCL (ppm)**	**Range**	**Avg.**
Arsenic	0.05		<0.001
Barium	2		<0.001
Cadmium	0.005		<0.0003
Chromium	0.1		0.01
Copper	1.3		-
Lead	0.015		<0.0001
Mercury	0.002		<0.0001
Selenium	0.01		<0.001
Silver	0.05		<0.007
Antimony	0.006		<0.001
Beryllium	0.004		0.002
Nickel	0.1		<0.001
Thallium	0.002		<0.001
Cyanide	0.2		<0.010
Sulfate	250		32.05
Nitrite Nitrogen	<1	<0.003	0.067
Nitrate Nitrogen	10	0.25 - 2.03	0.18
Primary Organic	**MCL (mg/l)**	**Range**	**Avg.**
POC's	0.005		<0.0005
Total THM's	0.1		0.026
SOC's\Pesticides	Varies		BDL
Secondary	**MCL (mg/l)**	**Range**	**Avg.**
Chloride	250		16
Fluoride	2.2	0.10 - 1.17	0.78
Iron	0.3	0.020 - 0.030	<0.005
Manganese	0.3	18.8 - 2.5	<0.001
Zinc	5		<0.0018
Color	15 units	1 - 10	5
Unregulated	**MCL (mg/l)**	**Range**	**Avg.**
Alkalinity	NLS	73 - 90	85
Aluminum	NLS	0.001 - 0.220	<0.003
Calcium	NLS	31.8 - 36.2	34.8
Magnesium	NLS	7.8 - 8.4	8.1
Hardness	NLS	117.6 - 139	125.2
Sodium	NLS	8.2 - 8.7	10.9
Total Dissolved Solids	NLS	141 - 187	162
Phosphorus	NLS		-
Silicone	NLS		-
Total Organic Carbon	NLS		22.99
Other Compounds	**MCL**	**Range**	**Avg.**
pH (acidity)		7.3 - 7.9	7.7
Turbidity	0.5 NTU	0.15 - 1.6	0.35
Coliform Bacteria	<1/100 ml		<1/100
Gross Alpha	15 pCi/L	+/-0.77	0.325
Gross Beta	50 pCi/L	+/-0.92	1.17
Radium 226	5.0 pCi/L	+/- 037	.04

Aesthetic Quality

Taste and odor is one component of drinking water's aesthetic quality. The Water Authority in recent years has been experiencing some of the worst episodes of summer taste and odor in its 70 year history. Although water sometimes has a taste and odor, it is 100% safe to drink.

Decaying vegetation and byproducts of microbia are probably the most universal sources of taste and odor problems in surface water. The organisms most often linked to taste and odor problems are the filamentous bacteria *actinomycetes* and the blue-green algae.

Two highly studied by-products of *actinomycetes* and the blue-green algae are geosmin and methylisborneol (MIB). These compounds are responsible for the common earthy-musty odors in water supplies and have been isolated from many genera of *actinomycetes* and the blue-green algae. Both geosmin and MIB can have odor threshold concentrations of less than 10 parts per trillion.



Facts About *Cryptosporidium*

Cryptosporidium is a parasite that lives and multiplies in the intestines of warm-blooded animals. Its eggs are shed through feces, where they can enter lakes, reservoirs and other sources of drinking water. When exposed to adverse conditions, these eggs can form a spore so rugged that they become impervious to even concentrated bleach.

Once the spore is ingested, an intestinal illness called *Cryptosporidiosis* may result. The incubation period may range from 1 - 12 days. *Cryptosporidium* can be spread by person-to-person, or animal-to person contact, and by drinking contaminated water.

Human *Cryptosporidiosis* was first reported in 1976. The primary symptom is acute diarrhea. Other symptoms include abdominal pain, vomiting, headache, loss of appetite and a low grade fever.

Some persons infected with *Cryptosporidium* will not become ill, but others may be especially susceptible to *Cryptosporidiosis*. In most individuals with normal immune systems, symptoms generally persist for two weeks or less. But immunocompromised persons, including individuals receiving chemotherapy and kidney dialysis patients, persons on steroid therapy, and those with Crohn's disease or HIV/AIDS, may have severe and long-lasting illness.

Properly operated water treatment procedures are effective in providing a barrier to *Cryptosporidium* and other pathogenic microorganisms from reaching the distribution system. Due to their high resistivity to chlorine, normal disinfection methods are ineffective against these parasites. Proper filtration of these small tough organisms, including the coagulation and sedimentation processes, is the most important vehicle in their control and elimination.

Cryptosporidium is spread through contact with fecal matter. One can minimize the risk of acquiring and spreading this parasite by cleansing hands after fecal contacts such as after toilet use, diaper changing and picking up pet waste. Since cattle are a common source, avoid drinking raw milk, and cleanse hands after contact with any farm animals. Avoid drinking unfiltered water, and comply with any water advisory issued by local and state authorities. If uncertain about the quality of a water supply, exposing water to a rolling boil for at least one minute will kill *Cryptosporidium*.

Bottled water (unless distilled, filtered, or pasteurized) may contain *Cryptosporidium*. Current standards for bottled water do not guarantee that it be *Cryptosporidium*-free.

If home water filters are used, filters should have a pore size of less than 2 microns. Home filters should be certified for cyst removal by the National Sanitation Foundation (NSF; Standard #53).

THE ZEBRA MUSSEL INVASION

The zebra mussel is a small freshwater shellfish native to the Black & Caspian seas of western Russia. They were introduced into European waters in the 18th Century. By 1986 the mollusks were transported to North America from freshwater European ports, through the discharge of ballast tanks from international shippers.

They are prolific breeders. Each female can produce up to 40,000 eggs each year. Using elastic-like fibers they can attach to any hard surface and quickly colonize large areas, reaching densities of more than 100,000 per square meter. They feed by filtering water containing microorganisms through their gill system.

Once the zebra mussels invaded Lake Erie they spread like wildfire. Their impact on Lake Erie has been profound. Nearly all particulate matter is strained from the lake's water. Uneaten suspended matter is bound with mucous and amassed among the shells in its immense colonies. Because of this filtering activity, the clarity of Lake Erie has greatly improved, allowing light to penetrate much deeper, and with much greater intensity than ever before.

Unfortunately this phenomenon has serious consequences to the lake's ecosystem and water quality. Besides severely affecting the aquatic food chain, this increase in light intensity causes the foul summertime taste and odor problem. The additional light entering the lake causes a steep acceleration in the blue-green algae growing cycle, the main source of taste and odor problems.

Close-up of a zebra mussel shows the tuft of byssal threads used for attachment. Particles on the ends of the threads are debris.

The Future Of Buffalo's Water Treatment

The commitment to insure lasting quality and safety in our community's water supply induces the BWA to consider the latest in water treatment technology. Two impending additions to Buffalo's water treatment process will serve in this endeavor.

The first modification , to be completed by the end of 1995, is the addition of mechanical flocculators (large paddles), and a baffle system constructed in our settling basin. This will allow more precise control of the coagulant reaction process, and will insure an even cleaner, clearer water.

The second modification, to be completed by August, 1995, is the addition of a corrosion control system. This system has the ability to coat waterlines, guarding the water against lead and copper contamination in homes and businesses that have internal lead pipes, lead service lines and copper pipes with lead solder joints.

Furthermore, new filter media , along with equipment to monitor the quality of each filter's output, is expected to be in place by the end of 1995.

As technology advances, the ability to assess hazardous contamination in public water supplies is heightened. This results in the implementation of additional and more stringent drinking water standards. Demands upon water suppliers for more frequent monitoring and more sophisticated treatment processes to assure higher quality drinking water will increase along with the cost of public drinking water. The responsibility for assuring the safety of drinking water at the tap will be shared by federal, state, and local authorities; the public water suppliers; and consumers.

This Water Quality Report has been prepared
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