



2010 ANNUAL DRINKING WATER QUALITY REPORT

CITY OF GLOUCESTER - MASSDEP PWS ID # 3107000

CAROLYN KIRK, MAYOR

MICHAEL HALE, DIRECTOR OF PUBLIC WORKS

This report is a snapshot of drinking water quality that we provided last year. Included are details about where your water comes from, what it contains, and how it compares to state and federal standards. We are committed to providing you with information because informed customers are our best allies.

I. PUBLIC WATER SYSTEM INFORMATION

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GLOUCESTER PUBLIC WATER SYSTEM

Our water system is routinely inspected by the Massachusetts Department of Environmental Protection (MassDEP). MassDEP inspects our system for its technical, financial, and managerial capacity to provide safe drinking water to you. To ensure that we provide the highest quality of water available, your water system is operated by Massachusetts certified operators who oversee the routine operation of our systems.

The Gloucester Public Water System consists of the following:

- East Gloucester System: Babson Water Treatment Plant; Babson & Goose Cove Reservoirs; and Klondike Water Treatment Plant & Reservoir (provides a lesser supplemental water supply).
- West Gloucester System: West Gloucester Water Treatment Plant; Dykes, Haskell, and Wallace Reservoirs; and Wallace & Haskell Pump Stations transfer water to Dykes Reservoir.
- Distribution System: 125 miles of water main with the majority older unlined cast iron pipe; Water Storage Facilities at Bond Hill Tank 7 million gallon (MG), Plum Cove Standpipe 1MG, and Blackburn Standpipe 0.6 MG (supplies the high service area fed from the Fuller Pump Station); and Unidirectional Distribution System Flushing began in 2009.

Neither the East nor the West Gloucester Systems have the capacity alone to supply the city's water needs continuously, thus we alternate operation between the Babson and West Gloucester plants. The operation of the water treatment plants, pump stations, and distribution system sampling is performed by Veolia Water North America (Veolia), the city's contract operator since November 1, 2009, under the supervision of the Environmental Engineer. The Department of Public Works (DPW) operates the distribution system under the supervision of the DPW Operations Manager - Jay Jarosz, the Environmental Engineer, and the Director.

The City of Gloucester performed Public Water System Upgrades in 2010 that included:

- Babson Water Treatment Plant (WTP): Finished High Lift Pump and Flow Meter Replacement
- Phase 1 Emergency Upgrades: Babson WTP Inlet, Sedimentation, and Filtration Improvements; and Reservoir Intake Improvements
- Phase 2 Emergency Upgrades: Chemical Optimization, Control, and Communication Improvements at Babson, West Gloucester, Klondike, Pump Stations, and Water Storage Facilities

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The Emergency Phase 1 and 2 Public Water System Upgrades were performed per MassDEP Administrative Consent Order with Penalty ACOP-NE-09-5D008, in response to the 2009 Boil Water Order.

The 2010 Public Water System Upgrades results include:

- Water Treatment Plants (WTPs) upgraded and online: Babson 7/9, Klondike 9/17, West Gloucester 10/6
- Distribution system disinfectant residual using monochloramine was maintained
- Bacteria detections were below MassDEP limits, with no water Boil Orders due to bacteria detections
- Disinfection by products were dramatically reduced and compliant following the WTP upgrades
- All lead sampling results were below EPA & MassDEP action levels
- Three years of engineering and construction was performed in one year's time

OPPORTUNITIES FOR PUBLIC PARTICIPATION

Water users can ask questions by contacting the Office of Water Compliance by phone, fax, e-mail, or using the citizen request on the city's website <http://gloucester-ma.gov/>. In 2010 Mayor Kirk formed a citizen advisory ad hoc water committee that works closely with the city's Environmental Engineer. Known as the Water Advisory Team of Citizens H₂O (WATCH₂O), their mission is to help manage, protect, improve and conserve the City of Gloucester's water, watersheds, storm water, and wastewater infrastructure. WATCH₂O works collaboratively with the city and Gloucester citizens to promote responsible stewardship of our water systems through communication, education and development and implementation of best management practices.

The Environmental Engineer, WATCH₂O, and Veolia held a public Goose Cove Reservoir cleanup in observance of 2011 earth day and Babson Water Treatment Plant public tours on May 7, 2011. Planning is underway for more reservoir cleanups and annual tours of the city's water treatment plants. WATCH₂O is currently working closely with the Environmental Engineer to provide more useful information on the City of Gloucester's DPW Office of Water Compliance website and informational notices to customers.

2. YOUR DRINKING WATER SOURCE

WHERE DOES MY DRINKING WATER COME FROM?

Your water is provided by the following sources:

Source Name	Source ID#	Source Type	Location of Source
Babson Reservoir	3107000-01S	Surface Water	Russell Avenue (Easter Gloucester)
Goose Cove Reservoir	3107000-07S	Surface Water	Goose Cove (East Gloucester)
Dykes Reservoir	3107000-04S	Surface Water	Laurel Lane (West Gloucester)
Haskell Reservoir	3107000-02S	Surface Water	Forest Lane (West Gloucester)
Wallace Reservoir	3107000-03S	Surface Water	Magnolia Avenue (West Gloucester)
Klondike Reservoir	3107000-05S	Surface Water	Quarry Street (East Gloucester)

IS MY WATER TREATED?

Yes: Our water system makes every effort to provide you with safe and pure drinking water. To improve the quality of the water delivered to you, we treat it to remove several contaminants. Water from the reservoirs is

treated at the Babson, West Gloucester, and Klondike Water Treatment Plants before being pumped to the distribution system, storage facilities, and to your home or business.

Originally constructed circa 1970, the upgraded Babson and West Gloucester Water Treatment Plants were brought back online with significant modernization improvements with the following water treatment process:

Raw Water Supply to the Water Treatment Plants:

- Raw Water Intake: At Babson gravity flow and low lift pumps and West Gloucester gravity flow are used to bring water into the plants
- Raw Water Flow Meter: Used for dosing and flow control
- Raw Water Control Valve: Regulates gravity flows at both plants, and is fully open when low lift pumps are operating at Babson

Pretreatment: The following processes are used to remove iron, manganese, organic matter, fine particles, algae, protozoa, viruses, and bacteria from source waters

- Iron & Manganese Oxidization & Removal: Sodium Hydroxide and Potassium Permanganate are added before raw water enters the plants to optimize removal in the sedimentation tanks
- Rapid Mix Coagulation: Chemicals added to clump fine particles into larger floc particles
 - Polyaluminum Chloride (PACl): Positive charges used to collect negatively charged fines
 - Polymer: Used to bind smaller particles into larger settleable floc (Babson only)
- Flocculation: Gentle mixing for creation of larger floc particles
- Sedimentation: Settling, collection, and removal of floc particles
 - Large tanks slow the water velocity down allowing floc particles (sludge) to settle out
 - Flights connected by chains are used to scrape sludge that is discharged to the sanitary sewer

Pre-filter Chlorination: Sodium Hypochlorite is added for additional iron & manganese removal

Filtration: Sand beds are used to filter out any remaining particles and clarify water

- Filter backwashing is used to clean out accumulated particles in the filters that are discharged to a sludge lagoon at Babson and to the sanitary sewer at West Gloucester

Water Treatment: Post filter water enters the clearwell tank and the following chemicals are added:

- Disinfection: Sodium Hypochlorite is added to kill micro-organisms
- Fluoride: Sodium Fluorosilicate is added for oral health
- pH Adjustment: Sodium Hydroxide is added for corrosion control for a target pH of 7.5 to 8
- Alkalinity: Sodium Bicarbonate is added for corrosion control to buffer pH making the water more stable and less susceptible to pH changes in the distribution system

High Lift Water Pumps & Flow Meter: Water is pumped and metered into the distribution system

Secondary Distribution System Disinfectant: After the high lift water pumps and before exiting the plant

- Secondary distribution system disinfection: Dilute Ammonia Sulfate is added as water is leaving all plants to create monochloramine, a long lasting disinfectant that produce less disinfection by products

Treated Water: Leaves Babson & West Gloucester Water Treatment Plants to distribution system

The water quality of our system is constantly monitored by the contract operator Veolia, the Environmental Engineer, and MassDEP at the water treatment plants and in the distribution system to determine the effectiveness of existing water treatment and to determine if any additional treatment or actions are required.

HOW ARE THESE SOURCES PROTECTED?

MassDEP has prepared a Source Water Assessment Program (SWAP) Report for the water supply sources serving this water system. The complete SWAP report is available at the Office of Water Compliance located at 50 Essex Avenue Gloucester, MA and online at <http://www.mass.gov/dep/water/drinking/3107000.pdf>. For more information, call 978-281-9792. The SWAP Report assesses the susceptibility of public water supplies. Drinking water may be threatened by many potential contaminant sources including storm runoff, road salting, animal wastes, and improper disposal of hazardous materials.

WHAT CAN BE DONE TO IMPROVE PROTECTION?

The SWAP report recommends:

- Review railroad right of way yearly operating plans
- Keeping prohibited activities out of the watersheds to minimize potential waste impact to the reservoirs

Our public water system plans to address the protection recommendations by:

- Maintaining contact with the railroad
- Stay active in the watershed and address potential waste impacts

Residents can help protect sources by:

- Practicing good septic system maintenance
- Supporting water supply protection initiatives at city council meetings
- Taking hazardous household chemicals to hazardous materials collection days
- Limiting pesticide and fertilizer use, etc.

3. SUBSTANCES FOUND IN TAP WATER

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals, and in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants -such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants -such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, and farming.

Pesticides and herbicides -which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic chemical contaminants -including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Radioactive contaminants -which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, MassDEP and U.S. Environmental Protection Agency (EPA) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. All drinking water, including bottled water, may 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 EPA's Safe Drinking Water Hotline (800-426-4791).

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

4. IMPORTANT DEFINITIONS

Maximum Contaminant Level (MCL) – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG) – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Residual Disinfectant Level (MRDL) -- The highest level of a disinfectant (chlorine, chloramines, chlorine dioxide) allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG) -- The level of a drinking water disinfectant (chlorine, chloramines, chlorine dioxide) below which there is no known or expected risk to health. MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Treatment Technique (TT) – A required process intended to reduce the level of a contaminant in drinking water.

Action Level (AL) – The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

90th Percentile – Out of every 10 homes sampled, 9 were at or below this level.

ppm = parts per million, or milligrams per liter (mg/l)
ppb = parts per billion, or micrograms per liter (ug/l)
ppt = parts per trillion, or nanograms per liter
pCi/l = picocuries per liter (a measure of radioactivity)
NTU = Nephelometric Turbidity Units
ND = Not Detected
N/A = Not Applicable
mrem/year = millirem per year (a measure of radiation absorbed by the body)

Secondary Maximum Contaminant Level (SMCL) – These standards are developed to protect the aesthetic qualities of drinking water and are not health based.

Massachusetts Office of Research and Standards Guideline (ORSG) – This is the concentration of a chemical in drinking water, at or below which, adverse health effects are unlikely to occur after chronic (lifetime) exposure. If exceeded, it serves as an indicator of the potential need for further action.

5. WATER QUALITY TESTING RESULTS

WHAT DOES THIS DATA REPRESENT?

The water quality information presented in the following tables is from the most recent round of testing, performed in accordance with the regulations. All data shown was collected during the last calendar year unless otherwise noted in the tables. MassDEP has reduced the monitoring requirements for inorganic contaminants at Babson and synthetic organic contaminants because the source is not at risk of contamination.

	Date(s) Collected	90 TH percentile	Action Level	MCLG	# of sites sampled	# of sites above Action Level	Possible Source of Contamination
Lead* (ppb)	8/2010	3	15	0	23	0	Corrosion of household plumbing systems
Copper* (ppm)	8/2010	0.032	1.3	1.3	23	0	Corrosion of household plumbing systems

*These samples were collected following startup of the upgraded water treatment plants and Lead and Copper sampling and analysis will be performed again in August 2011.

	Highest % Positive in a month	Total # Positive	MCL	MCLG	Violation (Y/N)	Possible Source of Contamination
Total Coliform	4%	-----	>5%	0	N	Naturally present in the environment
Fecal Coliform or <i>E.coli</i>	-----	0	*	0	N	Human and animal fecal waste

* Compliance with the fecal coliform/*E.coli* MCL is determined upon additional repeat testing.

Turbidity	TT	Lowest Monthly % of Samples	Highest Detected Daily Value	Violation (Y/N)	Possible Source of Contamination
Daily Compliance (NTU)	1	-----	0.4	N	Soil runoff
Monthly Compliance*	At least 95%	99%	0.4	N	

Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of water quality.

*Monthly turbidity compliance is related to a specific treatment technique (TT). Our system filters the water so at least 95% of our samples each month must be below the turbidity limits specified in the regulations.

Regulated Contaminant	Date(s) Collected	Highest Result or Highest Running Average Detected	Range Detected	MCL or MRDL	MCLG or MRDLG	Violation (Y/N)	Possible Source(s) of Contamination
Inorganic Contaminants: Note W = West Gloucester WTP/Dykes Reservoir, B Babson WTP/Babson Reservoir, and K = Klondike WTP/Klondike Reservoir							
Antimony (ppb)	6/9/10W 9/8/10B 12/14/10K	0.06	<0.02-0.06	6	6	N	Discharge from fire retardants; ceramics; electronics; solder
Barium (ppm)	6/9/10W 9/8/10B 12/14/10K	0.015	0.015	2	2	N	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits

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Regulated Contaminant	Date(s) Collected	Highest Result or Highest Running Average Detected	Range Detected	MCL or MRDL	MCLG or MRDLG	Violation (Y/N)	Possible Source(s) of Contamination
Fluoride (ppm) ■	daily	1.2	1-1.2	4	4	N	Added for oral health at WTPs, naturally from erosion of natural deposits
Nitrate (ppm)	6/9/10W 9/8/10B 12/7/10K	0.20	0.02-0.20	10	10	N	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Perchlorate	9/8/10B 10/21/10W 12/11/10K	0.94	<0.10-0.94	2	N/A	N	Rocket propellants, fireworks, munitions, flares, blasting agents
Volatile Organic Contaminants: Not detected above method analytical reporting limits for sampling Babson Reservoir 9/8/10, 6/9/10 Dykes Reservoir, and 12/7/10 Klondike Reservoir							
Radioactive Contaminants							
Gross Alpha (pCi/l) (minus uranium)	6/21/07 9/24/07 12/14/07	2.9	0.0-2.9	15	0	N	Erosion of natural deposits
GrossBeta/photon emmitters (pCi/L) ▲	6/21/07 9/24/07 12/14/07	5.1	<0.2-5.1	50	0	N	Decay of natural and man-made deposits
Radium 226 & 228 (pCi/L) (combined values)	6/21/07 9/24/07 12/14/07	0.5	0.2-0.5	5	0	N	Erosion of natural deposits
Synthetic Organic Contaminants: Not detected above method analytical reporting limits for sampling at Dykes Reservoir 3/22/10 and 5/25/10, Babson Reservoir 9/8/10 and 10/1/10, and Klondike Reservoir 9/21/10 and 12/7/10							
Disinfectants and Disinfection By-Products							
Total Trihalomethanes (TTHMs) (ppb)	Quarterly	91.1	39.1-91.1	80	-----	Y Q1 & Q2	Byproduct of drinking water chlorination
Haloacetic Acids (HAA5) (ppb)	Quarterly	28.0	13.6-28.0	60	-----	N	Byproduct of drinking water disinfection
Chlorine (ppm) (free, total or combined)	Monthly in (year)	1.2	0.5-1.2	4	4	N	Water additive used to control microbes

■ Fluoride also has a secondary contaminant level (SMCL) of 2 ppm.

▲ The MCL for beta particles is 4 mrem/year. EPA considers 50 pCi/L to be the level of concern for beta particles.

Unregulated contaminants are those for which there are no established drinking water standards. The purpose of unregulated contaminant monitoring is to assist regulatory agencies in determining their occurrence in drinking water and whether future regulation is warranted.

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Unregulated and Secondary Contaminants	Date(s) Collected	Result or Range Detected	Average Detected	SMCL	ORSG	Possible Source
Inorganic Contaminants						
Sodium (ppm)	6/9/10	32	38.5	----	20	Natural sources; runoff from use as salt on roadways; by-product of treatment process
	9/8/10	49				
	12/6/10	46				
	12/14/10	27				

6. COMPLIANCE WITH DRINKING WATER REGS

DOES MY DRINKING WATER MEET CURRENT HEALTH STANDARDS?

We are committed to providing you with the best water quality available. One contaminant; however, last year did not meet the applicable health standard regulated by the state and federal government. Contaminant violations of Total Trihalomethanes (TTHM), a byproduct of water disinfection, running annual averages (RAA) occurred during the first and second quarter of 2010. This resulted from the 2009 Water Boil Order as is detailed below.

The City of Gloucester took the following corrective actions to minimize both TTHM and Water Boil Order risks:

- Major modernization upgrades were performed at the Babson and West Gloucester Water Treatment Plants as is detailed in Section 1 – Public Water System Information
- Mayor Carolyn Kirk, DPW-Director Mike Hale, and the Gloucester City Council committed to these upgrades for the sake of the people and businesses of Gloucester in response to the 2009 Boil Order
- The Environmental Engineer was hired October 13, 2009, who managed the upgrades, contact with MassDEP, and the contractor operator
- Veolia began contract operation of the Water Treatment Plants on November 1, 2009, and has been a responsive partner with the city in the plant upgrades, operation, and environmental compliance
- The use of monochloramine as the secondary distribution system disinfectant has provided longer lasting water disinfection which decreases the risk of a boil order and has reduced TTHMs to compliant levels

The 2009 & 2010 Total Trihalomethanes (TTHM) results in parts per billion (ppb) or ug/L and running annual averages (RAA) by quarter are presented below:

Quarter-Year	Q1-2009	Q2-2009	Q3-2009	Q4-2009	Q1-2010	Q2-2010	Q3-2010	Q4-2010
TTHM Avg.	35	56	202	64	42	45	50.1	19
TTHM RAA	75	59	84*	89*	91*	88*	50	39.1

* TTHM RAA Maximum Contaminant Level of 80 ug/L exceeded

The RAA is calculated by adding the previous three quarters TTHM averages with the current quarter and dividing by four. The 2009-Quarter 3 TTHM average was extremely high as it was taken following the 2009 Boil Order when chlorine booster pumps operated in many portions of the city. This 2009-Quarter 3 TTHM elevated result, well over the 80 ppb maximum contaminant level (MCL), put the RAA in violation through 2010-Quarter 2. With the Boil Order lifted on September 9, 2009, and the switchover from the Babson to West Gloucester Water Treatment Plant on October 10, 2009, the chlorine dose was reduced and TTHM levels dropped per the 2009-Quarter 4 result. The upgraded Babson Water Treatment Plant began operation on July 9, 2010, with monochloramine as the secondary distribution system disinfectant and 2010-Quarter 3. TTHM levels were

dramatically reduced, and TTHM RRAs have been compliant since. Outside of 2009-Quarter 3 TTHM levels, all 2009 and 2010 quarter TTHM levels individually have been below the MCL.

Total Trihalomethanes: Some people who drink water containing trihalomethanes in excess of the MCL over many years experience problems with their liver, kidneys, or central nervous systems, and may have increased risk of getting cancer.

DRINKING WATER VIOLATIONS

In 2010 Total Trihalomethanes running annual average levels exceeded the maximum contaminant levels in Quarter 1 and 2. With the Public Water System upgrades we have been compliant since, with deficiencies that contributed to the 2009 Boil Order corrected.

In 2010 there were no Water Boil Orders because of excess bacteria detections; however, there was a Boil Order due to a pipe break in December 2010. Unintentionally, a contractor severed one of the 20” diameter cast iron (circa 1904) water mains serving the island portion of the City of Gloucester. This occurred at approximately 1:20 p.m. on Monday, December 20, 2010, off of Western Avenue in the general vicinity of the Blynman Canal. Because the water supply to the island side of the city was cut off, MassDEP imposed a water Boil Order for that portion of the city. The water main was repaired by approximately 6 p.m. December 20, and the Gloucester DPW began refilling the water system on the island portion of the City. The full water system was tested on the morning of December 21, and with all bacteria sampling negative for any detections, MassDEP lifted the Boil Water Order the morning of December 22, 2011.

7. EDUCATIONAL INFORMATON

DO I NEED TO BE CONCERNED ABOUT CERTAIN CONTAMINANTS DETECTED IN MY WATER?

Lead is not contained in the water provided by the city; however, it can leach from household and business water lines and plumbing fixtures. In order to reduce the potential for customer lead exposure from leaching in their internal plumbing systems, at the water treatment plants we raise the pH of the source waters to 7.5 to 8 and add alkalinity that provides buffering and stabilizes pH levels in the distribution system. Lead sampling was performed in August 2010, after the Babson Upgrades were brought on line and were found to be compliant with MassDEP and EPA levels. We will again be testing for lead in August 2011 per our MassDEP protocol.

If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Gloucester is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking.

Sodium sensitive individuals, such as those experiencing hypertension, kidney failure, or congestive heart failure, should be aware of the sodium levels where exposures are being carefully controlled. Sodium levels are elevated and come from natural sources; runoff from use as salt on roadways; by-product of treatment processes.