2011 ANNUAL DRINKING WATER QUALITY REPORT

CITY OF GLOUCESTER - MASSDEP PWS ID # 3107000

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This report is a snapshot of drinking water quality that the Department of Public Works 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 as 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 Tank 1MG, and Blackburn Tank 0.6 MG (supplies the high service area fed from the Fuller Pump Station.

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.

Since 2009 the city is performing phased Public Water System improvements as a part of MassDEP's Drinking Water State Revolving Fund (DWSRF) program with low 2% interest loans and some principal loan forgiveness. The following is summary of those projects completed, under construction, and under design:

- **Phase 1 & Phase 2 Public Water System Emergency DWSRF 2010 Upgrades** were constructed largely in 2010 and completed in 2011 are summarized as follows:
  - Phase 1: Babson Water Treatment Plant Inlet, Sedimentation, and Filtration Improvement; and all Reservoir Intake Improvements.
  - Phase 2**:** Chemical Optimization, Control, and Communication: Babson, West Gloucester, Klondike Water Treatment Plants, Pump Stations, and Water Storage Facilities.
- **Phase 3 Public Water System DWSRF 2011 Upgrades** were designed in 2011 & 2012, were bid and awarded in April of 2012, currently are under construction, and are summarized as follows:

- Phase 3A - Western Avenue and Governor's Hill Water Main Replacement Project: Western Avenue and the Governors' Hill neighborhood contain key water mains for water flow through from the main West Gloucester Bond Hill storage tank to the eastern island side of the city. This project also reconfigures piping to support a new river crossing (Phase 4B) and water supply to Gloucester's eastern island side of the city that will replace the +100 year old Spooner Tunnel water mains at the cut bridge.
- Phase 3B - Improvements at the Blackburn and Lanesville Water Storage Facilities: Provides for painting and a mixing system at the Blackburn Tank and demolition of the Lanesville Storage Tank at the Plum Cove School and installation of an elevated Pedestal Water Tank to improve water turnover (minimizing water age) and maintenance of the disinfectant residual.
- Phase 3C - Improvements at the Fuller Pump Station and Bond Hill Storage Facility: Provides for Fuller Pump Station rehabilitation that feeds the Blackburn Storage Tank supplying the Blackburn Industrial Area and the Gloucester Crossing retail mall. Adds a mixing system at the city's main Bond Hill concrete storage tank and provides for significant concrete crack repair of the tank. An actuated valve vault is also being added in North Gloucester to the trunk water main that will close when the new Lanesville Tank is full and open when it has dropped several feet. This will force use of the tank, keep the water fresh for Annisquam and Lanesville, and maintain a disinfectant residual.
- Phase 3D – Public Water System Master Plan Update: Last updated in 1998 the PWS Master Plan will reflect upgrades and provide a full evaluation of the Public Water System to allow the city to prioritize capital improvements for the next +20 years.

- **Phase 4 Public Water System (PWS) DWSRF 2012 Upgrades** design began in 2011, these are to be bid & awarded Summer 2012, and are summarized as follows:
  - Phase 4A - West Gloucester and Babson Water Treatment Plant Improvements:
    - West Gloucester Water Treatment Plant: Replacement of +40 year old original finished water pumps and pipe header; Installation of a filter backwash recycling system (This will recycle 30-80 million gallons of water each year reducing water removed from reservoirs and the discharge to the wastewater plant via Essex Avenue sewer and pump stations); Plant filter and sedimentation basin blowdown interlocks with Little River and Banjo Sewerage pump stations through new communication links to minimize the risk for sanitary sewer overflows; Installation of a generator automatic transfer switch that now requires manual generator starting; Replacement of the +40 year old sedimentation flights and chains that remove sludge to the sanitary sewer; Upgrade and replacement of the raw water intake control valve; Relocation of the plant discharge pipeline from under the Little River; Additional pressure and valve controls; Installation of a new electrical supply transformer; Installation of a system that allows the plant to run to waste before startup; Integration of these upgrades into the plant control system.
    - Babson Water Treatment Plant: Additional pressure and valve controls; Installation of a new electrical supply transformer; Installation of a system that allows the plant to run to waste before startup; Roof drainage away from the loading dock; Loading dock structural improvements; Integration of these upgrades into the plant control system.
  - Phase 4B - New two 20-inch water main pipelines constructed underneath the Annisquam River connecting West & East Gloucester replacing Spooner Tunnel mains:
    - Provides water supply redundancy from Bond Hill tank and the West Gloucester WTP to the eastern island side of Gloucester to the +100 year old Spooner tunnel pipelines (2) to the island. Phase 3A PWS Upgrades Pipeline project installs land base piping to support the Phase 4B crossing of the Annisquam River.
    - This project will ensure water supply to the eastern island side of Gloucester with 70% of population served and is critical to that supply should any issues with the +100 year old Spooner tunnel pipelines or the adjacent seawall arise in the future.
    - Following installation of the new pipelines (2) by horizontal directional drilling under the Annisquam River from adjacent to the Essex Avenue Wastewater Treatment plant to the High

School practice field outside of the Newell Stadium project, the Spooner Tunnel pipelines (2) will be taken out of service.

These phased Public Water Supply DWSRF Upgrades are necessary for the DPW to provide Gloucester with adequate, reliable, and compliant drinking water for the next twenty years with system maintenance. The upgrades will allow the city to safeguard public health and safety with improvements to water treatment plants, pumping stations, water storage facilities, and key water mains. With proper maintenance and guidance from the Phase 3D Public Water System Master Plan update, Gloucester will have a road map for the future. Following the completion of the upgrades, water main replacement and system maintenance will be the major DPW focus.

OPPORTUNITIES FOR PUBLIC PARTICIPATION

Questions can ask 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 has worked closely with the city's Environmental Engineer. Their mission is to help, protect, improve and conserve the City of Gloucester's water, watersheds, storm water, and wastewater infrastructure.

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 is 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 (an aggregation of suspended 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
- Corrosion Control: Sodium Hydroxide is added for pH Adjustment to a target pH of 8; Sodium Bicarbonate is added for alkalinity to buffer pH making the water more stable and less susceptible to pH changes in the distribution system; and Orthophosphate is added that creates a very thin coating on the walls of distribution pipes and house plumbing that protects the metal in the pipes from corrosion

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: Pumped from Water Treatment Plants to distribution system

The water quality of our system is constantly monitored by the DPW, the DPW Environmental Engineer, the contract operator Veolia, 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. The city through the Master Plan update is also updating key components of the 2005 Surface Water Supply Protection Plan to protect reservoirs & watersheds.

WHAT CAN BE DONE TO IMPROVE PROTECTION?

- Review railroad right of way yearly operating plans and maintaining contact with the railroad
- Keeping prohibited activities out of the watersheds to minimize potential waste impact to the reservoirs
- Stay active in the watershed and address potential waste impacts
- Practicing good septic system maintenance & limit pesticide and fertilizer use
- Supporting water supply protection initiatives at city council meetings
- Taking hazardous household chemicals to hazardous materials collection days

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 of 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 = millimrems 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.

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	90TH percentile	Action Level	MCLG	# of sites sampled	# of sites above Action Level	Possible Source of Contamination
Lead* (ppb)	9/2011	12	15	0	29	0	Corrosion of household plumbing systems
Copper* (ppm)	8/2011	0.038	1.3	1.3	29	0	Corrosion of household plumbing systems

*Analysis is required every three years by MassDEP and sites will be sampled and analyzed again in 2014.

	Highest % Positive in a month	Total # Positive	MCL	MCLG	Violation (Y/N)	Possible Source of Contamination
Total Coliform	1%	-----	>5%	0	N	Naturally present in the environment
Fecal Coliform or *E.coli*	-----	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	--------	0.2	N	Soil runoff
Monthly Compliance*	At least 95%	100%	0.2	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)	8/15/1& 10/12/11W 3/10/11B	ND > 0.0010	<0.0010	6	6	N	Discharge from fire retardants; ceramics; electronics; solder
Barium (ppm)	8/15/1& 10/12/11W 3/10/11B	0.17	0.015-0.17	2	2	N	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits

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	0.9-1.2	4	4	N	Added for oral health at WTPs, naturally from erosion of natural deposits
Nitrate (ppm)	8/15/11, 10/12/11W 3/10/11B	0.15	0.01-0.15	10	10	N	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Nitrite (ppm)	8/15/11& 10/12/11W 3/10/11B	ND >0.010	<0.010	1	1	N	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Perchlorate	8/15/11W	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 regulate VOCs sampling at Babson WTP 3/10/11, and West Gloucester WTP 9/7/11							
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 emmiters (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)	8/15/11W 3/10/11B	1.1	0.55-1.1	5	0	N	Erosion of natural deposits
Synthetic Organic Contaminants: Not detected above method analytical reporting limits for sampling 3/10/11 for Dalaphon at Babson Reservoir							
Disinfectants and Disinfection By-Products							
Total Trihalomethanes (TTHMs) (ppb)	Quarterly	31.7	9.6-29.4	80	-----	N	Byproduct of drinking water chlorination
Haloacetic Acids (HAA5) (ppb)	Quarterly	16.8	4.8-27.0	60	-----	N	Byproduct of drinking water disinfection
Chlorine (ppm) (total)	Monthly in (year)	1.9	1.5-1.9	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.

Unregulated and Secondary Contaminants	Date(s) Collected	Result or Range Detected	Average Detected	SMCL	ORSG	Possible Source
Inorganic Contaminants						

Unregulated and Secondary Contaminants	Date(s) Collected	Result or Range Detected	Average Detected	SMCL	ORSG	Possible Source
Sodium (ppm)	8/15/11W 10/12/11W 3/10/11B	43 51 53	49.0	----	20	Natural sources; runoff from use as salt on roadways; by-product of treatment process
Other Organic Contaminants - When detected at treatment plant as VOC residuals, not TTHM compliance						
Bromodichloromethane (ppb)	9/14/11W 3/10/11B	5.6 6.6		---	---	By-product of drinking water chlorination
Chloroform (ppb)	9/14/11W 3/10/11B	8.2 12		---	---	By-product of drinking water chlorination

6. COMPLIANCE WITH DRINKING WATER REGS

DOES MY DRINKING WATER MEET CURRENT HEALTH STANDARDS? Yes: We are committed to providing you with the best water quality available.

DRINKING WATER VIOLATIONS

In 2011 there were no drinking water violations.

Only one out of 634 distribution samples in 2011 collected tested positive for presence of Total Coliform bacteria. Coliforms are bacteria that are naturally present in the environment and Total Coliform testing is used as an indicator that other potentially harmful bacteria may be present. The Total Coliform bacteria Maximum Contaminant Level (MCL) or allowable level is that less than 5% of samples for a month test positive. The Total Coliform exceedences in August & September 2009 lead to the Boil Water Order. There were exceedences and violations of disinfection by-products in 2009 and 2010 as well, which were corrected in 2010, and are well below regulated levels in 2011. The 2011 Total Coliform & disinfection by-product compliance is indicative of the Public Water System upgrades that have been made through the efforts of Mayor Kirk, the City Council, Mike Hale DPW Director, Larry Durkin DPW Environmental Engineer, and MassDEP.

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.

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. The Gloucester DPW Water Department 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. 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

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.