



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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February 14, 2023

John M. Scannell, Director
Division of Water Supply Protection
Department of Conservation and Recreation (DCR)
251 Causeway Street
Boston, MA 02114

PWS Name: MWRA
PWS ID #6000000
Filtration Waiver Inspections
Wachusett Reservoir

David W. Coppes, Chief Operating Officer
Operations Division
Massachusetts Water Resources Authority (MWRA)
Charlestown Navy Yard
100 First Avenue
Boston, MA 02120

Dear Mr. Scannell and Mr. Coppes:

Please find attached the following information – Annual Inspection Follow-up Letter, Wachusett Reservoir. Please see Table 2 on pages nine and ten for a discussion of watershed and disinfection facility actions required and recommended. The signature on this cover letter indicates formal issuance of the attached document. If you have any questions regarding this letter, please contact Kathy Romero of my staff at kathleen.romero@mass.gov.

Sincerely,

Yvette DePeiza, Program Director
Drinking Water Program

cc: Damon Guterman, Margaret Finn, Frank Niles, program.director-dwp@mass.gov
Kristin, Divris, Sean Griffin, MassDEP NERO
Robert Bostwick, MassDEP CERO
Stephen Estes-Smargiassi, John Gregoire, MWRA
Kelly Freda, DCR DWSP
Kevin Reilly, Andrea Traviglia, U.S. EPA

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Y:DWP Archive\Boston\MWRA – Wachusett Reservoir – PWS ID #6000000 – Source Protection – Filtration Waiver – 2023-02-14

February 14, 2023

Annual Inspection Follow-Up Letter – Wachusett Reservoir

On October 17, 2022, staff from the Massachusetts Department of Environmental Protection (MassDEP), Drinking Water Program, Boston office, with staff from MWRA and DCR, conducted a remote annual review of the Wachusett Reservoir and watershed. This review took place through the Zoom meeting platform.

Additionally, on October 17, 2022, a virtual security briefing on the Cosgrove intake was conducted with invited individuals only. Attendance information for both components is provided on page 11.

On October 18, 2022, staff from MassDEP's Northeast Regional Office inspected MWRA's Carroll Water Treatment Plant disinfection facility and processes.

These inspections are requirements of the Massachusetts Drinking Water Regulations, 310 CMR 22.00, for systems with a filtration waiver. The watershed inspection, in conjunction with the Watershed Protection Control Program, and the disinfection process inspection are interrelated preventive strategies that ensure adequate control of water quality. The inspections ensure maximum use of the multi-barrier approach to source water protection.

The following information was reviewed by MassDEP Boston office staff for the annual inspection of the Wachusett Reservoir, watershed and intake.

- Wachusett Reservoir compliance letter for 2021 issued by MassDEP on February 3, 2022.
- Written Wachusett watershed updates submitted to MassDEP by the DCR Division of Water Supply Protection and MWRA on April 22, 2022.
- A detailed Wachusett Reservoir watershed program update presented by MWRA and DCR staff on October 17, 2022. Program highlights included, but were not limited to:
 - Overview of DWSP Watershed Protection Plan;
 - Land Acquisition;
 - Land Management;
 - Public Access Management;
 - Rangers/Interpretive Services; Watershed Visitor Encounters
 - Forestry Program;
 - Health of Watershed Forests – Asian Long-horned Beetle, others;
 - Wildlife Management - deer hunt, gull/geese program, loons, beaver, etc.;
 - Mass. Watershed Protection Act;
 - Resident Population within the Wachusett Reservoir Watershed Communities;
 - Water Quality and Quantity Monitoring;
 - Environmental Quality Assessment;
 - Stormwater Management and Structural Improvements;
 - Watershed Staff – vacancies, etc.

- Additionally, on October 17, 2022 a detailed presentation about the Physical Condition and Security at Cosgrove intake was made to MassDEP invited staff by MWRA security staff in a separate virtual meeting.
- DCR's Watershed Protection Plan Update, FY19-FY23 <https://www.mass.gov/info-details/dcr-watershed-plans#watershed-protection-plan->
- DCR's Land Management Plan Update, 2017 <https://www.mass.gov/info-details/dcr-watershed-plans#watershed-protection-plan->
- [DCR's Wachusett Reservoir Watershed Public Access Management Plan – 2011](https://www.mass.gov/files/documents/2017/12/21/2011wachusettaccessplan.pdf) <https://www.mass.gov/files/documents/2017/12/21/2011wachusettaccessplan.pdf> (currently being updated)
- 2022 Reservoir District Environmental Quality Assessment
- Pending, Ongoing and Harvests – MassDCR DWSP Forestry Program <https://storymaps.arcgis.com/stories/1d698658bc5843e59cae0adc0c3425fc>
- A review of DCR's current watershed outreach materials posted at <https://www.mass.gov/service-details/brochures-fact-sheets-and-reports>
- Various maps, publications and additional watershed information
- *FY22 Watershed Management Work Plan, Final Report*, DCR, June 2022, [DCR Watershed Plans | Mass.gov](#)
- *FY2023 DCR Watershed Management Work Plan, September 2022*, [DCR Watershed Plans | Mass.gov](#)
- MWRA Board of Directors Report on Key Indicators of MWRA Performance (Orange Notebook) – 2022 [MWRA - Orange Notebook Archive](#)
- Water Quality Report: 2021 Wachusett Reservoir Watershed, September 2022 [DCR Watershed Water Quality Reports | Mass.gov](#)
- Water quality data submitted to MassDEP by MWRA
- A review of the status of laboratory state certifications. All accepted eDEP results for MWRA between October 1, 2021 through September 30, 2022 were analyzed by a Mass. Certified Lab.

I. INSPECTION CRITERIA

The purpose of the on-site inspections was to evaluate the adequacy of the Wachusett Reservoir watershed and subsequent drinking water system to produce safe drinking water. The inspections included:

- 1) a review of the effectiveness of the Watershed Protection Control Program for Wachusett Reservoir;
- 2) a review of the physical condition of the source intake and how well it is protected;
- 3) a review of the appropriateness of the system's disinfection equipment and maintenance program in order to ensure a high operating reliability;
- 4) an inspection of the disinfection equipment for physical deterioration;
- 5) a review of management/operating procedures;
- 6) a review of data records that included source water quality data for fecal coliform bacteria and turbidity levels with the objective of ensuring that all required tests were conducted and recorded;
- 7) a separate review of bacteriological data for the occurrence of coliform in the distribution system in order to ensure that the disinfection process is effectively applied;
- 8) an identification of any improvements that are needed in the equipment, system maintenance, system operation, or data collection processes;
- 9) a review of the status of any SDWA compliance issues previously identified; and
- 10) confirmation that the public water system is using a laboratory certified by MassDEP for the required analytical methods.

II. INSPECTION RESULTS FOR WACHUSETT RESERVOIR

A. SOURCE WATER QUALITY CONDITIONS

- 1) Coliform Bacteria – The system has demonstrated that the requirements of 310 CMR 22.20A(2)(a)(1) for fecal coliform bacteria have been met in at least 90 percent of the representative source water samples. The samples were taken immediately prior to the point of disinfection application and were representative of the prior six-month period during which water was served to the public.
- 2) Turbidity – The system has met the requirements of 310 CMR 22.20A(2)(a)(2) and (3) for turbidity levels in representative source water samples that were taken immediately prior to the point of disinfection application.
- 3) Lab Certification - The system is using a laboratory that has been certified by MassDEP for the required analytical method(s).

B. DISINFECTION TREATMENT PROCESS

Waiver inspection comments:

At the Carroll Water Treatment Plant (“CWTP”) the disinfection treatment process that is in place has been designed to meet the required residual disinfectant concentration and contact time (“CT”) values and to achieve the inactivation rates specified in 310 CMR 22.20A(3)(a)(1) utilizing ozone as a primary disinfectant. The disinfection system is sufficient to ensure at least 99.9% inactivation of Giardia Lamblia cysts and 99.99% inactivation of viruses. Ultraviolet light (“UV”) provides at least 2-log inactivation of Cryptosporidium. MWRA calculates inactivation rates hourly and reports Giardia inactivation at maximum flow and Cryptosporidium inactivation at minimum UV dose. A review of data records demonstrates that all required tests are being conducted and disinfection is effectively practiced. In addition to the approved methods for calculating log credit inactivation, MWRA provides additional disinfection using sodium hypochlorite following UV treatment. Disinfection credit using sodium hypochlorite is not included in MWRA’s compliance calculations.

The CWTP UV system uses a variable Action Spectrum Conversion Factor (“ASCF”) that is a function of the specific operating conditions of flow, UVT (transmittance) of the water, number of lamps in operation and UV lamp output. The CWTP ASCF coefficients were programmed into the CWTP UV system by the UV system manufacturer in 2019 and has operated using these coefficients since to apply the correct UV dose to achieve the required Cryptosporidium inactivation . Following UV inactivation, sodium hypochlorite is added and provides additional disinfection through Storage Tanks A and B, after which aqueous ammonia is added to form monochloramine for secondary disinfection in the distribution system.

In 2021 MWRA assembled an expert panel to evaluate and provide comment on the disinfection process due to an apparent increase in coliform bacteria. At the recommendation of an expert panel, MWRA increased the chlorine to ammonia ration from 4.7:1 to 5.0:1 with a target dose of approximately 3.7 mg/L at the plant finished water tap and a secondary target exceeding 2.0 to 2.5 mg/L at Shaft 9A with seasonal variations. MWRA increased the ratio incrementally and monitored water quality to avoid unexpected disruptions in treatment or taste and odor impacts.

A review of the disinfection process maintenance records from 2021 found that all critical maintenance was completed on schedule. The treatment facility appears to be adequately operated and staffed. A review of operating procedures demonstrated that sufficient procedures were available for providing direction to operators and facility personnel. MWRA conducts routine evaluations of operating procedures and updates standard operating procedures (SOPs) for equipment and plant production processes on an ongoing basis.

An inspection of the physical condition of the equipment showed the equipment to be in excellent condition and well maintained. Following approval from the MassDEP, MWRA upgraded the sodium hypochlorite feed pumps in 2022 to include piping and valves in the chemical building, post treatment building and UV Rooms. The MWRA received approval from the Department on January 25, 2022 for comprehensive plant wide upgrades to the SCADA system.

Requirements

No requirements identified.

Recommendations

- 1) Continue to monitor source water quality changes and analyze impacts on distribution chlorine residual concentrations and bacteria detections. Evaluate options for process modifications to address changes in raw water quality to decrease bacteriological positivity percentage throughout system while evaluating simultaneous compliance issues.
- 2) Continue to train and update operators on maintenance and recording procedures.
- 3) Continue to evaluate and repair assets, as needed, to keep the appurtenances operating as intended.

C. WATERSHED PROTECTION/CONTROL PROGRAM

DCR and MWRA conduct an impressive watershed protection/control program. Two examples from the program include:

- The adoption of new technology in the form of mobile electronics, such as iPad Pros and GPS receivers, and staff training, allows better data collection and flow and enhances the ability to share information with other agencies and the public.
- DCR staff continued fieldwork and monitoring for water quality threats across the watersheds. DWSP continues to perform a detailed Environmental Quality Assessment (EQA) in one subbasin in each watershed, every year. In 2022, the Reservoir District EQA was completed.

MassDEP requires the following actions by MWRA and DCR DWSP (these actions are also included in Table 2).

1) Submit Watershed Update by June 1, 2023

Requirement: Submit a written update to MassDEP's Boston office on the watershed topics (listed on page two above) that were presented during the watershed meeting and inspection on October 17, 2022.

2) Maintain Adequate Staffing Numbers for Watershed Protection Program

MWRA is required to maintain sufficient technical, managerial and financial resources under its Safe Drinking Water Act Capacity Program. DCR has made significant progress in filling watershed positions that become vacant.

Requirement: MWRA and DCR will continue to identify staffing strategies for meeting Watershed Protection Program workloads.

Requirement: DCR will provide MassDEP's Drinking Water Program's Director with written updates in June 2023 and during the annual watershed review in 2023 about the number of staff vacancies in watershed programs, the status of filling them and how watershed programs are impacted. In addition, DCR shall notify MassDEP in writing at any time that watershed vacancies may impact watershed programs.

3) Continue to Reduce, Eliminate and/or Treat Stormwater Runoff to Wachusett Reservoir and Tributaries

MWRA and DCR DWSP have done an outstanding job reducing, treating and eliminating stormwater runoff into Wachusett Reservoir and tributaries. However, climate change and related warmer water temperatures and other impacts require continued water quality monitoring, maintenance of stormwater infrastructure and eliminating/reducing stormwater discharges.

Requirement: MWRA and DCR DWSP will 1) continue to reduce, treat and/or eliminate stormwater runoff to Wachusett Reservoir and tributaries and 2) work with **watershed towns, landowners and private facility owners/operators** to reduce impermeable surfaces and install vegetative buffers where appropriate. Updates on this work will be submitted by DCR during the annual watershed review in 2023.

D. DISEASE OUTBREAK

The public water system has not been identified as a source of a waterborne disease outbreak during the previous year.

E. SYSTEM COLIFORM

The public water system has complied with the maximum contaminant level (MCL) for E.coli as outlined in 310 CMR 22.05(8) and monitoring requirements as outlined in 310 CMR 22.05(1), (2), (3). The system is using a laboratory that has been certified by MassDEP for the required analytical method(s).

F. DISINFECTION BYPRODUCTS – TOTAL TRIHALOMETHANES (TTHMs) & HALOACETIC ACIDS (HAAs)

The public water system has complied with the monitoring requirements and Running Annual Average (RAA) MCLs for total trihalomethanes (TTHMs) and haloacetic acids (HAA5s) in its distribution system. The system is using a laboratory that has been certified by MassDEP for the required analytical method(s).

G. INTAKE

On October 17, 2022, MassDEP staff (invite only) met virtually with MWRA security staff to discuss and review the intake structure security and conditions. The intake structure and property continue to be well protected through multi-level security measures.

III. STATUS OF REQUIREMENTS AND/OR RECOMMENDATIONS FROM PREVIOUS ON-SITE INSPECTION (2021)

See attached Table 1

IV. REQUIRED AND/OR RECOMMENDED ACTIONS TO MAINTAIN WATERSHED STATUS (2022)

See attached Table 2

V. WATERSHED PROGRAM APPROVAL STATUS AND SUMMARY

A supplier of drinking water that uses a surface water source must meet all of the conditions as specified in 310 CMR 22.20A(2) in order to maintain a filtration waiver. Wachusett Reservoir continues to meet the minimum source and finished water quality for all customers on the system. It appears that the Watershed Protection Control Program will continue to be effective in minimizing microbiological contamination of this source water. MassDEP grants continued approval to MWRA and DCR for the Watershed Protection Control Program.

VI. The next on-site inspections will be conducted during 2023.

Table 1
**Status of Requirements and Recommendations
 from the Wachusett Reservoir Watershed Inspection on October 7, 2021 and the Carroll Water
 Treatment Plant Disinfection Facility and Processes Inspection on December 16, 2021**

Was this item identified during a prior inspection?	Reference #	Requirement/Recommendation 2021	Deadline for Taking Corrective Actions
Annual Action	2021-1	<u>Requirement:</u> Submit a written update to MassDEP’s Boston office on the watershed topics (listed on page two above) that were presented during the watershed meeting and inspection on October 7, 2021.	May 1, 2022 - completed
Yes	2021-2	<u>Requirements:</u> 1) MWRA and DCR will continue to identify staffing strategies for meeting Watershed Protection Program workloads. 2) Submit to MassDEP a quarterly (April 2022, July 2022 and October 2022) update about the number of staff vacancies in watershed programs, the status of filling them and how watershed programs are impacted.	Quarterly as noted completed
Yes	2021-3	<u>Requirement:</u> 1) Continue to reduce, treat and/or eliminate stormwater runoff to Wachusett Reservoir and tributaries. 2) work with watershed landowners and facility operators to reduce impermeable surfaces and install vegetative buffers where appropriate.	Ongoing
Yes	2021-5	Continue to monitor source water quality changes and analyze impacts on distribution chlorine residual concentrations and bacteria detections. Evaluate options for process	Ongoing

		modifications to address changes in raw water quality to decrease bacteriological positivity percentage throughout system while evaluating simultaneous compliance issues.	
Yes	2021-6	<u>Recommendation</u> : Continue to train and update operators on maintenance and recording procedures.	Ongoing
Yes	2021-7	<u>Recommendation</u> : Continue to evaluate and repair assets, as needed, to keep appurtenances operating as intended. .	Ongoing

Table 2
Requirements and/or Recommendations Action Plan from the Wachusett Reservoir, Intake and Watershed Inspection on October 17, 2022 and the Carroll Water Treatment Plant Disinfection Facility and Processes Inspection on October 18, 2022

Was this item identified during a prior inspection?	Reference #	Requirement/Recommendation 2022	Deadline for Taking Corrective Actions
Yes – Annual Action	2022-1	<u>Requirement</u> : Submit a written update to MassDEP’s Boston office on the watershed topics (listed on page two above) that were presented during the watershed meeting and inspection on October 17, 2022.	June 1, 2023
Yes	2022-2	<u>Requirement</u> : MWRA and DCR will continue to identify staffing strategies for meeting Watershed Protection Program workloads. <u>Requirement</u> : DCR will provide MassDEP’s Drinking Water Program’s Director with written updates in June 2023 and during the annual watershed review in 2023 about the number of staff vacancies in watershed programs, the status of filling them and how watershed programs are impacted. In addition, DCR shall provide MassDEP with a written update at any time that watershed vacancies may impact watershed programs.	Submit written updates on staffing to MassDEP in June 2023, during the annual watershed review in 2023 and at any other times that watershed vacancies may impact watershed programs.
Yes	2022-3	<u>Requirement</u> : MWRA and DCR DWSP will 1) continue to reduce, treat and/or eliminate	Ongoing

		stormwater runoff to Wachusett Reservoir and tributaries and 2) work with watershed towns, landowners and private facility owners/operators to reduce impermeable surfaces and install vegetative buffers where appropriate. Updates on this work will be submitted by DCR during the annual watershed review in 2023.	
Yes	2022-4	<u>Recommendation:</u> Continue to monitor source water quality changes and analyze impacts on distribution chlorine residual concentrations and bacteria detections. Evaluate options for process modifications to address changes in raw water quality to decrease bacteriological positivity percentage throughout system while evaluating simultaneous compliance issues.	Ongoing
Yes	2022-5	<u>Recommendation:</u> Continue to train and update operators on maintenance and recording procedures.	Ongoing
Yes	2022-6	<u>Recommendation:</u> Continue to evaluate and repair assets, as needed, to keep appurtenances operating as intended.	Ongoing

Attendance Sheet Provided by DCR DWSP
Wachusett Reservoir Watershed Review – October 17, 2022

Watershed Protection Briefing 10.17.22 from 0900 - noon:

Kathleen Romero, DEP
Christine Simard, DEP
Hem Pokharel, DEP
Michael Celona, DEP
Nicole Orzechowski, DEP
Dierdre Doherty, DEP
Victoria Wu, DEP
April Desclos, DEP
Michael McLean, DEP
Adam Kinney, DEP
Sean Flood, DCR
Erica Tefft, DCR
Tristan Lundgren, DCR
Bernadette DeBlander, DCR
Bryan LaRochelle, DCR
Greg Buzzell, DCR
Jamie Carr, DCR
Bill Moulton, DCR
Kelley Freda, DCR
John Scannell, DCR
John Gregoire, MWRA
Valerie Moran, MWRA
Steve Estes-Smargiassi, MWRA

Cosgrove Intake Security Briefing 10.17.22 from 1:00 – 2:00:

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