



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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November 17, 2017

Mr. Bernard E. Marshall, Superintendent
Norton Water & Sewer Department
166 John Scott Boulevard
Norton, MA 02766

RE: NORTON – Public Water Supply
Norton Water Department
PWS ID#: 4218000
Water Quality Improvement Alternatives
Guidance

Dear Mr. Marshall:

Attached please find the Department's guidance relative to alternatives to address discolored water complaints in the Town of Norton, Massachusetts. The Massachusetts Department of Environmental Protection (the Department or MassDEP) and the United States Environmental Protection Agency (EPA) have received numerous complaints from residents of Norton, Massachusetts ("Norton" or "the Town") regarding discolored drinking water. As you know, the discolored water has been of particular concern during Norton's semiannual hydrant flushing program when iron and manganese sediments can be re-suspended from the water mains during flushing. Iron and manganese are naturally occurring in groundwater and the elevated presence within Norton's water system is the reason that the Town will be constructing a drinking water treatment facility starting this spring. State Representatives Barrows and Howitt have been communicating with MassDEP concerning the discolored water, urging prompt response by the Department and Town. United States Senator Elizabeth Warren wrote a letter dated November 2, 2017, requesting EPA's intervention to assist in mitigating the discoloration. On November 7, 2017, MassDEP, EPA and the Town met to discuss the matter and to attempt to identify ways to reduce the iron and manganese in Norton's drinking water until the water treatment facility is complete.

The attached guidance follows-up on the MassDEP November 9, 2017, "Update on Town of Norton Drinking Water," posted on Norton's website, that contained a meeting summary and eight action items and recommendations intended to address discolored water and elevated iron and manganese in Norton's water system. Please continue to work with your consultants following this guidance to select strategies for implementation in coordination with MassDEP and EPA. Thank you for your ongoing efforts to address this important matter.

The signature on this cover letter indicates formal issuance of the attached document. If you have any questions concerning this document, please contact Jim McLaughlin at (508) 946-2805 or via email at james.m.mclaughlin@state.ma.us.

Sincerely,

David Johnston, Deputy Regional Director
Bureau of Water Resources

JM/encl.

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Norton Water Department
Norton, Massachusetts
PWS ID #4218000
Water Quality Improvement Alternatives Guidance

The Massachusetts Department of Environmental Protection (the Department or MassDEP) and the United States Environmental Protection Agency (EPA) have received numerous complaints from residents of Norton, Massachusetts (“Norton” or “the Town”) regarding discolored drinking water. State Representatives Barrows and Howitt have been communicating with MassDEP concerning the discolored water, urging prompt response by the Department and Town. United States Senator Elizabeth Warren wrote a letter dated November 2, 2017, requesting EPA’s intervention to assist in mitigating the discoloration. On November 7, 2017, MassDEP, EPA and the Town met to discuss the matter and to attempt to identify additional measures that could be taken to address the concerns. This guidance is meant to help the Town develop interim strategies to address the discolored water experienced by its customers for the period between now and until the drinking water filtration plant is projected to be operational in 2019.

The Town of Norton Water Department is a Community Public Water Supplier (PWS), registered under PWS ID 4218000. The Town obtains its drinking water from five groundwater wells, four of which have elevated iron and manganese levels, with two wells exceeding the EPA Health Advisory and MassDEP Office of Research & Standards (ORS) Guidance Level of 0.3 milligrams per liter (mg/l). Each well is treated chemically with potassium hydroxide to elevate the pH, sodium hypochlorite for disinfection, and AquaMAG[®] to sequester iron and manganese. Customers have experienced discolored water episodes for years, prompting the Town’s decision to construct a water treatment plant; however, the complaints appeared to increase after MassDEP directed the Town to elevate its water pH from 7.2 to 7.9 for consistency with the Town’s corrosion control study recommendation. The pH level of 7.9 had been established by the Town as its optimal pH level in its corrosion control study completed in 1992, and later approved by MassDEP. However, recent Departmental reviews found the pH was typically less than 7.2. MassDEP issued a letter dated December 16, 2016 requiring the Town to raise the pH level after voluntary water quality testing in Norton’s schools showed elevated lead and copper levels.

The Town has designed a water filtration facility to remove dissolved iron and manganese from three of its five wells. MassDEP approved the design for construction in a letter dated January 15, 2015. The Massachusetts Historical Commission (MHC) found archeological concerns with the site of the proposed treatment facility, causing a thirty (30) month delay in the project. The MHC documented completion of its site assessment in a letter dated June 13, 2017. The water filtration project is expected to be bid in the winter of 2018, with completion of the project anticipated by mid-2019.

MassDEP, EPA, and the Town have identified potential temporary strategies to reduce iron and manganese until the filtration facility is activated. However, it is important to note that changes to water treatment or operations to improve one aspect of water quality may result in unintended consequences, negatively impacting other aspects of water quality or system compliance. Balancing all the requirements is known as “simultaneous compliance,” which seeks to weigh the pros and cons of treatment/management operations options to provide a compliant drinking water supply that is also aesthetically acceptable. The following guidance is meant to provide an initial evaluation of

simultaneous compliance concerns for each option identified as having the potential to improve water quality until the treatment facility is online. Although the Department is providing this initial evaluation of options, it is up to the Town to fully evaluate each option and select its path forward balancing the pros and cons of each option. A number of options may be employed to achieve the greatest benefit for your customers.

During the November 7, 2017 meeting, the following alternatives were identified and discussed: 1) temporary filtration; 2) improved flushing methodologies; 3) construction of a filtered water station for Town residents; 4) water main replacements; 5) process optimization; 6) interconnection activation; 7) pH reduction; and 8) increasing pumping from the best quality well (Replacement Well 3). Prior to selecting any temporary strategy that aims to serve as a solution(s), effort must be made to determine the source of the water discoloration. If the discoloration is entirely due to accumulated iron and manganese deposits in the distribution system pipes, then strategies focused at the source water will not result in improved water quality. Each identified option is discussed below.

1. Temporary Filtration: Wells 4, 5, and 6 are all high in iron and manganese, and are located close to each other. Temporary filtration units could be installed to improve the water quality from these wells while the treatment facility is under construction. The Town received an estimate of \$400,000 to rent the filter units for eighteen (18) months. Additional funds would be required for operation and backwash disposal. Financing for this project may be available from the Massachusetts State Revolving Fund (SRF) program. Please contact the Department's SRF program staff in Boston for further assistance with funding questions. Should this option be selected, a WS24 Treatment Facility Construction permit application will be required. Results from the prior approved pilot study can be used to support the permit application.
2. Improved Flushing Methodologies: The Town historically flushes its distribution system during the spring and fall. The flushing is generally conducted starting from the sources, moving into the distribution system, and finishing in the southwest corner of town. An engineered unidirectional flushing program has been prepared and will be implemented in the spring of 2018. The Town anticipates the unidirectional flushing program will be more effective at scouring the distribution system pipes and removing accumulated iron and manganese deposits from the system. In addition to the improved flushing program, which is meant to scour the pipes, the Town also responds to spot complaints throughout the year by using low flows to more gently move discolored water from stagnated areas that do not have adequate water flow.
3. Filtered Water Station: The Town has decided to set up a spigot with a filter at a public location for its customers to fill containers free of charge. This water will provide customers with an option to obtain drinking and cooking water if they have particularly unaesthetic water. MassDEP has conducted a site visit and provided technical assistance to implement this option. The Department has determined the site does not constitute a new public water supply (PWS); accordingly, all applicable requirements for a water supplier using a point of use treatment device to meet a drinking water standard, per 310 CMR 22.23, will need to be followed.
4. Water Main Replacements: Water main replacement projects eliminate old pipes that act as a source of discoloration and sediment. The Town reports it has replaced approximately 25% of its 150 miles of distribution system water mains. The Town has a ten million dollar bond for

pipe replacement. 3400 feet of pipe will be replaced in the Spring of 2018, with more scheduled for the Fall of 2018.

5. Process Optimization: Department technical personnel have provided assistance to Norton and reviewed operations aimed at identifying process improvements that may improve the situation. Technical outreach continues at this time, including on-site, phone and email support to the Town.

6. Interconnection Activation: Four of Norton's municipal neighbors operate municipal community water supplies. Following review of the four water supplies, it appears that two of the communities may be able to provide Norton with water on an interim basis, the Town of Mansfield and the City of Attleboro. Both communities produce water in a similar pH range as Norton. Like Norton, Mansfield is a groundwater system, while Attleboro uses surface water. Other water quality parameters should be evaluated prior to requesting to use water from either community. For further guidance on evaluating water quality impacts, please refer to the EPA's "*Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems*," March, 2016, publication number EPA 816-B-16-003. Both Mansfield and Attleboro fluoridate their water for dental health. Instituting fluoridation typically requires taking a public vote. However, the Massachusetts Department of Public Health (DPH) indicates that communities can receive fluoridated water on an emergency basis without going through the typical process required to institute permanent fluoridation. MassDEP would require Norton to provide public notice to its customers regarding fluoride if an interconnection is used, and conduct periodic fluoride monitoring. A major concern in activating an interconnection is related to the change in flow directions caused by the new water supply. Customers in the vicinity of the interconnection may experience deteriorating water quality caused by scouring due to the change in hydraulics. This concern needs to be given serious consideration, and a process for activating the interconnection and a response plan to address unintended consequences needs to be developed prior to making any changes. A summary of actions the Town must take in activating interconnections follows:
 - a. Determine if Mansfield and/or Attleboro are willing and able to provide water;
 - b. Fully evaluate water quality compatibility with Norton's water;
 - c. Evaluate the vicinity of the interconnection(s) entry point(s) for scouring potential;
 - d. Submit a WS32 Distribution System Modification permit to MassDEP requesting the interconnection(s), including the results of the evaluations and any agreements with the supplying community;
 - e. Provide public notice to your customers regarding fluoride and any potential change in flow effects.

7. pH Reduction: Prior to making a determination that pH within the Norton public drinking water system can be lowered as per the recommendation of Norton's updated Corrosion Control Evaluation Report, MassDEP has requested Norton provide information regarding maintenance of pH system uniformity along with a long-term trend analysis showing pH range observed and changes overtime at different locations within the system. Additionally, a demonstration will need to be made that orthophosphate residual of at least 1.00 mg/l is entering the distribution system from each pumping station and can be uniformly maintained throughout the system.

Discussion has focused on the potential for a trial period of reduced pH, with continued semiannual monitoring for Lead and Copper, only after pH stability and orthophosphate levels are being maintained to minimize the potential effects of reduced pH on lead and copper levels. MassDEP and EPA view this option as least desirable for implementation because of concern that lowering the pH level can increase levels of lead and copper in drinking water.

8. Increased pumping from Replacement Well 3: Replacement Well 3 (ID number 4218000-09G) has an approved pumping rate of 263 gallons per minute (gpm), or 0.378 million gallons per day (MGD). In 2016, Norton operated the well at approximately 63% of the approved rate for an annual average daily rate of 164 gpm. A pumping test was performed in 2009 at a rate of 403 gpm. The well never reached stabilization, and the projected drawdown was under the required five feet above the well screen. Therefore, the Department does not recommend elevating the rate to 403 gpm. Additionally, the original Well 3 had manganese issues and collapsed. The Department cautions Norton that elevating the pumping rate of Replacement Well 3, particularly for an extended period of time, could mobilize naturally occurring manganese in the soil and lead to deteriorating water quality. The Department also cautions that increasing pumping may lead to scouring of deposits in the distribution system. No increase in withdrawal from Replacement Well 3 will be approved without a corresponding decrease in pumping from Wells 4, 5 and 6, all within the Canoe River watershed. The Town should engage the services of a qualified hydrogeological consultant to plan, propose, and evaluate the following process. The Department recommends the following procedures to increase withdrawal from Well 3:
 - a. Sample the well for secondary contaminants, including iron (Fe) & manganese (Mn).
 - b. Pump the well continuously at its approved daily rate of 263 gpm for two weeks. Sample daily for Fe & Mn. Measure drawdown of water levels within the replacement production well on a frequent basis (a minimum once every 8 hours).
 - c. If no issues are found, perform a second pumping test at up to 1.5 times the approved daily rate staying within the total daily allowed pumping of 0.378 MG. Specifically, pump the well at up to 395 gpm for 16 hours per day for two weeks. The average daily pumping rate would still be within the approved rate of 263 gpm over the course of a full 24 hours. Sample daily for Fe & Mn. Measure drawdown of water levels within the replacement production well on a frequent basis (a minimum once every 8 hours).
 - d. Perform a step test. Select three or four pumping rates between 263 gpm and 395 gpm and run each selected rate for an equal period of time (two or three hours). There are no shutdowns between each increase in pumping rate. Record drawdown measurements and pumping rates throughout the step test. This will establish an optimal pumping rate for the performance of an extended duration test.
 - e. Perform an extended duration pumping test for two weeks using the optimal pumping rate determined during the step test. Measure drawdown in the replacement production well as well as in existing observation wells. Perform the extended duration test in accordance with the MassDEP's most recent Guidelines and Policies for Public Water Systems. Provided stabilization of drawdown criteria are achieved, the Department will evaluate the results to determine if an elevated pumping rate can be approved for a temporary period.

- f. Provided the Department's review is favorable, Norton could request an Emergency Declaration according to the provisions 310 CMR 36.40 through 36.42. The Emergency Declaration would be used to utilize Replacement Well 3 at an increased pumping rate above its approved rate on a temporary basis. Once the emergency declaration is lifted, the approval rate of 263 gpm will be restored to Replacement Well 3.
9. Enhanced outreach efforts to residents, including continuance of efforts such as: door-to-door distribution to customers in areas to be flushed, of information aimed at reducing the discolored water impacts experienced by users during flushing; and, prompt posting on the Town's website and on social media of issues related to discolored water concerns and elevated iron and manganese issues and the Town's response efforts. The Department will continue to support the Town in efforts to increase educational outreach to its customers. Accordingly, the Department will immediately make staff available to assist Norton to develop a "Q&A" document to post on the Town's website to help answer frequently asked questions and provide education and notification to inform sensitive sub-populations, new customers, and billing units.
10. Provide regular updates: MassDEP strongly encourages Norton to continue its enhanced community outreach program with regular progress updates of the steps Norton is taking to address the water quality concerns being expressed by their customers. In addition to regular web and social media postings, particular effort should be made to provide opportunities for public access and engagement at regular water department meetings or other forums to enable direct communication and information exchange.