NJDEP OVERSIGHT REPORT
TRENTON WATER WORKS
Period: May 2023

Trenton Water Works is a community water system that provides drinking water to 200,000+ people in the City of Trenton and portions of neighboring Mercer County municipalities (Ewing, Hamilton, Hopewell, Lawrence). Due to state Safe Drinking Water Act (N.J.S.A. 58:12A) compliance concerns, the New Jersey Department of Environmental Protection (Department) issued a Unilateral Administrative Order (UAO) on October 12, 2022 to initiate direct operational oversight of Trenton Water Works (TWW). While under the Department's direct operational oversight, TWW remains responsible for managing the daily operations of the water system. To facilitate on-the-ground oversight of TWW's operations and enhance TWW's technical and managerial capacity, the Department appointed a third-party oversight contractor (TPO) that works routinely with TWW staff and reports directly to the Department.

This report is intended to summarize oversight findings and actions during the month of May 2023 and is a follow-up to the six-month report detailing findings and actions from November 2022 through May 2023.

Summary of May 2023 Findings and Immediate-Term Actions

The focus of efforts in May 2023 continued to prioritize actions necessary to address immediate concerns outlined in the findings of the six-month report published by the Department on July 28, 2023. These efforts primarily focused the efforts of the TPO and the Department in the following areas: 1) Rehabilitation of the SuperPulsator Units at the Treatment Plant; 2) Efforts on the Low Velocity Flushing Program & Legionella; 3) Unanticipated Failure of the Check Valve at the Pennington Reservoir. A summary of findings and steps in each of these areas follows below.

1) Treatment Plan Operation and Maintenance

SuperPulsator® Clarifier Units

Since starting work in January 2023, the TPO's contracted licensed operator has focused on inspecting the critical treatment process used to remove turbidity (solids) from the water and reviewing the daily operating procedures to identify and institute changes to improve the performance of the operational units.

As documented in numerous inspection reports and in the UAO, TWW has failed to effectively maintain the Superpulsator Clarifier® units (units) which are critical in removing solids and organic materials from the water. Inadequate removal of solids can contribute to the formation of disinfection-by-products throughout the TWW distribution system, raise chlorine demand, increased the risk to the public from waterborne pathogens such as *Cryptosporidium*, *Giardia lamblia*, viruses, and *Legionella*.

Following the recommendations of the TPO's third party licensed operator, TWW adjusted chemical dosing and other operating procedures to improve performance of the online units. This is displayed in Figure 1, which shows that TWW has met the EPA's Area Wide Optimization Program turbidity goal of less than 2.0 NTU from the two operational units since February 2023.

The improved functionality of these units was further demonstrated on May 1, 2023 when the Delaware River, TWW's raw water source, experienced a spike in raw water turbidity. The levels were the highest TWW had seen in the past year, reaching a raw water turbidity of 145 NTU. Despite the high raw water turbidity, TWW did not see, or report, any treatment issues and remained in compliance with the SDWA regulations for finished water. This can be contributed to the enhanced performance of the units. Prior to the Department and the TPO's involvement in the direct oversight of system operations, such a spike in raw water turbidity may have resulted in a treatment plant shutdown as the system struggled to treat the solids concentrations.

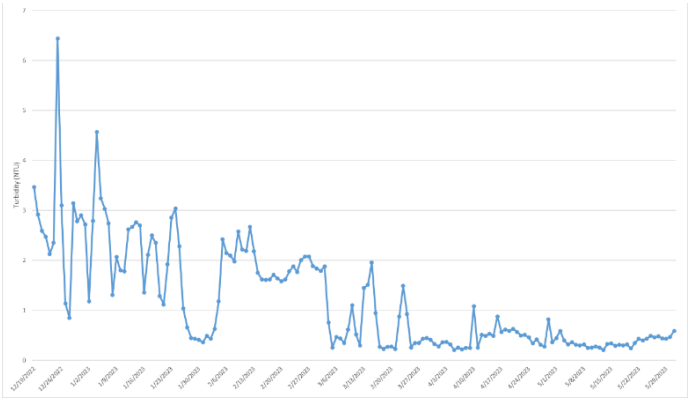

Figure 1: Graph depicting TWW's turbidity levels (in NTU) leaving both SuperPulsator units from December 2022-May 2023.

Unit Rehabilitation Progress

On February 3, 2023, the Department sent a formal letter to TWW requiring the emergency authorization of funds to be allocated to the rehabilitation of the SuperPulsator units. As mentioned above, these units are critical for the effective operation of the treatment plant to produce finished water that meets the requirements of the Safe Drinking Water Act (SDWA). While TWW is currently operating two units (#1 and #4), the other two units (#2 and #3) are non-operational, and thus there is no fail-safe or back-up unit that TWW can rely on if one of the operational units has a critical failure. Following the emergency authorization for the rehabilitation of the non-operable units, TWW's contractor, Municipal Maintenance, began replacing components of the units. As seen in Figure 2, Units #2 and #3 received new settling plates and these units should be able to be brought online in June 2023, ahead of schedule. When these units are online, units #1 and #4 will be drained, cleaned, and rehabilitated.

Figure 2: New settling plates have been installed in unit #3.

2) Distribution System Optimization and Legionella

Low Velocity Flushing & Legionella

In consultation with experts from Centers for Disease Control (CDC), the U.S. Environmental Protection Agency (USEPA), NJDOH and other state agencies, a strategy was developed to address the risk of *Legionella* in the TWW water system. With assistance by USEPA and the Department, TWW initiated a low-velocity flushing program throughout its service area in early April 2023 to increase water circulation throughout the distribution system, and to increase and optimize chlorine levels.

Throughout the month of May, investigative sampling and flushing continued throughout the TWW distribution system to help achieve a target free chlorine residual of 1.0 mg/l. Teams made up of TWW and Department staff prioritized areas based on records of *Legionella* detections, Legionnaires Disease cases, and areas of high-water age. By trending chlorine residual data collected in each sample area, TWW was able to identify and investigate the areas that were unable to reach the target residual. These areas are primarily located in the distal portions of the distribution system and may require automatic flushers to be installed long term. The findings also assisted in the determination that TWW needed to increase the chlorine residual leaving the Central Pumping Station (high service area) to help achieve the target residual in those areas.

Department staff continued to work with TWW staff in the field throughout the month. During the last week of May, the Department divided the distribution system into three sectors and assigned a team of TWW staff to continue the fieldwork in each sector moving forward. These teams of TWW staff will be responsible for flushing, monitoring, and maintaining chlorine residuals in their designated areas. However, the Department will continue to meet with TWW twice daily to go over the strategy for the day and provide continuing support for the low velocity flushing program. As temperatures rise, the chlorine residual is expected to decrease within the system. Therefore, the chlorine data and temperature will continue to be monitored to see the trends in the system and determine next actions.

3) Pennington Reservoir Check Valve Failure

Approximately 70% of TWW's service area is fed by the Pennington Reservoir, an uncovered finished water reservoir. TWW closely observes and monitors changes in the reservoir to protect against occurrences of algal blooms or other contaminants that could impact water quality and create a public health risk. TWW currently utilizes zinc orthophosphate (ZOP) for corrosion control at two locations: 1) prior to distribution to the gravity zone and 2) prior to distribution to the high service area after it has passed through the Reservoir and been re-chlorinated. TWW installed a check valve to ensure that the ZOP fed to the gravity zone, does not backflow or enter the reservoir. The reason for this is because ZOP contains phosphorus which is a food source for cyanobacteria and thus would raise the risk of harmful algal blooms forming in the Reservoir.

In late April/early May, TWW notified the Department that backflow had occurred into the Reservoir and upon inspection the check valve had failed. The failure resulted in water treated with ZOP entering the reservoir. Fortunately, at that tie temperature and other factors were not conducive to the formation of harmful algal blooms. To mitigate the risk approaching the summer months, TWW suspended the ZOP to the gravity zone on May 9, 2023. The Department is working with TWW to review WQP data and evaluate any impacts to corrosion control in the gravity zone until a solution is finalized. On May 17, 2023, TWW submitted a plan to the Department to address the check valve failure that includes options such as rerouting water through an unused water line or through installing an alternative style of check valve better suited for the prevention of backflow into the reservoir.

FIGURE 3: FAILED DUCKBILL CHECK VALVE

NEXT STEPS

The Department will continue to monitor the progress of the rehabilitation of the Superpulsator Clarifier® units and ensure the TPO contracted licensed operator oversees bringing the units online. As the temperatures begin to warm into the summer months, *Legionella* mitigation efforts will be paramount to ensure chlorine levels are maintained within the distribution system to prevent the growth of *Legionella* bacteria. While the Department will continue to carry out Phase 1 of the oversight of TWW, which includes addressing immediate-term issues regarding the improvement and maintenance of routine daily operations critical to sustained water service, progress is being made to bring additional outside contractors onboard to begin the system-wide assessments. These assessments will include a technical, managerial, and financial (TMF) assessment, along with a full 360° financial assessment of the water utility. These assessments will provide detailed organizational and operational recommendations, as well as short-, medium-, and long-term asset management and capital improvement recommendations, all with a shared goal of ensuring the current and future viability of the water system.