INSPECTION REPORT

OF THE

CITY OF WEST COLUMBIA PUBLIC WATER SYSTEM
DRINKING WATER TREATMENT PLANT
WEST COLUMBIA, SOUTH CAROLINA

By

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ENFORCEMENT AND COMPLIANCE ASSURANCE DIVISION
WATER ENFORCEMENT BRANCH
DRINKING WATER ENFORCEMENT SECTION

March 16 - March 17, 2022

Introduction

A Drinking Water inspection to evaluate compliance with the Safe Drinking Water Act (SDWA) was performed at the City of West Columbia Public Water System (PWS), PWS ID: SC3210004 in West Columbia, South Carolina on March 16 and 17, 2022. The inspection was conducted under the authority of Section 1445(b)(1) of the Safe Drinking Water Act (SDWA).

An entrance briefing was held on March 16, 2022, where U.S. Environmental Protection Agency (EPA) inspectors presented their credentials and discussed the purpose of the onsite inspection and the processes of each water treatment plant (WTP) operated by the system. Personnel from South Carolina Department of Health and Environmental Control (DHEC) were also present at the time of the inspection. Following the briefing, EPA, DHEC, and West Columbia PWS staff visited the Lake Murray intake, toured the Lake Murray water treatment plant and onsite laboratory, observed the Supervisory Control and Data Acquisition (SCADA) system, and conducted a portion of the document review. A tour of the Riverside WTP, including intake, treatment process, and onsite laboratory, was conducted on March 17, 2022, as well as the completion of the document review and tour of distribution system assets. At the closing meeting, a preliminary list of observations was presented to system staff.

Purpose

In FY20, the EPA began a National Compliance Initiative (NCI) with the goal of reducing noncompliance with drinking water standards at community water systems. One of the goals of the NCI is to support the Agency's Strategic Plan, which calls for a 25 percent reduction in the number of community water systems that are out of compliance with health-based standards by the end of FY 2022.

EPA has also been directed to take immediate and affirmative steps to incorporate environmental justice considerations into their work. As such, EPA has taken steps to recognize and prioritize systems that serve previously underserved populations. West Columbia PWS was identified as a candidate for inspection based on this directive.

Participants

City of West Columbia Public Water System:
- Andrew Zaengle – Director of Engineering and Water Plants
- Curtis Martin – Water Plant Superintendent
- Jeremy Bristow – Water/Wastewater Superintendent/Engineer

South Carolina Department of Health and Environmental Control:
- Lindsey Bounds - Drinking Water and Recreational Waters Compliance

EPA:
- Whitney Lehrer – Enforcement Officer
- Charlotte Bunch – Enforcement Officer
- Brianna LaPapa – Inspector in Training

Facility Description

The West Columbia Public Water System (System) has two surface water treatment plants, Lake Murray WTP and Riverside WTP, which are located at 730 Old Cherokee Road and 406 Sunset Boulevard, West Columbia, South Carolina 29169, respectively. Both WTPs and the distribution system are operated by the City of West Columbia. As described by System staff, the PWS supplies water to a population of roughly 43,000 via approximately 16,000 residential and 2,500 commercial service connections. The PWS also has wholesale contracts with three nearby water systems to provide nearly one hundred percent of the water supply for those systems. The Riverside and Lake Murray plants are split along Interstate 26, with Riverside supplying water to the City of West Columbia and Lake Murray supplying the surrounding areas. Combined, the PWS has a total of 14.8 million gallons (MG) of finished water storage capacity. Clearwells onsite at the WTPs account for 8.8 MG of storage. The remaining storage capacity is accounted for in distribution system storage tanks. Each WTP is staffed 24-hours per day, operating two shifts daily.

Riverside WTP

The Riverside plant was initially constructed in 1957 with an additional treatment train added in 1962. The plant was upgraded in 2011. It is rated to provide up to 6 million gallons per day (MGD) of water. The source water for the Riverside WTP is drawn from the Saluda River where the Broad and Lower Saluda River meet. The screened intake, which is kept clear of debris due to the high velocity of water flow, is located roughly 3.5 feet from the base of the river. Raw water is pumped through a 24-inch intake pipe via two, 6 MGD raw water pumps. The raw water pumps alternate to minimize overuse. Powdered activated carbon (PAC) is injected at the wet well for taste and odor control via two peristaltic pumps.

At the head of the treatment trains, water is dosed with Mixed Oxidant (MIOX) and alum in a flash-mix for coagulation and to gain disinfection contact time (CT) credit in the following steps of the treatment process. Water is then split into three single-stage flocculators with horizontal paddle wheels. Following flocculation, water is routed to three sedimentation basins, which are equipped with inclined plate settlers to increase the surface area of the basins. Sedimentation basins at this plant are cleaned approximately every four months.

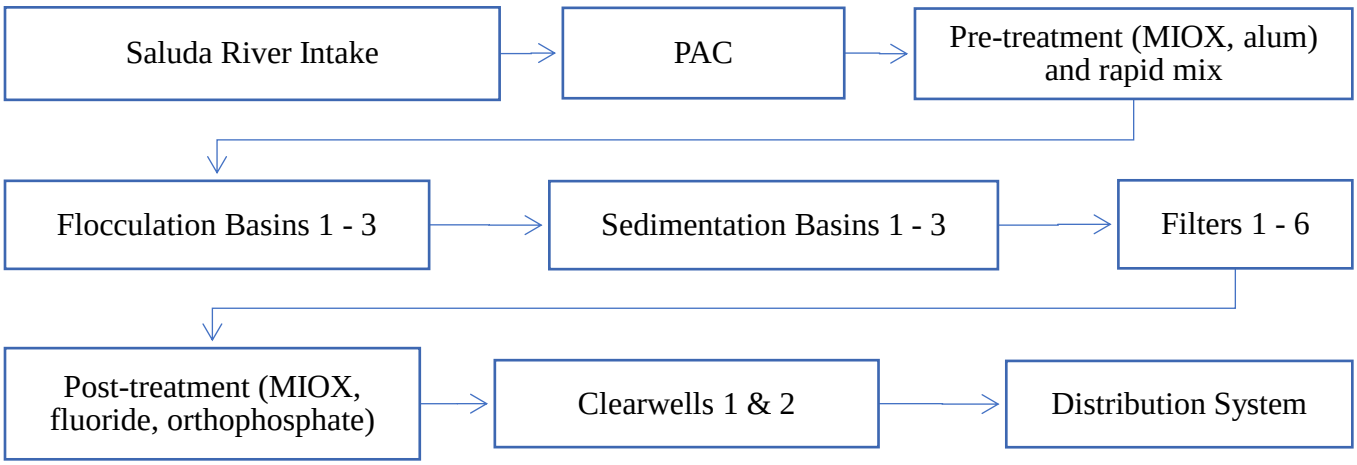
The Riverside plant has six filter basins, with Filters 1 through 4 located indoors and Filters 5 and 6 outdoors. The filters are comprised of 20 inches of anthracite and nine inches of sand, which have a filter rate of three gallons per minute per square-foot. At the time of the inspection, Filter 5 was out of service, but the plant is still able to meet capacity. Filters are backwashed either at 120 hours of service or if there is a loss of six feet of head pressure. A backwash cycle was observed at Filter 4. Backwash water is routed to two holding basins, which is then processed through a Delta Stack solids seperator unit. The settled sludge from the Delta Stack is processed through the City of Columbia waste treatment plant, and the effluent is discharged with a National Pollutant Discharge Elimination System (NPDES) permit into to the Saluda River.

Chemicals are added after filtration in a post-mix box immediately prior to entering the

clearwell. Post-chemical treatment includes orthophosphate for corrosion control, hydrofluorosilicic acid for dental health, and MIOX for disinfection. MIOX is generated onsite via a specialized generator that is fed a brine solution. Three generators are onsite for pre-treatment, post-treatment, and one redundant that can feed pre- or post-treatment. The WTP also keeps 12.5% liquid sodium hypochlorite onsite in case of generator failure.

Finished water is stored in two clearwells at the Riverside plant. Clearwell 1 has a capacity of 500,000 gallons, and Clearwell 2 can hold 800,000 gallons. Each clearwell has two high service pumps (HSPs), that alternate based on demand. The HSPs at Clearwell 1 are rated as 2 MGD on a variable frequency drive and 5 MGD single speed. Clearwell 2 HSPs are rated as 4 MGD on a variable frequency drive and 2 MGD single speed.

The flow of water at the Riverside WTP is as follows:



Lake Murray WTP

The Lake Murray WTP was commissioned in 1990 and has a capacity of 22.5 MGD. The intake is located on Lake Murray, a recreational and residential lake. The WTP is able to draw water from three different levels in the lake, though only the middle location is used, as it provides the best quality raw water. The intake is comprised of six sluice gates with bar screens that are set back from the flow of debris in the lake to prevent the need for cleaning. Six HSPs, which are run based on demand, pump water through a 36-inch main. PAC is fed via two peristaltic pumps into parallel wet wells for taste and odor control. An onsite diesel generator is exercised weekly and monthly under load in case of emergencies.

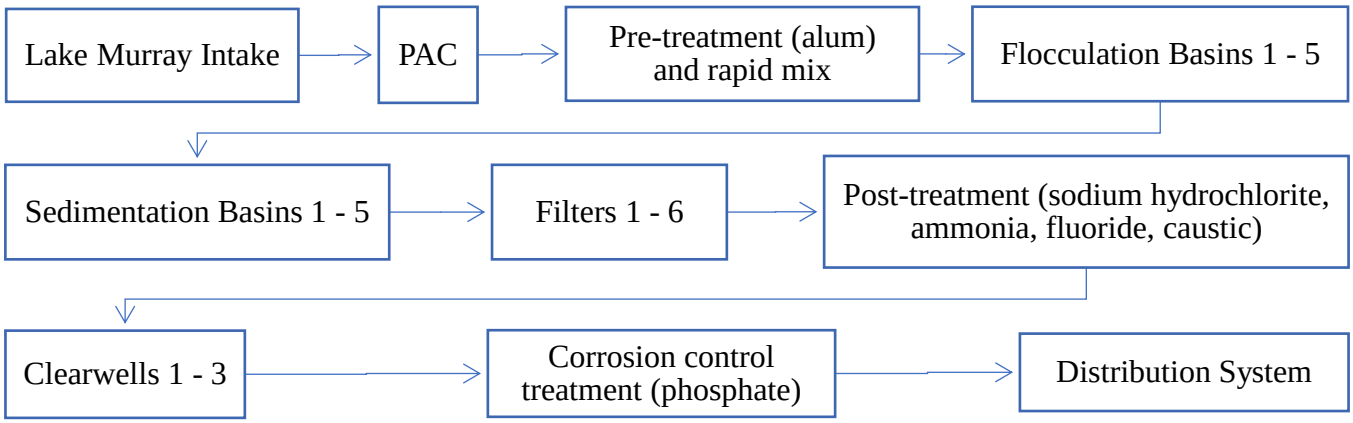
Water is then transported to the mechanical mixer at the head of the treatment process and dosed with alum. The WTP is also able to add additional carbon at this stage for taste and odor control, if necessary. Once pre-treated, water travels to five, 4.5 MGD treatment trains, starting with five, two-stage flocculation basins. After flocculation, water moves to five sedimentation basins, which have continuous sludge removal via trac-vacs. Removed sludge is pumped to sludge thickeners to be further processed, and decant water is routed back for treatment. The sedimentation basins at Lake Murray WTP are cleaned approximately every six months.

The filtration process consists of six filters with one for redundancy. Currently, one filter is offline, but the plant is still able to reach capacity with the redundant filter. The Leopold, Type-S underdrain filters have media comprised of 24 inches of anthracite and 12 inches of sand. Backwash is initiated when filters reach 120 hours of service, experience a loss of 10 feet of head pressure, or filtered water has a turbidity of 0.2 Nephelometric Turbidity Unit (NTU), though typically backwash is triggered by service hours. A backwash cycle of Filter 4 was observed. Backwash water is treated in the same manner as sedimentation sludge.

Filtered water is dosed with sodium hypochlorite and ammonia for disinfection, hydrofluorosilicic acid, and caustic directly prior to a post-mix basin with an eight foot drop to encourage mixing. The sodium hypochlorite is generated onsite using brine and Microchlor generators. The WTP has three Microchlor generators, with two serving as redundancy. The WTP also keeps backup 12.5% and 9% liquid sodium hypochlorite onsite in case of generator failure. Ammonia and sodium hypochlorite are dosed at a four to one ratio for chloramine generation.

Finished water moves to three, 2.5 MG clearwells where the final CT credit is earned. Orthophosphate is added to finished water as it travels from the clearwells to the HSPs for corrosion control. Five HSPs deliver finished water to the distribution system. One HSP is dedicated to pumping water to the Town of Lexington, which has a wholesale contract with West Columbia PWS. Only one HSP operates during the winter, two HSPs operate during the summer, and all HSPs are alternated to prevent overuse. Two backwash HSPs are also housed in this building.

The flow of water at the Lake Murray WTP is as follows:



Each plant operates an onsite laboratory. State-certified staff measure pH, chlorine, turbidity, temperature, calcium, fluoride, hardness, and bacteriological parameters. Bacteriological samples are run using Colilert. Benchtop turbidimeters are calibrated quarterly, and routine pH and turbidity monitoring equipment is calibrated once per shift. The System uses Rogers and Callcott Laboratory for total organic compound and phosphate monitoring.

Each plant maintains a diesel generator onsite for emergency use. At the Riverside plant, the

generator can support the entire plant for 48 hours. The generator at the Lake Murray plant can run the HSPs and plant operation. Both generators are exercised weekly and monthly under load.

The SCADA system used by West Columbia was updated in 2021 and is used mainly for monitoring and tracking activities. The System is able to monitor virtually all operations for both treatment plants and distribution system, including flow rate, turbidity, filter activity, finished water storage tank levels, chemical feed systems and bulk storage tank levels, and high service pump operation. Trends are able to be analyzed for the monitored activity. Alarms triggered in the SCADA system appear on the SCADA interface both auditorily and visually for the System to respond to. Currently, the System relies largely on manual changes to operational equipment rather than controlling them via SCADA.

EPA inspectors visited the following sections of the PWS:

- Riverside intake
- Riverside WTP
- Lake Murray intake
- Lake Murray WTP
- Green Hill standpipe
- Green Hill booster pump station
- Platt Springs Road elevated storage tank
- Pony Hill Road elevated storage tank
- Laurel Road standpipe
- Laurel Road booster pump station

Personnel

Eight Grade A, two Grade B, one Grade C, one Grade D, and one Grade E Certified Operators operate the PWS. Operators are responsible to maintain certification and keep all records of training.

Documentation reviewed

Prior to the inspection, EPA inspectors reviewed the following documentation:

- Last two sanitary surveys performed by DHEC
- Violation history
- Enforcement Targeting Tool Score history

While on site, EPA inspectors reviewed the following documentation:

- 10-year capital improvement plan
- Chemical inventory
- Consumer confidence reports 2018 – 2020
- Cross-connection control plan
- Customer complaints
- Filter backwash records 2019 – 2021
- Flushing program
- Lake Murray laboratory standard operating procedure (SOP)

- Lead and copper rule sampling results 2016 and 2019
- Lead and copper rule sampling letter to customers 2016 and 2019
- Lead and copper rule sampling plan
- Monthly operating reports 2021 – 2022
- Phosphate and total organic compounds sampling results 2021
- Riverside plant laboratory standard operating procedures (SOPs)
- Service orders and meter maintenance 2019 – 2020
- Stage 2 disinfection/disinfection biproduct sampling results 2018 – 2021
- Storage tank inspection reports 2020 and 2021
- System map
- Turbidimeter calibration records 2021
- Water audit 2018 – 2020
- Valve exercising plan

Comments and Observations

Comments

Facility staff was welcoming and helpful during the inspection. Good communication was observed among all participants. The staff was accommodating and efficient at touring EPA inspectors around the WTPs and the distribution system. System staff has comprehensive plans for future development of both the treatment plants and distribution system, as well as a robust cross-connection control plan.

Observations

1. **Observation**: Chemical dosing pipes at the Lake Murray plant were improperly labeled. The plant uses an unlabeled pipe for chlorine dosing, and the pipe labeled for chlorine is valved off (refer to Appendix A, Photograph 1).
   Comments: Chemical dosing pipes should be properly labeled with the type of chemical being fed. Mislabeled pipes can lead to confusion, lack of consistency in plant operation, and potentially cross contamination.

2. **Observation**: The hatch leading to the post-mix basin at the Lake Murray plant lacks a sanitary seal (refer to Appendix A, Photograph 2).
   Comment: Hatches should be properly sealed to prevent entry of contaminants to finished water.

3. **Observation**: Vegetative growth in the vertical plane was noted at Platt Springs and Pony Hill elevated storage tanks (refer to Appendix A, Photograph 3-5).
   Comment: The vertical plane should be kept free of vegetation to prevent damage to the tanks and entry of contaminants or animals to the finished water.

4. **Observation**: The altitude valve at the Green Hill high service pump station exhibited rusting and signs of corrosion (refer to Appendix A, Photograph 6).
   Comment: Pump appurtenances should be kept clean and free of rust to reduce the risk of pump failure.

5. **Observation:** Multiple monthly operating reports were unsigned by System personnel.
   Comment: Monthly operating reports should be completed and signed as prescribed on the Surface Water System Monthly Operation Report provided by DHEC.

Findings

1. **Finding**: At the time of the inspection, PWS staff could not locate the materials inventory completed for compliance with 40 CFR § 141.86.
   Comment: The PWS must develop a materials inventory as required by the Lead and Copper Rule.

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Whitney Lehrer, Enforcement Officer
Drinking Water Enforcement Section
Water Enforcement Branch

CHARLOTTE BUNCH

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Charlotte Bunch, Enforcement Officer
Drinking Water Enforcement Section
Water Enforcement Branch

BRYAN MYERS

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Bryan Myers, J.D, Chief
Drinking Water Enforcement Section
Water Enforcement Branch

Appendix A: Photograph Log

Photograph 1: Mislabeled chemical injection pipes at Lake Murray plant.

Photograph 2: Post-mix basin hatch, which lacks sanitary seal.

Photograph 3: Base of Platt Springs elevated storage tank with vegetation in the vertical plane.

Photograph 4: Platt Springs elevated storage tank with vegetation in the vertical plane.

Photograph 5: Pony Hill elevated storage tank with vegetation in the vertical plane.

Photograph 6: Altitude valve at Green Hill high service pump station exhibiting corrosion.