



DEPARTMENT OF
**PUBLIC
UTILITIES**

CITY OF RICHMOND, VA – PWSID No. 4760100

EPA SDWA Compliance Inspection Report performed July 26, 2022 – July 28, 2022

Attachment A – Areas of Concern

Source Water:	Seq Nos. 1-6
Chemical Treatment & Storage:	Seq Nos. 7-16
Filtration:	Seq Nos. 17-21
Finished Water & Distribution:	Seq Nos. 22-36
Compliance Monitoring:	Seq Nos. 37-39
System Management:	Seq Nos. 40-44

SEQ	CATEGORY	AREA OF CONCERN	SUPPORTING OBSERVATIONS	RELEVANT CITATION(S)	CITY RESPONSE
1	Backwash Water Recycle Rule	There is a lack of flow control and monitoring of recycled water from lagoon to pre-sedimentation basin that could increase the risk of actual flow rates higher than flows metered in the upstream process.	Recycled water flows by gravity from the lagoon to the pre-sedimentation basin through a manually operated sluice gate without flow measurement.	<p>40 CFR §141.76(d)(2) requires the System to “list all recycle flows and the frequency with which they are returned.”</p> <p>12VAC5-590-550.16.a.-f. describes the recycle flow information that the waterworks is required to collect and retain on file.</p> <p>System risks exceeding turbidity standards described in 40 CFR §141.173(a)(1).</p>	<p>The City acknowledges this observation and confirms there is currently no flow monitoring infrastructure associated with the lagoon effluent. Flow is controlled from the lagoon with sluice gates.</p> <p>Backwash Wastewater flows are measured and reported on the Monthly Reports to the Virginia Department of Health (VDH). These flows represent the majority of recycled water.</p> <p>Attached is a copy of the July/August 2022 report, which defines the inspection period. The “recycled water” column in the report presents the majority of the flow into and subsequently out of the residual’s basin.</p>
2	Backwash Water Recycle Rule	There is a lack of flow control and monitoring of recycled water from lagoon dredging operation that could increase the risk of actual flow rates higher than flows metered in the upstream process.	System Representatives were not aware of the lagoon dredge process water discharge location, and there are no flow measurements of process water from that operation.	<p>40 CFR §141.76(d)(2) requires the System to “list all recycle flows and the frequency with which they are returned.”</p> <p>40 CFR §141.76(b) requires the System to notify the State of “[a] plant schematic showing the origin of all flows which are recycled (including, but not limited to, spent filter backwash water, thickener supernatant, and liquids from dewatering processes), the hydraulic conveyance used to transport them, and the location where they are reintroduced back into the treatment plant.”</p> <p>12VAC5-590-550.16.a.-f. describes the recycle flow information that the waterworks is required to collect and retain on file.</p> <p>System risks exceeding turbidity standards described in 40 CFR §141.173(a)(1).</p>	<p>The City acknowledges this observation and has since confirmed with the project engineer that flow from the dredging process is not introduced directly into the pre-sedimentation basin.</p>

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3	Pre-sedimentation Basin	The basin cannot be bypassed for instances such as emergency or maintenance.	There is not a means for water to bypass the pre-sedimentation basin from the intake north of the William's Island Dam and the Kanawha Canal cannot be used as a sole source.	12VAC5-590-865.C.4. requires that "[p]rovisions for bypassing pre-sedimentation basins shall be provided."	<p>The Kanawha Canal provides source water to the WTP downstream of the pre-sedimentation basin in cases of emergency and/or maintenance.</p> <p>This operational capacity was in place during the inspection and remains unchanged. We offer this response as a point of clarification.</p>
4	Pre-sedimentation Basin	The basin does not Undergo maintenance.	The pre-sedimentation basin is not equipped with any means to remove sludge, and it does not appear to be on a regular maintenance schedule like the adjacent residuals settling lagoon.	12VAC5-590-865.C.2. states that the design of pre-sedimentation basins "shall address future needs for solids removal and handling."	The City acknowledges this observation and will review historical records to validate and, if needed revise, the maintenance schedule.
5	Raw Water Quality Monitoring	Raw water quality testing analytes and frequency is minimal for early detection issues that could affect treatment.	The System analyzes for pH, turbidity, and alkalinity in the raw water. The System does not conduct any other periodic monitoring of raw water to test for potential contaminants.	"Recommended Standards for Water Works" (2018 Edition) Part 2.19.h. – "Real time water quality monitoring with continuous recording and alarms should be considered at key locations to provide early warning for possible contamination events."	<p>Water quality monitoring equipment is being incorporated into the pre-sedimentation basin dredging project.</p> <p>The City will seek approval from VDH as needed for equipment / design. Raw water is also monitored and reported with online instrumentation.</p>
6	Kanawha Canal	There is a lack of flow monitoring of water from the Kanawha Canal, which could increase the risk of actual flow rates higher than flows metered in the upstream process; unknown flow could lead to unknown impacts to raw water quality.	Canal water flows by gravity without flow measurements. System Representatives stated that use of the Canal creates differences in water quality, and there is no prescribed procedure to adjust treatment for these instances.	<p>"Recommended Standards for Water Works" (2018 Edition) Part 2.13 states that "[a]ll water supplies shall have an acceptable means of measuring the flow from each source, the wash water, the recycled water, any blended water of different quality, and the finished water."</p> <p>Part 2.19.h. states that "[r]eal time water quality monitoring with continuous recording and alarms should be considered at key locations to provide early warning of possible contamination events." System risks exceeding turbidity standards described in 40 CFR §141.173(a)(1).</p>	<p>There is currently no flow monitoring infrastructure associated with any of the canal crossover gates. Flow is controlled from the Canal with sluice gates.</p> <p>The long-term effort to address this observation has been described in observation #5 above.</p>

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7	Finished Water Quality	Free ammonia concentrations exceed 0.1 mg/L when entering distribution.	July 2022 data sheets reflected several instances where free ammonia exceeds 0.1 mg/L, with a maximum of 0.41 mg/L.	12VAC5-590-1002 states that “[c]ontrol should be sufficient to limit free ammonia leaving the chloramination facility to no more than 0.1 mg/L as nitrogen.”	The City acknowledges this observation and Operators are currently adjusting the dosage when free ammonia reaches 0.1 mg/L. Staff has been trained accordingly.
8	Raw water coagulation channel	There was only one flash mixer for each plant and no operational procedure to respond to a failure.	There were not any redundant mixers for the flash mixer at each plant in the channel.	12VAC5-590-871.A.2. states, in part, that “[w]here mechanical mixing devices are utilized, duplicate units or spare mixing equipment shall be provided.” System risks exceeding turbidity standards described in 40 CFR §141.173(a)(1).	Redundancy exists in the system today. Spare mixers are available, and the PM schedule is monthly. To address potential failures, additional measures of redundancy are being considered. In the meantime, a hot swap method is the first method of choice for redundancy.
9	Raw water coagulation channel	Raw flow meters used for chemical dosage are unreliable.	The flow meters were unreliable and inaccurate while flow is critical in determining chemical dosing. Jar tests not completed on a regular schedule or required by the operators; they are only conducted as needed.	12VAC5-590-360.A. states that “[t]he owner shall provide and maintain conditions throughout the entirety of the waterworks in a manner that will assure a high degree of capability and reliability to comply with Part II of this chapter. This requirement shall pertain to the source water, transmission, treatment, storage, and distribution system facilities and the operation thereof. The owner shall identify and evaluate factors with the potential for impairing the quality of the water delivered to the consumers. Preventative control measures identified in Part II of this chapter shall be promptly implemented to protect public health.” System risks exceeding turbidity Standards described in 40 CFR §141.173(a)(1).	The City acknowledges this observation and is addressing repairs through a CIP project, which is scheduled for completion in June 2025. In the meantime, all RW flowmeters are operating as designed with exception of the RW2 mag meter. Dosage is verified by chemical feed through a manual process. When flow is adjusted, the chemicals are adjusted manually.
10	Raw water coagulation channel	Potassium permanganate treatment out of service.	The System intended for potassium permanganate treatment based on seasonal needs however, the treatment was out of service on two separate checks during the inspection due to an	12VAC5-590-360.A. states, in part, that “[t]he owner shall provide and maintain conditions throughout the entirety of the waterworks in a manner that will assure a high degree of capability and reliability to comply with Part II of this chapter.”	The permanganate system was repaired by WTP Maintenance and is working as designed.

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			instrumentational failure. Potassium permanganate residuals are not tested in treated water to confirm proper dosage.		
11	Chemical storage	Chemical leaks were observed.	The chemical line for caustic soda in the Korah 1 Pump Station had crystalized product on the exterior and the area was taped off. The SH-1-3 tank and the tank fill line had active leaks at the time of inspection. EPA observed leaking aluminum sulfate in the bulk storage area.	12VAC5-590-470. Waterworks condition. The waterworks shall be maintained in a clean and orderly condition.	Repairs have been addressed as follows: <ul style="list-style-type: none"> a. Hypo bulk storage tank #1 and day tank #2 were repaired (initiated 10/2023, repaired 4/2024) and returned to service. b. The manway flanges on various tanks were tightened to alleviate and prevent any leaks. c. The tank #3 has been emptied and taken out of service to replace the manway gasket. (photo #120) d. A small hypo leak on tank offloading / fill line was repaired shortly following the inspection. (WO#C269333)
12	Chemical storage	Capacity for chemical storage may not be a 30-day minimum.	The aluminum sulfate storage capacity may be less than a 30-day supply based on the System's average daily production rate. The capacity of the bulk and day tanks are 155,000 gallons. The System uses 14,000 gallons/day of aluminum sulfate, providing an 11-day supply.	12VAC5-590-860.D.1.a. states that "[s]pace shall be provided where at least 30 days of chemical supply can be stored..."	The remainder of 12VAC5-590-860.D.1.a states "Lesser storage capacity may be approved if the owner can demonstrate that the local suppliers or other conditions will provide an uninterrupted source of chemicals." <p>The City acknowledges this observation, but notes that contracts are in place for regular supply and recurring deliveries to promote continuous operations without interruption. Adequate storage is noted on the VDH plant inspections. Accordingly, the City does not believe there is any deviation from the Regulation with its chemical storage capacity.</p>
13	Chemical Treatment & Process Control	Operational SOPs for chemical application systems are not utilized or readily available.	Operators do not have an updated SOP to reference for chemical treatment processes; System Representatives explained there may be an SOP in the operator control room although it is dated from	12VAC5-590-360.A. states that "[t]he owner shall provide and maintain conditions throughout the entirety of the waterworks in a manner that will assure a high degree of capability and reliability to comply with Part II of this chapter. This requirement shall pertain to the source water, transmission, treatment, storage, and distribution	The City acknowledge the observation and have initiated a plan to update all WTP SOPs by year end 2025.

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			the 1990s. Polymer is not flow- paced and must be manually adjusted.	system facilities and the operation thereof. The owner shall identify and evaluate factors with the potential for impairing the quality of the water delivered to the consumers. Preventative control measures identified in Part II of this chapter shall be promptly implemented to protect public health.”	
14	Chemical Treatment & Process Control	System does not utilize a nitrification control plan to monitor the disinfection process.	System utilizes chloramination for disinfection but has not developed formalized steps to respond to chloramination disinfection issues such as nitrification. The System has experienced unexplained coliform positive samples recently, and there is no plan or procedure in place to respond to or investigate the cause these events. System Representatives stated that the chlorine residuals in these areas was high and there are observed instances of high free ammonia in the operator logs.	<p>“Recommended Standards for Water Works” (2018 Edition) Part 4.4.5.5.b. states that “[a] monitoring program shall be established...throughout the distribution system to verify proper chloramine formation and for determination of nitrification occurrence.”</p> <p>Part 4.4.5.6.b. states that “[a] nitrification control plan that includes flushing and the temporary use of a free chlorine residual should be prepared along with the triggering criteria for implementation.”</p>	Currently developing nitrification plan. Consulting with peer localities to aide in speedy adoption of plan. Regulation is followed for re-sampling.
15	Chemical Treatment & Process Control	Copper sulfate addition is not applied per a standardized procedure, increasing the risk of hazards due to improper dosing.	Copper sulfate is added to the basin without a process for testing water quality before or after application, or in the treatment process. System Representatives stated that 50-pound bags are added without a measured application.	12VAC5-590-960.A. states that “[c]ontinuous or periodic treatment of source waters with copper sulfate and other copper compounds to kill algae or other growths shall be controlled to prevent copper in excess of 1.0 mg/L, as copper, in the finished water leaving the treatment plant.”	The City acknowledge the observation and have initiated a plan to update all WTP SOPs by year end 2025.
16	Chemical Treatment & Process	PAC addition is not applied per a standardized procedure,	PAC is added without a formal procedure for dosage or application	“Recommended Standards for Water Works” (2018 Edition) Part 4.10.4.e.	The City acknowledge the observation and have initiated a plan to update all WTP SOPs by year end 2025.

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	Control	increasing the risk of hazards due to improper dosing.	periods.	states “[t]he required rate of feed of carbon in a water treatment plant depends upon the tastes and/or odors involved, but provision should be made for adding from 0.1 mg/L to at least 0.40 mg/L.”	
17	Plant 2 Filters	The exposed concrete filter beds and surface structures appeared deteriorated due to weathering and age, and failure of additional filters could impact overall filter performance.	Concrete structures above filter beds had hairline cracks throughout. Structural debris was observed on the center wall inside of Filter 16.	12VAC5-590-360.A. states that “[t]he owner shall provide and maintain conditions throughout the entirety of the waterworks in a manner that will assure a high degree of capability and reliability to comply with Part II of this chapter. This requirement shall pertain to the source water, transmission, treatment, storage, and distribution system facilities and the operation thereof. The owner shall identify and evaluate factors with the potential for impairing the quality of the water delivered to the consumers. Preventative control measures identified in Part II of this chapter shall be promptly implemented to protect public health.”	Debris has been removed. The overall solution is being evaluated through a larger CIP project.
18	Plant 1 Filters	The air scour pipes above the filters were significantly corroded on the exterior. Failure of the air scour process could impair the filter performance.	The filter beds are contained in an enclosed structure subject to the humidity and chlorine from the filter bed water; the exposed unpainted air scour piping had severe rust and corrosion <u>damage</u> .	System risks exceeding turbidity standards described in 40 CFR §141.173(a)(1).	The overall solution is being evaluated through a larger CIP project, which has been highlighted above in observation #17.
19	Filter Operation and Maintenance	Filter inspections or maintenance programs are not regularly performed.	The System completes filter rise tests, filter drop tests, and filter expansion tests, as required by VDH to confirm operational flowrates. Assessments to identify and address maintenance preventatively are not completed.		The City acknowledges this observation, and the solution has been addressed through the organizational changes made effective June 2023.
20	Filter Operation and Maintenance	High filter turbidity SCADA alarm response was inconsistent.	System Representatives explained that filters are returned to service from filter-to-waste after a backwash procedure when turbidity is less than 0.1 NTU and any filter performance not less than 0.1 NTU is addressed. However, EPA observed		

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			Filter 16 turbidity increase above 0.1 NTU in the minutes following its return to service.		<p style="text-align: center;"><u>Water Quality Supervisory Notification</u></p> <p><u>The Following Are Water Quality Parameters That The Plant Operations Supervisor On Duty Needs Is To Be Informed Of If They Are Not Met.</u></p> <ol style="list-style-type: none"> 1. Overall Water Quality Standards. (Raw to Finish) 2. Filter Turbidity ≥ 0.10 ntu (individual or combined) 3. Finish Water Turbidity > 1.0 ntu. 4. Finish Water Chlorine < 2.0 ppm. 5. Finish Water Chlorine < desired range. (Check sheet of desired plant operational ranges for each month) 6. Sudden increase or decrease in the PH and Alkalinity on the raw water or treated water (flash mix). 7. Sudden increasing Raw Turbidity. 8. Extraordinary positive or negative Zeta readings (> +4 or -4). 9. Filter well chlorine < 2.0 ppm. 10. Unbalanced Fluoride residuals and if the Fluoride residual < 0.65 ppm. 11. If finish PH is less than 7.3 or > 8.5. 12. P04 is lower than 1.1 ppm. 13. If Compliance Requirements for Water Quality are not being met.
21	Filter Operation and Maintenance	High filter turbidity SCADA alarm response was inconsistent.	There are several instances in the MORs that demonstrate a filter in use with turbidity in excess of 0.1 NTU as “turbidity spikes” that do not exceed 2.00 NTU. Turbidimeters appear to be set to a maximum read level of 2.00 NTU for an unknown reason.		<p style="text-align: center;"><u>Water Quality Supervisory Notification</u></p> <p><u>The Following Are Water Quality Parameters That The Plant Operations Supervisor On Duty Needs Is To Be Informed Of If They Are Not Met.</u></p> <ol style="list-style-type: none"> 1. Overall Water Quality Standards. (Raw to Finish) 2. Filter Turbidity ≥ 0.10 ntu (individual or combined) 3. Finish Water Turbidity > 1.0 ntu. 4. Finish Water Chlorine < 2.0 ppm. 5. Finish Water Chlorine < desired range. (Check sheet of desired plant operational ranges for each month) 6. Sudden increase or decrease in the PH and Alkalinity on the raw water or treated water (flash mix). 7. Sudden increasing Raw Turbidity. 8. Extraordinary positive or negative Zeta readings (> +4 or -4). 9. Filter well chlorine < 2.0 ppm. 10. Unbalanced Fluoride residuals and if the Fluoride residual < 0.65 ppm. 11. If finish PH is less than 7.3 or > 8.5. 12. P04 is lower than 1.1 ppm. 13. If Compliance Requirements for Water Quality are not being met.
22	Clearwell Pumps	Pumps are corroded and deteriorated at the base, risking a loss of capacity due to deteriorated structures.	EPA observed significant corrosion at the base of Pumps 1, 2, and 3 that move water from the clearwell to the finished water basin.	12VAC5-590-360.A. states that “[t]he owner shall provide and maintain conditions throughout the entirety of the waterworks in a manner that will assure a high degree of capability and reliability to comply with Part II of this chapter. This requirement shall pertain to the source water, transmission, treatment, storage, and distribution system facilities and the operation thereof. The owner shall identify and evaluate factors with the potential for impairing the quality of the water delivered to the consumers. Preventative control measures identified in Part II of this chapter shall be promptly implemented to protect public health.”	The City acknowledges this observation and is addressing this through an O&M project. Pump N-2 refurbishment is nearing completion (see pics 115 and 116). Pumps N-1 and N-3 refurbishment will follow accordingly.

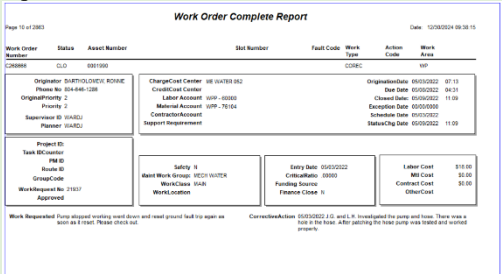
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23	Finished Water Basin 2	Risk of contamination from entry and landing structure.	Debris collected at the door base and was easily tracked inside, and the landing area had dirt and debris and portions without a baseboard or other barrier to prevent it from falling into the finished water basin.	12VAC5-590-470. Waterworks condition. The waterworks shall be maintained in a clean and orderly condition. 12VAC5-590-1081.J. states that “[e]very catwalk over finished water in a storage structure shall have a solid floor with raised edges designed so that shoe scrapings and dirt will not fall into the water.”	The City acknowledges this observation and have included photos 32 and 33 for confirmation.
24	Byrd Park Reservoir	There was a risk of contamination from rooftop stormwater due to valve pit flooding, and there is a lack of inspections of the pit.	The valve pit between the two cells of the reservoir was flooded. The valve pit shares common walls with the reservoir cells, and the walls are penetrated by multiple pipes. System Representatives were not informed of the flooding and did not know the cause, indicating the valve pit is not inspected on a regular basis.	12VAC5-590-1081.H. states that “[t]he roof and sidewalls of all structures shall be watertight with no openings...”	The deficiencies observed during the inspection were corrected shortly following the inspection. Long term solutions will be altered due to the CIP project that is currently underway and scheduled for completion in 2028.
25	Byrd Park Reservoir	Lack of overflow for reservoir.	The reservoir does not have an overflow and the installation of one is not included in any upcoming capital improvement <u>projects</u> .	12VAC5-590-1081.D. describes overflow requirement for finished water storage structures.	Enhanced overflow features for East and West Reservoir tanks are incorporated into the CIP project that is currently underway and scheduled for completion in Nov 2027. West side overflows are complete and East side overflows are scheduled for completion by end of 2027.
26	Warwick Road Tank	Overflow discharge location was not able to be located, unknown contamination risks.	System Representatives were not able to locate overflow pipe, indicating they are not inspected regularly. A potential overflow outfall point was not accessible due to heavy vegetation. System Representatives stated that the overflow may be connected to a sanitary	12VAC5-590-1081.D. describes overflow requirement for finished water storage structures.	The City acknowledges this observation. All vegetation has been removed and the Building & Grounds Team has kicked off an effort to perform grounds maintenance around the tank via PM ID 1215. WTP working with Water Distribution to locate overflow to verify air gap is in place via WO#C277117.

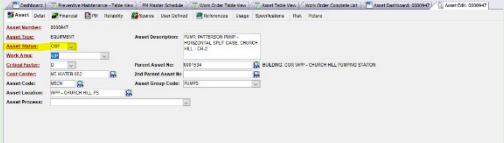
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			sewer line; EPA could not inspect air gap, screening, or connection location to ensure protection from <u>contaminants</u> .		
27	Warwick Road Tank	Lack of structural support to gate valve on the primary tank transmission main as designed to prevent failure.	Inside the tower at ground level, a 16" gate valve was installed on the tank transmission main connection above grade. EPA observed several pieces of wood stacked to create an insignificant support structure; it did not appear to be functional.	12VAC5-590-360.A. states, in part, that "[t]he owner shall provide and maintain conditions throughout the entirety of the waterworks in a manner that will assure a high degree of capability and reliability to comply with Part II of this chapter... The owner shall identify and evaluate factors with the potential for impairing the quality of the water delivered to the consumers. Preventative control measures identified in Part II of this chapter shall be promptly implemented to protect public health."	The City acknowledges this observation and will determine a path forward using the framework of the June 2023 organizational changes. The Water Distribution team intends to investigate and strategize immediately following the holidays.
28	Cofer Road Tanks	Concern of contamination due to unreliable seal at the overflow pipes.	The overflow pipes were equipped with a weighted, screened cover; however, the weight was not heavy enough to provide an adequate seal to the overflow pipe.	12VAC5-590-1081.D. describes overflow requirement for finished water storage structures.	Project manager indicates overflow was installed to satisfy code. The City acknowledges this observation and WOs# C277113 & C277114 has been generated to track resolution.
29	Jahnke Road Tank	There was no fine mesh on the overflow to prevent contamination or pests.	EPA only observed rough mesh on the overflow pipe that was large enough to allow pests into the finished water storage.	12VAC5-590-1081.A.2. states that "[a]ll finished water storage structures shall be designed to prevent vandalism and entrance by animals or unauthorized persons." "Recommended Standards for Water Works" (2018 Edition) Part 7.0.7.b. states that "[t]he overflow shall open downward and be screened with twenty-four mesh non-corrodible screen..."	The City acknowledges this observation and WO #C276853 has been created to track the effort.
30	Huguenot Road Tank	The overflow pipe was not able to be identified, and the pipes were below grade in a low-lying area that were	EPA could not confirm the location of the overflow pipe. There were three potential overflow pipes; only one was screened properly but it	12VAC5-590-1081.D. describes overflow requirement for finished water storage structures. "Recommended Standards for Water Works" (2018 Edition) Part 7.0.7.b.	Immediate removal of the debris was completed via WO# C275217 (See photos #: 89 & 90). These photos also show that two of the pipes had screens at the time of inspection. Additionally, the Building & Grounds Team has kicked off an effort to perform grounds

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		not screened or were blocked with debris.	was blocked with debris. The condition of the pipes and surrounding area indicate they are not inspected regularly.	states that “[t]he overflow shall open downward and be screened with twenty-four mesh non-corrodible screen...”	<p>maintenance around the tank out to the fence line via PM ID 1215.</p> <p>WTP working with Water Distribution to confirm identity of all 3 pipes and replace existing pipe screens via WO# C277116 & C276953 respectively.</p>
31	Ginter Park Tank	It was not known if Backflow prevention was in place on the overflow to prevent cross contamination with a sanitary or storm sewer line.	The overflow pipe was located underground in an access hatch, but no backflow prevention was visible. System Representatives were not aware if backflow prevention was installed.	12VAC5-590-600. Describes the cross-connection control program responsibilities for public water system owners.	WTP working with Water Distribution to locate overflow to verify backflow prevention is in place. Effort being tracked via WO# C277111. Organizational changes implemented in June 2023 are helping to fast track the long-term strategy of this issue.
32	Byrd Park Main Pump Station	The pump station had debris and leaks throughout, and a hose was on the floor without a vacuum breaker presenting a high contamination risk to the finished water.	EPA observed dirt and debris across the floor from the ceiling renovation, as well as buckets of oil waste and other trash throughout the pump station. EPA also observed a hose on a threaded tap connected to a finished water line; the hose was resting in an area that was wet from other leaks in the pump station, indicating potential for contamination during pressure loss.	12VAC5-590-600. Describes the cross-connection control program responsibilities for public water system owners.	<p>Immediate repairs were made to valves (replaced glands and packing), hose was removed, vacuum breakers installed on discharge header taps / spigots and floor drain was cleared. Flow / pressure transmitter functionality was restored. 100+ year old equipment. WO #C271037</p> <p>The ceiling coating will be addressed in the ongoing CIP project to significantly upgrade the pumping station. See CIP Project Name Below.</p> <p>Project Name; Byrd Park Main Pumping Stations Renovations (suspected end date April 2027).</p>
33	Finished Water Storage Facilities	Lack of regular inspections performed on the finished water tanks and storage facilities.	System Representatives stated that the tanks were last inspected in 2017; however, reports reflect the inspections were performed in 2015. Clearwells and finished water basins were not included in the tank inspection reports provided.	12VAC5-590-360.A. states that “[t]he owner shall provide and maintain conditions throughout the entirety of the waterworks in a manner that will assure a high degree of capability and reliability to comply with Part II of this chapter... The owner shall identify and evaluate factors with the potential for impairing the quality of the water delivered to the consumers. Preventative control	Organizational changes in June 2023 have elevated the ownership and maintenance of these structures to reflect business needs and compliance concerns. A schedule is being developed to manage ongoing required maintenance and PMs will be generated from the CMMS system.

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				measures identified in Part II of this chapter shall be promptly implemented to protect public health.”	
34	Finished Water Storage Facilities	Several tanks had Overgrown vegetation within 6’ and/or overhanging the structures.	Overgrown vegetation was observed at the Jahnke Road Tank and Huguenot Tank within proximity and/or overhanging. There is potential for damage to the structure in storm conditions.	12VAC5-590-360.A. states, in part, that “[t]he owner shall identify and evaluate factors with the potential for impairing the quality of the water delivered to the consumers. Preventative control measures identified in Part II of this chapter shall be promptly implemented to protect public health.”	Vegetation was removed shortly following the inspection. Additionally, the Building & Grounds Team has kicked off an effort to remove vegetation and debris from around the tank structures on a recurring basis (Jahnke, Huguenot and Ginter Park) via PM ID 1215. The CMMS system will serve as the host location for PMs.
35	Pump Station Maintenance	Byrd Park Main Pump Station operations at the pump station are manual and poorly maintained, reducing reliability to operation, capacity, and emergency response.	The pump station is not tied to SCADA and requires manual operation. There were several housekeeping concerns at the pump station. There were not adequate logs or recordkeeping at the pump station for operator activities.	12VAC5-590-470. States that “[t]he waterworks shall be maintained in a clean and orderly condition.”	The City acknowledges this observation and has increased its focus on the “Weekly Checklist at Station” via PM ID 1948. Operators record pump operations daily, which are maintained digitally. SCADA to be installed with upgrade currently in design via Byrd Park Main Pumping Stations Renovations CIP Project. =====
					The WTP Operation and associated assets are 100+ years old. Ongoing maintenance, preventative repairs and overall replacement schedules are managed through CMMS, Condition Assessments and CIP projects. Deficiencies pointed out during the inspection have been resolved - Pressure / flow transmitters, leaking valve packing / glands, water on the floor, hoses removed / vacuum breakers installed, etc.
36	Pump Station Maintenance	Korah Pump Stations safety concerns	The building that houses Korah Pump Station #2 and #3 had active water drainage to the floor from at least two sources. The pump for Korah 1-2 had <u>exposed wiring</u> .	12VAC5-590-1050.A.8. states that “[a] suitable outlet for drainage from pump glands shall be provided without discharging onto the floor.”	The City acknowledges this observation, and the exposed wiring was remedied through WO #C270729. The active water drainage is being managed through a short-term solution (see photo #43) (i.e., temporary PVC line). A longer-term solution is under review through WO #C276963, which is anticipated to be complete January 4, 2025.

SEQ	CATEGORY	AREA OF CONCERN	SUPPORTING OBSERVATIONS	RELEVANT CITATION(S)	CITY RESPONSE
37	Lead and Copper Rule	Lack of inventory developed for service lines, and sampling sites are not validated.	No inventory of service line materials exists; only 100 sample sites were identified in 1992. Ground truthing activities are not conducted to ensure proper Tier levels for sample sites to ensure current material of service lines.	12VAC5-590-375.B.1.a describes the requirements for lead and copper monitoring sample site location, including a materials evaluation of the distribution system.	The new Lead and Copper Rule Revisions addresses this through the required inventory system. A new list of sample sites will be developed to meet the regulation. The City's interactive map was submitted to EPA by the deadline of October 16, 2024.
38	Revised Total Coliform Rule	Population figures used to determine compliance requirements may be understated.	Population served at the System is determined by Census data, which determined a population of 226,000 in 2020. The System's RTCR sampling plan uses a population of 220,000, thereby impacting the number of compliance samples to be collected.	12VAC5-590-370 describes the Bacteriological monitoring required, including Table 370.1 that describes number of required samples per population group. For Systems serving 220,001 to 320,000, System must collect at least 150 samples.	The City's Laboratory has been collecting 150 samples each month since June 2023.
39	Revised Total Coliform Rule	Recent total coliform positive events have unknown cause.	System Representatives discussed five recent total coliform positive results. The results were not formally evaluated to identify the cause.	12VAC5-590-380.D. states that "[a] total coliform positive result is indicative of a breakdown in the protective barriers and shall be cause for repeat monitoring and special follow-up action to locate and eliminate the cause of contamination."	Any distribution sample that is positive for coliform bacteria is also checked for E. coli. To date the City has never had a sample that was also positive for E. coli. The sample that was positive for coliforms is resampled within 24 hours as well as a sample that is upstream and one that is downstream from the site. All 3 are tested and reported to VDH. It is normal for positive samples to come back as negative for bacteria in the resamples.
40	Cross-Connection Control	Backflow prevention device inspection does not appear to occur annually with corrective action taken for failures.	Tags on several backflow prevention devices throughout the System were failed and/or out of date for annual inspections.	12VAC5-590-600.E. requires at least annual testing after initial installation, relocation or repair of backflow assemblies. 12VAC5-590-600.H.-I. describes the backflow prevention recordkeeping and inventories owners shall maintain.	The City acknowledges this observation and inspections are in process. PMs 2292 & 845 are generated to initiate inspections. (See file WTP Backflow PMs.pdf) WOs# C275650, C275652, C275646, C275647, C275653, C275649, C275648, C275645, C275654, C275651, issued to repair backflows. WOs# C275645, C275648, C275649, C275650, C275652, issued to replace backflows.

SEQ	CATEGORY	AREA OF CONCERN	SUPPORTING OBSERVATIONS	RELEVANT CITATION(S)	CITY RESPONSE
41	Cross-Connection Control	Threaded taps were located on finished water lines without vacuum breakers, presenting cross contamination risk during pressure loss.	EPA observed several hoses without vacuum breakers that were tied to a finished water line throughout the plant and the distribution system.	12VAC5-590-600. Describes the cross-connection control program responsibilities for public water system owners.	Repairs of deficiencies noted during the inspection are complete. See photos: 92, 93, 105, & 109.
42	CMMS Work Orders	Calibration of critical Instrumentation and chemical feed pumps is irregular or as needed.	System Representatives stated that flow meters at the pump stations are verified as needed. Work orders from 2022 show preventative maintenance calibration of some pH analyzers and turbidimeters, but no chlorine analyzers. The chemical pump output is overseen by operators who submit work orders for maintenance if they sense output is not correct. Calibrations are not on a regular schedule.	12VAC5-590-480.E. states that “[p]rocess control instruments, monitors, gauges, and controllers, including reading, recording, and alarm features, required in Part III, Manual of Practice (12VAC5-590-640 et, seq.), shall be maintained fully operational and calibrated in accordance with the manufacturer instructions.”	Staff performs cleaning / verification of on-line water quality instrumentation via a weekly PM generated by the CMMS. Attached is an uploaded file of PM Completion Reports for PM ID's 677, 702, 703, 737, 865, 1370, & 1416 and includes the respective work orders. FILE NAME: I&C PMs for 2024.pdf
43	CMMS Work Orders	Preventative maintenance Documentation appears to be limited and corrective maintenance does not appear to be documented, and there is no tracking for out of service assets. Loss of critical assets creates risk for meeting production demands.	Work orders from 2022 only reflect some preventative maintenance activities, and they are not used to track all maintenance activities or operational status. System Representatives explained that the CMMS system does not allow for an inventory of critical assets out of service. EPA observed several flocculators, filters, and pumps out of service with no forecasted date to return to service, potentially impacting	“Recommended Standards for Water Works” (2018 Edition) Part 2.19(c) states, in part, that “...provisions should be made for maintaining an inventory of critical parts.”	Preventative/Corrective Maintenance Documentation – Preventative and corrective maintenance logs are documented in the Computerized Maintenance Management System “CMMS”. See Work Order Complete Report example. (1 of 2,824 WOs closed in 2022 compared to another 2,041 closed in 2021). Total open at the time of this response equals 413. 

SEQ	CATEGORY	AREA OF CONCERN	SUPPORTING OBSERVATIONS	RELEVANT CITATION(S)	CITY RESPONSE
			overall capacity.		<p>Out of Service Assets – The CMMS does have the ability to track assets status for Out of Service Assets. Asset status changes are made manually when WOs are generated and closed.</p>  <p>Critical Parts – Critical assets are monitored for repair and replacement through its asset management / condition assessment process.</p>
44	Emergency Response Planning	The ERP needs to be updated and finalized.	The ERP references out-of-date information and needs updated. Both the DPU EOM and the System’s ERP need to be finalized and signed for full implementation.	12VAC5-590-505. Describes requirements of an emergency management plan for extended power outages. “Recommended Standards for Water Works” (2018 Edition) Part 1.1.17.a.-d. describes considerations for Security, Contingency Planning, and Emergency Preparedness.	The City acknowledges this observation and has implemented steps for completion in early 2025.

List of Attachments

- See Response #1
- See Response #40
- See Response #42