

CORRECTIVE ACTION PLAN

NPDES PERMIT NO. AR0021768, AFIN 58-00105

CAO LIS No. 22-088

Pollution Control Works

PREPARED FOR:

City Corporation of Russellville

October 31, 2022



By:



HW Project 2019071

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1.0 Introduction

1.1 Purpose

On August 23, 2022, the Arkansas Energy & Environment's Division of Environmental Quality's Enforcement Branch (DEQ) issued Consent Administrative Order (CAO) LIS No. 22-088 to Russellville City Corporation (RCC). The CAO includes a requirement for RCC to submit a Corrective Action Plan (CAP) prepared by a professional engineer that includes measures intended to address NPDES permit effluent violations recorded between January 2019 and February 2022. The CAP is also required to include a milestone schedule for the recommended measures. The purpose of this document is to serve as the CAP and milestone schedule.

1.2 Background

RCC has operated under several CAOs since 1998. The CAOs necessitated primarily by wet weather induced infiltration and inflow (I&I) that caused sanitary sewer overflows (SSOs) throughout the city's collection system. A Completion Report for CAO LIS No. 09-146, dated March 31, 2022, details the significant capital invested by the Utility to successfully mitigate SSOs. Peak wet weather flow also negatively impacts a wastewater treatment plant's ability to perform in compliance with permit conditions. Between 1998 and 2013, RCC conducted thirteen significant capital improvement projects to their Pollution Control Works (PCW) at a cost of over \$35 million to increase the plant's resiliency during wet weather and increase its treatment capacity. Due to the PCW's continued inability to consistently comply with permit limits, RCC submitted a CAP to DEQ on March 5, 2018 that suggested the need for a new treatment master plan. Hawkins-Weir Engineers, Inc. (HW) was engaged by RCC in 2019 after the consultant hired to prepare the master plan failed to produce a strategy to address the Utility's needs within budgetary constraints.

Between January 2019 and February 2022, effluent violations for CBOD₅, TSS, NH₃, fecal coliform, total residual chlorine, or zinc (and other heavy metals) have been reported by twenty-three discharge monitoring reports (DMRs). The permit violations primarily resulted from peak wet weather flows, industrial batch loading, and limitations caused by plant construction activities. Corrective actions taken during the period as well as measures currently underway are briefly outlined in this CAP. The CAP also details RCC's continued commitment to achieve consistent compliance with permit conditions by implementing new corrective measures. A milestone schedule is provided that lists anticipated completion dates for each action as well as a date of final compliance.

2.0 Compliance Issues

2.1 NPDES Permit (AR0021768)

RCC is authorized to discharge treated municipal wastewater in accordance with the provisions of the Arkansas Water and Air Pollution Control Act (Ark. Code Ann. 8-4-101 et seq.), and the Clean Water Act (33 U.S.C. 1251 et seq.) according to the provisions detailed in their NPDES Permit. The Utility's treated wastewater effluent is discharged into Whig Creek, thence to Segment 3F of the Arkansas River. RCC's current permit expired on August 31, 2021. DEQ is in the process of issuing a new permit that will include a design flow increase from 7.3 MGD to 8.5 MGD. HW's understanding of the primary discharge limitations defined in the new permit are listed in Table 2.1.

Table 2.1. Assumed Effluent Discharge Requirements

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		
	Monthly Average (mg/l)		7-Day Average (mg/l)
	May - Oct	Nov - Apr	
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	10	9	N/A
Total Suspended Solids (TSS)	15	20	N/A
Dissolved Oxygen (DO)	6.0		Instantaneous Minimum
Fecal Coliform Bacteria	1,000 Colonies/100 ml		2,000 Colonies/100 ml
NH ₃ -N	2.2	2.2	3.3
NO ₃ -N	10	10	15
Total Nitrogen	Report Only		
Total Phosphorus	Report Only		
pH	N/A	6.0 Minimum	9.0 Maximum

During the 37-month period between January 2019 and February 2022, RCC reported effluent violations on twenty-three discharge monitoring reports (DMRs). The one hundred thirty-eight permit violations resulted primarily from peak wet weather flows, industrial batch loading, and operational limitations caused by plant construction projects. Figure 2.1 below illustrates the causes of the permit violations as well as the corrective measures taken by RCC.

Figure 2.1: NPDES Permit Violation Summary



2.2 5-Day Carbonaceous Biochemical Oxygen Demand (CBOD₅)

CBOD₅ exceedances were reported for eleven of the thirty-seven monitoring periods between January 2019 and February 2022. Six of the violations resulted from peak wet weather events. The plant's secondary clarifiers become overloaded during the high flow periods causing a portion of the plant's solids inventory to escape over the weirs. This problem can be exacerbated by the plant's high solids volume index (SVI). A high SVI is an indication of poorly settling solids. The SVI at RCC's PCW was historically high due to filamentous growth fueled by a highly soluble influent waste stream. Four of the CBOD₅ violations were caused by batch loading from a significant industrial user (SIU) with a highly organic waste stream. Sudden and unexpected increases in influent BOD overwhelmed the PCW's assimilative capacity. Biomass was not able to expand fast enough to utilize all of the available carbon and the oxygen demand exceeded the PCW's blower capacity. The resulting low dissolved oxygen concentration slowed biological activity, further limiting the plant's ability to remain in compliance with its permit limitations. The final CBOD₅ violation resulted from a power outage. Each permit violation is detailed in Appendix A along with its corresponding cause.

In 2019 RCC had the PCW's mixed liquor biology professionally evaluated to determine options for lowering the SVI. The study found that the plant's biomass was suffering from filamentous bulking driven by a septic influent condition. RCC began periodically chlorinating its RAS to reduce filament growth. The project currently under construction (i.e. 2022 Improvements) has constructed an anaerobic selector that will biologically inhibit filamentous bulking. The 2022 Improvements will also expand the PCW's aeration basin volume by over 30% and double its blower capacity. Each of these improvements will provide additional resources to the operators during peak flow and high loading conditions, but they are not expected to eliminate future permit violations associated with those issues. The plant has operated with reduced aeration basin

capacity since mid-2021 to accommodate construction of the new aeration basin, which will share a common wall with existing Aeration Basin No. 3. That portion of the work is nearly complete.

2.3 Total Suspended Solids (TSS)

TSS exceedances were reported during twelve of the thirty-seven monitoring periods between January 2019 and February 2022. Ten of the violations resulted from peak wet weather events and two were caused by industrial batch loading. RCC's secondary clarifiers have a combined theoretical peak hydraulic capacity of approximately 24 MGD, but they became overloaded at much lower flow rates due to the plant's high MLSS concentration and historically poor solids settling characteristics. RCC began improving the solids settleability in 2019 by periodically chlorinating the RAS, but the plant cannot operate with a thin enough MLSS to accommodate peak flows > 18 MGD for long periods. The plant operated with only two of its three secondary clarifiers in service for the majority of 2022 while the failing clarifier equipment was replaced.

2.4 Ammonia Nitrogen (NH₃-N)

NH₃-N exceedances were reported for seventeen of the thirty-seven monitoring periods between January 2019 and February 2022. Seven of the violations resulted from peak wet weather events, seven were caused by industrial batch loading, and three were the result of equipment failures. Each permit violation is detailed in Appendix A along with its corresponding cause. When biomass is lost during peak flow events, the slow-growing nitrifier population is significantly impacted and requires about seven days to fully re-establish. The industrial batch loading events impacted nitrification by lowering aeration basin dissolved oxygen to levels too low for NH₃-N removal. It is also suspected that the industrial discharge contained inhibitory properties due to the longer than usual amount of time needed to restart nitrification after each event. Additional investigation is needed. The equipment failures are being addressed by the current plant improvement project. The 2022 Improvements will expand the PCW's aeration basin volume by over 30% and double its blower capacity. Each of these improvements will provide additional resources to the operators during peak flow and high loading conditions, but it is not certain that this will eliminate future permit violations for NH₃-N.

2.5 Fecal Coliform

Fecal Coliform violations were reported for twelve of the thirty-seven monitoring periods between January 2019 and February 2022. Nine of the violations resulted from peak wet weather events, three were caused by industrial batch loading. Each permit violation is detailed in Appendix A along with its corresponding cause. The PCW began struggling to comply with disinfection requirements when a low total residual chlorine (TRC) requirement was added to their permit. Even after the installation of a sulfur dioxide dechlorination system, chlorine dosage had to be throttled to prevent TRC exceedances. Low chlorine residual during disinfection occasionally resulted in fecal coliform violations. Peak wet weather events impacted the plant's ability to provide effective disinfection by exaggerating short-circuiting problems in the circular contact basins. Biomass flushed from the plant also consumed chlorine residual and shielded

microorganisms. RCC took steps to address the PCW's disinfection issues in January 2020 with the installation of a temporary peracetic acid (PAA) disinfection system. RCC was able to apply a higher oxidant dosage with PAA to achieve more consistent disinfection. The plant continued to struggle with fecal coliform issues following the installation of the temporary PAA system due to short circuiting and the increased oxidation demand associated with periodic solids washout and industrial batch loading. A permanent PAA feed facility and new contact basin are being constructed as a part of the current improvements project. The new contact basin will eliminate the short-circuiting issue, but the improvements were not designed to overcome the issues created by periodic high organic effluent.

2.6 Zinc

Sporadic violations were reported for various heavy metals between January 2019 and February 2022, three of which were for zinc. Activated sludge wastewater treatment plants are not designed to remove metals. Metals issues are the focus of pretreatment programs since they are more effectively addressed at their source. RCC had been unsuccessful in locating the source of the reoccurring zinc violations in their system. Shortly after HW began working with RCC in 2019, they discovered that the Utility's relatively new secondary clarifier equipment was severely corroded. The premature corrosion was determined to be the result of an imbalance in stainless steel and galvanized metal. This manufacturing error caused galvanic corrosion to occur, which stripped the zinc galvanization from the mild steel components. The then unprotected mild steel corroded while the zinc was discharged in the PCW's effluent. A similar equipment failure occurred during the same time frame on a new clarifier in Little Rock that was designed by the same consulting firm and provided by the same equipment manufacturer. All the clarifier equipment that may have contributed zinc to the effluent was replaced as a part of the 2022 improvements project.

3.0 Corrective Actions

3.1 Plant Improvements

The 2022 Improvements are currently being constructed at the RCC PCW. The \$18.6 million project includes an anaerobic selector to control filamentous bulking, increase aeration basin volume, double plant blower capacity, and improve disinfection effectiveness, among other miscellaneous improvements. This project will increase the plant's capacity and provide additional resiliency against peak wet weather flow and industrial slug loading. The plant improvements are anticipated to be completed by December 2022.

3.2 Industrial Batch Loading

Many of the permit violations during the past three years have been caused by unauthorized batch discharges from a significant industrial user. The discharges have often first been discovered at the PCW headworks due to the milky white appearance of the influent. Grab samples of the influent have revealed organic loading > 1,000 mg/l CBOD₅. When this condition was discovered, operators would divert all influent flow into the plant's equalization basins until the condition passed or the basins were full. The contents of the equalization basins would later be returned to the PCW at a controlled rate. Unfortunately, many times the batch loading was not discovered quickly enough to prevent impact to plant performance because they occurred during overnight hours or on weekends. RCC's pretreatment coordinator was able to confirm that a single SIU was the source of each discharge. The pretreatment non-compliance issue was complicated by the fact that RCC's personnel assisted that SIU in the operation of their pretreatment system. To provide more effective enforcement against future events, RCC began negotiations in 2021 to remove the Utility from providing any pretreatment services for the SIU. With that transition complete, RCC is now better positioned to enforce pretreatment requirements since the industry will not be able to shift any blame back onto the Utility. A new influent COD monitor is also being installed as a part of the 2022 improvements to help RCC operators react to potential future batch discharges in a timely manner.

3.3 Peak Wet Weather Flow

The improvements made to mitigate SSOs in the collection system have resulted in higher peak flow rates at the PCW. The 2022 Improvements project will increase the plant's peak capacity to 18 MGD for a limited duration but larger wet weather peaks are anticipated to occur each year. The PCW has nearly 22 million gallons in equalization storage capacity. The use of the storage basins is limited by the capacity of the influent pump station. The basins also drain very slowly which hinders their use for back-to-back rainfall events. These limitations were documented in RCC's 2019 Master Plan. RCC has engaged HW to perform a more detailed study into the improvements necessary to maximize the effectiveness of the existing equalization storage. The study will also consider additional improvements to the existing treatment train, such as additional clarifiers or tertiary filters, to increase the WWTPs peak capacity to 24 MGD. After this study is complete, RCC will explore funding options for any recommended improvements.

3.4 Nitrification Inhibition

The PCW has struggled to maintain consistent nitrification for many years. The expansion of the aeration basins and blower capacity by the 2022 Improvements Project is expected to reduce this limitation. The elimination of industrial batch loading and better management of peak wet weather flow events will also improve the plant's ability to consistently nitrify. Other issues, possibly including insufficient alkalinity, low solids inventory, and inhibitory substances (such as quaternary ammonium compounds) could also be contributing to this issue. RCC will engage HW to perform a detailed study into the actions necessary to achieve consistent nitrification at the PCW. After this study is completed on November 1, 2023, RCC will explore funding options for any recommended improvements.

3.5 Milestone Schedule

CORRECTIVE MEASURE	COMPLETION DATE
2022 Capital Improvements Project	December 15, 2022
Discontinue Operation of SIU Pretreatment	July 1, 2022
Peak Flow Improvements Study	February 1, 2023
Nitrification Study	November 1, 2023
Construction of Recommended Improvements	April 1, 2024
Achieve Final Compliance with CAO	October 1, 2025

Appendix A: NPDES Violations for Jan 2019 – Feb 2022

AR0021768 - RUSSELLVILLE WATER & SEWER SYSTEM, CITY CORPORATION (58-00105)									
DMR_Envd Date	Parameter Description	Reported DMR Value	Limit Value	Likely Cause	Description	Corrected?	Corrective Measure	Further Action on CAP?	Compliance Date
01/31/2019	Oxygen, dissolved [DO] (INST MIN, mg/L)	5.8	6	Peak Wet Weather Flow (14 MGD)	1) Limited blower capacity may have resulted in low effluent D.O. 2) Excess feed of sulfur dioxide may have consumed residual D.O. 3) Peak flow reduced re-aeration by limiting fall over final effluent weir.	Yes (2021 & 2022)	Eliminated use of Sulfur Dioxide (2021). New blowers and contact basin installed (2022)	Not Needed	N/A
01/31/2019	Solids, total suspended (MO AVG, lb/d)	4352.8	1217.6	Peak Wet Weather Flow (14 MGD)	Solids washout due to rainfall induced peak flow exacerbated by high SVI from filaments	Partial (2019 & 2022)	Chlorination of RAS (2019). Anaerobic Selector installed (2022) to lower SVI	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
01/31/2019	Solids, total suspended (MO AVG, mg/L)	66.4	20						
01/31/2019	Solids, total suspended (7 DA AVG, mg/L)	110	30						
01/31/2019	Coliform, fecal general (30DA GEO, #/100mL)	>829	1000						
01/31/2019	Coliform, fecal general (7 DA GEO, #/100mL)	>5526	2000						
02/28/2019	Oxygen, dissolved [DO] (INST MIN, mg/L)	2.1	6	Peak Wet Weather Flow (19 MGD)	1) Limited blower capacity may have resulted in low effluent D.O. 2) Excess feed of sulfur dioxide may have consumed residual D.O. 3) Peak flow reduced re-aeration by limiting fall over final effluent weir.	Yes (2021 & 2022)	Eliminated use of Sulfur Dioxide (2021). New blowers and contact basin installed (2022)	Not Needed	N/A
02/28/2019	pH (MINIMUM, SU)	5.55	6	Unknown	Possibly caused by instrument calibration error or low alkalinity	Yes	Issue did not reoccur	Not Needed	N/A
02/28/2019	Solids, total suspended (MO AVG, lb/d)	12210.8	1217.6	Peak Wet Weather Flow (19 MGD)	Solids washout due to rainfall induced peak flow exacerbated by high SVI from filaments	Partial (2019 & 2022)	Chlorination of RAS (2019). Anaerobic Selector installed (2022) to lower SVI	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
02/28/2019	Solids, total suspended (MO AVG, mg/L)	151.5	20						
02/28/2019	Solids, total suspended (7 DA AVG, mg/L)	128.9	30						
02/28/2019	Nitrogen, ammonia total [as N] (MO AVG, lb/d)	452	243.5						
02/28/2019	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	5.3	4						
02/28/2019	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	7.7	6		Solids washout due to rainfall induced peak flow exacerbated by high SVI from filaments which inhibited nitrification	Partial (2019 & 2022)	Chlorination of RAS (2019). Anaerobic Selector installed (2022) to lower SVI. Additional aeration basin capacity installed (2022) which will help PCW preserve biomass during peak flow	Optimize use of equalization basins. Consideration of additional clarifier capacity. Consideration of alkalinity addition.	Study complete by 6/1/2023.
02/28/2019	Chlorine, total residual (INST MAX, mg/L)	0.2	.1	Peak Wet Weather Flow (19 MGD)	Sulfur Dioxide System not capable of required feed rate at high flow	Yes (2020)	Change to PAA disinfection (2021)	Not Needed	N/A
02/28/2019	Coliform, fecal general (30DA GEO, #/100mL)	>1170	1000						
02/28/2019	Coliform, fecal general (7 DA GEO, #/100mL)	>790	2000						
02/28/2019	BOD, carbonaceous [5 day, 20 C] (MO AVG, lb/d)	2099.4	913.2						
02/28/2019	BOD, carbonaceous [5 day, 20 C] (MO AVG, mg/L)	26.1	15						
02/28/2019	BOD, carbonaceous [5 day, 20 C] (7 DA AVG, mg/L)	29.5	22.5		Short circuiting in circular contact basins, limited disinfectant feed rate, solids shielding	Yes (2022)	New Contact Basin installed (2022). New PAA feed system installed (2022)	Not Needed	N/A
03/31/2019	Solids, total suspended (MO AVG, lb/d)	2202.2	1217.6	Peak Wet Weather Flow (8 MGD)	Solids washout due to rainfall induced peak flow exacerbated by high SVI from filaments	Partial (2019 & 2022)	Chlorination of RAS (2019). Anaerobic Selector installed (2022) to lower SVI	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
03/31/2019	Solids, total suspended (MO AVG, mg/L)	38.3	20						
03/31/2019	Solids, total suspended (7 DA AVG, mg/L)	61.6	30						
03/31/2019	Nitrogen, ammonia total [as N] (MO AVG, lb/d)	256.9	243.5						
03/31/2019	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	4.5	4						
03/31/2019	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	7.9	6		Possibly caused by high solids discharge or undiscovered pretreatment noncompliance	Yes	Issue did not reoccur	Not Needed	N/A
03/31/2019	Copper, total recoverable (MO AVG, lb/d)	0.49	.45	Unknown	Possibly caused by high solids discharge or undiscovered pretreatment noncompliance	Yes	Issue did not reoccur	Not Needed	N/A
03/31/2019	Mercury, total recoverable (MO AVG, lb/d)	0.00092	.00082	Unknown		Yes	Issue did not reoccur	Not Needed	N/A
03/31/2019	Mercury, total recoverable (MO AVG, ug/L)	0.014	.0134						

AR0021768 - RUSSELLVILLE WATER & SEWER SYSTEM, CITY CORPORATION (58-00105)									
DMR_Env Date	Parameter Description	Reported DMR Value	Limit Value	Likely Cause	Description	Corrected?	Corrective Measure	Further Action on CAP?	Compliance Date
03/31/2019	Coliform, fecal general (30DA GEO, #/100mL)	2083	1000	Peak Wet Weather Flow (8 MGD)	Short circulating in circular contact basins, limited disinfectant feed rate, solids shielding	Yes (2022)	New Contact Basin installed (2022). New PAA feed system installed (2022)	Not Needed	N/A
03/31/2019	Coliform, fecal general (7 DA GEO, #/100mL)	4627	2000						
04/30/2019	Oxygen, dissolved [DO] (INST MIN, mg/L)	3.8	6		1) Limited blower capacity may have resulted in low effluent D.O. 2) Excess feed of sulfur dioxide may have consumed residual D.O. 3) Peak flow reduced re-aeration by limiting fall over final effluent weir.	Yes (2021 & 2022)	Eliminated use of Sulfur Dioxide (2021). New blowers and contact basin installed (2022)	Not Needed	N/A
04/30/2019	Solids, total suspended (MO AVG, lb/d)	5144.1	1217.6		Solids washed out due to rainfall induced peak flow exacerbated by high SVI from filaments	Partial (2019 & 2022)	Chlorination of RAS (2019). Anaerobic Selector installed (2022) to lower SVI	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
04/30/2019	Solids, total suspended (MO AVG, mg/L)	71.1	20						
04/30/2019	Solids, total suspended (7 DA AVG, mg/L)	139.9	30						
04/30/2019	Nitrogen, ammonia total [as N] (MO AVG, lb/d)	440.9	133.9		Solids washout due to rainfall induced peak flow exacerbated by high SVI from filaments reduced sludge age which inhibited nitrification	Partial (2019 & 2022)	Chlorination of RAS (2019). Anaerobic Selector installed (2022) to lower SVI. Additional aeration basin capacity installed (2022) which will help PCW preserve biomass during peak flow	Optimize use of equalization basins. Consideration of additional clarifier capacity. Consideration of alkalinity addition.	Study complete by 6/1/2023.
04/30/2019	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	6.1	2.2	Peak Wet Weather Flow (18 MGD)					
04/30/2019	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	14.4	5.6						
04/30/2019	Coliform, fecal general (30DA GEO, #/100mL)	1068	1000		Short circulating in circular contact basins, limited disinfectant feed rate, solids shielding	Yes (2022)	New Contact Basin installed (2022). New PAA feed system installed (2022)	Not Needed	N/A
04/30/2019	Coliform, fecal general (7 DA GEO, #/100mL)	9373	2000						
04/30/2019	BOD, carbonaceous [5 day, 20 C] (MO AVG, lb/d)	963.5	913.2		Solids washout due to rainfall induced peak flow exacerbated by high SVI from filaments reduced PWC's treatment capacity	Partial (2019 & 2022)	Chlorination of RAS (2019). Anaerobic Selector installed (2022) to lower SVI. Additional blower and aeration basin capacity (2022)	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
05/31/2019	Solids, total suspended (MO AVG, lb/d)	1215.7	913.2		Solids washout due to rainfall induced peak flow exacerbated by high SVI from filaments. Note that chlorination of RAS has reduced TSS excursion	Partial (2019 & 2022)	Chlorination of RAS (2019). Anaerobic Selector installed (2022) to lower SVI	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
05/31/2019	Solids, total suspended (MO AVG, mg/L)	16.1	15						
05/31/2019	Nitrogen, ammonia total [as N] (MO AVG, lb/d)	245	133.9	Peak Wet Weather Flow (15 MGD)	Solids washout due to rainfall induced peak flow exacerbated by high SVI from filaments. Reduced solids loss due to chlorination of RAS has reduced NH ₃ excursion	Partial (2019 & 2022)	Chlorination of RAS (2019). Anaerobic Selector installed (2022) to lower SVI. Additional aeration basin capacity installed (2022) which will help PCW preserve biomass during peak flow	Optimize use of equalization basins. Consideration of additional clarifier capacity. Consideration of alkalinity addition.	Study complete by 6/1/2023.
05/31/2019	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	3.3	2.2						
05/31/2019	Coliform, fecal general (30DA GEO, #/100mL)	2429	1000		Short circulating in circular contact basins, limited disinfectant feed rate, solids shielding	Yes (2022)	New Contact Basin installed (2022). New PAA feed system installed (2022)	Not Needed	N/A
05/31/2019	Coliform, fecal general (7 DA GEO, #/100mL)	7027	2000						
07/31/2019	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	2.3	2.2	Equipment Malfunction	Valve malfunction on blowers	Yes	Valve repaired in 2019, blowers replaced in 2022	Not Needed	N/A
07/31/2019	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	8.5	5.6		Premature failure of clarifier equipment installed circa 2011 was discovered in 2020. Corrosion from improper ratio of dissimilar metal, stripped zinc from galvanized steel.	Yes (2022)	Clarifier equipment replaced (2022)	Not Needed	N/A
07/31/2019	Zinc, total recoverable (MO AVG, lb/d)	8.4	5.2	Inconclusive, potentially related to equipment corrosion unknown to RCC in 2019					
07/31/2019	Zinc, total recoverable (MO AVG, ug/L)	165.7	85.5						
07/31/2019	Zinc, total recoverable (7 DA AVG, ug/L)	280	171.6	Operation Error	Clarifier returned to service caused temporary increase in effluent chlorine concentration.	Yes	Issue did not reoccur	Not Needed	N/A
07/31/2019	Chlorine, total residual (INST MAX, mg/L)	0.8	.1						
09/30/2019	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	8.6	5.6		Loss of aeration impacted nitrification process	Yes	Issue did not reoccur	Not Needed	N/A

AR0021768 - RUSSELLVILLE WATER & SEWER SYSTEM, CITY CORPORATION (58-00105)									
DMR_Env Date	Parameter Description	Reported DMR Value	Limit Value	Likely Cause	Description	Corrected?	Corrective Measure	Further Action on CAP?	Compliance Date
09/30/2019	BOD, carbonaceous [5 day, 20 C] (7 DA AVG, mg/L)	17.3	15	Power Outage	Loss of aeration temporarily decreased PCW's assimilation capacity	Yes	Issue did not reoccur	Not Needed	N/A
10/31/2019	Zinc, total recoverable (MO AVG, lb/d)	5.7	5.2	Inconclusive, potentially related to equipment corrosion unknown to RCC in 2019	Premature failure of clarifier equipment installed circa 2011 was discovered in 2020. Corrosion from improper ratio of dissimilar metal, stripped zinc from galvanized steel.	Yes (2022)	Clarifier equipment replaced (2022)	Not Needed	N/A
10/31/2019	Zinc, total recoverable (MO AVG, ug/L)	116	85.5						
10/31/2019	Zinc, total recoverable (7 DA AVG, ug/L)	290	171.6						
10/31/2019	Chlorine, total residual (INST MAX, mg/L)	0.013	.011	Equipment Failure	Sulfur Dioxide rotometer had minor leak that decreased feed rate	Yes (2019 & 2021)	Rotometer repaired (2019). System replaced with PAA (2021)	Not Needed	N/A
02/29/2020	Solids, total suspended (MO AVG, lb/d)	4207.5	1217.6			Partial (2022)	Installation of new aeration basin (2022) will provide capacity for improved solids management	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
02/29/2020	Solids, total suspended (MO AVG, mg/L)	53.2	20						
02/29/2020	Solids, total suspended (7 DA AVG, mg/L)	71.2	30						
02/29/2020	Nitrogen, ammonia total [as N] (MO AVG, lb/d)	392.5	243.5	Peak Wet Weather Flow (16 MGD)	Solids washout due to rainfall induced peak flow	Partial (2022)	Additional aeration capacity (blowers and aeration basin volume) installed in 2022	Optimize use of equalization basins. Consideration of additional clarifier capacity. Consideration of alkalinity addition.	Study complete by 6/1/2023.
02/29/2020	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	5	4						
02/29/2020	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	7.2	6						
02/29/2020	Copper, total recoverable (MO AVG, lb/d)	0.52	.45	Unknown	Possibly caused by high solids discharge or undiscovered pretreatment noncompliance	Yes	Issue did not reoccur	Not Needed	N/A
02/29/2020	Coliform, fecal general (30DA GEO, #/100mL)	1029	1000			Yes (2022)	New Contact Basin installed (2022). New PAA feed system installed (2022)	Not Needed	N/A
02/29/2020	Coliform, fecal general (7 DA GEO, #/100mL)	2280	2000						
02/29/2020	BOD, carbonaceous [5 day, 20 C] (MO AVG, lb/d)	1775.9	913.2	Peak Wet Weather Flow (16 MGD)	Solids washout due to rainfall induced peak flow exacerbated by high SVI from filaments reduced sludge age which inhibited nitrification	Partial (2019 & 2022)	Chlorination of RAS (2019). Additional blower and aeration basin capacity (2022)	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
02/29/2020	BOD, carbonaceous [5 day, 20 C] (MO AVG, mg/L)	22.5	15						
02/29/2020	BOD, carbonaceous [5 day, 20 C] (7 DA AVG, mg/L)	28.3	22.5						
04/30/2020	Solids, total suspended (MO AVG, lb/d)	1655	1217.6			Partial (2022)	Installation of new aeration basin (2022) will provide capacity for improved solids management	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
04/30/2020	Solids, total suspended (MO AVG, mg/L)	21.8	20						
04/30/2020	Solids, total suspended (7 DA AVG, mg/L)	34.6	30						
04/30/2020	BOD, carbonaceous [5 day, 20 C] (MO AVG, lb/d)	1060.6	913.2			Partial (2019 & 2022)	Chlorination of RAS (2019). Additional blower and aeration basin capacity (2022)	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
04/30/2020	BOD, carbonaceous [5 day, 20 C] (7 DA AVG, mg/L)	24.1	22.5						
06/30/2020	Oxygen, dissolved [DO] (INST MIN, mg/L)	5.6	6	Peak Wet Weather Flow (9 MGD)	1) Limited blower capacity may have resulted in low effluent D.O. 2) Excess feed of sulfur dioxide may have consumed residual D.O. 3) Peak flow reduced re-aeration by limiting fall over final effluent weir.	Yes (2021 & 2022)	Eliminated use of Sulfur Dioxide (2021). New blowers and contact basin installed (2022)	Not Needed	N/A
07/31/2020	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	2.6	2.2	Operations Error	WAS pump ran for longer period than intended which depleted the MLSS concentration and interrupted nitrification	Yes	Issue did not reoccur	Not Needed	N/A
08/31/2020	Oxygen, dissolved [DO] (INST MIN, mg/L)	5.9	6	Equipment Failure	Air valve failure lowered DO in aeration basins	Yes	Air valve repaired	Not Needed	N/A

AR0021768 - RUSSELLVILLE WATER & SEWER SYSTEM, CITY CORPORATION (58-00105)									
DMR_Env Date	Parameter Description	Reported DMR Value	Limit Value	Likely Cause	Description	Corrected?	Corrective Measure	Further Action on CAP?	Compliance Date
08/31/2020	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	3.2	2.2	Industrial Batch Loading, Equipment Failure	A slug of high concentration soluble BOD was discharged to the PCW at that same time that an air valve failed. Low aeration basin DO inhibited nitrification.	Yes (2020, 2022)	Air valve repaired (2020). Changes to pretreatment practice at industrial user expected to limit future non-compliance (2022)	Finalize pretreatment changes at suspected industry	Pretreatment Changes Complete by 7/1/2022
08/31/2020	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	9.5	5.6						
01/31/2021	Solids, total suspended (7 DA AVG, mg/L)	33	30	Industrial Batch Loading	A slug of high concentration soluble BOD discharged from an industrial user exceeded the capacity of the PCW and caused multiple violations	Yes (2022)	Changes to pretreatment practice at industrial user expected to limit future non-compliance (2022)	Finalize pretreatment changes at suspected industry	Pretreatment Changes Complete by 7/1/2022
01/31/2021	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	4.2	4						
01/31/2021	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	9.7	6						
01/31/2021	Coliform, fecal general (7 DA GEO, #/100mL)	3220	2000						
02/28/2021	Nitrogen, ammonia total [as N] (MO AVG, lb/d)	610.3	243.5	Industrial Batch Loading	Industrial batch discharge in January resulted in process upset.	Yes (2022)	Changes to pretreatment practice at industrial user expected to limit future non-compliance (2022)	Finalize pretreatment changes at suspected industry	Pretreatment Changes Complete by 7/1/2022
02/28/2021	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	12.8	6						
02/28/2021	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	19.7	6						
02/28/2021	Mercury, total recoverable (MO AVG, lb/d)	0.00123	0.0082	Unknown	Possible industrial discharge	Yes	Pretreatment investigation	Not needed, problem did not reoccur	N/A
02/28/2021	Mercury, total recoverable (MO AVG, ug/L)	0.025	0.134						
02/28/2021	BOD, carbonaceous [5 day, 20 C] (MO AVG, mg/L)	15.6	15	Industrial Batch Loading	Industrial batch discharge resulted in process upset.	Yes (2022)	Pretreatment changes expected to limit future non-compliance (2022)	Finalize pretreatment changes at suspected industry	Pretreatment Changes Complete by 7/1/2022
02/28/2021	BOD, carbonaceous [5 day, 20 C] (7 DA AVG, mg/L)	22.9	22.5						
03/31/2021	Solids, total suspended (MO AVG, lb/d)	2433.9	1217.6						
03/31/2021	Solids, total suspended (MO AVG, mg/L)	41.7	20		SVI remained high due to industrial discharge in January, which resulted in a solids washout during high flow.	Yes (2022)	Changes to pretreatment practice at industrial user expected to limit future non-compliance (2022)	Finalize pretreatment changes at suspected industry	Pretreatment Changes Complete by 7/1/2022
03/31/2021	Solids, total suspended (7 DA AVG, mg/L)	89.3	30						
03/31/2021	Nitrogen, ammonia total [as N] (MO AVG, lb/d)	735.8	243.5	Industrial Batch Loading	The PCW's nitrification did not fully resume following the January event.	Partial	Pretreatment group investigated possible discharge of quaternary ammonium compounds.	Investigate cause of reoccurring nitrification inhibition at PCW	Study complete by 12/1/2022.
03/31/2021	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	12.6	4						
03/31/2021	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	20.9	6						
03/31/2021	BOD, carbonaceous [5 day, 20 C] (MO AVG, lb/d)	1125.8	913.2						
03/31/2021	BOD, carbonaceous [5 day, 20 C] (MO AVG, mg/L)	19.3	15		SVI remained high due to industrial discharge in January, which resulted in a solids washout during high flow.	Yes (2022)	Changes to pretreatment practice at industrial user expected to limit future non-compliance (2022)	Finalize pretreatment changes at suspected industry	Pretreatment Changes Complete by 7/1/2022
03/31/2021	BOD, carbonaceous [5 day, 20 C] (7 DA AVG, mg/L)	31.6	22.5						
04/30/2021	Nitrogen, ammonia total [as N] (MO AVG, lb/d)	550.5	133.9						
04/30/2021	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	10.6	2.2	Industrial Interference	The PCW's nitrification did not fully resume following the January event.	Partial	Pretreatment group continued investigation into inhibition compounds.	Investigate cause of reoccurring nitrification inhibition at PCW	Study complete by 6/1/2023.
04/30/2021	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	15.2	5.6						
05/31/2021	Solids, total suspended (MO AVG, lb/d)	1584.2	913.2						
05/31/2021	Solids, total suspended (MO AVG, mg/L)	23.4	15		Solids washout due to rainfall induced peak flow and high SVI	Partial (2022)	Installation of new aeration basin (2022) will provide capability for improved solids management	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
05/31/2021	Solids, total suspended (7 DA AVG, mg/L)	24.6	22.5						
05/31/2021	Coliform, fecal general (7 DA GEO, #/100mL)	2144	2000	Peak Wet Weather Flow (12 MGD)	Shielding and short circuiting	Yes (2022)	New contact basin and PAA feed system installed (2022)	Not Needed	N/A
05/31/2021	BOD, carbonaceous [5 day, 20 C] (MO AVG, lb/d)	951.5	608.8						
05/31/2021	BOD, carbonaceous [5 day, 20 C] (MO AVG, mg/L)	14.1	10		Solids washout due to rainfall induced peak flow reduced PWC's treatment capacity	Partial (2022)	Installation of new aeration basin (2022) will provide capability for improved solids management	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
05/31/2021	BOD, carbonaceous [5 day, 20 C] (7 DA AVG, mg/L)	18.6	15						
07/31/2021	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	2.9	2.2						
07/31/2021	Coliform, fecal general (30DA GEO, #/100mL)	1473	1000	Industrial Batch Loading	Several batch loading events during the period diminished plant performance	Partial (2022)	Installation of new aeration basin, blowers, and disinfection system will increase the resiliency of the PCW.	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration. Investigate nitrification inhibition.	Study complete by 6/1/2023.
07/31/2021	Coliform, fecal general (7 DA GEO, #/100mL)	10974	2000						
07/31/2021	BOD, carbonaceous [5 day, 20 C] (MO AVG, mg/L)	11.6	10						
08/31/2021	Oxygen, dissolved [DO] (INST MIN, mg/L)	5.8	6						
08/31/2021	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	2.7	2.2	Industrial Batch Loading	Several batch loading events during the period diminished plant performance	Partial (2022)	Installation of new aeration basin, blowers, and disinfection system will increase the resiliency of the PCW.	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration. Investigate nitrification inhibition.	Study complete by 6/1/2023.
08/31/2021	BOD, carbonaceous [5 day, 20 C] (MO AVG, mg/L)	11.7	10						
08/31/2021	BOD, carbonaceous [5 day, 20 C] (7 DA AVG, mg/L)	16.7	15						

AR0021768 - RUSSELLVILLE WATER & SEWER SYSTEM, CITY CORPORATION (58-00105)									
DMR_Env Date	Parameter Description	Reported DMR Value	Limit Value	Likely Cause	Description	Corrected?	Corrective Measure	Further Action on CAP?	Compliance Date
08/31/2021	Zinc, total recoverable (MO AVG, ug/L)	88	85.5	Inconclusive, potentially related to equipment corrosion unknown to RCC in 2019	Premature failure of clarifier equipment installed circa 2011 was discovered in 2020. Corrosion from improper ratio of dissimilar metal, stripped zinc from galvanized steel.	Yes (2022)	Clarifier equipment replaced (2022)	Not Needed	N/A
10/31/2021	Coliform, fecal general (30DA GEO. #/100mL)	>177	1000	Industrial Batch Loading	Organics that passed through treatment were oxidized by PAA, lowering disinfectant residual below necessary level.	Yes (2022)	New PAA contact basin and feed system installed (2022). Changes to pretreatment practice at industrial user.	Finalize pretreatment changes at suspected industry	Pretreatment Changes Complete by 7/1/2022
10/31/2021	Coliform, fecal general (7 DA GEO. #/100mL)	>604	2000						
01/31/2022	Solids, total suspended (7 DA AVG, mg/L)	44.9	30	Peak Wet Weather Flow, Construction (12 MGD)	Solids washout due to rainfall induced peak flow. Plant operations disrupted by ongoing construction project.	Partial (2022)	Installation of new aeration basin (2022) will provide capability for improved solids management. Project anticipated complete by August 2022.	Optimize use of equalization basins. Consideration of additional clarifier capacity and/or dual use filtration	Study complete by 12/1/2022.
01/31/2022	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	4.8	4						
01/31/2022	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	9.7	6						
01/31/2022	Coliform, fecal general (7 DA GEO. #/100mL)	3353	2000						
02/28/2022	Oxygen, dissolved [DO] (INST MIN, mg/L)	5.8	6						
02/28/2022	Solids, total suspended (MO AVG, lb/d)	3652.7	1217.6						
02/28/2022	Solids, total suspended (MO AVG, mg/L)	69.2	20						
02/28/2022	Solids, total suspended (7 DA AVG, mg/L)	139.6	30						
02/28/2022	Nitrogen, ammonia total [as N] (MO AVG, lb/d)	782.1	243.5						
02/28/2022	Nitrogen, ammonia total [as N] (MO AVG, mg/L)	14.8	4						
02/28/2022	Nitrogen, ammonia total [as N] (7 DA AVG, mg/L)	24.3	6						
02/28/2022	Coliform, fecal general (30DA GEO. #/100mL)	1953	1000						
02/28/2022	Coliform, fecal general (7 DA GEO. #/100mL)	22592	2000						
02/28/2022	BOD, carbonaceous [5 day, 20 C] (MO AVG, lb/d)	2383.8	913.2						
02/28/2022	BOD, carbonaceous [5 day, 20 C] (MO AVG, mg/L)	45.2	15						
02/28/2022	BOD, carbonaceous [5 day, 20 C] (7 DA AVG, mg/L)	66.9	22.5						