Blytheville
ARKANSAS

Office of the Mayor
JAMES W. SANDERS

124 WEST WALNUT • BLYTHEVILLE, AR 72315 • (870) 763-3602 • FAX (870) 762-0443

April 27, 2015

Jacqueline Trotta
Enforcement Analyst
Water Division
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118

This letter represents my response to the issues addressed regarding the City of Blytheville's Wastewater system. Enclosed with this letter you will find the Updated Corrected Action Plans for case numbers AR0022560 (West Plant), AR0022578 (South Plant) and AR0022586 (North Plant) that were prepared by our engineering firm, SSR. I have examined these plans, along with my Treatment Coordinator, and believe they will assist us in continuing to upgrade our system. I will be presenting these plans to East Arkansas Planning and Development and the USDA to search for grant opportunities to assist in funding. I will keep your office updated on the status of any funding we are able to secure.

Sincerely,

James W. Sanders
Mayor

CITY OF BLYTHEVILLE

BLYTHEVILLE, ARKANSAS

CORRECTIVE ACTION ORDER UPDATE

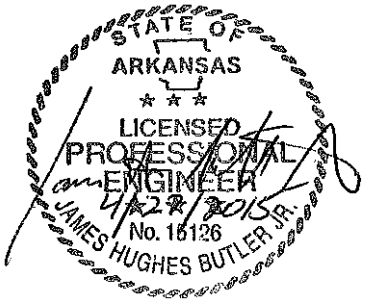
BLYTHEVILLE NORTH WASTEWATER TREATMENT FACILITY
ASSESSMENT AND RECOMMENDED PLAN FOR CORRECTIVE MEASURES

SSR Smith Seckman Reid, Inc.

CORRECTIVE ACTION ORDER UPDATE

Blytheville North Wastewater Treatment Facility

Assessment and Recommended Plan for Corrective Measures



Bo Butler, P.E.
Senior Principal

Marshall Fall, E.I
Project Manager

Prepared for:
City of Blytheville

Prepared by:
Smith Seckman Reid, Inc.
2650 Thousand Oaks Blvd.
Suite 3200
Memphis, TN 38118
Tel 901.683.3900
Fax 901.683.3990

SSR Project No.:
14-41-027.1

Date:
April 27, 2014

Table of Contents

1 Executive Summary

In February 2015, ADEQ requested that the City issue a detailed Corrective Action Order Update (CAOU). The CAOU report should address the status of the facility's compliance to I&I issues, the potential effluent violations and additional measures to be taken to maintain compliance of the NPDES. The report should also address the status of compliance in regards to total recoverable mercury (Hg) concentrations, and address measures to be taken by the City to begin locating any sources of contamination in the waste stream.

After reviewing plant data and the existing operations at the plant, the following corrective actions were developed. Once implemented by the City, these corrective actions should allow the treatment facility to maintain compliance with the NPDES permit and reduce the concentration of Hg concentrations**.**

1. Based on previous completed studies, complete collection system rehabilitation on a priority basis focusing on high priority areas first.

2. Aggressively track and locate sources of Hg in the waste stream flow and require sources to incorporate pre-treatment to remove the Hg from the flow.

3. Conduct rate study and review capital expenditure plans to ensure adequate revenue stream to allow for effective operation, maintenance, repair, and replacement of WWTF equipment.

4. Install synthetic media in the primary basin of the plant to encourage the growth of nitrifying bacteria and prevent bacteria from washing out of the facilities during heavy flow events.

2 General Information

2.1 Description of Wastewater Treatment Facility

The City treats wastewater at three treatment facilities. This CAP will address operations at the North facility (NWWTF). The facility is a modified lagoon that incorporates the BIOLAC® technology. The facility consists of traveling screens, a primary aeration and mixing basin, integral clarifiers to facilitate settling, a basin that incorporates both aerated and non-aerated polishing, and ultra-violet disinfection. The capacity of the NWWTF is 0.8 MGD. The facility was built adjacent to a retired non-aerated lagoon that was repurposed as sludge disposal basin for the facility. The facility was constructed and commissioned in 1989.

The source of wastewater for the NWWTF is 22 pumping stations with a combined total capacity of 7,100 gallons per minute (GPM). The capacity of each pumping station is summarized in Table 2.1.

Table 2.1- Flow Source (PS Capacities)

North Plant	Walmart	800 GPM
	Lockard	1500 GPM
	Ward/Normandy	200 GPM
	Ruddle Road	200 GPM
	Riggs	180 GPM
	Grandview	225 GPM
	Walker Park	600 GPM
	Comfort Inn	250 GPM
	Interstate	200 GPM
	Universal	225 GPM
	Borg-Warner	300 GPM
	Terra	225 GPM
	Hwy 151	180 GPM
	Hwy 312	180 GPM
	Hardhat	450 GPM
	Wisdom Road	180 GPM
	Briarcrest #1	200 GPM
	Briarcrest #2	200 GPM
	Ridgeway	200 GPM
	Golf Links	200 GPM
	Country Club	225 GPM
	Wheeler Lane	180 GPM

2.2 Description of Need

In the last 24 months, the NWWTF has experienced continuous events of excessive flow volumes that exceed the facility's designed capacity. Excessive flows can "wash out" the facility causing the loss of valuable nitrifying bacteria that are critical to the proper treatment of the waste stream. I&I must be reduced to allow the facility to operate as designed. Additionally, under the existing NPDES permit issued in January of 2014, the concentration of Hg in the effluent will be required to meet a limit by January 2017. Recent monitoring records show the facility may have an issue meeting the limits for Hg set forth in the NPDES permit on a consistent basis.

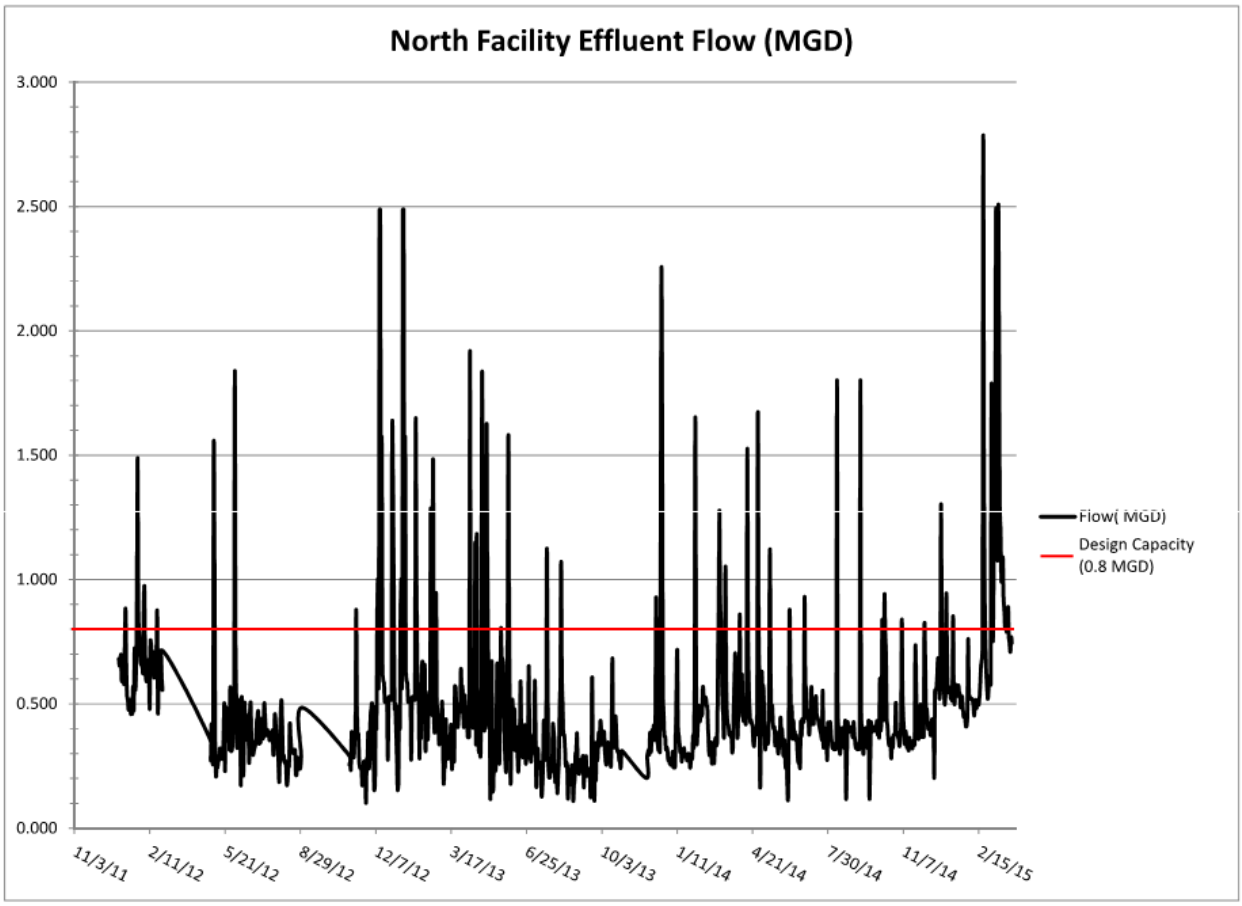
2.3 Influent and Effluent Flows

The daily effluent flows for the treatment facility are summarized in Table 2.2. During a heavy rain event, the facility can go multiple days where influent flows exceed the facility's design capacity, As evidenced by Figure 2.1 below. Over the last two years, influent flows have exceeded the design flow by as much as 350 percent.

Table 2.2 – Daily Effluent Flows

Flow Condition	North Plant (million gallons)
Minimum Day	0.101
Average Day	0.487
Maximum Day	2.778

Figure 2.1 – Daily Effluent Flows



These flow excursions are directly related to rainfall events as identified in the Daily Operation Report Calculations (DOR's) provided by the City. During these spikes, the plant loses a majority of its microbial treatment ability due to the washout of the nitrifying organisms from the treatment basins. This is confirmed by the Daily Monitoring Reports (DMRs) that show lower-than-normal mixed liquor suspended solids (MLSS) concentrations in the primary mixing basin (as compared to pre-rainfall concentrations) and high total suspended solids (TSS) concentrations in the effluent after every rain event that increased plant flow. The carbonaceous biochemical oxygen demand (CBOD) loading in the influent flow also drops significantly during and immediately after every rainfall event that affects flow due to dilution by inflow and infiltration. This diluted CBOD loading further promotes degradation of the biomass used to treat the wastewater.

The facility was originally designed to have a hydraulic residence time of between 24 and 48 hours to allow for adequate treatment. When the plant receives flows in excess of the design flow, three conditions occur that affect the treatment capabilities of the plants: (1) the hydraulic residence time is reduced such that there is not adequate time for treatment to occur; (2) the additional flow has a very low concentration of CBOD, sharply decreasing the strength of the waste stream, and depriving the biomass of needed nutrients for growth and treatment abilities; and (3) the MLSS concentration in the treatment basin is significantly reduced due to washout of the biomass from the basins, thereby preventing adequate treatment of subsequent incoming flows. As a result of these conditions, the facility could possibly be out of compliance for several days while the biomass attempts to reestablish itself.

2.4 Influent and Effluent Quality

Facility MORs were analyzed for the NWWTF to diagnose the concerns by ADEQ that the plant will not continue to produce quality effluent. The information submitted covered nearly five years of operating data from 2011 to 2015 for the facility. The data included influent and effluent properties that are monitored on a regular basis to verify the plant's compliance with the NPDES permits and its ability to treat the waste stream. Overall the NWWTP looks to be a very biologically healthy facility. The facility experiences frequent events of excessive volumes of flow due to I&I and rebounds back to normal operation very quickly. There are still possibilities of noncompliance for brief periods during and immediately after heavy rain events so a reduction in I&I would only further benefit the facility.

2.4.1 Total Recoverable Mercury (Hg)

For several years, the NWWTP has been reporting higher than acceptable Hg limits in the effluent stream. Starting three years after the issuance date of the current permit (April 2012), the facility was required to meet a specified limit for Hg in lieu of just reporting the reading. According MOR data, the facility continually fails to meet the limits stipulated in the NPDES. Data shows that in 2008 there was a spike in the influent and effluent concentrations suggesting that attention should be focused on locating a source for influent contamination.

3 Proposed Treatment Plant Corrections

The proposed treatment facility corrective actions described below intend to mitigate violations of the facility's NPDES permit by attempting to utilize existing facilities and personnel to the greatest extent practical. Recommendations are made on the basis of priority ranking, high priority, medium priority, and low priority.

3.1 High Priority

1. Based on Appendix A, from a report titled "Sanitary Sewer Collection System Report" issued to ADEQ in February of 2012 by Smith, Seckman, Reid, Inc. (SSR), the city shall focus on fixing the sections of pipe listed as "high priority", as funds become available. The City shall also continue efforts to indentify additional inflow and infiltration locations within the collection system. This action shall be an immediate and continuous effort. Inflow and infiltration should show signs of reduction by June 2016.

a. If additional funding is necessary to accomplish this in a timely matter, application to the proper authority should be submitted as soon as possible.

2. Conduct trace studies to track sources of Hg contamination and confirm whether or not the proper equipment has been installed and is in working order. If a source is identified that does not incorporate proper pre-treatment, equipment such as amalgam particle separators shall be installed at the source.

    a. A review of customer records shall be completed to determine any actions that may have taken place in 2008 that might be contributing to the high concentration levels in the flow stream.

    b. Testing and monitoring should continue until all sources are identified and have pre-treatment installed.

        i. A database shall be created to track and monitor testing results to ensure appropriate recording/reporting procedures are followed and for proper enforcement.

    c. This action shall be an immediate and continuing effort. Concentrations of Hg in the influent and effluent streams should show reasonable potential to meet the allowable permit limits by May, 2016.

    d. If amalgam particle filters are found to be inadequate at removing contaminates, the city shall require the customers that continue to discharge contaminates to design and construct activated carbon adsorption beds.

3. Review budget capital plans and fares for adequate revenue stream.

3.2 Medium Priority

1. Based on Appendix B, from a report titled "Sanitary Sewer Collection System Report" issued to ADEQ in February of 2012 by Smith, Seckman, Reid, Inc. (SSR), the city shall focus on fixing the sections of pipe listed as "medium priority" as funds become available.

2. Testing of the existing sludge for Hg contamination should be completed. If the sludge should be found contaminated, a plan shall be developed immediately to have the sludge removed from the pond and disposed of as funds become available.

3. Repair and or replace any equipment that may not be performing as designed or is not operable.

3.3 Low priority

1. If after extensive pipeline repairs have taken place within the collection system do not fix the I&I problem and the plant continues to be washed out during rain events, the City shall install a system of synthetic media in the primary basins of each plant to provide the nitrifying bacteria a surface

area for attached growth. This improvement will mitigate washout of ammonia removing bacteria during high flow events. The anticipated date for completion of this action is January 2018.

APPENDIX A

HIGH PRIORITY AREAS

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
705-1								
WD5 WD4	346.1	LINER	2	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,227.00
							705-1 Subtotal:	**$ 25,227.00**
705-2								
WD33 WD32	121	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 8,970.00
WD34 WD33	156.4	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,448.00
WD35 WD34	336.8	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,576.00
WD40 WD2	232.7	LINER	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,289.00
WD47 WD46	234.1	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,887.00
WD53 WD51	197.4	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,318.00
WD55 WD54	163	CONC	?	POOR/FULL OF GROUT	RELAY	$ 90.00	$ 500.00	$ 14,670.00
							705-2 Subtotal:	**$ 107,158.00**
705-3								
WD16 WD7	249.1	CONC	2	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,437.00
WD21 WD20	172.1	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 13,047.00
WD22 WD21	216.1	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,127.00
							705-3 Subtotal:	**$ 47,611.00**

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
1767-1								
WP18 WP17	245.2	CONC	3	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,664.00
WP21 WP20	75.2	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 5,764.00
WP27 WP24	206.1	CONC	3	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,927.00
WP29 WP22	168.2	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,774.00
WP30 WP31	199.1	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,437.00
WP35 WP34	400	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,000.00
WP44 WP42	363.9	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 26,973.00
WP40 WP39	410.3	LINER	6	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 31,721.00
							1767-1 Subtotal:	**$ 72,410.00**
1767-2								
WP78 WP2	464	CONC	5	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 34,980.00
WP79 WP78	350.2	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,014.00
WP80 WP79	80	CONC	0	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 5,600.00
WP82 WP81	391.6	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,412.00
							1767-2 Subtotal:	**$ 94,006.00**
Ruddle-1								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
ND6 ND6A	17.2	CLAY	?	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,204.00
ND7 ND6	216.7	CLAY	1	POOR/SMOKE LEAK	RELAY	$ 90.00	$ 500.00	$ 20,003.00
ND8 ND7	282	CLAY	3	POOR	RELAY	$ 90.00	$ 500.00	$ 26,880.00
ND9 ND8	290	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,300.00
ND10 ND9	404	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,280.00
ND11 ND10	160.6	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,742.00
ND12 ND11	205	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,850.00
ND15 ND14	146.5	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,255.00
ND16 ND15	182.3	CLAY	4	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,761.00
ND17 ND13	92.1	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 6,947.00
ND19 ND6A	140.9	PVC	0	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 9,863.00
ND21A ND21	174.5	CLAY	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,715.00
ND21 ND20	120.6	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 9,942.00
ND22 ND21A	209.7	CLAY	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,679.00
ND23 ND22	233.8	CLAY	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,366.00
ND26								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
ND25	570	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,900.00
ND27 ND25	235.4	CLAY	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,978.00
							Ruddle-1 Subtotal:	**$ 288,665.00**
Walker Park 1								
NC49A NC49	231.3	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,191.00
NC49B NC8	246.4	CLAY	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,248.00
NC49 NC49B	288.0	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,660.00
NC50 NC9	117.1	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 9,197.00
NC51 NC50	215.8	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,106.00
NC53 NC52	273.0	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 19,610.00
NC54A NC54	43.3	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,531.00
NC54 NC10A	98.6	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 7,902.00
SERVICE CAP NC52	143.8	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,066.00
SERVICE CAP NC54A	47.2	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,804.00
Locust & Lilly Popular & Lilly	229	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,530.00
NC 20A NC19	703	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 50,710.00
NC15A								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
NC15	426.2	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 34,334.00
NC15								
NC16	23.7	CLAY	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,659.00
NC24				POOR/SMOKE				
NC23	291	CLAY	2	LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,370.00
NC25A								
NC25	344	CLAY	11	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 29,580.00
NC25								
NC24	193.9	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,073.00
							Walker Park 1 Subtotal:	**$ 306,571.00**
Walker Park 2								
1								
2	67.6	CLAY	1	POOR	RELAY	$ 90.00	$ 500.00	$ 6,584.00
NC66								
NC65	80.6	CONC	2	POOR	BURST/RELAY	$ 85.00	$ 500.00	$ 7,851.00
NC86								
NC85	349.5	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,965.00
NC87								
NC86	397	CLAY	12	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 33,790.00
NC89								
NC88	232.4	TRUSS	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,768.00
NC93								
NC92	343	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,510.00
NC94								
NC93	300.1	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,507.00
NC95								
NC94	320.3	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,921.00
NC99								
NC98	240	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 19,300.00
NC100								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
NC99	217.1	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,697.00
NC102 NC101	263.2	CONC	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,424.00
NC103 NC92	361.9	CLAY	7	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,833.00
NC104 NC103	563	CLAY	4	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,410.00
NC105 NC104	246	CLAY	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,720.00
NC108 NC107	250	CLAY	3	POOR	RELAY	$ 90.00	$ 500.00	$ 24,000.00
NC109 NC108	242.7	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,989.00
NC110 NC109	160.7	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 13,249.00
NC111 NC110	264.9	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 20,543.00
NC72 NC71	257.4	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 20,018.00
NC74 NC73	335.5	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,485.00
NC75 NC74	245.9	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,213.00
NC112 NC109	86.1	CLAY	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 7,027.00
EOL NC24	148.3	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,381.00
							Walker Park 2 Subtotal:	**$ 469,185.00**
Ward 1								
90W3								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
90W2	323.7	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,659.00
LOCUST & LILY POPLAR & LILY	272.4	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,068.00
MICHAELS JEWEL TEE IN LINE	183.9	CONC	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,873.00
WF105 WS31	225	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,250.00
WF108 WF107	296.4	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,248.00
WF109 WF108A	206.9	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,983.00
WF110 WF109	340.7	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,349.00
WF111 WF110	305.8	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,906.00
WF115 WF114	507.2	CONC	12	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,504.00
WF116 WF107	347.6	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,832.00
WF118 WF117	287.2	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,604.00
WF119 WF118	359.8	CONC	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 29,186.00
WS1 PS	51	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,570.00
WS30 WS29	247.4	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 19,318.00
WS31 WS29	62.4	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 5,368.00
WS18 WS15	115	CLAY	2	FAIR	PC & INSTALL MH	$ 2,000.00	-	$ 2,000.00

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
WS24								
WS23	175.2	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,264.00
							Ward 1 Subtotal:	**$ 328,982.00**
Ward 2								
WF57								
WF56	94.4	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 6,608.00
WF63								
WF62	138.5	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 10,195.00
WF68								
WF67	252	PVC	?	PIPE MISSING	RELAY	$ 90.00	$ 500.00	$ 22,680.00
WF72								
WF71	447.4	CONC	17	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 39,818.00
WF71								
WF70	319.8	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,386.00
							Ward 2 Subtotal:	**$ 103,687.00**
							High Priority Area Total:	**$ 1,843,502.00**

*Unit costs for BURST/RELAY/CIPP=$70 per LF, RELAY/BURST=$85 per LF, RELAY=$90 per LF, REPAIR SERVICE or POINT REPAIR=$1000 EA, SMH=$2000 EA

APPENDIX B

MEDIUM PRIORITY AREAS

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
705-2									
WD3 WD2	238.4	8"	LINER	1	POOR	RELAY/BURST	$ 85.00	$ 500.00	$ 20,764.00
WD27 WD2	184.9	10"	LINER	0	POOR	PT. REPAIR	$ 1,000.00	$ 500.00	$ 1,000.00
WD42 WD41	252.2	8"	LINER	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,154.00
								705-2 Subtotal:	**$ 39,918.00**
705-3									
WD20 WD19	110.9	8"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 7,763.00
WD24 WD23	40.7	8"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 2,849.00
								705-3 Subtotal:	**$ 10,612.00**
1767-1									
WP41 WP40	379.6	8"	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,572.00
WP48 WP47	249	8"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,930.00
								1767-1 Subtotal:	**$ 46,502.00**
1767-2									
WP81 WP80	384.8	8"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 27,936.00
								1767-2 Subtotal:	**$ 27,936.00**
Ruddle-1									
EOL ND10	82.8	6	CLAY	2	POOR	NEEDS M/H	$ 2,000.00		$ 2,000.00

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
EOL									
ND22	83.1	6	CLAY	1	POOR	NEEDS M/H	$ 2,000.00		$ 166,200.00
ND6A									
ND5	320.5	8	PVC	1	POOR	RELAY	$ 90.00	$ 500.00	$ 29,345.00
ND14									
ND13	293.7	6	CLAY	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,559.00
ND20									
ND19	381	6	CLAY	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,670.00
ND24									
ND23	200.6	6	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,542.00
ND25									
ND21	315.3	6	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,071.00
								Ruddle-1 Subtotal:	**$ 291,387.00**
Walker Park 1									
NC27									
NC26	61.4	6"	CONC	?	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 4,298.00
NC28									
NC20	154.7	6"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 10,829.00
NC52									
NC51	353.3	6"	CLAY	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 27,731.00
NC16									
NC37	485.6	10"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 34,992.00
NC17									
NC16	27.9	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,953.00
NC18									
NC30	42.3	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 2,961.00
NC19									
NC18	18.9	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,323.00
NC30									
NC17	234.2	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,394.00

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
								Walker Park 1 Subtotal:	**$ 100,481.00**
Walker Park 2									
NC81A NC58	162	8"	CLAY	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,340.00
NC81 NC81A	318.9	8"	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,323.00
NC85 NC84	152.7	8"	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,689.00
NC91 NC91A	319.4	10"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,358.00
NC107 NC106	512.8	8"	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 40,396.00
NC73 NC68	316.8	8"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,676.00
NC88 NC59	328.1	8"	TRUSS	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,467.00
NC57 NC56	434.1	12"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,387.00
								Walker Park 2 Subtotal:	**$ 187,636.00**
Ward 1									
WS20 WS19	400.2	10"	CLAY	4	FAIR	PC & REPAIR SERVICE	$ 1,000.00	$ 500.00	$ 1,000.00
WF102 WF101	506.9	6"	CONC	13	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,983.00
WF106 WF93	168.7	10"	CONC	1	FAIR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,309.00
WF107 WF106	200.5	10"	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,535.00
WF108A									

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
WF108A	123.9	6"	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 10,173.00
WF114 WF113	48	8"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,360.00
WF117 WF116	299.9	8"	CONC	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,993.00
WS6 WS5	364.1	8"	CLAY	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,487.00
WS29 WS28	305	6"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,350.00
WS21 WS20	382.9	8"	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 27,803.00
								Ward 1 Subtotal:	**$ 187,993.00**
Ward 2									
WF4A WF57	56	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,920.00
WF56 WF55	428.9	12"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,523.00
WF60 WF59	307	8"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,490.00
WF62 WF61	313.8	8"	CONC	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,966.00
WF70 WF59	311.6	8"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,312.00
								Ward 2 Subtotal:	**$ 104,211.00**
								Medium Priority Total Cost:	**$ 996,676.00**

*Unit costs for BURST/RELAY/CIPP=$70 per LF, RELAY/BURST=$85 per LF, RELAY=$90 per LF, REPAIR SERVICE or POINT REPAIR=$1000 EA, SMH=$2000 EA

CITY OF BLYTHEVILLE

BLYTHEVILLE, ARKANSAS

CORRECTIVE ACTION ORDER UPDATE

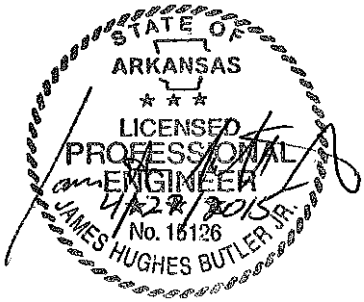
BLYTHEVILLE SOUTH WASTEWATER TREATMENT FACILITY
ASSESSMENT AND RECOMMENDED PLAN FOR CORRECTIVE MEASURES

SSR Smith Seckman Reid, Inc.

CORRECTIVE ACTION ORDER UPDATE

Blytheville South Wastewater Treatment Facility

Assessment and Recommended Plan for Corrective Measures



Bo Butler, P.E.
Senior Principal

Marshall Fall, E.I
Project Manager

Prepared for:
City of Blytheville

Prepared by:
Smith Seckman Reid, Inc.
2650 Thousand Oaks Blvd.
Suite 3200
Memphis, TN 38118
Tel 901.683.3900
Fax 901.683.3990

SSR Project No.:
14-41-027.1

Date:
April 27, 2014

Table of Contents

1 Executive Summary

In April 2014, the City of Blytheville (City) received a Notice of Violation (NOV) from the Arkansas Department of Environment Quality (ADEQ). The NOV was in response to a review of monthly operating reports (MORs) from the City's South Wastewater Treatment Facility (SWWTF), which showed violations of the plant's National Pollutant Discharge Elimination System (NPDES) permit (No. AR0022578). This NOV described two violations concerning nitrogen-ammonia concentrations in the SWWTF effluent.

In February 2015, ADEQ requested that the City issue a detailed Corrective Action Order Update (CAOU). The CAOU report should address the status of the facility's compliance to I&I issues, the potential effluent violations and additional measures to be taken to maintain compliance of the NPDES. The report should also address the status of compliance in regards to total recoverable mercury (Hg) concentrations, and address measures to be taken by the City to begin locating any sources of contamination in the waste stream.

After reviewing plant data and the existing operations at the plant, the following corrective actions were developed. Once implemented by the City, these corrective actions should allow the treatment facility to return to compliance with the NPDES permit**.**

1. Based on previous completed studies, complete collection system rehabilitation on a priority basis focusing on high priority areas first.

2. Aggressively track and locate sources of Hg in the waste stream flow and require sources to incorporate pre-treatment to remove the Hg from the flow.

3. Conduct rate study and review capital expenditure plans to ensure adequate revenue stream to allow for effective operation, maintenance, repair, and replacement of WWTF equipment.

4. Install synthetic media in the primary basin of the plant to encourage the growth of nitrifying bacteria and prevent bacteria from washing out of the facilities during heavy flow events.

2 General Information

2.1 Description of Wastewater Treatment Facility

The City treats wastewater at three treatment facilities. This CAOU will address issues at the SWWTF. The facility is a modified lagoon that incorporates the BIOLAC® technology and consists of traveling screens, a primary aeration and mixing basin, integral clarifiers to facilitate settling, a basin that incorporates both aerated and non-aerated polishing, and ultra-violet disinfection. The design capacity of the SWWTF is 1.4 MGD. The facility was built adjacent to a retired non-aerated lagoon that was repurposed as sludge disposal basin for the facility. The facility was constructed and commissioned in 1989.

The source of wastewater for the SWWTF is 16 pumping stations with a combined total capacity of 10,535 gallons per minute (GPM). The capacity of each pumping station is summarized in Table 2.1.

Table 2.1- Flow Source (PS Capacities)

South Plant	County Road	6000GPM
	Willie B. Reed	180 GPM
	College	200 GPM
	Barker Lane	600 GPM
	Dogwood #1	225 GPM
	Dogwood #2	180 GPM
	Ross Road	200 GPM
	Ed's Catfish	180 GPM
	New School	180 GPM
	Lake Street	600 GPM
	8th Street	450 GPM
	Sarah	180 GPM
	Chickasaw Courts	180 GPM
	Promised Land	180 GPM
	Jake Rhodes	200 GPM
	McHaney Street	800 GPM

2.2 Description of Need

In the last 24 months, the SWWTF has experienced continuous events of excessive flow volumes that exceed the facility's designed maximum capacity. Excessive flows can "wash out" the facility causing the loss of valuable nitrifying bacteria critical to the proper treatment of the waste stream. I&I must be reduced to allow the facility to operate as designed. Additionally, under the existing NPDES permit issued January, 2014, the concentration of Hg in the effluent will be required to meet a limit for by January 2017,. Recent monitoring records show the facility may have an issue meeting the limits for Hg set forth in the NPDES permit on a consistent basis.

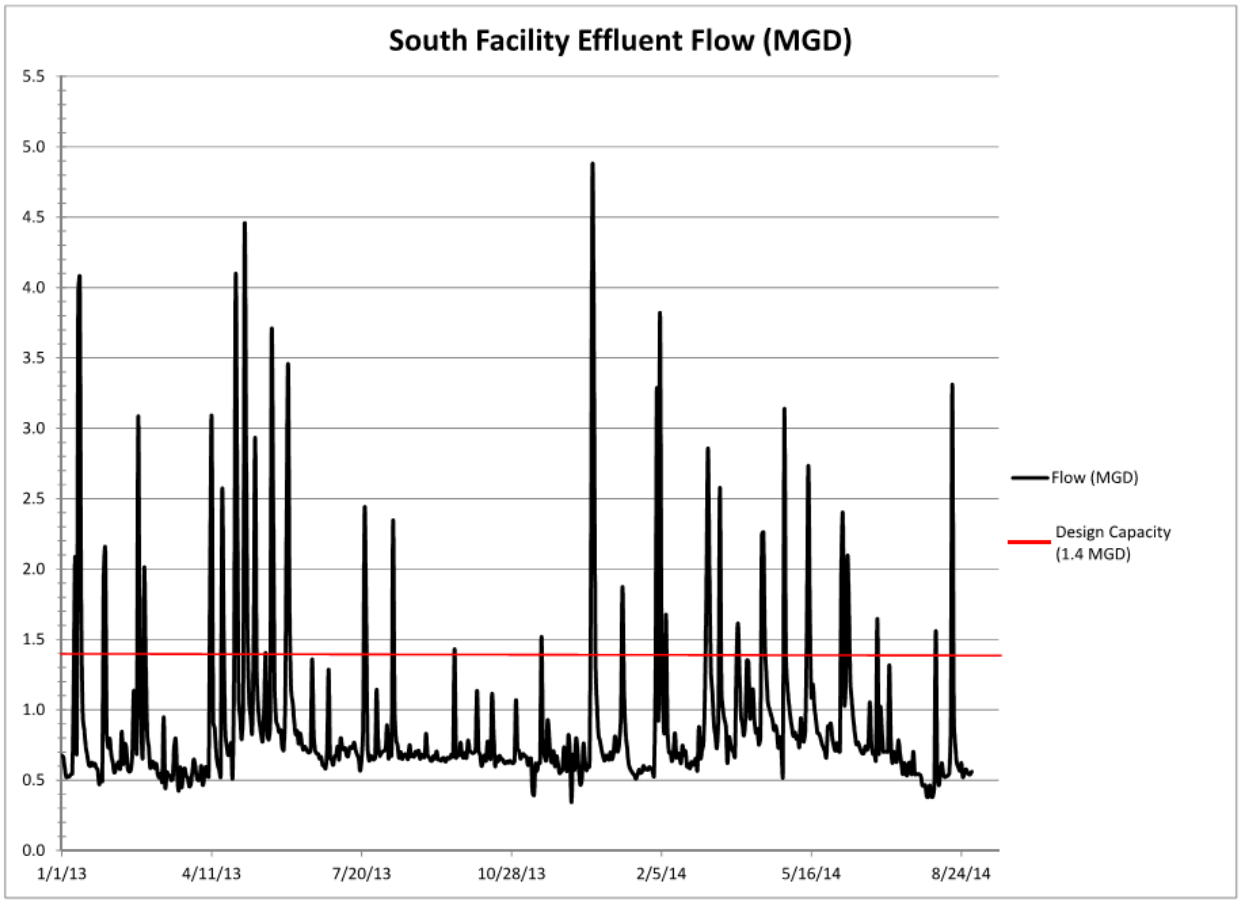
2.3 Influent and Effluent Flows

The daily effluent flows for the facility are summarized in Table 2.2. During a heavy rain event, the facility can go multiple days where influent flows exceed the facility's design capacity, as evidenced by Figure 2.1 below. Over the last two years, influent flows have exceeded the design flow by as much as 340 percent.

Table 2.2 – Daily Effluent Flows

Flow Condition	South Plant (million gallons)
Minimum Day	0.343
Average Day	0.854
Maximum Day	4.851

Figure 2.1 – Daily Effluent Flows



These flow excursions are directly related to rainfall events as identified in the Daily Operation Report Calculations (DOR's) provided by the City. During these events, the plant loses a majority of its microbial treatment ability due to the washout of the nitrifying organisms from the treatment basins. This is confirmed by the Daily Monitoring Reports (DMRs) that show lower-than-normal mixed liquor suspended solids (MLSS) concentrations in the primary mixing basin (as compared to pre-rainfall concentrations) and high total suspended solids (TSS) concentrations in the effluent after every rain event that increased plant flow. The carbonaceous biochemical oxygen demand (CBOD) loading in the influent flow also drops significantly during and immediately after every rainfall event that affects flow due to dilution by inflow and infiltration. This diluted CBOD loading further promotes degradation of the biomass used to treat the wastewater.

The facility was originally designed to have a hydraulic residence time of between 24 and 48 hours to allow for adequate treatment. When the plant receives flows in excess of the design flow, three conditions occur that affect the treatment capabilities of the plants: (1) the hydraulic residence time is reduced such that there is not adequate time for treatment to occur; (2) the additional flow has a very low concentration of CBOD, sharply decreasing the strength of the waste stream, and depriving the biomass of needed nutrients for growth and treatment abilities; and (3) the MLSS concentration in the treatment basin is significantly reduced due to washout of the biomass from the basins, thereby preventing adequate treatment of subsequent incoming flows. As a result of these conditions, the facility could possibly be out of compliance for several days while the biomass attempts to reestablish itself.

2.4 Influent and Effluent Quality

Plant MORs were analyzed for the SWWTF to diagnose the violations reported by ADEQ. The information submitted covered nearly four years of operating data from 2011 to 2014 for the facility. The data included influent and effluent properties that are monitored on a regular basis to verify the plant's compliance with the NPDES permits and ability to treat the waste stream.

2.4.1 Ammonia

The ammonia level in the effluent flow is a direct reflection of the amount of nitrification provided by biological processes within the lagoon treatment facility. Ammonia is removed from the waste stream by conversion into nitrites and nitrates by nitrifying bacteria. The NPDES permit has three effluent discharge limitations that must be met to avoid violations (i.e., monthly average concentration, 7-day average concentration, and monthly mass loadings). MOR data suggests that the facility will have continued difficulty meeting permit requirements during and after heavy rain events unless the I&I is reduced. A summary of SWWTF effluent ammonia data is provided in Table 2.4.

Table 2.4

Effluent Reading	Reading /Permit Limit
7-day avg. (mg/L)/Permit Limit	0.7/3.0
Monthly Avg. (mg/L)/ Permit Limit	0.7/2.0
Mass (lb//Day)/ Permit Limit	5.2/23

2.4.2 Total Recoverable Mercury (Hg)

For several years, the SWWTF has been reporting higher than acceptable Hg limits in the effluent stream. Starting three years after the issuance date of the current permit (January 2014), the facility will be required to meet a specified limit for Hg. According to the past recorded concentrations, the facility does not show reasonable potential to meet the limits on a regular basis without the implementation of proper treatment. Data shows that in 2008 there was a spike in the influent and effluent concentrations suggesting that attention should be focused on locating a source for influent contamination.

3 Proposed Treatment Plant Corrections

The proposed treatment facility corrective actions described below intend to mitigate violations of the facility's NPDES permit by attempting to utilize existing facilities and personnel to the greatest extent practical. Recommendations are made on the basis of priority ranking, high priority, medium priority, and low priority.

3.1 High Priority

1. Based on Appendix A, from a report titled "Sanitary Sewer Collection System Report" issued to ADEQ in February of 2012 by Smith, Seckman, Reid, Inc. (SSR), the city shall focus on fixing the sections of pipe listed as "high priority", as funds become available. The City shall also continue efforts to indentify additional inflow and infiltration locations within the collection system. This action shall be an immediate and continuous effort. Inflow and infiltration should show signs of reduction by June 2016.

    a. If additional funding is necessary to accomplish this in a timely matter, application to the proper authority should be submitted as soon as possible.

2. Conduct trace studies to track sources of Hg contamination and confirm whether or not the proper equipment has been installed and is in working order. If a source is identified that does not incorporate proper pre-treatment, equipment such as amalgam particle separators shall be installed at the source.

    a. A review of customer records shall be completed to determine any actions that may have taken place in 2008 that might be contributing to the high concentration levels in the flow stream.

    b. During an earlier investigation, high concentration levels of Hg were found in the Dogwood, County Road, and the College pumping stations.

        i. These stations shall be re-tested to confirm contamination and the sources should implement proper pre-treatment in the form of amalgam particle separators immediately.

    c. Testing and monitoring should continue until all sources are identified, recorded and have pre-treatment installed.

        i. A database shall be created to track and monitor testing results to ensure appropriate recording/reporting procedures are followed and for proper enforcement.

    d. This action shall be an immediate effort. Concentrations of Hg in the influent and effluent streams should show reasonable potential as defined in the NPDES to meet the allowable permit limits by May, 2016.

    e. If amalgam particle filters are found to be inadequate at removing contaminates, the city shall require the customers that continue to discharge contaminates to design and construct activated carbon adsorption beds.

3. Review budget capital plans and fares for adequate revenue stream.

3.2 Medium Priority

1. Based on Appendix B, from a report titled "Sanitary Sewer Collection System Report" issued to ADEQ in February of 2012 by Smith, Seckman, Reid, Inc. (SSR), the city shall focus on fixing the sections of pipe listed as "medium priority" as funds become available.

2. Testing of the existing sludge for Hg contamination should be completed. If the sludge should be found contaminated, a plan shall be developed immediately to have the sludge removed from the pond and disposed of as funds become available.

3. Repair and or replace any equipment that may not be performing as designed or is not operable.

3.3 Low priority

1. If extensive pipeline repairs have taken place within the collection system and the I&I problem at the facility continues the City shall install a system of synthetic media in the primary basins of each plant to provide the nitrifying bacteria a surface area for attached growth. This improvement will mitigate washout of ammonia removing bacteria during high flow events for a period sufficient to allow for additional collection system study and rehabilitation. The anticipated date for completion of this action is January 2018.

APPENDIX A

HIGH PRIORITY AREAS

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
705-1								
WD5 WD4	346.1	LINER	2	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,227.00
							705-1 Subtotal:	**$ 25,227.00**
705-2								
WD33 WD32	121	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 8,970.00
WD34 WD33	156.4	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,448.00
WD35 WD34	336.8	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,576.00
WD40 WD2	232.7	LINER	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,289.00
WD47 WD46	234.1	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,887.00
WD53 WD51	197.4	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,318.00
WD55 WD54	163	CONC	?	POOR/FULL OF GROUT	RELAY	$ 90.00	$ 500.00	$ 14,670.00
							705-2 Subtotal:	**$ 107,158.00**
705-3								
WD16 WD7	249.1	CONC	2	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,437.00
WD21 WD20	172.1	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 13,047.00
WD22 WD21	216.1	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,127.00
							705-3 Subtotal:	**$ 47,611.00**

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
1767-1								
WP18 WP17	245.2	CONC	3	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,664.00
WP21 WP20	75.2	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 5,764.00
WP27 WP24	206.1	CONC	3	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,927.00
WP29 WP22	168.2	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,774.00
WP30 WP31	199.1	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,437.00
WP35 WP34	400	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,000.00
WP44 WP42	363.9	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 26,973.00
WP40 WP39	410.3	LINER	6	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 31,721.00
							1767-1 Subtotal:	**$ 72,410.00**
1767-2								
WP78 WP2	464	CONC	5	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 34,980.00
WP79 WP78	350.2	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,014.00
WP80 WP79	80	CONC	0	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 5,600.00
WP82 WP81	391.6	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,412.00
							1767-2 Subtotal:	**$ 94,006.00**
Ruddle-1								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
ND6 ND6A	17.2	CLAY	?	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,204.00
ND7 ND6	216.7	CLAY	1	POOR/SMOKE LEAK	RELAY	$ 90.00	$ 500.00	$ 20,003.00
ND8 ND7	282	CLAY	3	POOR	RELAY	$ 90.00	$ 500.00	$ 26,880.00
ND9 ND8	290	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,300.00
ND10 ND9	404	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,280.00
ND11 ND10	160.6	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,742.00
ND12 ND11	205	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,850.00
ND15 ND14	146.5	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,255.00
ND16 ND15	182.3	CLAY	4	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,761.00
ND17 ND13	92.1	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 6,947.00
ND19 ND6A	140.9	PVC	0	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 9,863.00
ND21A ND21	174.5	CLAY	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,715.00
ND21 ND20	120.6	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 9,942.00
ND22 ND21A	209.7	CLAY	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,679.00
ND23 ND22	233.8	CLAY	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,366.00
ND26								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
ND25	570	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,900.00
ND27 ND25	235.4	CLAY	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,978.00
							Ruddle-1 Subtotal:	**$ 288,665.00**
Walker Park 1								
NC49A NC49	231.3	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,191.00
NC49B NC8	246.4	CLAY	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,248.00
NC49 NC49B	288.0	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,660.00
NC50 NC9	117.1	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 9,197.00
NC51 NC50	215.8	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,106.00
NC53 NC52	273.0	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 19,610.00
NC54A NC54	43.3	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,531.00
NC54 NC10A	98.6	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 7,902.00
SERVICE CAP NC52	143.8	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,066.00
SERVICE CAP NC54A	47.2	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,804.00
Locust & Lilly Popular & Lilly	229	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,530.00
NC 20A NC19	703	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 50,710.00
NC15A								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
NC15	426.2	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 34,334.00
NC15								
NC16	23.7	CLAY	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,659.00
NC24				POOR/SMOKE				
NC23	291	CLAY	2	LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,370.00
NC25A								
NC25	344	CLAY	11	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 29,580.00
NC25								
NC24	193.9	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,073.00
							Walker Park 1 Subtotal:	**$ 306,571.00**
Walker Park 2								
1								
2	67.6	CLAY	1	POOR	RELAY	$ 90.00	$ 500.00	$ 6,584.00
NC66								
NC65	80.6	CONC	2	POOR	BURST/RELAY	$ 85.00	$ 500.00	$ 7,851.00
NC86								
NC85	349.5	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,965.00
NC87								
NC86	397	CLAY	12	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 33,790.00
NC89								
NC88	232.4	TRUSS	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,768.00
NC93								
NC92	343	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,510.00
NC94								
NC93	300.1	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,507.00
NC95								
NC94	320.3	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,921.00
NC99								
NC98	240	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 19,300.00
NC100								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
NC99	217.1	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,697.00
NC102 NC101	263.2	CONC	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,424.00
NC103 NC92	361.9	CLAY	7	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,833.00
NC104 NC103	563	CLAY	4	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,410.00
NC105 NC104	246	CLAY	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,720.00
NC108 NC107	250	CLAY	3	POOR	RELAY	$ 90.00	$ 500.00	$ 24,000.00
NC109 NC108	242.7	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,989.00
NC110 NC109	160.7	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 13,249.00
NC111 NC110	264.9	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 20,543.00
NC72 NC71	257.4	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 20,018.00
NC74 NC73	335.5	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,485.00
NC75 NC74	245.9	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,213.00
NC112 NC109	86.1	CLAY	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 7,027.00
EOL NC24	148.3	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,381.00
							Walker Park 2 Subtotal:	**$ 469,185.00**
Ward 1								
90W3								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
90W2	323.7	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,659.00
LOCUST & LILY POPLAR & LILY	272.4	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,068.00
MICHAELS JEWEL TEE IN LINE	183.9	CONC	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,873.00
WF105 WS31	225	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,250.00
WF108 WF107	296.4	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,248.00
WF109 WF108A	206.9	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,983.00
WF110 WF109	340.7	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,349.00
WF111 WF110	305.8	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,906.00
WF115 WF114	507.2	CONC	12	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,504.00
WF116 WF107	347.6	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,832.00
WF118 WF117	287.2	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,604.00
WF119 WF118	359.8	CONC	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 29,186.00
WS1 PS	51	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,570.00
WS30 WS29	247.4	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 19,318.00
WS31 WS29	62.4	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 5,368.00
WS18 WS15	115	CLAY	2	FAIR	PC & INSTALL MH	$ 2,000.00	-	$ 2,000.00

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
WS24								
WS23	175.2	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,264.00
							Ward 1 Subtotal:	**$ 328,982.00**
Ward 2								
WF57								
WF56	94.4	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 6,608.00
WF63								
WF62	138.5	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 10,195.00
WF68								
WF67	252	PVC	?	PIPE MISSING	RELAY	$ 90.00	$ 500.00	$ 22,680.00
WF72								
WF71	447.4	CONC	17	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 39,818.00
WF71								
WF70	319.8	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,386.00
							Ward 2 Subtotal:	**$ 103,687.00**
							High Priority Area Total:	**$ 1,843,502.00**

*Unit costs for BURST/RELAY/CIPP=$70 per LF, RELAY/BURST=$85 per LF, RELAY=$90 per LF, REPAIR SERVICE or POINT REPAIR=$1000 EA, SMH=$2000 EA

APPENDIX B

MEDIUM PRIORITY AREAS

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
705-2									
WD3 WD2	238.4	8"	LINER	1	POOR	RELAY/BURST	$ 85.00	$ 500.00	$ 20,764.00
WD27 WD2	184.9	10"	LINER	0	POOR	PT. REPAIR	$ 1,000.00	$ 500.00	$ 1,000.00
WD42 WD41	252.2	8"	LINER	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,154.00
								705-2 Subtotal:	**$ 39,918.00**
705-3									
WD20 WD19	110.9	8"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 7,763.00
WD24 WD23	40.7	8"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 2,849.00
								705-3 Subtotal:	**$ 10,612.00**
1767-1									
WP41 WP40	379.6	8"	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,572.00
WP48 WP47	249	8"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,930.00
								1767-1 Subtotal:	**$ 46,502.00**
1767-2									
WP81 WP80	384.8	8"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 27,936.00
								1767-2 Subtotal:	**$ 27,936.00**
Ruddle-1									
EOL ND10	82.8	6	CLAY	2	POOR	NEEDS M/H	$ 2,000.00		$ 2,000.00

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
EOL									
ND22	83.1	6	CLAY	1	POOR	NEEDS M/H	$ 2,000.00		$ 166,200.00
ND6A									
ND5	320.5	8	PVC	1	POOR	RELAY	$ 90.00	$ 500.00	$ 29,345.00
ND14									
ND13	293.7	6	CLAY	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,559.00
ND20									
ND19	381	6	CLAY	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,670.00
ND24									
ND23	200.6	6	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,542.00
ND25									
ND21	315.3	6	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,071.00
								Ruddle-1 Subtotal:	**$ 291,387.00**
Walker Park 1									
NC27									
NC26	61.4	6"	CONC	?	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 4,298.00
NC28									
NC20	154.7	6"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 10,829.00
NC52									
NC51	353.3	6"	CLAY	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 27,731.00
NC16									
NC37	485.6	10"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 34,992.00
NC17									
NC16	27.9	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,953.00
NC18									
NC30	42.3	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 2,961.00
NC19									
NC18	18.9	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,323.00
NC30									
NC17	234.2	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,394.00

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
								Walker Park 1 Subtotal:	**$ 100,481.00**
Walker Park 2									
NC81A NC58	162	8"	CLAY	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,340.00
NC81 NC81A	318.9	8"	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,323.00
NC85 NC84	152.7	8"	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,689.00
NC91 NC91A	319.4	10"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,358.00
NC107 NC106	512.8	8"	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 40,396.00
NC73 NC68	316.8	8"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,676.00
NC88 NC59	328.1	8"	TRUSS	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,467.00
NC57 NC56	434.1	12"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,387.00
								Walker Park 2 Subtotal:	**$ 187,636.00**
Ward 1									
WS20 WS19	400.2	10"	CLAY	4	FAIR	PC & REPAIR SERVICE	$ 1,000.00	$ 500.00	$ 1,000.00
WF102 WF101	506.9	6"	CONC	13	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,983.00
WF106 WF93	168.7	10"	CONC	1	FAIR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,309.00
WF107 WF106	200.5	10"	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,535.00
WF108A									

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
WF108A	123.9	6"	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 10,173.00
WF114 WF113	48	8"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,360.00
WF117 WF116	299.9	8"	CONC	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,993.00
WS6 WS5	364.1	8"	CLAY	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,487.00
WS29 WS28	305	6"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,350.00
WS21 WS20	382.9	8"	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 27,803.00
								Ward 1 Subtotal:	**$ 187,993.00**
Ward 2									
WF4A WF57	56	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,920.00
WF56 WF55	428.9	12"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,523.00
WF60 WF59	307	8"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,490.00
WF62 WF61	313.8	8"	CONC	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,966.00
WF70 WF59	311.6	8"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,312.00
								Ward 2 Subtotal:	**$ 104,211.00**
								Medium Priority Total Cost:	**$ 996,676.00**

*Unit costs for BURST/RELAY/CIPP=$70 per LF, RELAY/BURST=$85 per LF, RELAY=$90 per LF, REPAIR SERVICE or POINT REPAIR=$1000 EA, SMH=$2000 EA

CITY OF BLYTHEVILLE

BLYTHEVILLE, ARKANSAS

CORRECTIVE ACTION ORDER UPDATE

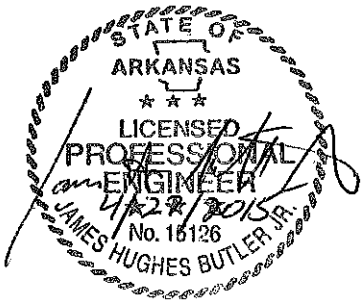
BLYTHEVILLE WEST WASTEWATER TREATMENT FACILITY
ASSESSMENT AND RECOMMENDED PLAN FOR CORRECTIVE MEASURES

SSR Smith Seckman Reid, Inc.

CORRECTIVE ACTION ORDER UPDATE

Blytheville West Wastewater Treatment Facility

Assessment and Recommended Plan for Corrective Measures



Bo Butler, P.E.
Senior Principal

Marshall Fall, E.I
Project Manager

Prepared for:
City of Blytheville

Prepared by:
Smith Seckman Reid, Inc.
2650 Thousand Oaks Blvd.
Suite 3200
Memphis, TN 38118
Tel 901.683.3900
Fax 901.683.3990

SSR Project No.:
14-41-027.1

Date:
April 27, 2015

Table of Contents

1 Executive Summary

In April 2014, the City of Blytheville (City) received a Notice of Violation (NOV) from the Arkansas Department of Environment Quality (ADEQ). The NOV was in response to a review of monthly operating reports (MORs) from the City's West Wastewater Treatment Facility (WWWTF). This facility had 13 violations of NPDES Permit No. AR0022560. The violations included excessive fecal coliform (colonies), ammonia concentrations, and total suspended solids (TSS) concentrations in the WWWTF effluent.

In August of 2014, the facility was mandated by the NPDES to start meeting a specified limit for total recoverable mercury (Hg) concentrations in the effluent. The facility at this time does not meet the limit on a consistent basis.

In February 2015, ADEQ requested that the City issue a detailed Corrective Action Order Update (CAOU). The CAOU report should address the status of the facility's compliance to I&I issues, the potential effluent violations and additional measures to be taken to maintain compliance of the NPDES. The report should also address the status of compliance in regards to total recoverable mercury (Hg) concentrations, and address measures to be taken by the City to begin locating any sources of contamination in the waste stream.

After reviewing plant data and the existing operations at the facility, the following corrective actions were developed. Once implemented by the City, these corrective actions should allow the treatment facility to return to compliance with the NPDES permit**.**

1. Based on previous completed studies, complete collection system rehabilitation on a priority basis focusing on high priority areas first.

2. Aggressively track and locate sources of Hg in the waste stream flow and require sources to incorporate pre-treatment to remove the Hg from the flow.

3. Conduct rate study and review capital expenditure plans to ensure adequate revenue stream to allow for effective operation, maintenance, repair, and replacement of WWTF equipment.

4. Install synthetic media in the primary basin of the plant to encourage the growth of nitrifying bacteria and prevent bacteria from washing out of the facilities during heavy flow events.

2 General Information

2.1 Description of Wastewater Treatment Facility

The City treats wastewater at three treatment facilities. This CAOU will address issues at the (WWWTF). The facility is a modified lagoon that incorporates the BIOLAC® technology and consists of traveling screens, a primary aeration and mixing basin, integral clarifiers to facilitate settling, a basin that incorporates both aerated and non-aerated polishing, and ultra-violet disinfection. The design capacity of the WWWTF is 1.5 million gallons per day (MGD). The facility was built adjacent to a retired non-aerated lagoon that was repurposed as sludge disposal basin for the facility. The facility was constructed and commissioned in 1989.

The source of wastewater flow for the WWWTF is 17 pumping stations with a combined total capacity of 5,565 GPM. The capacity of each pumping station is summarized in Table 2.1.

Table 2.1- Flow Source (PS Capacities)

West Facility	Shop Lift	1,000 GPM
	21st Street	600 GPM
	Cypress	200 GPM
	Howard	80 GPM
	Division	800 GPM
	Wards	300 GPM
	5th Street	225 GPM
	Broadmoor	225 GPM
	East Jr. High	180 GPM
	River Oaks	200 GPM
	Alert Pad	225 GPM
	Dog Pound	180 GPM
	820	600 GPM
	705	300 GPM
	1649	200 GPM
	2000	250 GPM

2.2 Description of Need

In the last eighteen months, the WWWTF has experienced ongoing effluent violations of the NPDES permit. Violations have included ammonia (both concentrations and loads), fecal coliform colonies, TSS concentrations, and since April, 2014, total recoverable mercury (Hg). Recent analysis of monitoring records show the facility continues to have an issue meeting the limits set forth in the NPDES due to I&I and also the limits for Hg mandated by the NPDES in April, 2014.

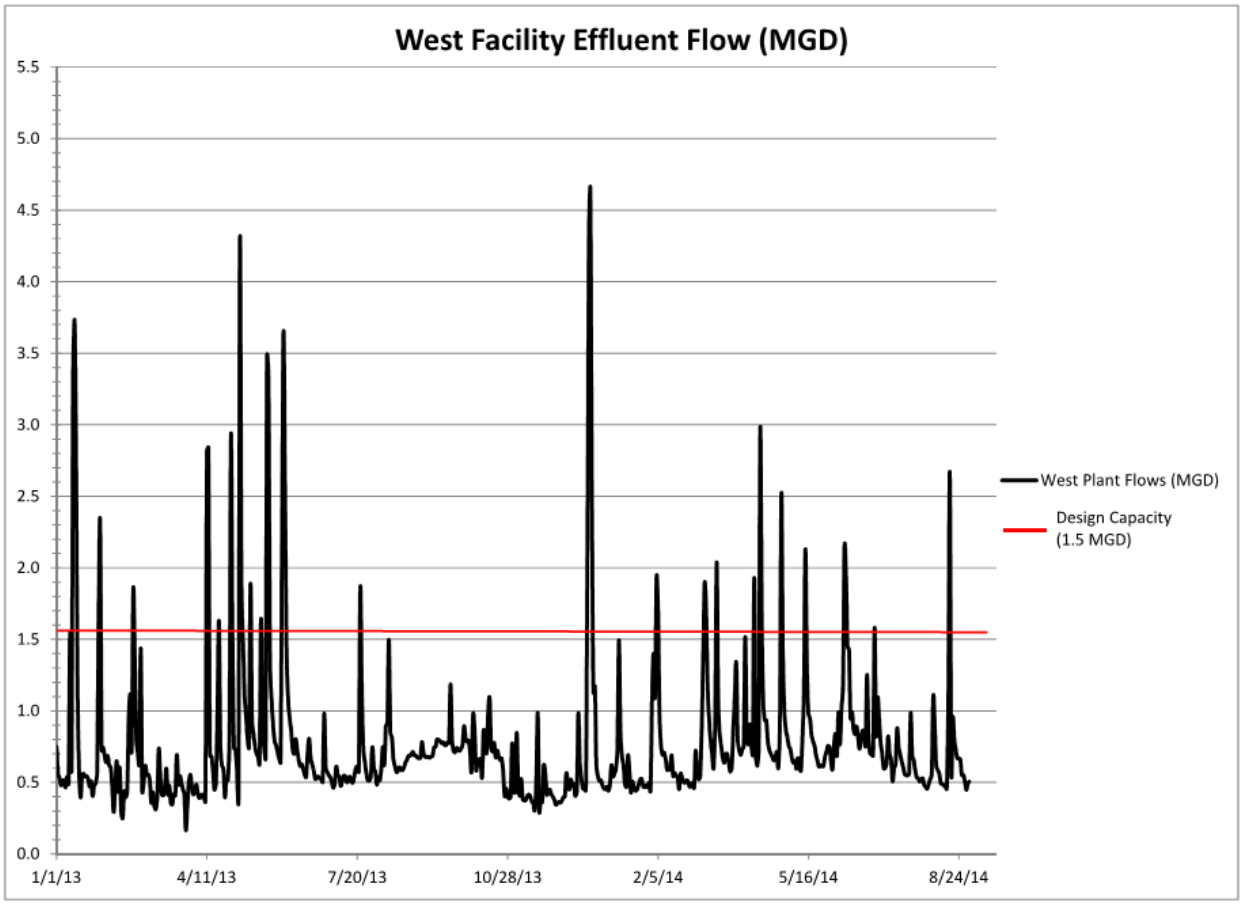
2.3 Influent and Effluent Flows

The daily effluent flows for the facility are summarized in Table 2.2. During a heavy rain event, the facility can go multiple days where the influent flows exceed the facility's design capacity, as evidenced by Figure 2.1 below. Over the last two years, influent flows have exceeded the design flow by as much as 350 percent.

Table 2.2 – Daily Effluent Flows

Flow Condition	West Facility (million gallons)
Minimum Day	0.148
Average Day	0.687
Maximum Day	5.274

Figure 2.1 – Daily Effluent Flows



These flow excursions are directly related to rainfall events as identified in the Daily Operation Reports (DOR's) provided by the City. During these spikes, the plant loses a majority of its microbial treatment ability due to the washout of the nitrifying organisms from the treatment basins. This is confirmed by the Daily Monitoring Reports (DMRs) that show lower-than-normal mixed liquor suspended solids (MLSS) concentrations in the primary mixing basin (as compared to pre-rainfall concentrations) and high total suspended solids (TSS) concentrations in the effluent after every rain event that increased plant flow. The carbonaceous biochemical oxygen demand (CBOD) loading in the influent flow also drops significantly during and immediately after every rainfall event that affects flow. This is due to dilution by inflow and infiltration. This diluted CBOD loading further promotes degradation of the biomass used to treat the wastewater.

The facility was originally designed to have a hydraulic residence time of between 24 and 48 hours to allow for adequate treatment. When the facility receives flows in excess of the design maximum flow, three conditions occur that affect the treatment capabilities of the facility: (1) the hydraulic residence time is reduced such that there is not adequate time for treatment to occur; (2) the additional flow has a very low concentration of CBOD, sharply decreasing the strength of the waste stream, and depriving the biomass of needed nutrients for growth and treatment abilities; and (3) the MLSS concentration in the treatment basin is significantly reduced due to washout of the biomass from the basins, thereby preventing adequate treatment of subsequent incoming flows. As a result of these conditions, the facility could possibly be out of compliance for multiple permit limits for several days while the biomass attempts to reestablish itself.

2.4 Influent and Effluent Quality

Plant MORs were analyzed for the WWWTF to diagnose the violations reported by ADEQ. The information submitted covered nearly four years of operating data from 2011 to 2014 for the facility. The data included influent and effluent properties that are monitored on a regular basis to verify the plant's compliance with the NPDES permits and ability to treat the waste stream.

2.4.1 Ammonia

The ammonia level in the effluent flow is a direct reflection of the amount of nitrification provided by biological processes within the lagoon treatment facility. Ammonia is removed from the waste stream by conversion into nitrites and nitrates by nitrifying bacteria. The NPDES permit has three effluent discharge limitations that must be met to avoid violations (i.e., monthly average concentration, 7-day average concentration, and monthly mass loadings). MOR data suggests that the facility will have continued difficulty meeting permit requirements during and after heavy rain events unless the I&I is reduced. A summary of the average effluent ammonia data is provided in Table 2.4.

Table 2.4 – Effluent Ammonia Readings

Effluent Reading	Reading/Permit Limit	
	Winter Months (Oct - Mar)	Summer Months (Apr-Sept)
7-day avg. (mg/L)/Permit Limit	2.1/5.0	2.8/5.0
Monthly Avg. (mg/L)/ Permit Limit	2.1/3.0	1.8/2.8
Mass (lb//Day)/ Permit Limit	12.5/38	14.0/35.0

2.4.2 Total Suspended Solids (TSS)

TSS is a measurement of solids of a particular size in the waste stream. This measurement is typically reported in units of mg/L (concentration) or lbs/day (mass). Excessive levels of TSS in a plant effluent can have several adverse effects on the receiving waters. High levels of TSS can cause scum to collect at or near discharge sites which can harbor harmful pathogens. TSS can also block out sunlight that native organisms in the receiving water body depend on for survival. One of the most important effects of high TSS levels is the effect it has on disinfection. High TSS levels will inhibit the effectiveness of the UV disinfection process by limiting the transitivity of the ultraviolet rays. In short, the suspended solids block the ultraviolet rays from reaching the target organisms. A high level of TSS in an effluent stream can also indicate that the hydraulic residence time for treatment is insufficient.

Based on MOR data, as influent flows increase beyond the design capacity of the plant, the TSS concentrations in the effluent also increases due to solids being washed out of the plant. Additionally, MOR data suggests that the facility will have continued difficulty meeting permit requirements during and after

heavy rain events unless the I&I is reduced. A summary of the average effluent TSS data is provided in Table 2.6.

Table 2.6 – TSS Readings

Effluent Reading	Reading/Limit
7-day Average (mg/L)	12.9/45
Monthly Average (mg/L)	13.1/30
Monthly Average (lb/day)	102.3/375

2.4.3 Fecal Coliform

Fecal coliform is a bacterium found in the intestines of warm blooded animals. It is an indicator organism that can suggest the presence of more harmful pathogenic organisms. High levels of fecal coliform can indicate poor treatment process performance of the plant. The plant has violated the NPDES discharge permit twice by exceeding the allowable concentration of fecal coliform in the plant effluent. An analysis of the plant data indicates that the dates of the violations correlate to the dates the plant received an excessive volume of flow causing solids to be washed out of the plant. A high concentration of solids in the effluent stream can reduce the effectiveness of the UV disinfection system causing pathogens to survive through the process. MOR data suggests that the facility will have continued difficulty meeting permit requirements during and after heavy rain events unless the I&I is reduced. A summary of the average effluent fecal coliform readings for the 2011-2014 data is provided in Table 2.7.

Table 2.7 – Fecal Coliform Readings

	West Plant/Permit Limit	
Effluent Reading	Winter Months (Oct - Mar)	Summer Months (Apr-Sept)
7-day avg. (colonies/100 ml)	361/2000	172/400
Monthly Avg. (colonies/100 ml)	400/1000	238/200

2.4.4 Total Recoverable Mercury (Hg)

For several years, the WWWTP has been reporting higher than acceptable Hg limits in the effluent stream. In April of 2014, three years after the issuance date of the current permit, the facility was required to meet a specified limit for Hg for failing to reduce the concentration in the effluent. According to the recent MORs, there has not been any improvement in the concentrations of Hg in the effluent and additional measures must be taken to trace and locate sources. A study of data collected back to October of 2005 shows a spike in the influent concentrations of Hg in late 2008 and looks to be consistent through the South Plant also. Also a study of the data graphed shows a pattern of spikes in the concentrations every 3 or 4 months.

3 Proposed Treatment Plant Corrections

The proposed treatment facility corrective actions described below intend to mitigate violations of the facility's NPDES permit by attempting to utilize existing facilities and personnel to the greatest extent practical. Recommendations are made on the basis of priority ranking, high priority, medium priority, and low priority.

3.1 High Priority

1. Based on Appendix A, from a report titled "Sanitary Sewer Collection System Report" issued to ADEQ in February of 2012 by Smith, Seckman, Reid, Inc. (SSR), the city shall focus on fixing the sections of pipe listed as "high priority" as funds become available.

    a. If additional funding is necessary to accomplish this in a timely matter, application to the proper authority should be submitted as soon as possible.

    b. The City shall continue efforts to indentify additional inflow and infiltration locations within the collection system.

    c. This action shall be an immediate and continuous effort. Inflow and infiltration should show signs of reduction by June 2016.

2. Re-confirm previous sources of mercury discharge based on prior studies, and confirm whether or not the proper equipment has been installed and is in working order. If a source is identified that does not incorporate proper pre-treatment, equipment such as amalgam particle separators shall be installed at the source.

    a. A review of customer records shall be completed to determine any actions that may have taken place in 2008 that might be contributing to the high concentration levels in the flow stream.

    b. A review of customer records shall be completed to help determine any actions that may be repeated every 3 or 4 months.

    c. Testing and monitoring should continue until all sources are identified and have pre-treatment installed.

        i. A database shall be created to track and monitor testing results to ensure appropriate recording/reporting procedures are followed and for proper enforcement.

d. This action shall be an immediate and continuing effort. Concentrations of Hg in the influent and effluent streams should show reasonable potential to meet the allowable permit limits by May, 2016.

e. If amalgam particle filters are found to be inadequate at removing contaminates, the city shall require the customers that continue to discharge contaminates to design and construct activated carbon adsorption beds.

3. Review budget capital plans and fares for adequate revenue stream.

3.2 Medium Priority

1. Based on Appendix B, from a report titled "Sanitary Sewer Collection System Report" issued to ADEQ in February of 2012 by Smith, Seckman, Reid, Inc. (SSR), the city shall focus on fixing the sections of pipe listed as "medium priority" as funds become available.

2. Testing of the existing sludge for Hg contamination should be completed. If the sludge should be found contaminated, a plan shall be developed immediately to have the sludge removed from the pond and disposed of as funds become available.

3. Repair and or replace any equipment that may not be performing as designed or is not operable.

3.3 Low Priority

1. If after extensive pipeline repairs have taken place within the collection system do not fix the I&I problem and the plant continues to be washed out during rain events, the City shall install a system of synthetic media in the primary basins of each plant to provide the nitrifying bacteria a surface area for attached growth. This improvement will mitigate washout of ammonia removing bacteria during high flow events. The anticipated date for completion of this action is January 2018.

APPENDIX A

HIGH PRIORITY AREAS

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
705-1								
WD5 WD4	346.1	LINER	2	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,227.00
							705-1 Subtotal:	**$ 25,227.00**
705-2								
WD33 WD32	121	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 8,970.00
WD34 WD33	156.4	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,448.00
WD35 WD34	336.8	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,576.00
WD40 WD2	232.7	LINER	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,289.00
WD47 WD46	234.1	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,887.00
WD53 WD51	197.4	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,318.00
WD55 WD54	163	CONC	?	POOR/FULL OF GROUT	RELAY	$ 90.00	$ 500.00	$ 14,670.00
							705-2 Subtotal:	**$ 107,158.00**
705-3								
WD16 WD7	249.1	CONC	2	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,437.00
WD21 WD20	172.1	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 13,047.00
WD22 WD21	216.1	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,127.00
							705-3 Subtotal:	**$ 47,611.00**

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
1767-1								
WP18 WP17	245.2	CONC	3	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,664.00
WP21 WP20	75.2	CONC	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 5,764.00
WP27 WP24	206.1	CONC	3	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,927.00
WP29 WP22	168.2	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,774.00
WP30 WP31	199.1	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,437.00
WP35 WP34	400	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,000.00
WP44 WP42	363.9	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 26,973.00
WP40 WP39	410.3	LINER	6	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 31,721.00
							1767-1 Subtotal:	**$ 72,410.00**
1767-2								
WP78 WP2	464	CONC	5	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 34,980.00
WP79 WP78	350.2	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,014.00
WP80 WP79	80	CONC	0	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 5,600.00
WP82 WP81	391.6	CONC	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,412.00
							1767-2 Subtotal:	**$ 94,006.00**
Ruddle-1								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
ND6 ND6A	17.2	CLAY	?	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,204.00
ND7 ND6	216.7	CLAY	1	POOR/SMOKE LEAK	RELAY	$ 90.00	$ 500.00	$ 20,003.00
ND8 ND7	282	CLAY	3	POOR	RELAY	$ 90.00	$ 500.00	$ 26,880.00
ND9 ND8	290	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,300.00
ND10 ND9	404	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,280.00
ND11 ND10	160.6	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,742.00
ND12 ND11	205	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,850.00
ND15 ND14	146.5	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,255.00
ND16 ND15	182.3	CLAY	4	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,761.00
ND17 ND13	92.1	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 6,947.00
ND19 ND6A	140.9	PVC	0	FAIR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 9,863.00
ND21A ND21	174.5	CLAY	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,715.00
ND21 ND20	120.6	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 9,942.00
ND22 ND21A	209.7	CLAY	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,679.00
ND23 ND22	233.8	CLAY	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,366.00
ND26								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
ND25	570	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,900.00
ND27 ND25	235.4	CLAY	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,978.00
							Ruddle-1 Subtotal:	**$ 288,665.00**
Walker Park 1								
NC49A NC49	231.3	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,191.00
NC49B NC8	246.4	CLAY	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,248.00
NC49 NC49B	288.0	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,660.00
NC50 NC9	117.1	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 9,197.00
NC51 NC50	215.8	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,106.00
NC53 NC52	273.0	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 19,610.00
NC54A NC54	43.3	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,531.00
NC54 NC10A	98.6	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 7,902.00
SERVICE CAP NC52	143.8	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,066.00
SERVICE CAP NC54A	47.2	CLAY	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,804.00
Locust & Lilly Popular & Lilly	229	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,530.00
NC 20A NC19	703	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 50,710.00
NC15A								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
NC15	426.2	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 34,334.00
NC15								
NC16	23.7	CLAY	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,659.00
NC24				POOR/SMOKE				
NC23	291	CLAY	2	LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,370.00
NC25A								
NC25	344	CLAY	11	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 29,580.00
NC25								
NC24	193.9	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,073.00
							Walker Park 1 Subtotal:	**$ 306,571.00**
Walker Park 2								
1								
2	67.6	CLAY	1	POOR	RELAY	$ 90.00	$ 500.00	$ 6,584.00
NC66								
NC65	80.6	CONC	2	POOR	BURST/RELAY	$ 85.00	$ 500.00	$ 7,851.00
NC86								
NC85	349.5	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,965.00
NC87								
NC86	397	CLAY	12	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 33,790.00
NC89								
NC88	232.4	TRUSS	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,768.00
NC93								
NC92	343	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,510.00
NC94								
NC93	300.1	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,507.00
NC95								
NC94	320.3	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,921.00
NC99								
NC98	240	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 19,300.00
NC100								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
NC99	217.1	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,697.00
NC102 NC101	263.2	CONC	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,424.00
NC103 NC92	361.9	CLAY	7	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,833.00
NC104 NC103	563	CLAY	4	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,410.00
NC105 NC104	246	CLAY	1	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,720.00
NC108 NC107	250	CLAY	3	POOR	RELAY	$ 90.00	$ 500.00	$ 24,000.00
NC109 NC108	242.7	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,989.00
NC110 NC109	160.7	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 13,249.00
NC111 NC110	264.9	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 20,543.00
NC72 NC71	257.4	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 20,018.00
NC74 NC73	335.5	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,485.00
NC75 NC74	245.9	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,213.00
NC112 NC109	86.1	CLAY	2	POOR/SMOKE LEAK	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 7,027.00
EOL NC24	148.3	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,381.00
							Walker Park 2 Subtotal:	**$ 469,185.00**
Ward 1								
90W3								

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
90W2	323.7	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,659.00
LOCUST & LILY POPLAR & LILY	272.4	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 21,068.00
MICHAELS JEWEL TEE IN LINE	183.9	CONC	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,873.00
WF105 WS31	225	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,250.00
WF108 WF107	296.4	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,248.00
WF109 WF108A	206.9	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,983.00
WF110 WF109	340.7	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,349.00
WF111 WF110	305.8	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,906.00
WF115 WF114	507.2	CONC	12	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,504.00
WF116 WF107	347.6	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 25,832.00
WF118 WF117	287.2	CONC	5	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,604.00
WF119 WF118	359.8	CONC	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 29,186.00
WS1 PS	51	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,570.00
WS30 WS29	247.4	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 19,318.00
WS31 WS29	62.4	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 5,368.00
WS18 WS15	115	CLAY	2	FAIR	PC & INSTALL MH	$ 2,000.00	-	$ 2,000.00

TABLE 1 - HIGH PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length (ft)	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Cost
WS24								
WS23	175.2	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 14,264.00
							Ward 1 Subtotal:	**$ 328,982.00**
Ward 2								
WF57								
WF56	94.4	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 6,608.00
WF63								
WF62	138.5	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 10,195.00
WF68								
WF67	252	PVC	?	PIPE MISSING	RELAY	$ 90.00	$ 500.00	$ 22,680.00
WF72								
WF71	447.4	CONC	17	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 39,818.00
WF71								
WF70	319.8	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,386.00
							Ward 2 Subtotal:	**$ 103,687.00**
							High Priority Area Total:	**$ 1,843,502.00**

*Unit costs for BURST/RELAY/CIPP=$70 per LF, RELAY/BURST=$85 per LF, RELAY=$90 per LF, REPAIR SERVICE or POINT REPAIR=$1000 EA, SMH=$2000 EA

APPENDIX B

MEDIUM PRIORITY AREAS

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
705-2									
WD3 WD2	238.4	8"	LINER	1	POOR	RELAY/BURST	$ 85.00	$ 500.00	$ 20,764.00
WD27 WD2	184.9	10"	LINER	0	POOR	PT. REPAIR	$ 1,000.00	$ 500.00	$ 1,000.00
WD42 WD41	252.2	8"	LINER	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 18,154.00
								705-2 Subtotal:	**$ 39,918.00**
705-3									
WD20 WD19	110.9	8"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 7,763.00
WD24 WD23	40.7	8"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 2,849.00
								705-3 Subtotal:	**$ 10,612.00**
1767-1									
WP41 WP40	379.6	8"	CONC	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,572.00
WP48 WP47	249	8"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 17,930.00
								1767-1 Subtotal:	**$ 46,502.00**
1767-2									
WP81 WP80	384.8	8"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 27,936.00
								1767-2 Subtotal:	**$ 27,936.00**
Ruddle-1									
EOL ND10	82.8	6	CLAY	2	POOR	NEEDS M/H	$ 2,000.00		$ 2,000.00

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
EOL									
ND22	83.1	6	CLAY	1	POOR	NEEDS M/H	$ 2,000.00		$ 166,200.00
ND6A									
ND5	320.5	8	PVC	1	POOR	RELAY	$ 90.00	$ 500.00	$ 29,345.00
ND14									
ND13	293.7	6	CLAY	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,559.00
ND20									
ND19	381	6	CLAY	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,670.00
ND24									
ND23	200.6	6	CLAY	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,542.00
ND25									
ND21	315.3	6	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,071.00
								Ruddle-1 Subtotal:	**$ 291,387.00**
Walker Park 1									
NC27									
NC26	61.4	6"	CONC	?	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 4,298.00
NC28									
NC20	154.7	6"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 10,829.00
NC52									
NC51	353.3	6"	CLAY	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 27,731.00
NC16									
NC37	485.6	10"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 34,992.00
NC17									
NC16	27.9	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,953.00
NC18									
NC30	42.3	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 2,961.00
NC19									
NC18	18.9	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 1,323.00
NC30									
NC17	234.2	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 16,394.00

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
								Walker Park 1 Subtotal:	**$ 100,481.00**
Walker Park 2									
NC81A NC58	162	8"	CLAY	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 11,340.00
NC81 NC81A	318.9	8"	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,323.00
NC85 NC84	152.7	8"	CLAY	4	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,689.00
NC91 NC91A	319.4	10"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,358.00
NC107 NC106	512.8	8"	CLAY	9	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 40,396.00
NC73 NC68	316.8	8"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,676.00
NC88 NC59	328.1	8"	TRUSS	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 23,467.00
NC57 NC56	434.1	12"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,387.00
								Walker Park 2 Subtotal:	**$ 187,636.00**
Ward 1									
WS20 WS19	400.2	10"	CLAY	4	FAIR	PC & REPAIR SERVICE	$ 1,000.00	$ 500.00	$ 1,000.00
WF102 WF101	506.9	6"	CONC	13	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 41,983.00
WF106 WF93	168.7	10"	CONC	1	FAIR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 12,309.00
WF107 WF106	200.5	10"	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 15,535.00
WF108A									

TABLE 2 - MEDIUM PRIORITY REPAIRS

Upst MH # to Dnst MH#	Line Length	Pipe Size	PIPE TYPE	No. of Services	Line Conditions	Recommendations	Unit Cost*	Service Connect	Total Cost
WF108A	123.9	6"	CONC	3	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 10,173.00
WF114 WF113	48	8"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,360.00
WF117 WF116	299.9	8"	CONC	8	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,993.00
WS6 WS5	364.1	8"	CLAY	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 28,487.00
WS29 WS28	305	6"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,350.00
WS21 WS20	382.9	8"	CLAY	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 27,803.00
								Ward 1 Subtotal:	**$ 187,993.00**
Ward 2									
WF4A WF57	56	10"	CONC	0	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 3,920.00
WF56 WF55	428.9	12"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 30,523.00
WF60 WF59	307	8"	CONC	2	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,490.00
WF62 WF61	313.8	8"	CONC	6	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 24,966.00
WF70 WF59	311.6	8"	CONC	1	POOR	BURST/RELAY/CIPP	$ 70.00	$ 500.00	$ 22,312.00
								Ward 2 Subtotal:	**$ 104,211.00**
								Medium Priority Total Cost:	**$ 996,676.00**

*Unit costs for BURST/RELAY/CIPP=$70 per LF, RELAY/BURST=$85 per LF, RELAY=$90 per LF, REPAIR SERVICE or POINT REPAIR=$1000 EA, SMH=$2000 EA