

CORRECTIVE ACTION PLAN

For the

***Alma Arkansas Wastewater Treatment System
Permit Number AR0021466
AFIN 17-00059***

Prepared for:

***The City of Alma Arkansas Public Works
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General

A Corrective Action Plan (CAP) was prepared on behalf of Alma Arkansas in response to a request dated June 12, 2017 from the Arkansas Department of Environmental Quality (ADEQ). Specifically, the request is related to exceedances during the period from June 2012 through April 2017. The exceedances were for 5-day Biochemical Oxygen Demand (BOD₅) and Total Suspended Solids (TSS). This amendment to the CAP is the result of corrective actions taken to date to address the BOD₅ and TSS exceedances. Particularly, the research led to a lack of positive evidence that ultrasonic technology is effective at disrupting and removing algae from wastewater treatment lagoons.

Treatment System Permit Exceedances

The treatment system has exceeded the permitted effluent limits at times over the past five years. Exceedances include BOD₅ and TSS. The BOD₅ exceedances range from 30.7 mg/L to 66.5 mg/L compared to the discharge limit of 30 mg/L. The TSS exceedances range from 45.7 mg/L to 94.3 mg/L compared to the permit limit of 45 mg/L.

In 2012, the TSS and BOD₅ limits were exceeded from June through December.

In 2013, the BOD₅ limit was exceeded in November, and the TSS limit was not exceeded in 2013.

In 2014, the BOD₅ limit was exceeded in October, and the TSS limit was exceeded in March

In 2015, The BOD₅ limit was exceeded in November and December, and the TSS limit was exceeded in October

No exceedances were indicated for 2016

In 2017, the BOD₅ limit was exceeded in March and April, and the TSS limit was exceeded in April

The table below indicates the timeline for the permit limit exceedances indicated by the June 12, 2017 letter from ADEQ:

Year	Jan	Feb	Mar	Apr	May	June	July	AUG	Sept	Oct	Nov	Dec
2012						BOD ₅ TSS	BOD ₅ TSS	BOD ₅	BOD ₅ TSS	BOD ₅ TSS	BOD ₅ TSS	BOD ₅ TSS
2013											BOD ₅	
2014			TSS							TSS		
2015										TSS	BOD ₅	BOD ₅
2016												
2017			BOD ₅	BOD ₅ TSS				TSS				

Evaluation of the Existing Treatment System

The existing treatment process includes an influent solids-removal screen, Parshall flume, and 3 lagoons followed by optional chlorination and dichlorination with effluent flow measuring and

discharge to the Arkansas River. The discharge is in Hydrologic Unit Code 11110201 and reach #016. The first cell of the initial lagoon is designed to perform as complete mix, with the following 2 cells operating as partial-mix cells. The following lagoon operates as a facultative lagoon according to the permit. The third lagoon is operated as a facultative lagoon. A fourth lagoon which is not part of the process is used as an equalization basin. The system design flow is 1.75 MGD.

Additives are used in an effort to enhance the system performance. A bacterial additive is used. The additive is known as B.E.F and is manufactured by the Heussner Company in Bruceville, Texas. The additive is introduced at the head of the treatment system at a rate of one pound per day.

Earthtec® algacide is applied by spraying from the levees of the lagoons at no more than 220 gallons per day as approved by the Department in June of 2014.

The pH is monitored and sulfuric acid is used to adjust the pH when the pH becomes too basic. The goal is to keep the pH near neutral.

Liquid alum (48.5% aluminum sulfate by weight) is used at a rate of approximately 25 gallons per day and is introduced between the first two lagoons in an effort to precipitate phosphorus.

During the initial visit on June 20, 2017, the aeration in the first cell of the first pond appeared to be inadequate to provide a complete-mix process. Aerators in the second lagoon were not operating.

The final lagoon appeared to have a high concentration of algae.

The City of Alma has analyzed the algae types in an effort to move toward a solution for eliminating the algae and hopefully reducing the TSS and suspended BOD₅.

Alma has also contacted Triplepoint Environmental of Oak Park Illinois to investigate the use of an ultrasonic algae control device in an effort to eliminate the algae in and around the discharge from the final lagoon. Morrison Shipley Engineering followed up by contacting references for ultrasonic technology manufacturers including Sonic Solutions, LLC.

Planned Corrective Actions

Some investigation will be conducted into the system performance and into why, after a year of being in compliance the system exceeded limits in March and April, 2017.

The aerators will be put into service to create complete-mix in the first cell of the first lagoon.

Additional aeration will be studied and if feasible, the aerators in the second lagoon will be activated with prior notice to ADEQ so that the facultative lagoon (as permitted) could be operated as partial mix.

Additives will be evaluated for correct dosages and usage.

Timeline

The following timeline is proposed for executing the proposed corrective actions:

Corrective Action	Completion Deadline
Investigate Changes from 2012 through 2017	Completed June , 2017
Restore Aeration in Cell 1, First Pond	Completed September 30, 2017
Collect and analyze samples for Triplepoint Environmental	Completed October 30, 2017
Repair and restore aerators in the Second Lagoon and measure effect	Completed November 30, 2017
Interim Progress Report Number 1	Completed November 30, 2017
Research recycled materials for lagoon covers	January, 2018
Begin fabricating lagoon covers	March 2018
Interim Progress Report Number 2	May 10, 2018
Deploy floating covers	March 2018 - November 2018
Interim Progress Report Number 3	August 10, 2018
Interim Progress Report Number 4	November 10, 2018
Amend CAP if Necessary or Request CAP Closure	December 31, 2018

Recycled material (vinyl from billboards) will be used to fabricate covers for the lagoon. Flotation material will be sandwiched between sheets of vinyl by heat-welding the vinyl around the flotation.

Once the covers are fabricated, they will be deployed over the surface of the final lagoon. The covers will block sunlight, preventing the algae from growing, killing the algae in the lagoon and allowing the dead cells to settle.

SOURCES

Tchobanoglous, George; Metcalf and Eddy, Wastewater Engineering Treatment and Reuse, McGraw-Hill, 2002

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