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Mr. Myrl Lawrence
Arkansas Department of Environmental Quality
Office of Water Quality
Enforcement Branch
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

RE: NPDES Permit Number AR0021466, AFIN 17-00059

Dear Mr. Lawrence:

Thank you for meeting with our staff and consulting engineer on November 1. As discussed in the meeting, I am requesting an extension and modification of our Corrective Action Plan (CAP). I would like the CAP to be extended through the end of 2019, with an expected completion date of December 31, 2019.

The extension is necessary for several reasons. Our original proposal was to pursue algae mitigation by using ultrasonic devices as well as increasing the aeration in the lagoon system. When we investigated that technology further, we found that the references for the systems in the United States did not indicate that the technology was successful at bringing wastewater treatment lagoons into compliance with their permits. Therefore, we had to find a new method of algae control.

The method for Alma that will be cost-effective as well as simple to operate without generating residuals or biosolids seems to be covering the lagoon to block sunlight and prevent algae growth. With this in mind, we began acquiring used billboard sign material and fabricating covers from recycled materials. The method was promising. However, a wind storm destroyed some of the cover material after we deployed part of the covers on the lagoon. We were disappointed that this method would not provide a solution for us within the time frame to meet our timeline.

In order to move forward as quickly as possible, we have decided to purchase a commercially-available cover material called HexProtect Aqua. The material is comprised of hexagonal tiles approximately 8-inches in the largest dimension. The tiles float but are ballasted with water and are advertised to withstand 130 mile per hour winds. The tiles are supposed to float against one another while allowing some air diffusion to the water surface. The tiles have been ordered but will not be delivered until early 2019 due to manufacturing limitations at the plant in Texas.

We also want to ensure that adequate treatment is available in the final lagoon of our treatment system. To that end, we propose to install baffle curtains and create aerated cells within the final lagoon. The modifications to the treatment system will require a construction permit from ADEQ. Our understanding is that the time to obtain the permit is a minimum of 180 days. Therefore, we are requesting the CAP extension so adequate time is available to obtain the permit, manufacture the HexProtect Aqua tiles, and complete construction in the final lagoon.

Regarding the corrective actions implemented to date, the aeration systems have been repaired and deployed in the existing lagoons. Dosing with the EarthTec® additive has been unnecessary. The treatment system has remained in compliance with the TSS and BOD5 permit limits since October 1st of 2017.

The modified CAP accompanies this letter. A timeline with milestones is included in the modified CAP.

Thank you for considering our request for an extension.

Sincerely,

Keith Greene, Mayor

Keith Greene

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
811 Fayetteville Avenue
Alma, AR 72921

Prepared by:

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July 2017

Amended March 2018

Amended November 2018

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 (BOD_5) and Total Suspended Solids (TSS). This amendment to the CAP is the result of corrective actions taken to date to address the BOD_5 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 Resulting in the Corrective Action Plan Request

The treatment system exceeded the permitted effluent limits at times over the period from 1012 through 2017 and the Arkansas Department of Environmental Quality (ADEQ) requested a Corrective Action Plan (CAP). Exceedances included BOD_5 and TSS. The BOD_5 exceedances ranged from 30.7 mg/L to 66.5 mg/L compared to the discharge limit of 30 mg/L. The TSS exceedances ranged from 45.7 mg/L to 94.3 mg/L compared to the permit limit of 45 mg/L.

In 2012, the TSS and BOD_5 limits were exceeded from June through December.
In 2013, the BOD_5 limit was exceeded in November, and the TSS limit was not exceeded in 2013.
In 2014, the BOD_5 limit was exceeded in October, and the TSS limit was exceeded in March
In 2015, The BOD_5 limit was exceeded in November and December, and the TSS limit was exceeded in October
No exceedances were indicated for 2016
In 2017, the BOD_5 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 dechlorination 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 were used to enhance the system's performance. A bacterial additive is used. The additive is known as B.E.F, 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® algaecide was 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 Earthtec algaecide was discontinued on June 28, 2017 except for an application in September 2018 to use the remainder in stock.

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. The last application was September 13, 2018.

Liquid alum (48.5% aluminum sulfate by weight) was used at a rate of approximately 25 gallons per day and is introduced between the first two lagoons to precipitate phosphorus.
Alum addition was discontinued December 7 of 2018.

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 analyzed the algae types to move toward a solution for eliminating the algae and hopefully reducing the TSS and suspended BOD_5.

Alma also contacted Triplepoint Environmental of Oak Park Illinois to investigate the use of an ultrasonic algae control device 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.

Corrective Actions as of November 2018

The aeration equipment was repaired and put into service to create complete-mix in the first cell of the first lagoon.

The aerators in the second lagoon were activated and the facultative lagoon (as permitted) are operated as partial mix.

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

Covers were fabricated and deployed over the part of surface of the second lagoon. Unfortunately, the covers were struck by a wind storm and many of the covers were torn from their connectors.

Effects of Corrective Actions as of November 2018

The Discharge Monitoring Reports (DMRs) for 2017 and 2018 indicate that the treatment system remains in compliance with the following exception:

August 2018 had a slight excursion for Fecal coliform, with a 30-day geometric mean of 272/100 mL (permit 200/100 mL) and a daily geometric mean of 430/100 mL (permit 400/100 mL). The addition of a small amount of chlorine brought the system back into compliance.

The system has been in compliance with the TSS and BOD_5 permit limits since October 1st of 2017. No additives have been required.

Corrective Actions Proposed for 2019

Hexprotect® Aqua high-density polyethylene (HDPE) tiles are proposed for the lagoon cover. The tiles are approximately 8 ½ inches across and are ballasted with water. The tiles are advertised to withstand up to 130 mph winds. The lagoon cover is expected to prevent algae growth and keep the treatment system in compliance with BOD_5 and TSS.

Baffle curtains are proposed for Lagoon 3 to help keep the Hexprotect® cover modules in place and prevent short-circuiting.

Aeration is proposed for sections of Lagoon 3 to add aeration that may be blocked by the floating cover and to ensure that the system meets the 2 mg/L Dissolved Oxygen discharge limit.

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	Completed January, 2018
Begin fabricating lagoon covers	Partially completed March 2018
Interim Progress Report Number 2	Completed May 10, 2018
Deploy floating covers	Partially-completed May 2018
Interim Progress Report Number 3	Completed August 10, 2018
Bid and Contract to purchase HexProtect Aqua Cover	Completed October, 2018
Interim Progress Report Number 4	Completed November 10, 2018
Amend CAP	December 31, 2018
Submit Construction Permit Application	December 31, 2018
Interim Progress Report Number 5	February 30, 2019
Interim Progress Report Number 6	May 30, 2019
Construct Baffle Curtains in Lagoon 3	August, 2019
Interim Progress Report Number 7	August 30, 2019
Manufacture and Deploy Hexprotect Aqua Lagoon Cover	November 30, 2019
Interim Progress Report Number 8	November 30, 2019
Final Report and Request CAP Closure	December 30, 2019

SOURCES

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

Arkansas Department of Environmental Quality; Permit No. AR0021466 AFIN 17-00059

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