

Corrective Action Plan

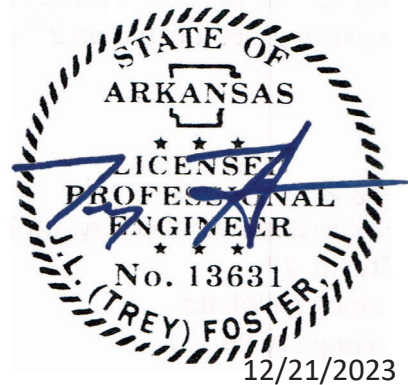
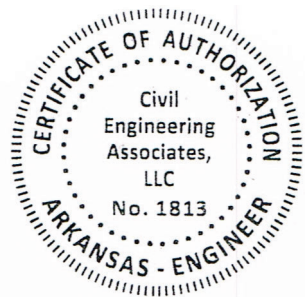
City of Nashville, AR

Wastewater Treatment Facilities

ADEQ Permit AR0021776

December 2023

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Overview

The City of Nashville Sewer Department (Permittee) has requested Civil Engineering Associates, LLC (CEA) to complete the necessary corrective action plan for violations to their existing Arkansas Energy & Environment, Division of Environmental Quality (DEQ) NPDES Permit No. AR0021776 as noted in the Consent Administrative Order (CAO) effective November 21, 2023. Based on the CAO Findings of Fact, the Permittee has multiple violations that must be addressed to maintain permit compliance.

A review of the CAO has been completed and it is noted that the majority of violations stated are due to administrative ineffectiveness within the Permittee's processes. These ineffective processes will be addressed through corrective actions to be implemented by the Permittee. From an operation standpoint, the Permittee has multiple violations due to sanitary overflows and the corrective actions needed to reduce and/or prevent this type of violation will be the primary focus of this Corrective Action Plan (CAP).

Background

The Permittee owns and operates a wastewater treatment facility with a design treatment capacity of 3.5-MGD located at 743 Highway 27 South, Nashville, AR 71852. The treatment facility operates as an activated sludge process plant consisting of an influent pump station with screen, 2 aerated lagoons, secondary clarification, UV disinfection, and waste sludge processing. Expansion of the facility to the current design capacity was completed in 2014. Since the new facility has been online, the Permittee has had consistent difficulty maintaining biological processes to sustain operations within the permit limits. Significant research has been completed by the Permittee to determine the cause and it has been determined that the primary factors are due to low influent BOD and insufficient aeration in the aerated lagoons. The issues related to BOD have been addressed, and modifications to the aeration system are planned.

The Permittee is also responsible for approximately 80,000-linear feet of wastewater collection system that is mostly comprised of a gravity system. This system was originally constructed in the early 1900's and has been expanded over time as the need arose. The system consists of various pipe sizes and materials along with manholes, pump stations, force mains, and other typical appurtenances associated with a wastewater collection system. As with any collection system that has been in service for many years, there are issues related to inflow and infiltration. The Permittee is no exception, and the system should undergo an evaluation to determine the greatest problem areas within the system.

Data Collection and Analytical Review

A review of DMR data from the periods in which violations occurred are directly associated with the issues that the Permittee has had in maintaining compliance with the NPDES Permit except for the administrative oversights. It is clear from our review that the Permittee has addressed the administrative issues and implemented new standard operating procedures to ensure that these violations are prevented in the future. Per the Findings of Fact the Permittee must correct the underlying issues with treatment processes to ensure compliance with Permit limits and address maintenance rehabilitation of the collection system to minimize sanitary overflows.

An analytical review of the data available from the Permittee and through DMR data corresponds to the exceedance violations in Ammonia Nitrogen, Total Suspended Solids, and Carbonaceous Biochemical Oxygen Demand. These violations are directly related to ineffective biological processes through the treatment facility and can be attributed to insufficient mixing through the aeration pond. The lack of proper aeration allows for an imbalance in the food to micro-organism ratio that leads to premature death of the micro-organisms needed to break down the organic matter in the influent stream. As the micro-organisms die out, they produce ammonia as a by-product during decay which leads to an increase in the final effluent Ammonia Nitrogen levels. The Permittee tested the influent BOD and found that low levels of BOD in the influent stream were attributing to the imbalance in the food to micro-organism ratio. Upon this determination, the Permittee began acquiring waste-activated sludge from a nearby treatment facility to increase influent BOD. The additional BOD has proven highly beneficial to the process, but can be better managed with proper aeration within the pond. Without sufficient mixing and breakdown of organic matter in the aeration pond, larger suspended particles are transferred to the clarifier. Lack of settling within the clarifier ultimately leads to an exceedance of Total Suspended Solids in the effluent.

In order to combat the effluent violations, the Permittee should modify the diffused air system within Treatment Pond #1. The modification will include additional air being added to the pond and the relocation of the return activated sludge discharge into the complete mix zone of the pond. The modification should provide better mixing throughout the pond and enough air to keep the biological process in balance.

Regarding violations related to overflows of sanitary sewer, the data review corresponds to high and/or extended periods of wet weather. During normal rain events and typical day-to-day flows, the existing collection system has the capacity to carry the flow. When fast rain events or extended periods of rain occur, the system does not have the capacity to carry the additional flow from inflow and infiltration (I&I). There is no data available to base a determination that the existing collection system is undersized. However, flow data from the treatment facility spike during rain events, which leads to the determination that I&I is a major concern. In order to identify areas that are most subject to I&I, the Permittee will need to undertake a program to

perform smoke testing, televising, and inspection of manholes. Once the area(s) are identified, the Permittee can implement a rehabilitation plan to address I&I. Funding for this type of rehabilitation will be difficult to obtain and should be taken under consideration when developing budgets and applying for financial assistance. The most cost-effective approach for the Permittee to address I&I is to implement an Annual Maintenance Program. Implementing the Maintenance Program will allow the Permittee to budget funds annually to address the issue over time while preventing additional debt within the system. Self-funded rehabilitation should be utilized to address low-cost preventative maintenance while financial assistance through grants and/or loans should be considered for higher cost rehabilitative work.

Conclusions and Recommendations

For simplicity, the table shown below provides a breakdown of the violations and the recommended corrective action to be taken to prevent future violations.

Wastewater Treatment Facility			
Violation Noted		Potential Cause	Corrective Action to be Implemented
1	Sludge Build-Up Treatment Pond #2	Ineffective Biological Processes	Modify Department budget to allow funds to perform yearly disposal of sludge through hauling
2	Failures to Respond	Administrative Oversight	Hold weekly Department staff meetings to ensure deadlines are met
3	Ammonia Nitrogen	Loss of Food to Bug Ratio for proper biological processes	Department will initiate modifications to the diffused air system within the Aerated Lagoon to provide additional air to Pond #1 for proper biological process to occur
4	Total Suspended Solids	Ineffective Biological Processes	Department will initiate modifications to the diffused air system within the Aerated Lagoon to provide additional air to Pond #1 for proper biological process to occur
5	Carbonaceous Biochemical Oxygen Demand	Ineffective Biological Processes	Department will initiate modifications to the diffused air system within the Aerated Lagoon to provide additional air to Pond #1 for proper biological process to occur
6	Fecal Coliform	Incorrect Reporting	Implement secondary review of data prior to submittal

7	Nitrate + Nitrite	Incorrect Reporting & Failure to Test	Implement secondary review of data prior to submittal and create checklist for all required sampling
8	Total Phosphorus	Incorrect Reporting & Failure to Test	Implement secondary review of data prior to submittal and create checklist for all required sampling
9	Whole Effluent Toxicity	Failure to Test	Implement secondary review of data prior to submittal and create checklist for all required sampling
10	Sanitary Sewer Overflow	High Rainfall Amounts	Develop SSES and modify Department budget to implement an Annual Maintenance Program to rehabilitate the collection system

It is recommended that Permittee implement the above corrective actions to satisfy the requirements of DEQ under the existing CAO. Funding will be of great concern and may delay full corrective actions being implemented to address sanitary overflows. To effectively remain in compliance, the Permittee will budget, no less than, \$200,000 per year for a period of not less than five years with funds directed specifically to the rehabilitation of the collection system. It is also recommended that the Permittee seek financial assistance through the Community Development Block Grant Program administered by the Arkansas Economic Development Commission.

Timeline of Corrective Action Plan

Submission of CAP to ADEQ	December 2023
Approval of CAP by ADEQ	February 2024
1. Remove & Dispose Sludge from Treatment Pond #2	December 2025
2. Failures to Respond	Complete
3. - 5. Ineffective Biological Processes	December 2024
6. - 9. Incorrect Reporting & Failure to Test	Complete
10. Sewer System Evaluation Study	November 2024
Smoke Testing	April 2024
Televising	June 2024
Manhole Inspection	June 2024
Annual Maintenance Program w/Scope of Work	Annually October 2024 - 2027
Final Compliance with SSO & CAO	December 2028