

CORRECTIVE ACTION PLAN

NPDES Permit Number AR0022411 AFIN: 59-00029
Hazen Wastewater Treatment Facility
City of Hazen Prairie County
AR 72064

May 15, 2022

The city of Hazen (City) operates and maintains a wastewater system referred to as Hazen Wastewater Treatment Facility. The facility encompasses a wastewater treatment plant and sanitary sewer collection unit. Its wastewater treatment plant (WWTP) was built as a “biological nitrogen removal” plant with a rated capacity of 0.275 MGD. The WWTP is a lagoon Biolac system.

Biolac is a proprietary process that is fundamentally an extended-aeration activated sludge system. It is effective with widely fluctuating flow and waste loads, thus making it to be an extraordinarily stable, reliable and easily operated process. It is characterized with long hydraulic retention time (HRT), long sludge age, and low food to microorganism ratio (F/M). Biolac uses in-ground earthen basin lagoon with an integral clarifier for secondary settling of the microbial sludge. These features seem to help the Biolac system produce state-of-the-art treatment results at the possible lowest total plant cost.

Raw wastewater from the city of Hazen first passes through a stainless-steel perforated spiral fine screen (6 mm). The spiral dewater solid matter and transports it to a receiving container. The screened wastewater then enters the Biolac basin where fine bubble diffuser assemblies are suspended above the basin floor by floating aeration chains. The moving diffuser assemblies provide sufficient mixing of the contents of the basin as well as good oxygen transfer. Solids from the Biolac basin are settled in the integral clarifier that shares a common wall with the Biolac aeration zone. Biomass is separated from the mixed liquor in the secondary settling tank (SST). The effluent from the SST flows to the polishing pond, and then enters the UV system for disinfection.

The facility had violated several effluent parameters in the past three years. The parameters of excursions include total suspended solids (TSS), fecal coliform (FC), ammonia-nitrogen, and five-day carbonaceous biochemical oxygen demand (CBOD₅). The excursions were mostly in

concentration terms (monthly and weekly averages) except one mass limit violation ascribed to ammonia-nitrogen. The ammonia-nitrogen excursions seem to occur one time in almost three years, though its violated concentration terms substantially exceeded their permit limits, which led to “slight” violations of the mass limit.

A study of the DMR data and discussions with the owner seem to suggest that the prevailing environmental parameters at the time of violations were favorable. The possible cause of violations could be ascribed to clogging of the aeration devices that resulted in somewhat insufficient oxygen transfer to the microorganisms in the Biolac. Another plausible reason is the system population dynamics at the time minimally favored ammonia oxidizing bacteria (AOB) caused by some operational issues. As discussed in paragraph 2 of this presentation, the biolac system is extremely stable and reliable, if properly operated.

During the period of the violations, in which AOB was barely adequate, the hydraulic loading of the plant was quite within the normal range. The hydraulic loading of the WWTP was approximately 50 percent of the design flow, and the flow that caused the exceedance of the mass limit was only 32 percent of the design flow, under favorable operating environmental parameters. With time operations improved and considerable quantity of AOB reappeared back in the Biolac resulting in the elimination of the ammonia nitrogen violations. As can be observed from the DMR, in the subsequent month (August 2021) the violation of an ammonia nitrogen concentration term was only 16 percent over its permit limit as opposed to 351 percent over the permit limit in the preceding month. The hydraulic loading in the month of August 2021 was nearly identical to the hydraulic loading that occurred in the month of July 2021.

The excursions of ammonia nitrogen and CBOD₅ appear to be temporary due to somewhat inefficient operations at that time. As the modus operandi of the treating plant was improved, the effluent discharge was relieved of ammonia nitrogen and CBOD₅ excursions. The suspended solids violations can be ascribed to relatively non-quiescent conditions that occur sometimes in the polishing pond; and perhaps, also due to algal growth around the peripheral of the integral clarifier and in the polishing pond. The UV light needs considerable maintenance. For instance, ballast and bulbs need replacement. In addition, maintenance and replacement of the wiper system are necessary to ensure adequate disinfection of the effluent. Although the UV light system is presently undergoing rehabilitation.

The following milestones were developed based on the preceding:

Milestone	Date
1. Evaluation of the process units, particularly integral clarifier and polishing pond	Jun 30 – Sep 30, 2022
2. Formulation of possible corrective measures for issues identified during evaluation of the plant	Oct 3 – 28, 2022
3. Replacement of necessary parts for the UV light system	Oct 17, 2022
4. Resolution of the corrective measures identified in Item 2	May 28, 2023

The final compliance deadline would be June 30, 2023. Quarterly report would be provided upon approval by the Arkansas Division of Environmental Quality (DEQ).