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August 23, 2018

Mr. Layne Pemberton
Enforcement Analyst
Enforcement Branch
ADEQ Office of Water Quality
5301 Northshore Drive
North Little Rock, AR 72118

Ref: City of Forrest City; Permit No.: AR0020087
Nutrient Reduction Plan – Total Phosphorus
Your letter to Mayor Bryant Dated July 24, 2018

Dear Mr. Pemberton,

In the above referenced letter, you correctly pointed out that in my previous letter relating to Nutrient Reduction Plan I only addressed Ammonia Nitrogen. I also needed to address Total Phosphorus (TP) reduction since Part 1, Section B Permit Compliance Schedule requires that the City of Forrest City also prepare a BMP implementation Plan with regards to TP.

According to the Fact Sheet from the current permit, Forrest City WWTP (FCWWTP) historically (based on data from 2012) discharges Total Phosphorus in the receiving stream at a 7-day average concentration of 2.6 mg/l. ADEQ considers Total Phosphorus concentration level above 2 mg/l. as harmful to the receiving waters. Therefore, the FCWWU must develop a specific plan to implement for further reduction of TP.

In my earlier letter relating to Nutrient Reduction Plan for Ammonia Nitrogen I stated the following statements.:

> "To understand various options that are available to FCWWTP to further reduce nutrient level I researched the case studies presented in the EPA publication titled "Case Studies on Implementing Low-Cost Modification to Improve Nutrient Reduction at Wastewater Treatment Plant" (EPA-841-R-15-004) dated August 2015. In that publication an Exhibit is presented on Table 1, page 12 which lists 12 WWTP located within the USA with various modifications implemented to achieve further reduction in nutrient level. All of the WWTPs are activated sludge

type. The exhibit is attached to this letter. As can be seen the WWTP at Titusville, FL has the best post performing ammonia nitrogen effluent level. The ammonia nitrogen from this plant after the modification is 0.94mg/l. This compares very favorably to the FCWWTP effluent level. Based on this it can be concluded that additional reduction through modification of the FCWWTP aeration system (changes to existing physical aeration equipment, controls, operation and function of equipment and aerated areas), process system and process control (adjustments to process control characteristics such as food-to-microorganism ratio, mixed liquor suspended solids or return activated sludge) or plant configuration (addition of new flowstreams such as recycle lines or new unit process) may not yield any significant nutrient reduction and may be impractical. Chemical modification (addition of alkalinity or supplemental carbon) requires chemical feed which is very expensive and operationally unsustainable.

At this time, it appears that the most cost-effective way to achieve any additional nutrient removal may be to implement discharge modification at the FCWWTP prior to delivery of the effluent to the receiving stream. In this option, discharge from the treatment plant will be diverted to a natural system that may include land application, wetland assimilation or holding pond with controlled discharge. FCWWTP is rich in land holding and as such can implement any of these alternatives at a reasonable cost. Further evaluation will have to be performed based on receiving stream nutrient level and reduction desired in the effluent nutrient load."

The above conclusion is also true for Total Phosphorus reduction. The Titusville, Florida WWTP as referenced in the attached exhibit achieved a reduction of 94% in Total Phosphorus using the proposed land application/wetland assimilation/holding pond with controlled discharge.

Phosphorus removal is often complimentary to nitrogen removal. Modestly improved phosphorus reduction often co-occurs as a result of improvements in biological nitrogen removal.

Another option that is available to the FCWWTP is Chemical Precipitation. Chemical precipitation is the most common technique to achieve higher levels of phosphorus removal. Chemical Precipitation is a well-established technology widely adapted to different plant types and configurations. For activated sludge and most other types of WWTPs, metal salts can be added to chemically precipitate orthophosphate, which can then be removed with solids, during primary or secondary clarification and/or tertiary filtration. Metal salts can be added upstream of the primary and/or secondary clarifiers as well as at other points within the treatment system. At FCWWTP, chemical precipitation of phosphorus can be used as part of a tertiary treatment process. However, as stated earlier chemical modification requiring chemical feed of expensive chemical is unsustainable and requires continuous maintenance.

FCWU will continue to monitor and report the FCWWTP effluent for Phosphorus as required by the NPDES permit. However, I request that you consider this CAO item to have been satisfactorily complied by the FCWU. Please feel free to contact me if you have any question or need additional clarification.

Sincerely,

Mizan Rahman, P.E.
Project Manager

Attachment
CC: Mayor Larry Bryant
Calvin Murdock

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