Richard Healey (adpce.ad)

Subject: FW: CAO LIS 22-082 NPDES Permit Number AR0044016- Corrective Action Plan (CAP)
Attachments: North Central- CAP 09-08-2022.pdf

From: Chid Kwelle [mailto:ckwelle@mce.us.com]
Sent: Monday, October 3, 2022 4:09 PM
To: Tiana Toups (adpce.ad)
Cc: Chris Ashcraft (DOC); Richard Cooper (DOC); Adam Triche
Subject: CAO LIS 22-082 NPDES Permit Number AR0044016- Corrective Action Plan (CAP)

Dear Tiana,

Please see attached. The CAP is due October 6, 2022.

Chid Kwelle, PhD, PE

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CONSENT ADMINISTRATIVE ORDER
CAO LIS 22-082

CORRECTIVE ACTION PLAN
NPDES Permit Number AR0044016 AFIN: 33-00036
ADC North Central Wastewater Treatment Facility
Route 5, Highway North 5
Calico Rock, AR 72519

October 4, 2022

The Arkansas Department of Correction (ADC) owns and operates a wastewater treatment plant, the North Central Unit (NCU) situated at Calico Rock in Izard County. The wastewater treatment plant (WWTP) has an NPDES Permit Number AR0044106 with a design capacity of 0.09 MGD, and serves over 180 employees and a maximum unit capacity of approximately 800 prisoners. ADC is contemplating to increase the NCU capacity by an additional 800 prisoners, thus making it a total of 1,600 prisoners in the future.

The wastewater treatment system is a single unit oxidation ditch with two secondary settling tanks (SSTs). The influent wastewater enters the bar screen, and flows through a Parshall flume that has a flow recorder before winding up in the biological oxidation ditch. The secondary effluent from the SSTs then goes to the tertiary filter, and passes through UV lights before discharging to a receiving waterbody. There is a standby chlorination system that serves as an alternative disinfection method should UV light break down or is being maintained.

Volumetric flow data from 2017 to 2021 DMRs indicate that the capacity of the existing WWTP has substantially been exceeded. A summary of the flow data is presented in Table 1.

Table 1 Summary of relevant flow data from 2017 to 2021

Year	Ave. Monthly Flow, MGD	Ave. Daily Maximum, MGD
2017	0.110	0.258
2018	0.140	0.296
2019	0.130	0.265
2020	0.119	0.248
2021	0.160	0.490

The flowrates in the second column of Table 1 are considerably greater than the design capacity of the plant from 2017 to 2021. The exceedances of the design flow rate range

from 20 to 80 percent, almost doubling the design flow in 2021. The average daily maximum in the third column seems to be significantly high each year from 2017 to 2021. It is apparent that the hydraulic capacity of the plant has also been substantially exceeded each year beginning 2017 to 2021, which implies that inflow/infiltration (I/I) could be potentially be a contributing factor to the high flows.

A review of other relevant performance data indicates that, in general, considerable excursions of the permit limits commenced in 2019, though the parametric violations citations by the Arkansas Division of Environmental Quality (DEQ) were from 2018 to 2021. In 2018 there were only three (3) excursions: dissolved oxygen (DO), and ammonia nitrogen. The DO excursions occurred twice, while ammonia nitrogen was only once though out 2018. In 2019 the number of violations increased to 12, indicating approximately 400 percent rise in the number of excursions. The number of violations rose to 16 and 29, in 2020 and 2021, respectively. Performance data for the past six months (January to June 2022) showed the number of violations to be 20 indicating the number of violations could rise to 40 by the end of this year, if mitigating steps were not implemented.

The parameters of violations over the period cited herein were DO, five-day carbonaceous biochemical oxygen demand ($CBOD_5$), nitrate-nitrogen (NO_3^- -N), ammonia nitrogen (NH_3-N), total suspended solids (TSS), fecal coliform (FC) and oil & grease. Five-day carbonaceous biochemical oxygen demand rarely or seldom occurred, which tends to agree with the operational mode of the plant. The most excursions occurred with FC. Considerable violations occurred with NH_3-N and NO_3^- -N; when there were no NH_3-N excursions, there were NO_3^- -N violations as were the case in 2020 and 2021. In 2019 there were equal number of NH_3-N and NO_3-N excursions. In 2022, there were appreciable number of NH_3-N violations compared to only one NO_3^- - N excursion.

Recently, several improvements have been made on the wastewater treatment plant. Such improvements include restoration of aeration system, installation of UV lights, and replacement of magna rotor. Replacement of magna rotor was made June 10, 2022, and the aeration system became fully operational on July 13, 2022. Whereas the UV lights became operative August 3, 2022. It would take approximately three months to properly understand the performance results obtainable from the improvements already made.

Nevertheless, it would be difficulty to bring nitrate nitrogen to compliance because the WWTP was not originally designed for nitrate-nitrogen removal. Some level of nitrate-nitrogen may be achieved through good operational skills of an operator. In fact,

consistent compliance would be difficult, but may be accomplished only by exceptional skills of an operator.

The following milestones have been developed based on the preceding:

	Milestone	Date
1.	Performance observations of the newly installed equipment	Aug 4 – Nov 4, 2022
2.	Finetuning of the operations of the WWTP to probably assist in the achievement of nitrate-nitrogen compliance	Nov 7, 2022 – Mar 31, 2023
3.	Reduction of inflow/infiltration (I/I) within the wastewater collection system	Nov 7, 2022 – Jun 30, 2023
4.	Design and construction of a new wastewater that will include nitrate-nitrogen removal capabilities	Apr 2023 – Apr 2025

The final compliance deadline would be December 31, 2025. Quarterly reports would be provided upon approval by the Arkansas Division of Environmental Quality (DEQ).