

PROGRESS REPORT – MAY 26, 2017

Required by Corrective Action Plan dated August 17, 2015
and Progress Report dated June 30, 2016
City of Sheridan Wastewater Treatment System
NPDES No. AR0034347

1.0 INTRODUCTION

This progress report is being submitted to the Arkansas Department of Environmental Quality (ADEQ) as required by a Corrective Action Plan (CAP) dated August 17, 2015 and an associated Progress Report dated June 30, 2016 (“2016 Progress Report”). The CAP addresses effluent violations during recent years at the City of Sheridan (Sheridan) wastewater treatment system. As discussed in the CAP and the 2016 Progress Report, Sheridan’s efforts to improve compliance with the National Pollutant Discharge Elimination System (NPDES) permit limits are focused on addressing effluent concentrations of ammonia nitrogen during and after extended periods of cold weather.

Table 5 of the 2016 Progress Report lists the following three milestones to be completed by April 28, 2017 (this due date was extended to May 26, 2017 via e-mail messages between ADEQ and FTN Associates on April 28):

- 1) Installation and start-up of four aerators in Pond No. 2 during December 2016.
- 2) Collection of water quality data in the Pond No. 2 during the winter of 2016-2017.
- 3) Evaluate a breakpoint chlorination system during the winter of 2016-2017. Apply for a State Construction Permit if a breakpoint chlorination system will be pursued.

2.0 INSTALLATION AND START-UP OF AERATORS IN POND NO. 2

As discussed in Section 5.1 of the 2016 Progress Report, four aerators were purchased and installed in Pond No. 2. Figure 1 shows the location of Pond No. 2 within the wastewater treatment system. Two aerators were installed on each side of the existing baffle curtain. These aerators were installed and began operating in December 2016.



Figure 1. Flow path through wastewater ponds.

3.0 WATER QUALITY DATA COLLECTED DURING WINTER 2016-2017

During the winter of 2016-2017, a limited quantity of field data were collected for wastewater entering and leaving Pond No. 2. The purpose of this field data collection was to see how much the ammonia concentrations were decreasing as the wastewater moved through Pond No. 2 during extended periods of cold weather when nitrifying bacteria are less active and algae concentrations are lower. Because there were no extended periods of extreme cold, data were collected on only several dates. These data are summarized in Table 1.

Table 1. Water quality data for wastewater entering and leaving Pond No. 2.

Date	Entering or leaving Pond No. 2?	Water temperature (°C)	pH (su)	Dissolved oxygen (mg/L)	Ammonia nitrogen (mg/L)
2/07/2017	Entering	18.3	6.97	1.84	9.94
	Leaving	17.0	8.36	13.4	8.71
2/14/2017	Entering	14.0	6.69	< 1.0	10.6
	Leaving	14.6	6.84	5.42	7.42
3/01/2017	Entering	no data	no data	no data	13.2
	Leaving	no data	no data	no data	13.1

The data collected on February 7 and February 14 show a significant increase in dissolved oxygen from the inlet to the outlet of Pond No. 2. This shows that the four aerators in Pond No. 2 are adding a considerable amount of oxygen to the wastewater.

The ammonia concentrations decreased as the wastewater moved through Pond No. 2, although the concentrations on March 1 were nearly the same at the inlet and outlet. In general, Pond No. 2 does provide reductions in ammonia concentrations in the wastewater.

4.0 BENCH TESTING OF BREAKPOINT CHLORINATION

On March 1, 2017, FTN Associates, Ltd. (FTN) conducted a bench scale test of breakpoint chlorination using wastewater samples collected at the inlet and outlet of Pond No. 2. Household bleach was added to samples until test strips showed that the ammonia concentrations were well below the current permit limits. The treated and untreated samples were sent to Arkansas Analytical Laboratory to determine ammonia concentrations before and after adding

bleach. The results were used to calculate how much bleach would be needed to lower ammonia concentrations to about 8 mg/L at the outlet of Pond No. 2 with a flow rate of 0.676 MGD (the design flow rate for the facility). The target concentration was chosen as 8 mg/L because that provides a small margin of safety below the current permit limits. These calculations showed that 230 gallons/day of 12.5% bleach would be needed if the untreated ammonia concentration was 12 mg/L, 410 gallons/day would be needed if the untreated concentration was 15 mg/L, and 580 gallons/day would be needed if the untreated concentration was 18 mg/L.

A rough estimate of the cost to install a breakpoint chlorination system (including engineering design) would exceed \$30,000. The primary operational cost would be the cost of the bleach (estimated to be \$0.75/gallon); this would result in an operational cost of about \$173/day (\$5,175/month) if the untreated ammonia concentration is 12 mg/L, or \$435/day (\$13,050/month) if the untreated ammonia concentration is 18 mg/L.

Due to the cost of a breakpoint chlorination system, the City of Sheridan has decided not to pursue a breakpoint chlorination system at this time.

5.0 AN ALTERNATIVE PERMIT LIMIT FOR AMMONIA DURING WINTER

As an alternative to breakpoint chlorination, the City of Sheridan will pursue a permit limit for ammonia that is expressed as lbs/day per cfs of upstream flow. The advantage of this permit limit is that if the effluent ammonia concentration exceeds the current monthly average permit limits during winter, the City will not have to stop discharging altogether (or incur a permit violation), but instead the City will be able to discharge at a reduced effluent flow rate to offset the higher concentration. This will keep the downstream concentration of ammonia in the receiving stream the same (or slightly less) than with the current permit limits for ammonia.

FTN has calculated this new limit to be 17.17 lbs/day per cfs during January – February, and 9.68 lbs/day per cfs during March, April, November, and December (both are monthly averages). Upon request, FTN will gladly provide to ADEQ the spreadsheet with the calculations for these proposed limits. The calculations will show that these proposed limits are consistent with the allowable effluent loads in the existing total maximum daily load (TMDL) for dissolved oxygen in the receiving stream (Big Creek).

No change will be proposed to the current ammonia limits for May – October (monthly average of 4.0 mg/L and 7-day average of 6.0 mg/L) because there has been no difficulty meeting the current limits for those months.

Because the facility is currently in compliance with ammonia limits (no permit violations for ammonia have occurred since March 2015, the City proposed to wait until the next permit renewal to implement these proposed limits. The City's permit expires December 31, 2019.