



CORRECTIVE ACTION PLAN

CITY OF SHERIDAN, ARKANSAS WASTEWATER TREATMENT SYSTEM



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Prepared for

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1.0 INTRODUCTION

This Corrective Action Plan (CAP) is being submitted to the Arkansas Department of Energy and Environment (ADE&E), Division of Environmental Quality (DEQ) as required by a letter from DEQ to the City of Sheridan (Sheridan) dated January 9, 2020. The letter cited permit violations for three different parameters (fecal coliform bacteria, dissolved oxygen, and pH). Violations for each parameter are addressed in the following sections of this document.

2.0 FECAL COLIFORM BACTERIA

2.1 Causes(s) of the Violations

The DEQ letter cited 10 violations for fecal coliforms. One of these violations (July 2019) was due to a clerical error by the contract laboratory personnel that prepared the discharge monitoring report (DMR). Samples were collected and analyzed for fecal coliforms on July 15, 16, and 17 (Monday, Tuesday, and Wednesday) with results each day of 93, 580, and 10, respectively. The highest single value (580) was inadvertently entered on the DMR instead of the 7-day geometric mean of the three values (81). The correct value (81) is not a violation of the permit limit for 7-day geometric mean during July (400). Sheridan will submit a revised DMR with the correct value.

This same clerical error occurred several other times during 2017 – 2019. In each case, the correct value is lower than what was reported on the DMR, but even after correcting these values, there will still be 9 values that exceeded permit limits for fecal coliforms. These 9 violations for fecal coliforms appear to be caused by problems with the analytical procedures. This is based on the evaluation of available information as described in Section 2.2.

2.2 Evaluation of the Current System and Effluent Data

Sheridan's wastewater system consists of three large ponds with a combined volume of approximately 104 million gallons. For the design flow rate (0.676 MGD), this yields an average hydraulic retention time of approximately 154 days, and at the average flow rate for 2016-2018

(0.376 MGD), the average hydraulic retention time is approximately 276 days. This long retention time provides good treatment for fecal coliform bacteria, which is why the facility does not currently use any disinfection equipment, nor has any disinfection equipment been used in the last 20+ years.

Historically, Sheridan has not had problems complying with fecal coliform permit limits. From January 2005 through November 2016, all of Sheridan's 7-day geometric mean values reported on discharge monitoring reports (DMRs) were 400 or less (see Table 1). However, in December 2016, the contract laboratory that analyzes Sheridan's effluent samples started using a different analytical method for fecal coliforms. Since that time, fecal coliform results have been highly variable, including some values more than 50 times as high as the previous maximum value. These high values are not believable because no changes have taken place at the facility (i.e., the retention time in the ponds has not changed). Figure 1 shows fecal coliform values that were reported on Sheridan's DMRs for January 2005 through December 2019.

Table 1. Ranges of fecal coliform values for different time periods.

Time period	Analytical method	Range of values (colonies per 100 mL)	
		7-day geo. mean	Single samples
Jan. 2005 – Nov. 2016	SM 9222D-1997	1 – 400	< 1 – 438 ^A
Dec. 2016 – Dec. 2019	IDEXX Colilert-18	2 – 5,900 ^B	1 – 24,000

Notes: A. Based only on Jan. 2015 – Nov. 2016; individual sample data are not readily available prior to Jan. 2015.

B. DMRs erroneously show 7-day geometric means up to 24,200; the highest corrected value is 5,900.

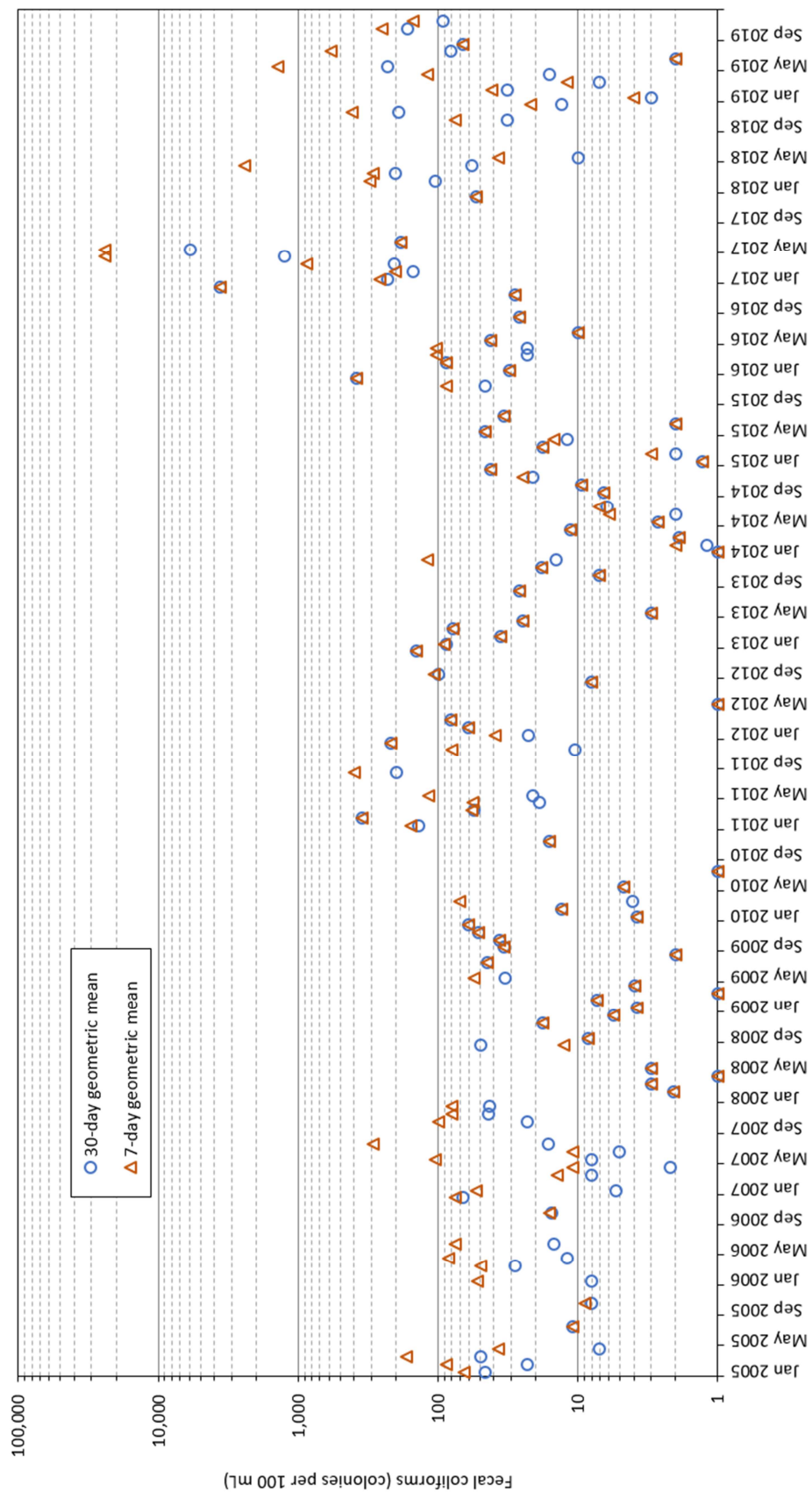


Figure 1. Fecal coliform values reported by Sheridan on DMRs.

During December 2016 through December 2019, there were several instances of fecal coliform values that were several orders of magnitude different than the value from the previous day. For example, values that were measured on April 4, 5, and 6 (in 2017) were 8,300, 24,000, and 10, respectively. Even though fecal coliform results are inherently variable, this extreme variability within a 3-day period should not occur in Sheridan's effluent because the discharge comes from a pipe near the bottom of the last pond, which has a capacity of nearly 46 million gallons. The last pond should be relatively well mixed with stable water quality that would not be expected to change much over several days. The large variability among individual samples since December 2016 suggests the need for further investigation of the analytical procedures.

2.3 Actions to be Taken

Sheridan will conduct additional sampling and analysis of their discharge using two commercial laboratories. At least 15 effluent samples will be collected during February – May 2020. Each sample will be split in the field; one split will be sent to the commercial laboratory that has been analyzing Sheridan's effluent samples for many years, and the other split will be sent to a second laboratory that is certified with DEQ for bacteria analyses. Each split will be promptly transported to the appropriate laboratory so that the laboratory analyses can be initiated within the required holding time (6 hours). Both laboratories will use the same analytical method, which will be determined after consulting with both laboratories.

Some or all of the samples may also be analyzed for *E. coli*. If the results show that Sheridan could comply with *E. coli* limits more consistently than fecal coliform limits, then Sheridan will submit an application to modify the discharge permit to replace the fecal coliform limits with *E. coli* limits.

2.4 Milestone Schedule

The milestone schedule for fecal coliform compliance is provided in Table 2. The last row of the table shows compliance with permit limits by February 28, 2021, but compliance will likely be achieved sooner if Sheridan does not pursue *E. coli* limits. It should also be noted that Sheridan usually does not discharge during the late summer and early fall because they discharge

according to a hydrograph-controlled release and the receiving stream typically does not have enough upstream flow for discharge to occur during hot, dry periods. It may not be possible to demonstrate the effect of changes that are made after the February – May sampling period until late fall.

Table 2. Milestone schedule for fecal coliform compliance.

Milestone	Completion Date
Submit Corrective Action Plan (this document)	February 10, 2020
Begin collecting and analyzing split effluent samples	February 2020
Submit Progress Report #1 to DEQ	March 10, 2020 (60 days after receipt of DEQ letter)
Submit Progress Report #2 to DEQ. This will include a summary of analytical data from the effluent sampling, and it will outline Sheridan's path forward to achieve compliance (i.e., whether Sheridan will pursue <i>E. coli</i> limits, change laboratories or analytical methods, or undertake other actions based on results of the effluent sampling).	June 10, 2020
Submit a permit modification application to DEQ (if Sheridan chooses to pursue <i>E. coli</i> limits)	June 30, 2020
Submit Progress Report #3	September 10, 2020
Submit Progress Report #4	December 10, 2020
Achieve compliance with permit limits for bacteria (either fecal coliforms or <i>E. coli</i>). If Sheridan chooses to pursue <i>E. coli</i> limits, it is assumed here that DEQ will process the application and issue the modified discharge permit in a timely manner.	February 28, 2021

3.0 pH

3.1 Causes(s) of the Violations and Evaluation of the Current System

The DEQ letter cited three violations for maximum pH. At least one of these violations occurred as a result of measurements that were taken in the afternoon (i.e., 4:15 pm for the measurement during May 2017). Late afternoon measurements are not representative of pH over

a 24-hour period because algae in the ponds cause pH to increase during the periods of maximum sunlight (due to photosynthesis) and decrease during the night (due to respiration).

According to a US Environmental Protection Agency (EPA) fact sheet, “[t]he presence of algae ... is essential to the successful performance of facultative ponds” (*Wastewater Technology Fact Sheet, Facultative Lagoons*, EPA 832-F-02-014, September 2002; accessed online at <https://www3.epa.gov/npdes/pubs/faclagon.pdf>). The algae levels in Sheridan’s wastewater ponds are considered reasonable because they do not cause nuisance conditions nor do they cause exceedances of permit limits for total suspended solids (TSS).

3.2 Actions to be Taken

Compliance with the permit limits for pH will be achieved by obtaining measurements that are more representative of conditions over a 24-hour period. Effluent pH is currently measured by personnel from the commercial laboratory that collects and analyzes effluent samples for DMRs. If the laboratory personnel cannot arrive at the facility to take measurements by early afternoon, Sheridan will obtain a pH meter and take measurements themselves at a time of day that yields representative data. If Sheridan takes pH measurements themselves, they will properly calibrate the pH meter before each use and maintain the calibration records.

3.3 Milestone Schedule

Compliance with pH permit limits will be achieved by June 10, 2020 and will be documented in Progress Report #2. It should be noted that Sheridan already complies with pH limits approximately 94% of the time (116 out of 123 values were in compliance during January 2005 through December 2019).

4.0 DISSOLVED OXYGEN

4.1 Cause(s) of the Violations and Evaluation of the Current System

The DEQ letter cited two violations for dissolved oxygen (DO) – one in February 2018 and one in January 2019. Both of these violations occurred when the creek was flooding and the water level in the creek rose almost up to the weir of the discharge structure. Normally, the effluent DO is measured at the bottom of the riprap below the discharge structure (after the effluent has cascaded down the riprap). On these two occasions, though, the riprap was submerged by the creek, forcing the effluent DO measurements to be made at the weir without any aeration that would normally be provided by the effluent cascading down the riprap. Creek flows that inundate the riprap occur rarely and only for short periods of time.

4.2 Actions to be Taken

No actions need to be taken to achieve compliance with permit limits for DO. Each of the two violations cited in the DEQ letter were considered to be isolated incidents. This is supported by the fact that during January 2005 through December 2019, the effluent DO was in compliance with permit limits almost 96% of the time (118 out of 123 values).

4.3 Milestone Schedule

No milestone schedule is needed for DO.