17.3.4.3

✓ 9-8-06

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date:	July 16, 1999	13. **Decision:**	
2. Review Engineer:	Terry L. Kirschenman	Date:	
3. Date Received:	July 6, 1999		
4. Facility Name:	Cherokee, Iowa	14. **Appeal:**	
5. County Number:	18	Date:	
6. Program Area:	CP		
7. Facility Type :	C09		
8. Subject Area :	366		
9. Rule Reference:	567-64.2(9)a		
10. Design Stds Ref:	17.3.4.3		
11. Consulting Engr:	Fox Engineering		
12. Variance Rule:	567-64.2(9)c		

15. Description of Variance Request:

Provide sludge holding tank with 0.7 HP/1000ft3 for mixing rather than 1.0 HP/1000 ft3.

16. Consulting Engineer's Justifications

a) The aerobic digester preceding the sludge holding tank will provide 60 days of detention at the maximum month biosolids production.

b) It is unlikely peak month loadings to the aerobic digester and minimum temperatures will occur at the same time.

c) The biosolids tank is designed to contain 180 days of sludge production.

d) The proposed mixer is designed on a rational basis to maintain a mixing velocity in the basin so uniform biosolids concentrations can be achieved prior to and during biosolids withdrawal and application.

e) The system can be operated to not produce offensive odors.

17. Department's Justifications

Less mixing horsepower than is required by our design standards has been used successfully for sludge holding tanks with long detention times. The variance approval letter will be conditioned to assure nuisance conditions will not be allowed to occur.

18. Precedents Used

19. Staff Reviewer:	Terry Kirschenman	Date:	July 16, 1999
20. Supervisor:		Date:	7/19/99
21. Authorized by:	Jack Riessen	Date:	7/19/99

Variance File

STATE OF IOWA

DEPARTMENT OF NATURAL RESOURCES

THOMAS J. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT. GOVERNOR

PAUL W. JOHNSON, DIRECTOR

July 16, 1999

The Honorable Bernard Kult
Mayor of Cherokee
416 W. Main St.
Cherokee, Iowa 51012

SUBJECT: Aerobic Digestion and Sludge Holding
Cherokee, Iowa
CS192127 01 and 02

Dear Mayor Kult:

This letter is in response to the correspondence dated July 1, 1999, from Fox Engineering. Their letter requests a variance, if necessary, from Sections 17.3.2.1 and 17.3.4.1. A design variance from 17.3.4.3 also is requested. Sections 17.3.2.1 and 17.3.4.1 recommend multiple tanks for both aerobic digestion and sludge holding. A single sludge digestion tank may be used in the case of small treatment plants or where adequate provision is made for sludge handling and where a single unit will not adversely affect normal plant operations. A single sludge holding tank may be used when adequate provisions are made for sludge handling and when a single tank will not adversely affect normal plant operation. Section 17.3.4.3 requires at least 1 HP per 1000 cubic feet for mixing by satisfactory aeration equipment for the design of sludge holding tanks.

Aerobic Digestion - Although the design population for Cherokee is larger than most communities in Iowa, a variance from the design standards will not be required if the aerobic digestion tank is designed to maintain continuity of service. The Phase 1 construction permit will prohibit the City of Cherokee from using the flow equalization basin as a means for sludge disposal after construction is completed. In addition to the removable aeration lances, the floor of the concrete tank must be sloped towards the withdrawal pipe.

Sludge Holding Tank - Multiple holding tanks will not be required at this time with satisfactory operations and mixer reliability. The provision of 0.7 HP per 1000 cubic feet for 180 days of sludge storage is approved as substantially equivalent to the design standard requirement of 1.0 HP per 1000 cubic feet for mixing by satisfactory aeration equipment based on the success of

other facilities with mixing and long term storage. However, if inadequate sludge stabilization for vector attraction control or odors occur at the plant in violation of Subrule 567 IAC 104.9(1), mixing by satisfactory aeration meeting the design requirements of Design Standard 17.3.4.3 may be required by the Department or the sludge holding tank shall be covered.

Should you have any questions, please contact Terry L. Kirschenman at 515-281-8885.

Sincerely,

Jack Riessen, P.E., Chief
Water Quality Bureau

Enclosure: July 1, 1999 Correspondence from Fox Engineering

Fox Engineering, Ames
Kuehl and Payer, Storm Lake
Field Office 3

July 1, 1999

FOX ENGINEERING

Terry Kirschenman, P.E.
Iowa Department of Natural Resources
Wastewater Section
Wallace State Office Building
Des Moines, IA 50319

Re: Cherokee WWTF
FOX PN 2459-98a.420

Dear Terry:

The following information is submitted to secure a variance from IDNR Design Standards for sections of the proposed Cherokee, Iowa Wastewater Treatment Plant improvement project. The requested variances are for two issues relative to the aerobic digestion and sludge storage proposed at the plant. Section 17.3.2.1 recommends multiple tanks for aerobic digestion and Section 17.3.4.1 recommends multiple tanks for biosolids storage. I am not sure a variance is required for this issue, but would like to identify our justification for use of one tank for each function at Cherokee other than the obvious one of cost.

The aerobic digester has been sized for 60 days of detention at maximum month biosolids production in the design year of 2020. Design guidelines suggest a detention time of 20 days is adequate for complete digestion at 59° F. The additional time will allow for periods of lower temperature and short- term equipment problems. It is unlikely that maximum month biosolids production and minimum temperatures will occur the same month. Please refer to my letter of May 14, 1999 (item 29) for additional discussion on this item. Duplicate blowers are provided that can each deliver the design air requirement of 30 scfm per 1,000 cubic feet. The aeration and mixing system is made up of multiple aeration lances that can each be removed individually for maintenance and repair without reducing process efficiently. The only item that is vulnerable is the poured concrete tank and it should not require any period where it is totally out of service.

The biosolids storage tank is designed to store 180 days of digested biosolids production in the design year. The tank is proposed as a poured in place concrete tank. The only mechanical equipment in the tank will be a removable mixer. Therefore, no events can be anticipated that would require the single basin to be out of service for more than a few days. We would request a variance, if required, to allow single basins for the aerobic digester and the biosolids storage tank.

The proposed mixing of the biosolids storage basin does not meet the requirements of Section 17.3.4.3 of one (1) HP per 1,000 cubic feet. The proposed 40 HP mixer provides 0.7 HP per 1,000 cubic feet when the basin is full. The proposed mixer has been designed on a rational basis to maintain a mixing velocity in the basin so uniform biosolids concentration can be achieved prior to and during biosolids withdrawl and application. A

FOX Engineering Associates, Inc.
1531 Airport Road, Ames, Iowa 50010
800/433-3469 • 515/233-2000 • Fax 515/233-0103

number of communities in Iowa have received similar variances for this rule and are operating very well. The biosolids stored in the tank are being aerobically digested with high SRT's, that should yield very stable biosolids and will not require additional mechanical treatment. The digested solids in the storage tank are expected to be in the 3% to 4% solids range and will only require mixing prior to loading and discharge. It is our opinion that the proposed aerobic digestion system and biosolids storage tank can be operated so it does not produce offensive odors that would be a problem for any of the neighbors. We would request a variance for the mixing requirement of biosolids storage to allow a smaller mixer based upon mixing velocity criteria.

Thank you for your consideration of these requests.

Sincerely,
FOX Engineering Associates, Inc.

David M. Fox, P.E., DEE
Project Manager

cc: City of Cherokee
Neal Kuehl, P.E.