✓ 9-8-06 17.3.4.3

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date:	December 26, 2002	13. **Decision:** Approved	
2. Review Engineer:	Larry Bryant	Date: 1/2/03	
3. Date Received:	December 18, 2002		
4. Facility Name:	City of Charles City	14. **Appeal:**	
5. County Number:	34 (Floyd)	Date:	
6. Program Area:	CP (Wastewater Construction)		
7. Facility Type :	C09 (Sludge Handling)		
8. Subject Area :	366 (Sludge Holding Tank – Aeration & Mixing)		
9. Rule Reference:	567-64.2(9)a		
10. Design Stds Ref:	17.3.4.3 (Mixing and Air Requirements)		
11. Consulting Engr:	FOX Engineering Associates, Inc.		
12. Variance Rule:	567-64.2(9)c		

15. Description of Variance Request:

Design Standard 17.3.4.3 (Mixing and Air Requirements) requires that sludge holding tanks be designed for mixing by diffused air or mechanical aeration systems. For mechanical aeration systems, a minimum of 1.0 horsepower per 1,000 ft^3 of tank volume is required. In addition, the use of mechanical equipment is discouraged when freezing temperatures are normally expected.

The City of Charles City is proposing to use a mechanical mixer with 0.48 hp per 1,000 ft^3 for a new 800,000 gallon uncovered sludge storage tank.

16. Consulting Engineer's Justifications

- The proposed mixer has been designed on a rational basis to maintain a mixing velocity in the basin so a uniform solids concentration can be maintained prior to and during withdrawal and application.
- A number of communities in Iowa have received similar variances from this rule and are operating very well.
- The biosolids stored in the tank should be very stable and will not require additional treatment

17. Department's Justifications

Recommend variance approval (with conditions):

The purpose of 17.3.4.3 is to assure adequate mixing and oxygen transfer so that a uniform solids concentration and aerobic conditions are maintained in the storage tank, thereby allowing withdrawal of a uniform sludge and minimizing nuisance odor problems due to potential anaerobic conditions.

The engineer's argument is supported by available literature. A relatively stable sludge is predicted (40% volatile solids reduction) for influent to the storage tank if one of the digesters is off-line at the future design condition. Minimum required dissolved oxygen levels for stabilized sludge in storage basins are significantly less than that required for aerobic digesters. In addition, precedents for similar approved variances do indicate that a rational approach for storage mixing requirements has been successful on previous projects. However, the proposed storage tank will be uncovered and surrounding residences and recreational areas are present within less than 1,000 feet of the structure (although minimum separation distances required by 567 IAC 64.2(3) will be met via the 90% rule). Therefore, approval is recommended with the following condition:

- The City shall obtain a construction permit and install aeration equipment meeting the requirements of IA 17.3.4.3 and/or a tank cover within 18 months of written notification if the Department determines that the proposed storage tank is causing any odor or other operational problems due to the design variance.

18. Precedents Used
- City of Belmond. Approved 9/95. Mixing only. Covered tank.
- City of Cherokee. Approved 7/99. 0.7 HP/1,000 ft^3. Uncovered tank.
- City of Mount Pleasant. Approved 8/99. 0.27 HP/1,000 ft^3. Uncovered tank.
- City of Marshalltown. Approved 10/89. 0.33 hp/1,000 ft^3
- City of Grinnell. Approved 9/94. 0.33 hp/1,000 ft^3.
- City of Iowa Falls. Approved 10/95. 0.66 hp/1,000 ft^3. Uncovered tank.

19. Staff Reviewer: Date: 12/26/02

20. Supervisor: Date: 12/30/02

21. Authorized by: J Riessen Date: 1/2/03