17.3.4.3

V 9-13-06

# VARIANCE REQUEST

**Iowa Department of Natural Resources**

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|---|---|---|---|---|
| 1. | Date: | September 2, 1994 | 13. | **Decision:** |
| 2. | Review Engineer: | Bill Graham | | Date: |
| 3. | Date Received: | August 30, 1994 | | |
| 4. | Facility Name: | Grinnell Wastewater Works | 14. | **Appeal:** |
| 5. | County Number: | 79 | | Date: |
| 6. | Program Area: | CP (wastewater construction) | | |
| 7. | Facility Type: | C09 | | |
| 8. | Subject Area: | 366 ( Sludge holding tank, aeration and mixing) | | |
| 9. | Rule Reference: | 900-64.2(9)a | | |
| 10. | Design Stds Ref: | 17.3.4.3; Mixing and Air Requirements | | |
| 11. | Consulting Engr: | Fox Engineering | | |
| 12. | Variance Rule: | 900-64.2(9)c | | |

15. Description of Variance Request:

Design Standard 17.3.4.3 requires that mechanical aerators/mixers in sludge storage tanks provide 1.0 horsepower per 1000 cubic feet of tank volume. The city is proposing an aerator/ mixer which provides about 1/3 of this horse power.

16. Consulting Engineer's Justifications

The consultant agrees that mixing capability is needed in the sludge storage tank to achieve solids concentration uniformity when sludge is removed from the tank for land application. The consultant believes that the high mixing energy level is for digestion reliability and odor reduction and that the proposed mixer will provide functional equivalence to the requirements of the design standard for the following reasons:

1. The digester detention time exceeds 40 days at design sludge production and 60 days at current sludge production rates. Required detention time with the new mixer and heating system is less than 20 days so there is significant reliability in the digester even after extended equipment downtime. There would be no foreseeable situation in which raw sludge would be put into the storage tank.

2. To avoid increasing the plant ammonia load, supernatant from the digested sludge is not returned to the headworks and so the solids concentration in the sludge storage tank does not increase and therefore solids concentration is always less than 2%. This low solids concentration does not require as much mixing energy as sludge from a conventional sludge storage tank.

3. The Grinnell Treatment Plant is located in a rural area and is 1/2 mile from the nearest residence and much farther from the city. The existing plant has not had complaints about odors even though the existing digester cover cannot contain gas or odors.

17. Department's Justifications

Departmental approval for the variance request is recommended because the mixing equipment as specified provides a motor large enough to provide a zone of complete mix in a tank the size of the sludge storage tank while maintaining suspension of solids at all points in the tank at a solids concentration of 25,000 mg/l (2.5% solids concentration). The highest solids concentration that would go into the tank would be less than 20,000 mg/l. The plant is located far enough away from neighbors so that if odors were to develop it would be unlikely that there would be a problem.

18. Precedents Used

A variance was approved for the same model mixer installed in the Marshalltown sludge storage tank of approximately the same power per volume as the mixer proposed for the Grinnell sludge storage tank. It has been operating for 4 years without apparent odor or solids stratification problems.

19. Staff Reviewer: Date:

20. Supervisor: Date:

21. Authorized by: Date: