

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date: October 16, 2009
2. Review Engineer: Terry Kirschenman
3. Date Received: October 9, 2009
4. Facility Name: Remsen
5. Facility Number: 6-75-68-0-01
6. County Number: 75
7. Program Area: CP
8. Facility Type : C04
9. Subject Area : 329
10. Rule Reference: 567-64.2(9)a
11. Design Stds Ref: 18B.3
12. Consulting Engr: DGR
13. Variance Rule: 567-64.2(9)c

14. **Decision: Request Denied**
Date: 10/22/09

15. **Appeal:**
Date:

16. Description of Variance Request:

From 18B.3: "When primary settling tanks are not used, effective removal or exclusion of ...debris...shall be accomplished prior to the activated sludge process."

The City of Remsen is seeking to install a comminutor in lieu of a screen. Primary settling is not proposed to exclude debris prior to the complete mix reactors.

17. Applicant's/Consulting Engineer's Justifications

Lemna recommends a screen sizing no greater than 0.5 inches. The openings in the proposed comminutor are less than that.

Screenings would not be handled allowing organics to remain in the stream flow.

If a screen is not provided, a building to house a screen is not required whereas a comminutor (Franklin Miller Dimminutor) could be located outside. The city would save about \$95,000 in construction costs.

Section 18B.3 does not prohibit the use of comminutors explicitly.

18. Department's Justifications for Denial

Effective removal or exclusion of debris is the underlying requirement of Section 18B.3. Mixer failure caused by stringy substance accumulation has been documented at a similar plant in Wisconsin where adequate screening or primary settling was not provided. Poplar, Wisconsin also experienced the

accumulation of debris in its submerged media reactor despite the partial mix and settling cells that preceded it. Six feet of sludge in the final settling cell at Poplar has been reported. The Lemna process does not include settling weirs to prevent short circuiting and the accidental release of debris from the plant. In this aspect, Remsen and Villisca fall under the criteria in Section 14.4.3. Section 72.43 of Ten States Standards limits the weir overflow rate to 30,000 gpd/ft. No weirs were provided at Villisca.

Ten States Standards, Section 62.2, provides the following recommended standard: "Comminutors may be used in lieu of screening devices to protect equipment where stringy substance accumulation or downstream equipment will not be a substantial problem." Further Section 92.2 of Ten States Standards limits the clear spacing to no more than ¼ inch for activated sludge processes where primary clarifiers are not provided.

A screen with a clear spacing of ¼ inch was included at Villisca. Villisca's plant is the most similar to Remsen. After one year, it seems to be working satisfactorily. The prototype for Remsen is Villisca.

Remsen is proposing complete mix reactors for compliance with end of pipe limits at design loadings. It's limits are more stringent than Villisca. The Lemna process is most similar to a conventional activated sludge mechanically, but it's different. No means to easily waste sludge is provided. Section 73.2 of Ten States Standards requires sludge removal. Any debris that passes through Remsen's mechanical screen or comminutor will accumulate in the plant. As a result, if timely sludge wasting and adequate settling is not provided, a substantial amount of debris could be released to the environment.

Lemna's recommendation to provide a screen with a clear spacing no greater than 0.5 inches does not necessarily mean that a screen with a clear spacing of 0.5 inches if provided is adequate to protect the process and effluent quality.

After 5 years of operation, Lemna estimates that there may more than 5 feet of sludge in the settling cell at Remsen. This amount of sludge may inhibit effective settling prior to the submerged media reactor.

In reality, Remsen is not following Lemna's recommendation to provide a screen either. DGR's proposal for Remsen is a comminutor in lieu of screenings removal.

Treatment plants with facilities to remove screenings from the wastewater flow is the trend in the last 20 years.

If initial cost is the only consideration, screening devices may be located outdoors provided they are adequately protected from freezing, IA 15.2.1.2.

The added initial cost to house a screen and provide screenings removal while meeting the ¼ inch clear spacing requirement in Ten States Standards would add \$95,000 to the project cost. Remsen is a community of 1,762. This is not a significant added cost for them.

A spare mixer is recommended even if the minimum clear spacing requirement of $\frac{1}{4}$ inch is met. As there is no continuous means of sludge wasting for this process, debris remaining in the wastewater is expected to accumulate in the complete mix reactors. With more experience, we may determine that a clear spacing less than $\frac{1}{4}$ inch is needed for a Lemna complete mix plant.

The examples cited, Emmetsburg and Sioux Center, employ comminutors in situations meeting IDNR's design requirements, IA 18B.3. Primary settling is provided at Sioux Center. A stationary screen is provided at Emmetsburg. We must assume that both of these mechanical plants waste sludge routinely.

19. Precedents Used

None.

20. Staff Reviewer:

21. Supervisor:

22. Authorized by:

Date:

Date:

Date:

10/16/09

10/22/09

10/20/2009