

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date:	April 13, 1993	13. Decision:	<i>Approved</i>
2. Review Engineer:	Bill Graham	Date:	<i>4/15/93</i>
3. Date Received:	April 7, 1993		
4. Facility Name:	Tama WWTP	14. Appeal:	
5. County Number:	86	Date:	
6. Program Area:	CP (wastewater)		
7. Facility Type:	C 05		
8. Subject Area:	374 (RAS pumping capacity)		
9. Rule Reference:	900-64.2(9)a		
10. Design Stds Ref:	18B.5.1 and 18B.5.2		
11. Consulting Engr:	RUST Environmental & Infrastructure Inc.		
12. Variance Rule:	900-64.2(9)c		

15. Description of Variance Request:

The city is requesting a variance for the Return Activated Sludge pumping capacity for extended aeration processes from the required 150 % of AWW flow to 100% of AWW flow (18B.5.1 - Return Sludge Rate). The city is also requesting a variance from the related design standard, 18B.5.2 Return Sludge Pumps, requiring that return sludge rates be attained with the largest pump out of service. The city proposes having an uninstalled backup pump which would be available to quickly replace one of the installed pumps in the event of failure.

16. Consulting Engineer's Justifications

The city installed two new submersible RAS pumps at the same time that a new final clarifier was built. These pumps were sized for a lower design flow than that proposed for the reconstructed WWTP. Together these two pumps provide a return sludge rate ranging from 25% to 100% of the increased 2.0 MGD AWW design flow. According to the city's consultant, the required 150% of AWW capacity is needed to accommodate peaking flows and loads beyond the AWW. However, plant improvements include a large new raw wastewater equalization lagoon (20 million gallon capacity) which will prevent the flow to the plant from exceeding the AWW flow of 2.0 MGD, even during wet weather. Therefore, there is not a need for an RAS pumping capacity of 150% to handle peaking flows greater than the AWW flow.

To provide reliability for RAS pumping the city proposes obtaining a third submersible pump identical to the two already installed. The city's consultant estimates that it will take 30 to 60 minutes to replace an installed RAS pump with the standby.

TAMA SRF 01
wsq



TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

April 13, 1993

Mr. Ernest Buresh
Chairman, Water and Wastewater Committee
305 Siegel Street, City Hall
Tama, Iowa 52339

SUBJECT: Design Variance; RAS Pumping Capacity
Tama WWTP Improvements
CS192059 01

Dear Mr. Buresh:

The Iowa Department of Natural Resources has reviewed your request for a variance from Design Standards 18B.5.1 and 18B.5.2. Your proposals for an extended aeration process Return Sludge Rate of 100% of AWW flow and an uninstalled standby RAS pump are approved.

These approvals are based on the equalization of peak flows to the plant by a 20 million gallon capacity surge lagoon, maximum MLSS concentration of 3500 mg/l, and the possession on site of an uninstalled replacement RAS pump.

Should you have any questions please call me at (515) 281-8869.

Sincerely,

Darrell McAllister, Chief
Water Quality Bureau

cc:: RUST Environmental & Infrastructure, Waterloo, Iowa
Field Office 5

17. Department's Justifications

Departmental approval for this variance is recommended because equivalent treatment effectiveness is provided by the city's proposal based on the following:

1. The AWW flow of 2.0 MGD, which is also the plant design flow, is the maximum flow rate that will be seen at the plant because of the 20 million gallon equalization basin. There will not be any peaking flow beyond the AWW flow and therefore a return sludge rate of 100% would provide approximately equivalent RAS capacity to the design standard of 150% AWW flow RAS pumping capacity. Without peaking, MLSS "washout" is avoided.

2. Conventional activated sludge MLSS concentrations range from 1500 to 3000 mg/l and typical extended aeration MLSS concentrations range from 3000 to 6000 mg/l (1991 WEF Manual of Practice No. 8 - Iowa Design Standard typical ranges are 1000-3000 mg/l for conventional A.S. and 3000-5000 mg/l for extended aeration). Under Design Standard 14.5.2.4A (Unit Process Reliability Exceptions), a single existing clarifier is allowed in a system that is being upgraded if it is large enough to provide 100% of the total design load capacity. The existing clarifier provides a maximum hydraulic loading at peak flow (2.0 MGD) of 1000 gpd/sf as required by design standard 16.3.2.4.2 (Final Settling Tanks - Activated Sludge) and so falls under the Process Reliability Exception standard. However, Design Standard 16.3.2.4.2 also requires that solids loading to the clarifier not exceed 30 pounds solids per day per square foot at AWW flow.

In two letters from the city's consultant dated September 28, 1992 and October 16, 1992, the solids loading to the final clarifier was discussed and it was stated, based on the solids loading limit of 30 pounds per day per square foot, that the maximum MLSS that the oxidation ditches will operate under in normal conditions will be 3500 mg/l. This maximum operating MLSS concentration significantly decreases the typical solids concentration range for this particular extended aeration process, bringing it closer to that of a conventional activated sludge process, where RAS pumping capacity of 100% AWW flow is the design standard requirement. The two letters from the city's consultant are attached.

3. The existing RAS pumping facilities were constructed in 1988 and are in very good condition. To comply with the design standards the existing pumps would need to be removed and larger pumps installed. Major structural changes to the RAS pumping facility would also be required.

4. Since flows can be diverted to the equalization lagoon, the ability to change a failed RAS pump in one to two hours provides equivalent reliability. This capability is discussed in a letter from the city's consultant dated April 5, 1993.

18. Precedents Used

No precedents for variance from the Design Standard requirements for extended aeration RAS pumping capacity were found.

19. Staff Reviewer: *William Graham* Date: April 13, 1993
20. Supervisor: *[Signature]* Date: *4/13/93*
21. Authorized by: *Daniel M. Alote* Date: *4/15/93*