16.4.1

✓ 9-8-06

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date:	June 16, 2003	13. **Decision:**	Denied
2. Review Engineer:	Larry Bryant	Date:	6/23/03
3. Date Received:	May 16, 2003		
4. Facility Name:	City of Eagle Grove WWTP	14. **Appeal:**	
5. County Number:	99 (Wright)	Date:	
6. Program Area:	CP (Wastewater Construction)		
7. Facility Type :	C05 (Biological Treatment)		
8. Subject Area :	402 (Scum Removal)		
9. Rule Reference:	567-64.2(9)a		
10. Design Stds Ref:	16.4.1 (Scum Removal)		
11. Consulting Engr:	Kuehl & Payer, Ltd.		
12. Variance Rule:	567-64.2(9)c		

15. Description of Variance Request:

The City of Eagle grove is in the process of upgrading their existing wastewater treatment plant. One of the improvements includes the addition of a new 3rd final clarifier. The two existing final clarifiers do not have scum skimmers. The City is requesting a variance from the above referenced design standard to omit scum removal equipment from the new final clarifier.

16. Consulting Engineer's Justifications

A. The existing final clarifiers do not have scum skimmers. In order to add skimmers to the existing units, the entire sludge removal mechanisms would have to be replaced. These units are operating well now and replacement of the mechanisms would be cost prohibitive.

B. The existing final clarifiers have operated with only a few minor TSS violations (based on effluent TSS for 2001 - 2002). The reduction in clarifier loadings due to addition of the new clarifier will further improve TSS removal performance.

17. Department's Justifications

Recommend variance denial:

Denial of the variance is recommended for the following reasons:

A. From January 1987 to present the plant has had a 30-day average and/or 7-day average TSS violation during 23 months, representing an effluent TSS non-compliance level of nearly 12%.

B. From the data available, it is impossible to discern what TSS violations or what percentage of historical effluent TSS may have been attributable to the lack of scum removal in the existing final clarifiers.

C. If scum removal equipment in the primary clarifiers should fail or not operate properly, scum removal in the final clarifiers provides a means of reliability.

D. Future retrofit of skimming equipment in the existing final clarifiers will be easier if skimming equipment in the new final clarifier is included as part of this project. It is unknown if previous TSS violations are due to scum in the effluent. However, if TSS violations persist following addition of the new final clarifier it may be necessary to retrofit the existing final clarifiers.

E. The cost for the skimming equipment has been estimated at $4,000. The total project costs are approximately 1.7 million dollars.

18. Precedents Used

No precedents were found.

19. Staff Reviewer:	Amy Bryant	Date: 6/16/03
20. Supervisor:		Date: 6/17/03
21. Authorized by:	J Riesson (denied)	Date: 6/23/03

Fields of Opportunities

STATE OF IOWA

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

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

June 16, 2003

City of Eagle Grove
210 E. Broadway Street
P.O. Box 165
Eagle Grove, IA 50533-0165

Attn: Ryan Heiar, City Administrator

RE: Variance Requests - Wastewater Treatment Plant Improvements

Dear Mr. Heiar:

The Iowa Department of Natural Resources, in accordance with subrule 567 IAC 64.2(9), has denied the variances requested by the City and your consulting engineer in letters dated May 14, 2003. Variances from four sections of the Iowa Wastewater Facilities Design Standards were requested, three of which pertain to flow splitting and one that concerns scum removal.

Flow Splitting

Design Standards 14.4.9.2 and 14.4.9.3 require a central collection and distribution point with flow division control that is measurable and adjustable prior to duplicate unit processes. Design Standard 18A.7.4.5 requires even division of flow among all trains and provisions for measurement of flow to each train for Rotating Biological Contactors (RBCs).

The proposed means of flow splitting to the RBCs at the Eagle Grove treatment plant does not meet these requirements. The arrangement includes effluent weirs at the end of each RBC train for level control and submerged inlet piping connected to a common manifold. The actual flow split would depend on variable head losses that will fluctuate with the total flow rate. The flow split could also be affected by variable head loss that would occur through each RBC train due to differences in biomass accumulation on the RBCs themselves.

In evaluating these variance requests, the Department considered the justifications presented in the aforementioned letters, hydraulic calculations for predicted flow splits and previous correspondence regarding the issue. The following is a summary of our responses to items noted by the City and Kuehl & Payer:

(1) *The existing arrangement has been in use for over 20 years with no reported problems due to uneven flow splitting.*

We do not dispute this. However, any difference in effluent quality due to proportional flow splitting or lack thereof is impossible to quantify without individual monitoring of effluent characteristics from each RBC train. Also, the addition of a third unit at future design flows will increase maldistribution between the RBC trains.

(2) *Measurements taken at the existing maximum flow through each RBC train found identical water levels, thus indicating an even flow split with the current piping arrangement.*

It appears questionable whether or not the accuracy of the measurements obtained is sufficient to confirm or dispute calculated flow splits. The expected water level difference for the existing units at a total plant flow of 1.77 MGD is only 0.4", assuming that the effluent weirs are set at the same elevation. The observed levels show a negative head loss of ¼" between Stage 1 and Stage 2, which is not possible and indicates and error of at least ± ¼".

(3) *The above observation indicates that loss through the RBC units themselves dampens the effect of differential head loss between the RBC trains attributable to the manifold piping arrangement.*

We agree that head loss through the RBC units could cause a more proportional flow split by effectively throttling the flow. However, the head loss through the units would have to be much higher than the measured 7/8" loss to have a significant effect.

(4) *At high flows (when the difference in flow between the units will be the largest) the influent characteristics are so low that a small difference in flows to each unit should not make a difference.*

NPDES permit limitations for mass and minimum percent removals will still require significant treatment regardless of how dilute the influent concentrations are. Also, the proposed arrangement is expected to cause significant maldistribution even at average dry weather flows.

(5) As an alternative to a flow splitting structure, an increase in the size of the proposed inlet piping/valve to the third unit was previously suggested. While this modification would create a nearly even flow split between the second and third RBC trains, the first train would still receive approximately 10% more flow than the other units throughout the design flow range.

In view of these considerations, we will require positive flow splitting prior to the RBC units. The City's engineer should verify that sufficient hydraulic head is available for installation of a splitter box.

Scum Removal

Design Standard 16.4.1 requires that scum collection and removal facilities be provided for all primary and final settling tanks. The existing final clarifiers at this facility do not have scum collection and removal equipment. The proposed arrangement would not include scum removal equipment for the new final clarifier.

The primary justification presented for this variance request is that effluent TSS violations for the existing plant have been infrequent and will decrease with the additional clarifier area provided. From the data available, we found it impossible to discern what TSS violations or what percentage of historical effluent TSS may have been attributable to the lack of scum removal in the existing final clarifiers, if any. However, effluent data from January 1987 to the present was reviewed. During this time period the facility has experienced 23 months where 30-day average and/or 7-day average TSS violations occurred. Of the 23 months when violations occurred, over half corresponded to clarifier hydraulic loading rates below typical average design rates for settling following the RBC process. This indicates that a major portion of the facility's past TSS violations have been caused by factors other than excessive hydraulic loading on the final clarifiers.

We will require that scum collection and removal equipment be included for the new final clarifier. If TSS violations continue to occur following the improvements, it may be necessary to retrofit skimming equipment in the existing final clarifiers. We recommend that skimming equipment be retrofit in the existing final clarifiers regardless of effluent TSS performance. This provides a means of reliability if scum removal equipment in either of the primary clarifiers should fail to operate properly or need to be removed for maintenance/repair.

If there are any questions, please contact Larry Bryant at 515/281-8847.

Sincerely,

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

c: Neal Kuehl, P.E./Kuehl & Payer, Ltd.
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