✓ 9-8-06 16.4.2.3

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date:	April 16, 2003	13. **Decision:**	
2. Review Engineer:	Larry Bryant	Date:	
3. Date Received:	March 3, 2003		
4. Facility Name:	City of Adair	14. **Appeal:**	
5. County Number:	01 (Adair)	Date:	
6. Program Area:	CP (Wastewater Construction)		
7. Facility Type :	C09 (Sludge Handling)		
8. Subject Area :	390 (Sludge Removal Piping)		
9. Rule Reference:	567-64.2(9)a		
10. Design Stds Ref:	16.4.2.3 (Sludge Removal Piping)		
11. Consulting Engr:	FOX Engineering Associates, Inc.		
12. Variance Rule:	567-64.2(9)c		

15. Description of Variance Request:

Design Standard 16.4.2.3 requires that sludge withdrawal piping from a primary or final clarifier be at least 6 inches in diameter. The City of Adair is proposing to use 4 inch piping for the sludge withdrawal lines for two new final clarifiers.

16. Consulting Engineer's Justifications

"The existing sludge withdrawal piping on the existing final clarifier was a 4-inch line also. The new final clarifiers will utilize gravity flow of sludge out of the clarifier to a sludge pumping station. Unrestricted flow through this pipe would yield a flow of approximately 5 gal/sec with a pipe velocity of 7.5 ft/sec. This velocity will yield a sufficient flowrate for solids suspension. This flowrate will allow for sludge withdrawal to be approximately every 4 hours for a short duration if the valve is allowed to open fully. Open stops could be set to allow the valve to be partially opened at max and allow for slower durations of sludge withdrawal. This mode of operation using a 4-inch pipe will keep pipe velocities higher than using a larger 6-inch pipe."

17. Department's Justifications

Recommend variance approval:

The existing 4-inch gravity withdrawal line on the existing final clarifier has worked without any reported problems. This is a trickling filter plant with primary clarification - large solids should not be present in the final clarifier sludge. The clarifiers are small (20-foot diameter) and the gravity head available for sludge withdrawal is large (in excess of 12 feet). The smaller pipe size will allow a greater pipe velocity for the lower withdrawal rates associated with this size of plant and allow more sensitivity in selecting a desired withdrawal rate. A 6-inch gravity line has greater potential to pull a hole through the sludge blanket in this size of clarifier.

18. Precedents Used

Rockwell City – Approved 2/15/99 (4-inch withdrawal line for a new primary clarifier with pumped sludge withdrawal)

19. Staff Reviewer: Larry Bryant Date: 4/16/03

20. Supervisor: Tom Fowell Date: 4/16/03

21. Authorized by: J R Riessen Date: 4/17/03

Howard R. Green Company

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DEPT. OF
NATURAL RESOURCES

March 3, 2003

Larry Bryant, P.E.
Iowa Department of Natural Resources
Wallace State Office Building
502 East Ninth Street
Des Moines, IA 50319

Re: Adair Wastewater Treatment Plant Improvements – Final Clarifier Sludge Pipe Variance

Dear Larry:

This letter is to request a variance for using 4-inch sludge removal piping. Four inch piping has been proposed for the sludge withdrawal lines on the new 20-foot diameter final clarifiers. The existing sludge withdrawal piping on the existing final clarifier was a 4-inch line also. The new final clarifiers will utilize gravity flow of sludge out of the clarifier to a sludge pumping station. Unrestricted flow through this pipe would yield a flow of approximately 5 gal/sec with a pipe velocity of 7.5 ft/sec. This velocity will yield a sufficient flowrate for solids suspension. This flowrate will allow for sludge withdrawal to be approximately every 4 hours for a short duration if the valve is allowed to open fully. Open stops could be set to allow the valve to be partially opened at max and allow for longer slower durations of sludge withdrawal. This mode of operation using a 4-inch pipe will keep pipe velocities higher than using a larger 6-inch pipe.

A 6" pipe was chosen for sludge withdrawal out of the new primary clarifier because of the unknown size and type of solids removed from the primary clarifier.

Please allow the use of the smaller pipe for the final clarifier sludge lines. If you have any questions or would like to discuss please don't hesitate to contact Mike Halde or myself at (515) 278-2913.

Sincerely,
Howard R. Green Company

James R Rasmussen

James R. Rasmussen, P.E.
Project Manager

cc: File

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