



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

Variance File
13.9
STATE OF IOWA

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

September 11, 2006

Honorable Mayor Mr. Ron Kroll
City of Shelby
P. O. Box 186
Shelby, IA 51570

Subj: Department Response to Variance Request
RE: 2006 Sanitary Sewer Extension to Industrial Development, City of Shelby, Iowa

Dear Mr. Kroll:

The Department has received a request for variance from the Iowa Wastewater Facilities Design Standards from your Engineer in a letter dated August 18, 2006. This letter transmits the Department's comments regarding the variance request for the above referenced project.

- A. Design Standard 13.9 – request variance from the requirement that “under no conditions shall the combined total of dynamic suction lift and required NPSH at design operating conditions exceed 22 feet” for the proposed suction lift pump station design.

The above variance is **denied** due to the fact that the justification presented does not substantially demonstrate that the project resulting from the proposed variance provides equivalent or improved effectiveness. The design conditions in this particular case are so restrictive and would indicate that an alternate pump system design is probably warranted.

If you have any questions, please call Satya Chennupati, P.E. at 515-281-8995.

Sincerely,

Wayne Farrand, P.E.
Wastewater Construction Section Supervisor

Cc: Snyder & Associates, Atlantic - Rick Rohan, P.E.
IDNR Field Office #4
IDNR Sewage File 6-83-69-0-01

V 9-14-06

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date: September 11, 2006
 2. Review Engineer: Satya Chennupati
 3. Date Received: August 18, 2006
 4. County Number: 78 (Pottawattamie)
 5. Facility Name: Shelby
 6. Program Area: CP (Wastewater)
 7. Facility Type: CO5
 8. Subject Area: 367, suction pump lift station design
 9. Rule Reference: 507-64.2(9)a
 10. Design Stds Ref: 13.9
 11. Consulting Engr: Snyder & Associates
 12. Variance Rule: 507-64.2(9)c

13. Decision: *denied*
 Date: *9/13/06*
 14. Appeal:
 Date:

15. Description of Variance Request:

The City requested a variance from the design standard which requires that under no conditions shall the combined total of dynamic suction lift at the "lead pump off" elevation and required net positive suction head (NPSH) at design operating conditions exceed 22 feet. The City is proposing a total suction lift and NPSH of 24.7 feet.

16. Consulting Engineer's Justifications

There are two pump manufacturers who have certified that their self-priming pumps can prime at least 25 feet at the specified pump speed and submitted letters. In addition, the available NPSH at the "lead pump off" level is 11.3 feet, much greater than the 4.2 feet of required NPSH indicating that the pump should function under this operating condition.

17. Department's Justifications

Recommend variance **denial**.

In designing suction lift pumps, Hydraulic Handbook indicates one of the conditions that should be avoided is high suction lifts. The proposed pump design has a very high suction lift of 19.2 feet which is beyond the Design Standard - 15 feet maximum. Excessive suction lifts could cause vapor pockets and cavitation in the pumps which could in turn destroy the impeller and other components of the pumps over time. Although the manufacturer has submitted letters that their pumps could work under the conditions, as time passes and pump parts and piping wear, efficiency decreases, the losses in the piping system and pumps would increase and thereby the total head to overcome would increase beyond the 25 feet requested and there is a danger that the pumps would not function properly and be able to pump the design flows as intended. One of the pump manufacturers letter indicated that their pump can reprime at 25 feet of lift only in clear water conditions which is not representative of wastewater design conditions. There is no precedence for this type of variance.

18. Precedents Used

None.

19. Staff Reviewer: *Satya Chennupati* Date: *9/13/06*
 20. Supervisor: *[Signature]* Date: *9/13/06*
 21. Authorized by: *[Signature]* Date: *9/13/06*



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Iowa DNR
Page Two
August 18, 2006

During a telephone conversation last week, you and I discussed Lift Station B and the self-priming pumps. I asked if a variance could be granted by Iowa DNR for the lift Station B. You indicated that Iowa DNR could grant a variance if we could show by calculation that the pumps would be able to operate under the most strenuous operating conditions.

We are requesting a variance to the 22 feet maximum requirement for combined total dynamic suction lift and required NPSH. There are two pump manufacturers who have certified that their self-priming pumps can prime at least 25 feet at the specified pump speed (letters from both manufacturers are attached). In addition, the available NSPH at the "lead pump off" level is 11.3 feet, much greater than the 4.2 feet of required NSPH indicating that the pump should function under this operating condition.

Sincerely:

SNYDER & ASSOCIATES, INC.



Richard A. Rohan, P.E.

Cc: City of Shelby
File

Attachments: Hydraulic calculations w/reference information
Gorman-Rupp letter, May 25, 2006
HOMA letter, August 10, 2006