9/6/06

18C.4.1.1
18C.5.4

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date	: 10/8/92	13. Decision:	Approved
2. Review Engineer	: FRED RONSON	Date:	10-19-92
3. Date Received	: 10/6/92		
4. Facility Name	: GRAETTINGER	14. Appeal:	
5. County Number	: 74	Date:	
6. Program Area	: CP		
7. Facility Type	: CO5		
8. Subject Area	: 300, 301		
9. Rule Reference	: 567-69.2		
10. Design Std. Ref.	: 18C.4.1.1, 18C.5.4		
11. Consulting Engr.	: DEWILD GRANT ROCKORT		
12. Variance Rule	: 567-69.2(a)		

15. Description of Variance Request

IOWA DESIGN STANDARD 18C.4.1.1 REQUIRES CONTROLED DISCHARGE LAGOONS TO BE DESIGNED TO HANDLE THE WETTEST 180 DAYS OF RECORD, THE PROPOSED DESIGN FLOW IS 0.163 MGD WHILE DEPARTMENT RECORDS SHOW FLOWS RANGING FROM 0.051 MGD (JAN, FEB 1990) TO 0.576 MGD (MAY, JUN, JUL 1991). THE HYDRAULIC OVERLOADING IS MAINLY DUE TO INFILTRATION. THE MAIN PUMP STATION CANNOT HANDLE FLOWS GREATER THAN 0.570 MGD. ALL EXCESS FLOWS ARE BYPASSED AT THE LIFT STATION, THE EXISTING 2 CELL LAGOON SYSTEM HAS AN APPROXIMATE EFFECTIVE STORAGE OF 7.62 MG WHICH RESULTS IN A DETENTION TIME OF 149.4 DAYS AT A FLOW OF 0.051 MGD AND 13.2 DAYS AT A FLOW OF 0.576 MGD. THE EXISTING LAGOON SYSTEM IS A CONTINUOUS DISCHARGE SYSTEM. THE PROPOSED 3 CELL CONTROLLED DISCHARGE SYSTEM WILL HAVE AN APPROXIMATE EFFECTIVE STORAGE CAPACITY OF 25.8 MG. THIS RESULTS IN A DETENTION TIME OF 506.6 DAYS AT A FLOW OF 0.051 MGD 158.5 DAYS AT A FLOW OF 0.163 MGD AND 45.3 DAY AT A FLOW OF 0.570 MGD. NO INFORMATION WAS SUBMITTED ON BYPASS FLOWS. THE EFFECTIVE VOLUME WAS CALCULATED ON THE DEPARTMENT'S REQUIRED OPERATING DEPTH OF 6 FEET IN THE PRIMARIES AND 8 FEET IN THE SECONDARY. A VARIANCE WAS ALSO REQUESTED TO ALLOW OPERATION OF PRIMARIES AT 7 FEET AND SECONDARY AT 9 FEET. THIS WOUD RESULT IN AN APPROXIMATE STORAGE CAPACITY OF 31 MG AND DETENTION TIMES OF 608 DAYS AT 0.051 MGD, 190 DAY AT 0.163 MGD AND 54.9 DAYS AT 0.570 MGD.

16. Consulting Engineer's Justification

EQUIVILANT EFFECTIVENESS IS MEETING DISCHARGE LIMITS. DILUTION DUE TO INFILTRATION RESULTS IN A DISCHARGE EQUILIGANT TO STANDARD SECONDARY IN THE EXISTING 2 CELL LAGOON SYSTEM. NO CHANGE IN POPULATION IS EXPECTED OVER THE 20 YEAR DESIGN PERIOD. GRANTING THE TWO VARIANCES WILL ALLOW THE PROPOSED SYSTEM TO BE OPERATED AS A CONTROLLED DISCHARGE LAGOON MEETING STANDARD SECONDARY DISCHARGE LIMITS.

16. Consulting Engineer's Justification (cont.)

17. Department's Justification

THE DMR RECORD SHOWS THE FACILITY OPERATING AS A CONTINUOUS DISCHARGE FACILITY. DISCHARGE REQUIREMENTS FOR A CONTROLLED DISCHARGE LAGOON ARE 25 MG/L CBOD (30 MG/L BOD_5) AND 80 MG/L SS AS AVERAGE 30 DAY CONCENTRATIONS. RECORDS SHOW THE EXISTING LAGOON SYSTEM HAS VIOLATED THESE REQUIREMENTS IN THREE MONTHS OVER THE LAST 6 YEARS OF RECORD. THESE VIOLATIONS OCCURRED 3/91 @ CBOD 27 MG/L 8/91 @ CBOD 39 MG/L AND 5/92 @ CBOD 26.75 MG/L. WITH THE ADDED CAPACITY OF THE PROPOSED 3 CELL LAGOON SYSTEM AND THE EXPECTATION THAT THERE WILL BE NO POPULATION INCREASE, IT APPEARS REASONABLE THAT STANDARD SECONDARY DISCHARGE LIMITS CAN BE REACHED AND THE LAGOON CAN BE OPERATED AS A CONTROLLED DISCHARGE LAGOON. RECOMMEND APPROVAL OF VARIANCES.

The construction permit will be conditioned to require the city to continue to investigate for I/I sources and eliminate where possible to reduce the impacts of excessive flows. An ammonia limit will be inserted into NPDES as if it were a controlled discharge

18. Precedents Used

GARNAVILLO	APPROVED 5/7/86	ORANGE CITY	DENIED
HARTFORD		NEW PROVIDENCE	DENIED
GRAND RIVER	DENIED	FT. ATKINSON	DENIED
VAN WERT	DENIED	ROME	DENIED
SHOMBAUGH	DENIED	HILLSBORO	DENIED
		LOCKRIDGE	DENIED

19. Staff Reviewer : Jack Benson Date: 10/8/92

20. Supervisor : Kevin Conrad Date: 10/9/92

21. Authorized by : Darrell McClurg Date: 10/19/92

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

October 26, 1992

The Honorable Merle Jensen
Mayor of Graettinger
City Hall
Cedar Street
Graettinger, Iowa 51342

SUBJECT: Variance Request
Graettinger, Iowa
CS192056-01

Dear Mayor Jensen:

We have completed our review of the variance requests of September 30, 1992 in regards to Chapter 18C.4.1.1 and 18C.5.4 of the Iowa Wastewater Facilities Design Standards. Our design standard 18C.4.1.1 requires that controlled discharge lagoons be designed for the wettest 180 days of record and design standard 18C.5.4 specifies that the maximum operating depth of a controlled discharge lagoon not exceed 6 feet in the primary cell nor 8 feet in the secondary cells.

Due to the unique circumstances of this project the requested variances are being granted, however, certain conditions and restrictions will be required. The construction permit will be conditioned on the city's continued reduction of its Infiltration/Inflow sources to the collection system and the discharge permit will have an ammonia nitrogen limitation.

If you have any questions or comments I can be reached at 515/281-8974.

Sincerely,

DARRELL McALLISTER, CHIEF
SURFACE & GROUNDWATER PROTECTION BUREAU
DEPARTMENT OF NATURAL RESOURCES

cc: DeWild, Grant, Reckert & Assoc., 315 First Ave., Rock Rapids, IA 51246
Field Office 3

DGR

DeWild Grant Reckert and Associates Company
Consulting Engineers

315 First Avenue
Rock Rapids, Iowa 51246
(712) 472-2531

September 30, 1992

Department of Natural Resources
Wallace State Office Building
Des Moines, IA 50319

Attn: Fred Benson

Re: Wastewater Treatment Facilities
Graettinger, IA
DGR File No. 41143

Dear Fred:

We are hereby requesting a variance from Section 18C.4.1.1 of the Iowa Wastewater Facilities Design Standards for the computation of the design flow for the above referenced project. At issue is the design average wet weather flow of 163,140 gallons per day, as contained in our October 1991 Facilities Plan vs. a flow as high as 576,000 gallons per day as has been periodically reported for this facility. The basis of our variance request is that we can provide at least equivalent effectiveness while significantly reducing costs. This is provided for in the last paragraph on page 1 and the first paragraph on page 2 of Chapter 18C of the Design Standards.

We assume that the test of equivalent effectiveness is whether or not the proposed improvements can meet the effluent limitations for this facility. The improvements as described in our Facilities Plan of October 1991 not only eliminate the lift station bypass as the City was directed to do, but they upgrade the existing 2-cell facility to a 3-cell configuration, with a maximum storage capability of approximately four times the present facilities. We would point out two factors that we feel are evidence as to the equivalent effectiveness of the proposed improvements; that is to say that the proposed improvements will meet the effluent limitations for this facility.

1. We are aware of only one minor effluent violation at this facility in the time period from 1983 to date. This was in March of 1991, when a CBOD of 27 mg/l was reported.

2. At the flow that has been suggested for use as the design average wet weather flow, the influent to the wastewater facilities is already within permit limitations on both CBOD and total suspended solids. I would refer you to the DMRs

for April of 1991 and March of 1992. It makes no sense to construct facilities with six months of storage capacity based upon a flow in which the pollutant concentrations are reduced to a point acceptable for discharge.

The second aspect of substantiating a variance request is a significant reduction in costs. The estimated total project cost for the improvements, as contained in our Facilities Plan, is approximately $400,000. The differential in design flows that have been discussed could be as much as 3½ times. We have not done a preliminary design for a design flow of 576,000 gallons per day, but clearly it is going to significantly increase the costs for this project. From our knowledge of the area, we also anticipate that it would require condemnation. As noted in the Facilities Plan, we hope to confine the proposed improvements to a contiguous piece of ground already owned by the City.

A literal interpretation of design standard 18C.4.1.1 is to design for the most severe climatic situation. In no other municipal facilities is this practice followed. We would also point out, as noted in earlier correspondence, that some precedent has been established for the use of a five year recurrence interval. Please respond at your earliest convenience.

Very truly yours,

DEWILD GRANT RECKERT
& ASSOCIATES COMPANY

Thomas E. Wall, P.E.

TEW:kld

cc: Brad Bottenfield

Iowa
department of water, air and waste management

Duplicate
RECORD COPY

May 8, 1984

SWB

per

The Honorable Albert Allen
Mayor
City of Hartford
Hartford, Iowa 50118

Dear Mayor Allen:

I appreciated the opportunity to meet with you and the other members of the Hartford delegation on Tuesday. I hope that you are satisfied that your concerns were heard and that you understand my need to maintain the critical balance between the protection of the state's water resources and costs of building new wastewater treatment facilities.

Your proposal represents a complex set of issues. While there is obvious concern for costs, by our view, the hilly site selected requires substantially higher costs for earth moving than might typically be encountered. The location is also upwind of the city to the prevailing winds. While this location is not recommended by this Department, it would also not be precluded under our rules. The cells in the proposed lagoon system are also not at the same elevation, a feature which puts further constraints on the operation of a lagoon system and limits the flexibility to isolate and deal with problems in individual cells. Regardless of what might be done to meet design volume requirements, the design will not meet our sizing requirements for individual cells. For these reasons, we do not believe that the proposed design provides as much assurance of compliance with effluent requirements as the alternative aerated lagoon system which we are confident would constitute a long term solution to the city's needs.

While we are convinced that aeration would be the best approach for all concerned, I cannot ignore the economic constraints that you presented to me at our meeting. For this reason, I have carefully reviewed the details of your proposal and our design criteria; to identify areas of compromise that we could possibly accept. While I understand your estimates of probable wastewater flow, our own analysis of recently built collection systems does not justify altering our position on 100 gallons per capita per day. Flows from such plants are commonly as great as 100 gallons per capita per day and often are actually as much as two times that figure.

The option that does appear feasible is to allow the city to design the cells with greater depths consistent with the suggestion of Dr. Dague. Of all the options, this alternative appears to present the least potential problems. Ordinarily, I would not consider this option on a new system, but the unique constraints on your chosen site cause it to be the most workable option. Although these modifications to lagoon depths would not likely result in

compliance with the detention time requirements for individual cells, we accept this as another necessary variance coincident to our agreement to this alternative.

Your request that this Department issue a variance to install riprap is not granted. Erosion of the walls of the lagoons is likely without riprap. We have recently experienced cases of lagoon failure where it was not in place. Under these circumstances, construction without riprap is not warranted. In addition, I am sure you would find that later installation of riprap would be far more costly to the city.

Finally, our department's foremost concern is that new facilities continuously comply with their final effluent limits. We must continue to aggressively enforce these requirements, since failure to meet them has a direct impact on the downstream water uses that we are charged to protect. Consequently, while this Department would accept a final proposal by the city that incorporates deeper cells to extend the detention time, the permit to do so would be conditioned on the city's acceptance of responsibility for further improvements should the facility not meet its effluent limits. In order to foster understanding and agreement between us on the form of any further upgrading, I would ask that the final plans for your proposed facility include the details of what would be constructed in the future, given violations of effluent limits.

While a lagoon constructed in this manner may not entirely satisfy all of our requirements, I do feel that this approach reflects the best compromise.

Sincerely,

Stephen W. Ballou
Executive Director

SWB:ka

cc: The Honorable William Dieleman, State Senator
The Honorable Ed Parker, State Representative
Brent Wynja, Congressman Tom Harkin's Office

The University of Iowa
Iowa City, Iowa 52242

Division of Energy Engineering
Environmental Engineering Program
2203 Engineering Bldg.

(319) 353-4205

APR 1984

RECORD COPY
File Name City of Hartford
Senders Initials p.ch.

1847

April 26, 1984

Congressman Tom Harkin
1401 North Jefferson Street
Suite I
Indianola, IA 50125

Dear Congressman Harkin:

The purpose of this letter is to comment on the design criteria for waste stabilization lagoons, specifically the problem being experienced by the City of Hartford in meeting the State of Iowa criteria for such facilities.

From my discussions with Brent Wynja of your office and Terry Lutz of the McClure Engineering Company, it is my understanding that the main problem is a shortage of land area at the preferred site. This results in the engineers not being able to provide the required 180 day storage time for a wastwater flow rate of 100 gallons per capita per day (gpcd). They are able to provide 180 days of storage for only about 85 gpcd.

In general, I feel that the Iowa design standards for waste stabilization lagoons are quite good. About ten years ago, I presented a paper on lagoons at several conferences around the midwest. In that paper (copy attached) I proposed design standards for lagoons that are virtually identical to those adopted by the Iowa Department of Environmental Quality. The criteria recommended at that time are shown in Figure 11 on page 17 of the paper.

The performance of waste stabilization lagoons is affected significantly by ambient weather conditions, as discussed in detail in the paper. The concept of intermittent discharge, requiring long-term storage, arose from the fact that the performance of lagoons varies so much on a seasonal basis. The 180-day storage criterion enables retention and intermittent discharge of wastewaters, enabling the release of lagoon contents during times when the quality of the liquid meets discharge permit requirements.

It is my opinion that the 180-day storage requirement is more important to overall lagoon performance than are the depth criteria. The Iowa criteria, and my original recommendations, were that the primary and secondary cells be not more than 6 feet and 8 feet in depth, respectively. However, I see no serious problem with making the primary cells six inches deeper (total of 6.5 ft). The fact that the proposed BOD loadings on the primary cells of the Hartford lagoon system are lower than what is allowed by the Iowa criteria (18 lb BOD, per acre per day actual vs 25 allowed) is another reason for my feeling that the added depth will be of little consequence in terms of any adverse effects on performance. I would also see little problem with some deepening of the secondary cells, if this is necessary to achieve the 180 day minimum storage requirement.

Based on the information I have on the Hartford situation and my technical background and experience with waste stabilization lagoons, I believe that the best approach is simply to deepen the primary cells, and the secondary cells if necessary, to achieve the 180 day storage requirement at a wastewater flow rate of 100 gpcd. This should add very little to the cost of the facility. On the other hand, the minor deepening will enable achievement of the storage criterion with minimal, if any, adverse effect on the performance of the lagoon treatment system.

I hope these comments are of some value in your efforts to help the City of Hartford resolve the current problem. If I can be of further assistance, please let me know.

Sincerely yours,

Richard R. Dague, Ph.D., P.E.
Professor, Civil and
Environmental Engineering

Enclosure

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

RECORD COPY
File Name Jewell - Wastewater
Senders Initials GSL

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

August 2, 1988

Schlotfeldt Engineering, Inc.
Box 212
1440 Second Street
Webster City, IA 50595

ATTN: Mr. Curtis Martin, P.E.

RE: 1988 Wastewater System Improvement Project
Jewell, Iowa

Dear Curt:

This is a reply to your letter of July 11, 1988 which you requested the variance to Iowa Wastewater Facilities Design Standards Chapter 18C.5.4.1. The request addresses the design depth of seven feet for the proposed primary facultative cell.

In that letter, you also showed the reason to justify your variance request. You stated that additional depth will accommodate the future addition of mechanical aeration if influent organic loads should warrant such improvement. Aerators installed in shallower cells are not as efficient.

The Iowa Administrative Code, Chapter 567--64.2(9)c allows for a variation from design standards when it will result in at least equivalent effectiveness while significantly reducing cost or improved effectiveness. We have reviewed your request and have decided to deny the variance for the following reasons:

1. There are no indicators that the influent organic loading will increase beyond the design loading. There may not be a need of aeration equipment.

2. Should there be a need for aeration, the aeration equipment could still operate adequately at six feet liquid depth with erosion protection on the pond bottom. Although mechanical aeration is more efficient at greater depth, the reduction in operation cost may not be great.

3. The facility is a controlled discharge lagoon. Therefore, a large storage volume and this suggests that the need for aeration is at minimum even at design loadings.

We would permit construction earthwork to accommodate a seven foot water depth for the future. However, the lagoon should be sized for the required volumes at six-foot level in the primary cell. There shall be no operable drawoff piping at the seven-foot level. However, provisions can be made at flow control structures for future drawoffs.

Should you have any questions please call Gabriel S. Lee at (515)281-8899.

Sincerely,

Darrell McAllister
Bureau Chief
Surface and Groundwater Protection Bureau

DM:gsl

cc: City Clerk, Jewell, Iowa
Field Office 2