

				ENTERED	1	DATE	2	DATE	3	DATE
						TLK				
DATE RECEIVED	FACILITY NAME	COUNTY No.	PROGRAM AREA CODE	FACILITY TYPE CODE	SUBJECT AREA CODE					
8-7-86	Ames, Iowa	85	CP	C05	Sludge Lagoon - Aeration 320					
RULE REFERENCE	DESIGN STANDARD REFERENCE		DECISION		APPEAL ACTION					
9 900-64.2(9)a	10 17.3.5.3		11 Approved 3-9-87		12					
ENGINEER			VARIANCE Rule							
13 Harris Seidel, Ames			14 900-64.2(9)c							

15. DESCRIPTION OF VARIANCE REQUESTED: _____

The City of Ames is requesting that the mixing and aeration requirements stipulated in design standard IA 17.3.5.3 not be required for their digested sludge storage lagoon.

16. ENGINEERS JUSTIFICATION:

Final Plan Operational Mode (Holding Lagoon for Digested Sludge)

1) Mixing is unnecessary for proper and effective functioning of the unit.

2) Mixing would strip off gases and odors into the surrounding area

3) Consistent mixing would be difficult in the winter

4) Mixing equipment would have a very limited life

Interim Operational Mode (Holding Lagoon for TF Humus)

1) Solids will be highly stabilized prior to introduction

2) Mitigative measures can be taken if problems develop.

17. DEPARTMENTS JUSTIFICATION: The basin will be membrane lined.

1) Aerating anaerobic sludge might not be appropriate process technology

2) Solids will be stabilized prior to introduction into the lagoon thereby minimizing odors

3) There are no residential or commercial establishments in close proximity to the plant. Mixing can easily be added if found necessary.

4) The City of Ames is willing to take mitigative measures if objectionable odors occur

5) Provisions for removal of sludges has been considered.

6) The unit will be operated in a fill & draw mode

7) Sludge application requirements can be met with proper use of the unit in interim and final operations.

18. PRECEDENTS USED:

1. STAFF REVIEWER:

Terry Kinschenman

2. SUPERVISOR:

John M. Janssen

3. AUTHORIZED BY:

David McAllister 3/9/87

Additional Discussions :

Paragraph IA 17.3.5.3 of Iowa's design standards for Sludge Holding Lagoons states the following "Mixing and air requirements shall be in accordance with 17.3.4.3." Paragraph IA 17.3.4.3 states that "holding tanks shall be designed for mixing by satisfactory aeration equipment". Aeration rates and horsepower requirements also are found in IA 17.3.4.3.

The City of Ames is requesting that aeration of an anaerobic sludge holding lagoon not be required by the Department. It is proposed that stabilized sludge be directed to the holding lagoon to await land application. Schematically, upon completion of the project, the sludge will pass through primary digesters and a secondary digester and then flow to the sludge lagoon. Under interim

operations before the digesters are completed, trickling filter humus will be collected in the final clarifiers and directed to the lagoon (See 1/29/87 letter from Harris Seidel). Interim operations also will involve biological wastewater treatment and sludge handling at the existing plant site.

The proposal is probably acceptable within certain bounds. The environmental review for this project specifically indicated that "digested" sludge would be stored in the holding lagoon. Our standards require the capability for aeration and complete mixing of lagoon storage facilities.

Aeration provision requirements of $20 \text{ cfm} / 1000 \text{ ft}^3$ in paragraph IA 17.3.4.3 are essentially the same as Iowa design standard requirements for aerobic sludge digestion tanks. The environmental assessment for the project indicated that the lagoon

facility would be utilized for the storage of digested sludge solids. This will greatly reduce the potential problems from odors and vector attraction. Siting of the facility did take into account odor potentials of a treatment facility. The nearest homes are more than a $\frac{1}{2}$ mile away and also are west of the plant site. As designed, the operation should be relatively sanitary as the lagoon is lined with a 100 mil high density polyethylene liner, and water is readily available for washdown.

Complete Mixing of the sludge contents allows the sludge mixture to be or remain fully aerobic. However, in an anerobic sludge holding lagoon design mixing, if any, would only be necessary for removal of the contents. The

City has attempted to address any removal problems by providing 3 separate sludge drawoff locations. The bottom of the lagoon also has a slight slope to the drawoff area. In addition a perimeter road around the lagoon has been provided to also accomodate loading of the sludge vehicles. There also is equipment available at this time which can be lowered into a lagoon to allow pumping directly from the water surface. Removal of the lagoon contents should not be a problem - at least we have attempted to address it.

It should also be noted that the lagoon is intended to be operated on a fill and draw basis for limited use only during inclement weather when land application by injection of sludge is not practical. Its use would be

primarily during the winter when cold weather temperatures would tend to minimize any odors.

One Year Interim operations proposal

This proposal is discussed in some detail in Harris Seidel's January 29, 1987 letter to the Department.

It should be noted that since aerobic digestion equipment has not been proposed for this short term operational mode another means of treatment for pathogen reduction must be provided. Federal regulations require sludge to be treated by a process significantly reducing pathogens prior to land application of sludge wastes. A significant reduction in pathogens can be accomplished with long term detention as proposed. Harris mentions that a storage detention time of 447 days has been provided at interim operation outside loading rates for the new plant.

67
A lagoon system with these long detention times should be able to provide acceptable pathogen reductions

Vectors and odors appear to be addressed through aerobic stabilization by biological treatment. With both plants on line a significant amount of the volatile solids will be removed from the ^{wastewater} ~~the~~ existing treatment plant. Using all treatment units at the new site until the digesters are on line, will greatly reduce volatile solids. It may be desirable to require operational use of all biological units (if practical) until the digesters are on line. This would assure maximum stabilization.

The city under the interim operations proposal indicates that it is prepared to do whatever is necessary in taking remedial actions if necessary.

Recommended special conditions:

~~NO!~~ The City of Ames shall be responsible for mitigation of any objectionable odors resulting from operational use of the lagoon facilities.

The lagoon facilities shall not be utilized for final disposal of sludges.

Sludge handling and disposal practices shall be in accordance with 40 CFR Part 257 as well as Chapters 102, 120, and 130 of the Iowa Administrative Code.

TO: Terry K , Ames grant file

FROM: Wayne T.

DATE: 2/20/87

RE: Ames, Iowa . Sludge lagoon variance request.

In discussing the variance request with Darrell, he felt (and I agree) that it would first be important to confirm the justification for the lagoon in the first place. See Design Std 17.3.5

Did we cover this previously? It would (now at least) seem like it should have been addressed in the original concept phase.

The lagoon sounds better for interim operations than for the final plan. It doesn't take a variance to allow the lagoon but they must justify it. Why was it they need it? Is it grant eligible? How much storage do they have in digesters and how much do they need? Did we address these things earlier?

On the variance form - we haven't been explicit in instructions. Summarize succinctly so what's on the form tells the situation in a nutshell. The Engrs justification is OK as is but abbreviate the variance requested some and our justification

TO: Wayne Farrant

FROM: Terry Kinschenman

DATE: 2/24/87

RE: Justification for a Sludge Lagoon

The selection of a sludge lagoon stems from localized project constraints and minimum storage recommendations found in EPA publications.

Our standards, IA 17.3.4.2, recognize that sufficient sludge storage capacity shall be provided for periods of inclement weather and equipment failure. If possible, adequate detention should be provided to avoid sludge application on frozen or snow covered ground.

The Department does not have a definitive design value for sludge storage detention. However, a

publication by EPA indicates that approximately 120 days would be appropriate for central Iowa (See attachment, Environmental regulations and technology page 12).

In conjunction with their secondary digester and sludge storage lagoon Ames should have approximately 120 days of storage based on design assumptions. Approximately 180 days of storage will be available at initial loadings.

The storage requirement can be met by several methods. Some communities select a dewatering technology. Ames selected liquid handling of sludges because it was more cost-effective than dewatering. From a regulatory and practicality standpoint liquid handling of the sludge also appeared to be appropriate because of

the injection and/or incorporation constraints for the selected site. A significant area of the land at site 5 is in a 10 year flood plain. Area residents were concerned that Ames would surface apply without injection. Sufficient storage was another concern.

Several storage technologies were considered by the City of Ames. One option was a covered sludge storage tank similar in design to a secondary digester. There, however, was a significant cost associated with the covered tanks as opposed to an open lagoon system. The value engineering team suggested that a lagoon system be reconsidered as there appeared to be a savings of approximately 2 million dollars. The city then decided to proceed with the lagoon alternative.



CITY OF AMES, IOWA

50010

515-239-5150

August 7, 1986

Mr. Wayne Farrand
Iowa Dept. of Natural Resources
900 E. Grand, Wallace Building
Des Moines, IA 50319

SUBJECT: Ames WPC Project No. C190736

SPECIFIC SUBJECT: Request for Design Variance on Aeration in Sludge Storage Lagoon



RECEIVED
86 AUG 8 AM 10 02

Dear Mr. Farrand:

Section 17.3.5.3 of Chapter 17 of the Iowa Design Standards states that "Mixing and air requirements shall be in accordance with 17.3.4.3."

Section 17.3.4.3 deals with requirements for either diffused air or mechanical aeration systems for sludge holding tanks.

The aeration requirement for a sludge holding tank is understandable; perhaps the key word is "mixing".

For a storage lagoon, as included in the Ames WPC plant design,

- mixing is unnecessary for proper and effective functioning of the unit process;
- mixing would only serve to strip off gases and odors into the surrounding area;
- consistent performance of any type of mixing equipment in an open sludge lagoon in winter would be uncertain, if not impossible; and
- the useful life of such equipment, whether fixed or floating, would be very limited.

It is our best technical judgment that attempted aeration of an open sludge storage lagoon has no place in good practice and plant operation. We know of no such installation anywhere. In fact, it seems more likely that

Mr. Wayne Farrand
Page 2
August 7, 1986

Section 17.3.5.3 is an inadvertent insertion into an otherwise solid section. Therefore, we request variance and approval of the design of our sludge storage lagoon without an aeration system.

Yours very truly,

A handwritten signature in cursive script, reading "Harris F. Seidel". The signature is written in dark ink and is positioned above the printed name and title.

Harris F. Seidel, P.E.
Director
Water and Pollution Control

/bas
pc: Rieke Carroll Muller Associates



CITY OF AMES, IOWA

50010

515-239-5150

January 29, 1987

Mr. Terry Kirschenman
Iowa Department of Natural Resources
900 E. Grand, Wallace Building
Des Moines, IA 50319

SUBJECT: Ames WPC Project
Solids Handling Procedure during One-Year Interim Period

Dear Mr. Kirschenman:

As you know, the phased/segmented construction plan for the Ames WPC plant provides that the trickling filters and final clarifiers be operational early in 1985. However, the sludge digestion complex will not be completed until approximately one year later.

During this one-year interim period, the City proposes to pump all sludge to the sludge storage lagoon. The lagoon has an estimated sludge storage time of 447 days at the average plant loading anticipated during this period of interim operation in 1989-90.

Please note that the existing WPC plant near Highway 30 will continue in full operation during this interim period and can produce an effluent in the range of 40-50 mg/l of suspended solids. After this effluent has also undergone two-stage trickling filter treatment at the new plant, the solids content will be very low (anticipated 10-20 mg/l) and so highly stabilized that it will need no digestion in the normal sense of the word.

We are confident that we are not in conflict with the design standard statement that "Sludge lagoons shall not be substituted for adequate sludge digestion."

We are confident that we can operate successfully in this mode for the one-year interim period without odor or other environmental problems. We will observe this situation very closely and be ready to take remedial action if problems develop. This could be use of our sludge vehicles to haul decanted solids back to the present plant; use of the pumping capacity of the sludge vehicles to mix the lagoon; or installation of temporary floating aerators to move and aerate the lagoon contents.

Mr. Terry Kirschenman
Page 2
January 29, 1987

Finally, we express our regrets and apologies for not responding formally to you earlier with this technical justification. If any details need further discussion, we will be glad to meet with you at your convenience.

Yours very truly,

Haris F Saibel

Harris F. Seidel, P.E.
Director
Water and Pollution Control

/bas

pc: Steve Schainker, City Manager
Sam Claassen, Rieke Carroll Muller Associates, Inc.
Tom Neumann, Assistant Director, W&PC

WPC EX ISION
REVISED PHASING PLAN
AMES, IOWA
C190736

	Phase 1 FY85	Phase 2, Segment 1 FY86	Phase 2, Segment 2 FY87	Phase 2, Segment 3 FY88
<u>Major Components</u>	Interceptor Sewer Site Clearing Access Road/Culvert	Raw Pump Station TF Pump Station Control Building Auxiliary Power	(a) 1st Stage TF 2nd Stage TF Eq. Basins Sludge Lagoon Final Clar. Eff. Aeration SC (partial) Lab Equip. separate Water Well procurements Sludge Vehicles	(b) Solids Contact (complete) Digester Complex Gas Handling Grit Removal Primary Clarifiers
<u>Submit Plans and Specs</u>	--	--	Apr. 1, 1987	Apr. 1, 1987
<u>Advertise Date</u>	--	Oct. 17, 1986	Mar. 20, 1987	Nov. 30, 1987
<u>Bid Date</u>	--	Dec. 19, 1986	May 8, 1987	Jan. 20, 1988
<u>Contract Award</u>	Oct. 28, 1986	Mar. 17, 1987	June 15, 1987	Feb. 28, 1988
<u>Notice to Proceed</u>	Nov. 17, 1986	Mar. 31, 1987	June 30, 1987	Mar. 15, 1988
<u>Operational Status</u>	See Ph 2, Seg 2(a)	See Ph 2, Seg 2(a)	Feb. 28, 1989	Nov. 15, 1989
<u>Construction Complete</u>	Nov. 17, 1987	Jan. 15, 1989	June 30, 1989	Mar. 15, 1990
<u>Compliance w/Dis- charge Limits</u>	See Ph 2, Seg 2	See Ph 2, Seg 2	July 1, 1989	N.A.

Note: Interim treatment begins Feb. 15, 1989; compliance w/discharge standards by July 1, 1989

Jan. 19, 1987
Revised Jan. 29, 1987
Revised Feb. 13, 1987



Environmental Regulations and Technology

Use and Disposal of Municipal Wastewater Sludge



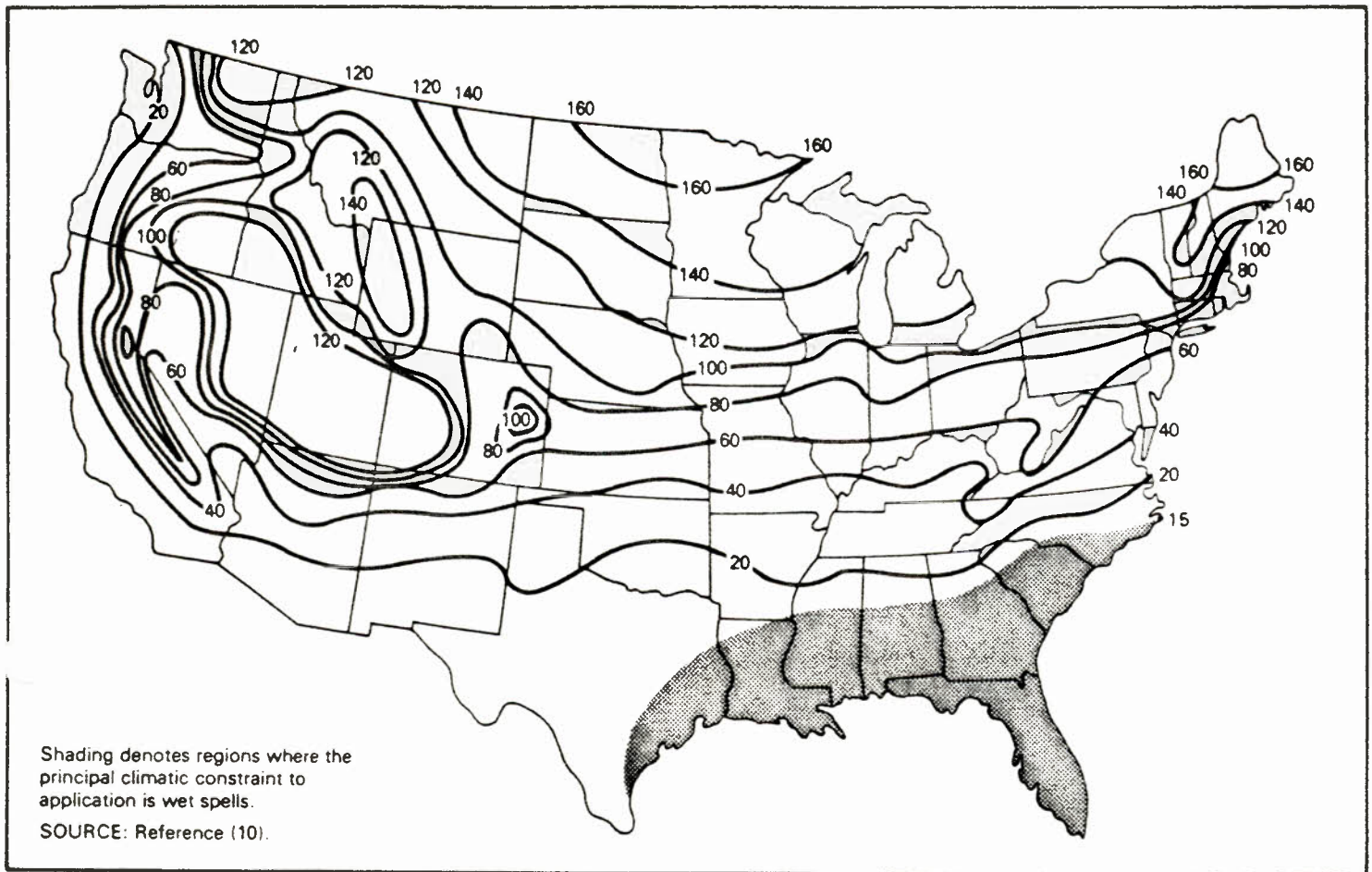


Figure 8. Estimated Number of Days that Sludge Storage is Required Based Solely on Climatic Factors (Temperature, Precipitation, and Snowcover)

3.2.4 Agricultural Use

Agricultural use of sludge is the most widely used of all land application methods. Sludges may be applied to a wide range of crops, including grains, animal feeds, and nonfood crops. Municipalities should retain enough control over the process to ensure that safe practices are followed in order to preclude adverse effects on the food chain.

Agricultural application does not usually require the municipality to purchase any land. The responsibilities of the farmer and the municipality can be laid out in a contract, which may cover liability for any damages, whether the farmer will pay for the sludge or be paid to take it, when the sludge may be applied, how much sludge can be applied, and under what conditions sludge application can be terminated by one of the parties to the contract. Figure 9 shows a sample contract. This was developed as part of an EPA demonstration project with the Ohio Farm Bureau. The contract can be adapted for local use by changing the costs, the application rate, and other terms.

Agricultural application is often extremely economical. In most cases the farmland to which the sludge is applied is kept on the tax rolls, in contrast to incineration, landfilling, and dedicated land disposal, where the municipality usually owns the land. Farmers participating in land application may save money by reducing their dependence on expensive chemical fertilizers. In some regions of the country the water added to the soil during sludge application is also a valuable resource.

Soil Conservation Service officials and the county agricultural extension agent are usually a municipality's prime contact with local farmers. These officials are familiar with the opportunities presented by sludge use and the operational needs and concerns of local farmers, and can assist in designing and implementing a land application program. Local farm bureaus may also assist. Such contacts are usually essential to generate farmer support for an agricultural application program.



FERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

LARRY J. WILSON, DIRECTOR

March 9, 1987

Mr. Steve Schainker
City Manager
City Hall
Ames, IA 50010

ATTENTION: Honorable Mayor & Council

SUBJECT: Phase 2, Segment 2
Ames, Iowa
C190736 04

Dear Mr. Schainker:

The Iowa Department of Natural Resources in accordance with Subrule 567-64.2(9)c of the Iowa Administrative Code has approved Dr. Harris Seidel's August 7, 1986 request for a variance from Iowa Wastewater Facilities Design Standard 17.3.5.3 which requires mixing and aeration of a sludge storage lagoon in accordance with 17.3.4.3. Based on the information presented, the purpose and intent of the rule can be met with appropriate sludge handling practices.

Sincerely,

DARRELL McALLISTER
BUREAU CHIEF
SURFACE & GROUNDWATER PROTECTION BUREAU

(now Water Quality Bureau)

DM:mla/EPW068F12.01

cc: Harris Seidel, Ames
Rieke, Carroll, Muller Associates, Hopkins, Minnesota
Field Office 5