Fields of Opportunities

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR
KIM REYNOLDS, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
CHUCK GIPP, DIRECTOR

July 8, 2016

OSI Group, LLC
Attn: Aaron Gordon
21876 N. Highway 59
Oakland, IA 51560

RE: OSI Group Biosolids Storage
IDNR Project No. S2014-0246

Subject: Variance Request from Design Standards Section 17.3.4.3.b

Dear Mr. Gordon:

After careful and thorough consideration, the Department has ***approved*** your June 13, 2016 request for a variance from Section 17.3.4.3(b) of the Iowa Wastewater Facilities Design Standards which requires a minimum of 1.0 horsepower per 1,000 ft^3 of tank (lagoon) volume for mechanical mixing for sludge holding facilities. Based on the documentation presented by your Engineer, it is the determination of this Department that satisfactory justification has been presented to warrant the granting of a variance for use of mixing equipment providing 0.63 horsepower per 1,000 ft^3. The requested variance is deemed to be reasonable and necessary pursuant to the Iowa Code section 455B.181.

The variance is approved subject to the following conditions:

- Final disposal of industrial sludge must be done in accordance with IAC 567 Chapter 121.
- The applicant, or any third party contractor, is required to contact the Solid Waste Section of the Iowa Department of Natural Resources to obtain any necessary approvals and/or permits.

The facts presented for the project present unique circumstances and the approved variance is therefore justified to provide the narrowest exception possible to the provisions of the rules in accordance with Rule 561 IAC 10.5. Since the project planning and construction may last more than one year, the variance is considered to be of a permanent nature. The validity of this variance approval shall last for a period of one year from the date of the construction permit in accordance with Rule 561 IAC 10.5.

This decision is based on our review of justification presented to support the request. Our concurrence with the request is based on the Department's finding that the resulting project will provide substantially equivalent effectiveness as would be provided by technical compliance with the design standard on this issue.

If you have any questions, please call Mark Valmore at 515-725-8433.

Sincerely,

Jon Tack
Water Quality Bureau Chief

cc: Chris Pederson, P.E., Snyder & Associates (Ankeny)
IDNR Field Office #4
IDNR Sewage File # 6-78-56-1-00

VARIANCE REQUEST
Iowa Department of Natural Resources

1.	Date:	July 6, 2016	14a.	Decision:	Approved
2.	Reviewer/Engr.:	Mark Valmore		Date:	7/13/16
				Expiration Date	
3.	Date Received:	July 1, 2016	14b.	(if any):	
4.	Facility Name:	Oakland Foods L.L.C.			
5.	Facility Number:	6-78-56-1-00			
6.	County Number:	78	15.	Appealed:	
7.	Program Area:	CP (Wastewater)		Date:	
8.	Facility Type:	C09 (Sludge Handling)			
9.	Subject Area:	366 (Sludge Holding Tank-Aeration			
10.	Rule Reference:	567-64.2(9)a			
11.	Design Std. Ref.:	17.3.4.3(b)			
12.	Consulting Engr.:	Snyder & Associates, Inc.			
13.	Variance Rule:	567-64.2(9)c			

16. Description of Variance Request:
OSI Group (Oakland Foods) is requesting a variance from Section 17.3.4.3(b) of the Iowa Wastewater Facilities Design Standards to install aeration equipment with a lower amount of total mechanical aeration horsepower than required.

17. Applicant's/Consulting Engineer's Justification:
- The facility is isolated from residential and commercial structures in excess of 1,200 feet, and odors will likely dissipate prior to reaching nearby residents.
- Aeration requirements will be decreased given only secondary biosolids are sent to the biosolids basin. Primary solids will settle out in the anaerobic lagoons.
- Per calculations 314 HP is needed to satisfy oxygen requirements, and 400 HP for mixing requirements. A total of 420 HP is proposed for both basins.
- The aerators will turn the contents of the biosolids basin over approximately every 11 minutes when the basin is full, ensuring that there is frequent turnover of contents and mixing.

18. Department's Justification:
Recommend variance **approval**.
10 States Standards does not specify minimum horsepower requirements for mechanical mixing, only that the impellers shall be designed to minimize fouling with debris in the sludge.
The biomass contained in secondary sludge is mainly inert, as opposed to primary sludge, therefore reducing the potential for strong odors; additionally, the site's location is isolated from other inhabitable structures.
The sludge is generated at an industrial facility and not subject to 40 CFR 503 regulations; all requirements pertaining to (sewage) biosolids stabilization may not necessarily apply. Although the applicant uses the term "biosolids" throughout, sludge (industrial waste) is the correct term, and disposal is governed by solid waste rules.
The proposed equipment provides for substantially equivalent effectiveness given that numerous variances have been granted to allow less energy than required by the standards without any adverse effects. The proposed aerators will provide 0.67 hp/1000 cu. ft, which is more than the majority of previously approved variances as well.

19. Precedents Used:
City of Ames-July 7, 2014
City of Garner-October 28, 2013*
City of Riverside-January 25, 2006*
LeMars-November 3, 2003
City of Walford-June 25, 2003*
18 additional variances prior to 2003 have been approved. Similar conditioned projects (uncovered lagoons providing aerobic mixing/digestion are denoted by "*".

20. Staff Reviewer:	Mark Valmore	Date:	07.08.2016
21. Supervisor:	Satya Chennupati	Date:	7/13/16
22. Authorized by:		Date:	7/13/16

2016-0230A

ENGINEERS & PLANNERS
SNYDER & ASSOCIATES, INC.
IOWA | MISSOURI | NEBRASKA | SOUTH DAKOTA | WISCONSIN

June 13, 2016

Satya Chennupati, Wastewater Section Supervisor
Iowa Department of Natural Resources
Wallace State Office Building
502 E. 9th Street
Des Moines, IA 50319-0034

RE: OSI GROUP WWTP BIOSOLIDS STORAGE
PETITION FOR VARIANCE REQUEST

Dear Mr. Chennupati:

Attached is a petition for variance from the IDNR Wastewater Facilities Design Standards to utilize a smaller amount of mechanical aerators in the biosolids basins for the OSI Biosolids Storage project. Please review and file accordingly. We are submitting this request for a variance based on previous correspondence regarding the aeration design with Mark Valmore of IDNR. As detailed in the "Guidance for petitioners when preparing a Variance Request from rules and regulations for wastewater construction projects," the following information is required to be provided in the petition when applicable and known to the petitioner.

1.) *The name, address, and telephone number of the entity or person for whom a waiver or variance is requested:*

OSI Group, LLC
21876 N. Highway 59
Oakland, IA 51560
Phone: 712-566-1300
Attn: Mr. Aaron Gordon

2.) *A description and citation of the specific rule from which a waiver or variance is requested.*

A variance is requested from Section 17.3.4.3(b) – Mixing and Air Requirements – Mechanical Aeration Systems, of the Iowa Wastewater Facilities Design Standards, Chapter 17, Sludge Handling and Disposal. Section 17.3.4.3(b) requires "If mechanical aerators are utilized, a minimum of 1.0 horsepower per 1000 ft^3 shall be provided."

3.) *The specific waiver or variance requested, including the precise scope and operative period that the waiver or variance will extend.*

A variance is requested for the installation of a lower amount of total mechanical aeration horsepower than required. The total volume of each of the two biosolids basins is 5.0 million gallons (668,400 ft^3). To meet the requirements of Section 17.3.4.3(b), a total of

2727 SW Snyder Boulevard | P.O. Box 1159 | Ankeny, IA 50023-0974
p: 515.964.2020 | f: 515.964.7938 | www.snyder-associates.com

669 horsepower of mechanical aeration would be needed for each basin. A total of 210 horsepower of mechanical aeration is proposed for each basin. The proposed layout of the aerators is as shown on the plan sheets as part of the above referenced project. The variance would extend through the usable operational life of the OSI wastewater treatment facility.

4.) *The relevant facts that the petitioner believes would justify a waiver of variance. The factual statement is to include a signed statement from the petitioner attesting to the accuracy of the facts provided in the petition and a statement of reasons that the petitioner believes will justify a waiver of variance.*

There are no major residential or commercial structures in close proximity to the wastewater facility. The wastewater facility meets the minimum separation distance criteria, with the closest residence being approximately 1,250 feet to the north. If there are odors, they will dissipate before reaching nearby residents.

Aeration requirements will be decreased given that only secondary biosolids will be sent to the biosolids basins, and aerobic treatment via the SBR unit will precede the biosolids basins. Primary biosolids will settle out in the existing anaerobic lagoons which precede the SBR unit.

Aeration system sizing calculations were completed by the aeration system manufacturer, which are attached. These calculations show a total of 314 horsepower is needed to satisfy oxygen requirements. The calculations also show a total of 400 horsepower is needed to satisfy mixing requirements. As recommended by the aeration system manufacturer, a total of 420 horsepower of mechanical aeration is proposed (total of both basins).

As stated in the aeration system manufacturer design documentation, the aerators in each basin will turn the contents of the sludge basin over approximately every 11 minutes when the basin is full. It was also stated that much of the mixing energy is directed downward into the basin to ensure complete mixing and frequent turnover of the basin contents.

Installing the proposed aerators would be more cost effective, would decrease operational costs, may decrease energy usage, and would have equivalent reliability compared to an aeration system with more aerators or larger aerators.

A search of the variance database results in numerous various approved variances allowing use of aeration systems with lower mixing and/or aeration intensities than those required by Chapter 17 of the Iowa Wastewater Facilities Design Standards.

I attest to the accuracy of the facts provided in this petition:

Darin Jacobs, PE
Project Manager

5.) *The history of prior contacts between the Department and the petitioner for the last five years. The history must include a description of each affected permit held by the petitioner and any notices of violation, administrative orders, contested case proceedings, and lawsuits involving the Department of the petitioner.*

No variances have been requested from the Environmental Protection Commission by OSI Group within the last five years. There have been no notices of violation, administrative orders, contested case proceedings, or lawsuits involving the Department of the petitioner within the last five years known to the petitioner.

6.) *Any information known to the petitioner regarding the Department's treatment of similar cases.*

A search of the variance database results in numerous various approved variances allowing use of aeration systems with lower mixing and/or aeration intensities than those required by Chapter 17 of the Iowa Wastewater Facilities Design Standards.

7.) *The name, address, and telephone number of any public agency or political subdivision of the state or federal government which also regulates the activity in question, or might be affected by the granting of a waiver or variance.*

None known to the petitioner.

8.) *The name, address, and telephone number of any person or entity that would be adversely affected by the granting of the petition.*

None known to the petitioner.

9.) *The identity of those having knowledge of relevant facts concerning the variance.*

Aaron Gordon, OSI Group, LLC
Darin Jacobs, PE & Christoffer Pedersen, PE, Snyder & Associates, Inc.

10.) *Signed releases authorizing persons with factual knowledge concerning the request to furnish the Department with information relevant to the waiver or variance.*

Please consider our signatures below as the signed release.

11.) *The petitioner is required to serve notice of the pending petition and a concise summary of its contents upon all persons to whom notice is required by any provision of law by certified mail within thirty days of submission of the petition. The petitioner is required to provide a written statement to the Department attesting that the required notice has been provided. Please send this written statement to the attention of the Department's Wastewater Engineering Section review engineer or project manager.*

To the best of our knowledge, no notices are required for this variance request.

I trust that you will find this petition for the variance requests in order. Please call me at 515-964-2020 should you have any questions or require any additional information.

Sincerely,

SNYDER & ASSOCIATES, INC.

Darin Jacobs, PE
Project Manager

OSI GROUP, LLC

Aaron Gordon
Plant Engineer

cc: Mark Valmore, P.E. – IDNR

S&N AIROFLO *Design Recommendation*

For: **Date: February 4, 2016**

Aerobic Sludge Basin Design

??? WWTP
Location Unknown

Prepared By:

S&N Airoflo
1011 Sycamore Avenue
Greenwood, MS 38930
877.247.6356 – Toll Free
662.453.0797 – Fax

Design Evaluation for
Aerobic Sludge Basin Aeration
Unknown WWTP
Location Unknown

Introduction:

Waste sludge is pumped from an SBR process into two aerobic sludge basins. The volume of each sludge basin is **5.0** million gallons (mil gal). The sludge basins need oxygen for digestion and a way to provide mixing of the biological solids. The WWTP management would like to consider the use of an S&N AIROFLO horizontal rotor aerator.

S&N AIROFLO aerators, as applied in this situation, will provide oxygen for the decomposing sludge, eliminating low DO problems and improving aesthetic conditions at the site. S&N AIROFLO aerators are extremely efficient in transferring oxygen to wastewater and are, therefore, more cost-effective than other types of aerators. It should be noted that the S&N AIROFLO aerators can provide the necessary DO levels to keep the digester aerobic throughout its depth. Thus, oxygen levels will improve and sludge digestion will be enhanced.

Sludge Characteristics:

Raw waste sludge typically consists of relatively biodegradable organic solids that are inoffensive when fresh, but it quickly turns septic because of biological activity. Under aerobic conditions, the biomass in the waste sludge will be converted to carbon dioxide, water, ammonia-N, nitrate-N and other end products.

S&N AIROFLO Provisions:

1. S&N aerators will provide additional dissolved oxygen levels and enhanced mixing in the sludge basins in order to increase DO levels and reduce odor problems associated with aerobic sludge digestion. Higher DO levels should keep the basin in an aerobic condition, thereby substantially improving site aesthetics.

2. S&N aerators will provide mixing in the sludge basin to disperse oxygen throughout its depth. The 30-hp S&N Airoflo aerator has a pumping capacity of 63,000 gpm and can transfer approximately 69 lb/hr of oxygen to the sludge basin contents at field conditions.

Aeration Requirements for the Sludge Basins:

Design of S&N Airoflo Aerators:

1. Check oxygen required for aerobic sludge digestion:

Provide 2.3 lb of oxygen per lb of volatile solids destroyed for aerobic digestion.

Based on Dr. Moore's estimates, the oxygen requirements are:

Assume raw waste sludge flow rate = 0.25 mgd

Assume VSS concentration is 8000 mg/L

VSS destroyed = 45%

O_2 required = 2.3 x 8000 mg/L x 0.25 mgd x 8.34 x 0.45

= 17,260 lb/day

Total O_2 requirement = 17,260 lb/day (total for both basins)

S&N aerator hp needed for oxygen transfer = 17,260 lb/day ÷ 55 lb/(hp-day) = 314 hp

2. Check aerator requirements for mixing and oxygen dispersion:

Total volume in each aerobic sludge basin ≈ **5.0 mil gal**

Minimum aerator requirements for adequate mixing and O_2 dispersion = 40 hp/mil gal (S&N aerators have been used in aerobic digesters at mixing intensities as low as 40 hp/mil gal with excellent results; see "Aeration Innovation," L.W. Moore & C. Van Zandt, Water Environment & Technology, Volume 19, No. 3, March 2007, pp. 58-62)

40 hp/mil gal x **5.0** mil gal = **200** hp (each basin)

Total hp proposed = **400** hp

Mixing requirements control the design.

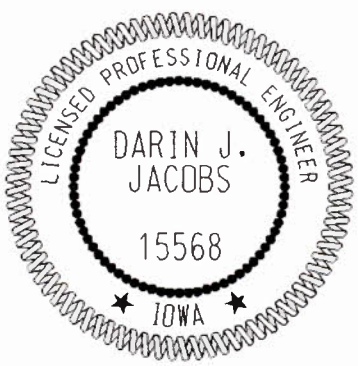
Seven 30-hp S&N aerators will be used to provide adequate mixing, excellent oxygen dispersion, and improved DO levels in each aerobic sludge basin.

With a pumping capacity of 63,000 gpm per aerator, the **seven** 30-hp S&N aerators in each basin will turn the contents of the sludge basin over approximately every 11 minutes when the basin is full. Because of the unique design of the S&N aerator, it will draw water from deep below the aerator and pump the water against the sides of the sludge basin. While some energy will be dissipated upon contact with the basin, much of it will be directed downward into the basin to ensure complete mixing and frequent turnover of the basin contents.

If anoxic conditions are desired for short durations, the aerator can be turned off for short periods to promote anoxic metabolism. During anoxic conditions, nitrate-N produced previously (under aerobic conditions by nitrifying bacteria) will be converted to nitrogen gas. This will generate about 3.5 pounds of alkalinity for every pound of nitrate-N converted to nitrogen gas. This will help keep the digester pH in the range of 6.5 to 8.5 by offsetting the loss of alkalinity caused by nitrification reactions. Anoxic metabolism will begin when the DO levels decrease to about 0.3 mg/L.

Recommendation: install seven 30-hp S&N aerators in each sludge basin and operate them 24 hours per day or as needed to keep the basin aerobic throughout its volume. The aerators can be turned off as needed to achieve anoxic conditions for short periods.

The total aeration requirement for this design is fourteen (14) 30-hp S&N aerators.



I hereby certify that this Engineering Document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the Laws of the State of Iowa.

6/29/16

Darin J. Jacobs, P.E. Date

License Number 15568

My License Renewal Date is December 31, 2016

OSI Group WWTP Biosolids Storage – Petition for Variance Request

Prepared by:

SNYDER & ASSOCIATES, INC.
2727 SW Snyder Blvd.
Ankeny, Iowa 50023
(515) 964-2020