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City of Osage planned denitrification testing

1 message

Tom Madden <tmadden@sehinc.com> Tue, Sep 26, 2023 at 4:52 PM
To: "Kumar, Suresh" <Suresh.Kumar@dnr.iowa.gov>, Sheila Bly <sheila.bly@dnr.iowa.gov>
Cc: "BrockWaters@osage.net" <brockwaters@osage.net>, "Lynch, Brian" <Brian.Lynch@valentbiosciences.com>, "Svoboda, David" <David.Svoboda@valentbiosciences.com>

Good afternoon Suresh!

Hope you have had a great summer.

We had a meeting today between the City of Osage, IDNR and Valent regarding the progress and status of nitrogen reduction. During that meeting we discussed a denitrification testing protocol I would like to try out at the City's WWTF. The attached correspondence provides some background information as well as how we plan to proceed with this testing.

The proposed testing will result in the pretreatment plant violating their treatment agreement discharge limits, but the overall load to the City WWTF will still be below the design capacity. Sheila thought it a good idea to provide the attached letter to the Department and include you as well.

If you have any questions regarding the attached, please feel free to reach out.

Thanks much!

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IDNR Denitrification Testing Protocol September 26 2023.pdf
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September 26, 2023

RE: Denitrification Testing Protocol
Osage, Iowa

Suresh Kumar
IDNR Wastewater Section
Wallace State Office Building
502 East 9th Street
Des Moines, IA 50319

Dear Mr. Kumar:

As you may recall, last year the City of Osage and Valent BioSciences (Valent) performed denitrification testing at the City's wastewater treatment facility (WWTF) with the addition of carbon using Micro-C. While the testing did show an increase in denitrification, the results did not seem to be as hoped. In addition, the additional operational costs associated with the addition a commercial carbon source were not favorable.

The purpose of performing the denitrification testing was to show that the City's WWTF was capable of properly treating an influent nitrogen loading that is exceeds the design values associated with the WWTF. The current discharge from the Mitchell County Pretreatment Facility exceeds the treatment agreement limitations for nitrogen, resulting in a WWTF influent that exceeds the nitrogen design value. Valent has also reviewed a significant number of alternatives for reduction of nitrogen both prior to and as part of pretreatment and continue to do so.

During the months of May through July the digester at the pretreatment facility became upset, sending higher strength (BOD) wastewater to the City's WWTF. During this period of higher strength WWTF influent, the denitrification performance increased markedly. Review of the MOR data shows that denitrification was effective in reducing total nitrogen by as much as 77% during this period. It is obvious from this data that the increase BOD provided the additional carbon needed for the bacteria in the anoxic tanks to denitrify at a much higher level. The digester has since been operating normally which has resulted in a significant decrease in denitrification due to reduced BOD loading at the WWTF.

Based on the positive results of the increased BOD loading to the WWTF, I am proposing to perform a controlled study whereby higher strength wastewater is discharged from the pretreatment facility to determine denitrification ability. Since it is impractical to operate the digestor at reduced efficiency, I am proposing that the testing be performed with pretreatment plant influent water. There are 2 sources of higher strength pretreatment plant influent that would be practical to use; raw wastewater that has passed through the first solids removal process (dissolved air floatation) at the pretreatment plant and discharge from centrifuges within Valent prior to any treatment at the pretreatment plant. Both sources will be investigated as part of this process.

During this testing process, the discharge from the pretreatment plant will exceed the treatment agreement limits for BOD in addition to the current exceedance for nitrogen. Since the raw water quality prior to pretreatment differs from the digester discharge, the program will consist of a controlled ramping up of wastewater strength and monitoring of the WWTF system.

Specifically, the following is proposed:

October 2 – add approximately an additional 150 lbs of BOD to the pretreatment plant discharge

October 9 – add an additional 150 lbs (300 lbs total) of BOD to the pretreatment plant discharge

October 16 – add an additional 150 lbs (450 lbs total) of BOD to the pretreatment plant discharge

October 23 – add an additional 150 lbs (600 lbs total) to the pretreatment plant discharge

The above proposed process will allow the WWTF to acclimate to the change in influent water quality as well as allowing the operator to ascertain if there are any negative impacts to the system and adjust biomass concentrations as necessary. It is our intention to run this investigation for 4 to 6 months through the winter to evaluate the impact on denitrification. We are limiting the testing to 600 lbs of additional BOD as the City is currently only operating 2 of 3 oxidation ditches due to low organic loads and low flows. The proposed additional load will keep the overall WWTF BOD load within the design capacity of 2 oxidation ditches.

The purpose of this correspondence is to provide you with the above information and intentions as well as to notify the Department of the progress being made. This information was shared today with Sheila Bly of IDNR Field Office 2 during a meeting with the City of Osage, Valent and the IDNR. It was a recommendation of the meeting to provide this information and our proposed plans to you for review. At the termination of the testing, I will be preparing a summary of the results which will be forwarded to the Department as well.

I would like to thank you for your time and assistance with this project. Please feel free to reach out with any questions you may have.

Sincerely,

SHORT ELLIOTT HENDRICKSON INC.

Thomas K. Madden, PE
Project Engineer
(Lic. IA, MN)

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