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Memorandum

To: Ben Hucka, Iowa DNR NPDES Section
Julie Faas, Iowa DNR NPDES Section
Sheila Bly, Iowa DNR Field Office 2

Date: August 26, 2025

From: Brock Waters, City of Osage
Daniel Shirley, Valent BioSciences

CC: Tom Madden, PE, SEH, Inc.
Darin Jacobs, PE, Snyder & Associates, Inc.

RE: Osage-Valent Carbon Supplement Test, Schedule Modification Request

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On behalf of the City of Osage and Valent BioSciences we present this performance update related to wastewater treatment at the Mitchell County Pretreatment Facility and the City Wastewater Treatment Plant. The City owned wastewater treatment plant is performing well and is meeting permit effluent limits for BOD, ammonia nitrogen and total nitrogen.

The City of Osage operates under Iowa DNR NPDES number 666301 and discharges into Sugar Creek.

Valent BioSciences, LLC operates the Mitchell County Pretreatment Facility to provide wastewater pretreatment prior to discharge to the City of Osage through the gravity sewer system.

The City of Osage filed a Nutrient Reduction Strategy (NRS) in June of 2021. The NRS was approved in August of 2021. Generally, the NRS determined the treatment plant would not consistently meet the goal of the NRS for Total Nitrogen due to being carbon limited (BOD limited). The NRS recommended the addition of a carbon source to be paced in accordance with the influent BOD (COD).

According to the preliminary schedule, design of the improvements was anticipated for April through June of 2022. Construction of permanent improvements was anticipated for summer 2023 with final compliance scheduled for November 2023. The NRS is in the process of being updated to include a recent watershed nutrient reduction program.

The City of Osage and Valent BioSciences have been working closely and cooperatively for more than a year to optimize operation of the City owned wastewater treatment facility utilizing BOD as a carbon source from the Mitchell County Pretreatment Facility which is operated by Valent BioSciences. The process has worked very well with the City treatment facility consistently meeting NPDES requirements and Nutrient Reduction Strategy goals.

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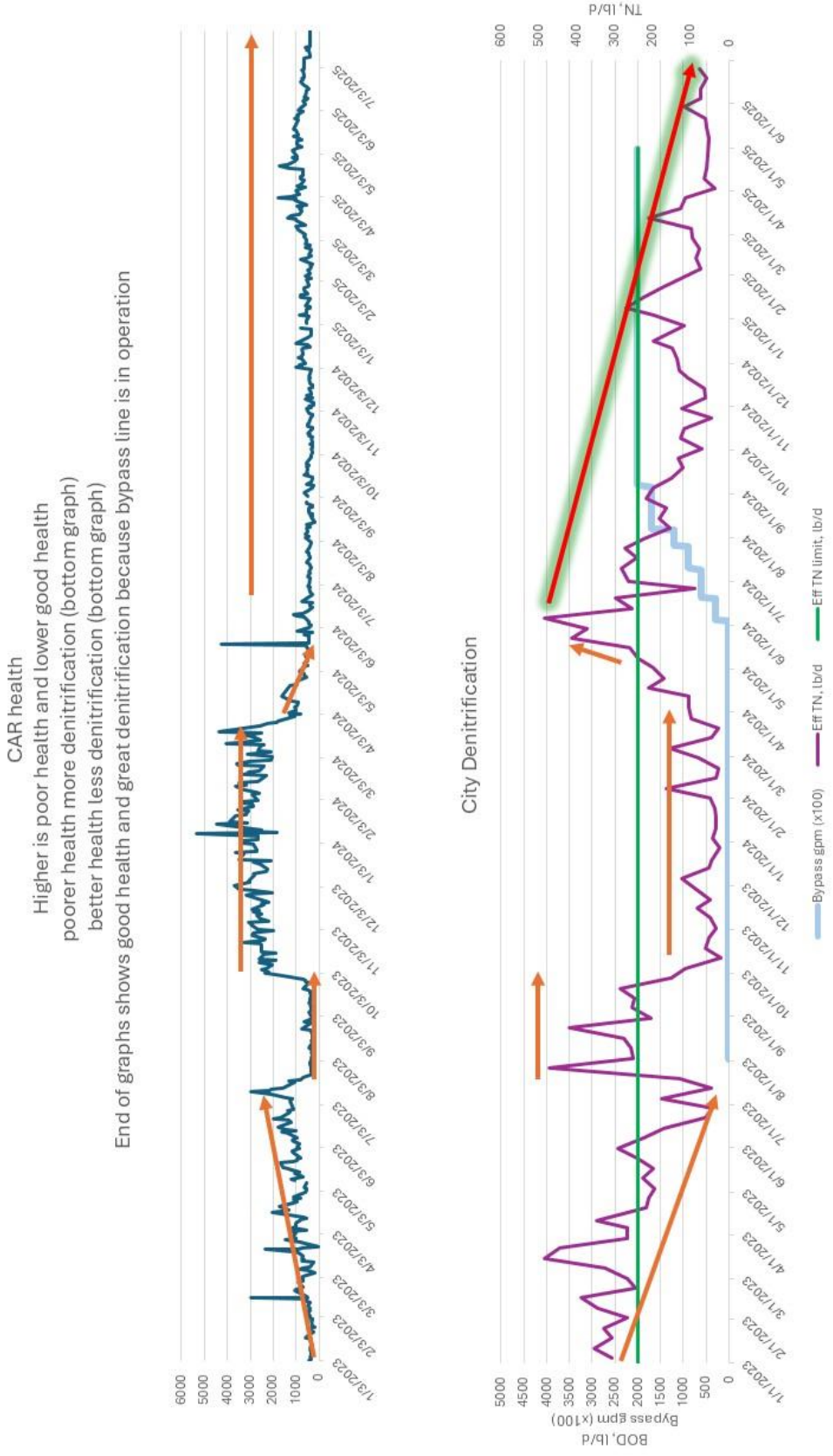

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The unfortunate reality is that the City treatment facility may have the ability to treat the loads but mathematically the Valent SIU is being exceeded. Currently, the treatment plant has been able to properly treat loads that periodically exceed the design capacity of the WWTF, providing some empirical evidence of capacity and performance. If the BOD flow is reduced, nutrient reduction performance will likely be correspondingly reduced. As an alternative, synthetic BOD can be added to the City treatment plant as recommended in the Facility Plan, but this seems to be an added expense with less sustainability. Previously, the use of synthetic carbon was tested. The process worked, but not as effectively as utilizing the "free" BOD from the pretreatment facility. Reuse of the existing BOD seems to meet our common goal of sustainability and effective treatment. In addition, the synthetic carbon supplement can be added without mathematically adding to the overall treatment plant load while the pretreatment facility BOD will count for loading despite providing a very similar endpoint.

It is also understood the loading to the City also includes significant Total Kjeldahl Nitrogen (TKN). The Valent team has been, and continues to be, working toward reduction of TKN. This is a more difficult goal than is immediately apparent.

Valent BioSciences has concentrated on activities within the production plant and pretreatment facility to meet upcoming limits and to assist the City with compliance with nutrient reduction goals and NPDES requirements. As discussed in the past, Valent continues to actively search for source reduction opportunities and treatment options. Source reduction is a particularly important concept to the overall sustainability goals of the company. Many of the technologies under consideration are intended to reduce total nitrogen at effluent from the pretreatment facility. A number of initiatives have been implemented with the following improvements highlighting the list.

- MBBR wastewater treatment pilot system-unsuccessful for nitrogen reduction
- Gross-Wen Technologies Revolving Algal Biofilm (RAB) wastewater treatment pilot system-unsuccessful for nitrogen reduction
- Methanol (synthetic carbon) addition to existing pretreatment facility-unsuccessful at improving performance
- Sampled production plant to understand individual waste streams to best manage nitrogen loading and application for treatment
- Installed a recovery line to send concentrated ammonia directly to biosolids tanks
- Planning recovery of another concentrated waste stream for application directly to biosolids tanks
- Currently studying membrane filtration of concentrated waste streams to reduce, redirect, or eliminate nitrogen
- Continue researching alternatives with benefits such as water reuse
- Planning purchase of Ceramic Microfilter (CMF) prefilter/Reverse Osmosis (RO) filtration train-planning to test this process to determine effectiveness
- Evaluate concentrate from the proposed membrane filter tests for direct application to the biosolids tanks

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- Tested nanofiltration technology for nitrogen reduction-limited efficacy, less than 40% removal
- Piloted Reverse Osmosis technology for nitrogen reduction-successful at nitrogen removal but appears to result in excessive maintenance efforts and operating cost
- Piloted Hyperion Ammonia Recovery System-successful at nitrogen removal but least desirable due to very high operating cost and effort

All involved have been working diligently to meet the past and current compliance dates described and fully understand the importance of doing so wherever possible. Valent BioSciences has worked to develop opportunities at the pretreatment facility while coordinating closely with the City to optimize operations at the City owned treatment plant.

To address loading issues, the team, as well as DNR staff, have met regularly to develop a strategy to provide a mathematical solution. At this point, doing so has not been possible.

During recent discussions, it was determined that four primary methods are available to resolve the condition:

1. Rerate the City treatment plant by working with the manufacturer to provide a detailed assessment of treatment capacity.
2. Reconsider the mathematical loading provided by the BOD when compared to providing synthetic carbon.
3. Reallocate available and unused TKN and BOD capacity at the City treatment plant.
4. If needed, plan for construction to manage the loads, whether at the Mitchell County facility or the City owned treatment plant. If required, a construction schedule would be developed as a part of the planning process.

Evaluation of the rating of the City treatment plant will be undertaken. Working with the original manufacturer, the process will include detailed evaluation and may include advanced system modelling, system modification, and possibly system upgrades to compare with the empirical proof of the plant easily treating current flows and loads. This process will require substantial efforts with a completion date projected to be approximately March 1, 2026.

Work will be undertaken cooperatively with Iowa DNR to determine if a method can be developed to accept additional BOD as a supplement in the same fashion as adding synthetic carbon where the addition is not counted against treatment plant influent load.

The City has allocated treatment plant loading to several businesses, many of which are allocated far more load than is normally received. The team will be discussing possible reserved load reductions which could then be incorporated and added into the Valent pretreatment SIU. Several SIU permit holders have substantial reserved capacity which is seldom, if ever used. One large industrial holder of capacity has unfortunately announced its closure which should make reallocation to Valent relatively simple. This closure was unexpected, and calculations have not been completed at this time. Reallocation discussions are underway with several SIUs with an undefined completion date.

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If it is determined that construction is required, developing a strategy and the required Facility Plan will require substantial effort and time. Should it be determined that improvements are required, the construction schedule will be discussed in the Facility Plan. Preparation of a Facility Plan and its related work could be completed by **30 September 2027**, with DNR review expected be completed by **31 December 2027** at which time detailed design could commence.

To continue this work, the City of Osage and Valent BioSciences are hereby requesting an extension to the compliance schedules held by each entity as follows:

Continue testing of carbon for nutrient reduction from Mitchell County pretreatment facility:	**Ongoing**
Reallocate unused SIU capacity:	**30 September 2026**
Work with DNR staff to develop math for carbon supplements, natural or synthetic:	**30 September 2026**
Recalculate rating of existing City Treatment Plant:	**15 October 2026**
Valent to construct additional sludge storage capacity:	**31 October 2026**

Other work activities and schedules will be identified as this process continues.

As always, the City and Valent wastewater team will work closely with each other and the Iowa DNR.

Respectfully submitted

Signed by: Brock Waters August 29, 2025 | 2:41:52 PM PDT
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Signed by: Daniel Shirley August 28, 2025 | 12:18:55 PM PDT
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Director of Public Works
City of Osage

Valent BioSciences